2646 - CID510201B_James City County_CFPF

Application Details

Funding Opportunity:	2335-Virginia Community Flood Preparedness Fund - Capacity Building/Planning Grants - CY24 Round 5
Funding Opportunity Due Date:	Mar 28, 2025 11:59 PM
Program Area:	Virginia Community Flood Preparedness Fund
Status:	Under Review
Stage:	Final Application
Initial Submit Date:	Jan 23, 2025 4:11 PM
Initially Submitted By:	Tammy Rosario
Last Submit Date:	
Last Submitted By:	

Contact Information

Primary Contact Information

Active User*:	Yes
Type:	External User
Name*:	Mrs. (Salutation) Tammy (First Name) Ann (Middle Name) Rosario (Last Name)
Title:	Assistant Director of Community Development
Email*:	tammy.rosario@jamescitycountyva.gov
Address*:	James City County Community Development PO Box 8784 Williamsburg (City) Virginia (State/Province) 23187-8784 (Postal Code/Zip)
Phone*:	(757) 253-6688 Ext. Phone ###-###-####
Fax:	###-###-####
Comments:	

Organization Information

Status*:	Approved
Name*:	James City County
Organization Type*:	County Government
Tax ID*:	543001365
Unique Entity Identifier (UEI)*:	XKY1BRD1MK11
Organization Website:	https://www.jamescitycountyva.gov/

Address*: PO Box 8784

Williamsburg (City) Virginia (State/Province) 23187-8784 (Postal Code/Zip)

Phone*: 757-253-6688 Ext.
###-###-####

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

Benefactor:

Vendor ID:

Comments:

VCFPF Applicant Information

Project Description

Name of Local Government*: James City County

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

NFIP/DCR Community Identification Number (CID)*: 510201

If a state or federally recognized Indian tribe,

Name of Tribe:

Authorized Individual*: Tammy (First Name) Rosario (Last Name)

Mailing Address*: PO Box 8784
Address Line 1

Address Line 2

Willamsburg (City) Virginia (State) 23187-8784 (Zip Code)

Telephone Number*: 757-253-6688

Cell Phone Number*: 757-253-6688

Email*: tammy.rosario@jamescitycountyva.gov

Is the contact person different than the authorized individual?

Contact Person*: No

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

Project Description*:

James City County is applying for funds to hire a consultant to create a countywide resilience plan. Please see the attached documents for additional details.

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

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

Benefit a low-income geographic area*: No

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

Census Block(s) Where Project will Occur*: Countywide: 801, 802, 803, 804

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

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

Flood Zone(s) (if applicable):

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

Eligibility - Round 4

Eligibility

Is the applicant a local government (including counties, cities, towns, municipal corporations, authorities, districts, commissions, or political subdivisions created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth, or any combination of these)?

Local Government*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration

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

Letters of Support*: N/A

Yes - Eligible for consideration
No - Not eligible for consideration

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

Previously Funded*: No

Yes - Not eligible for consideration
No - Eligible for consideration

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

Evidence of Match Funds*: Yes

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

Scoring Criteria for Capacity Building & Planning - Round 4

Scoring

Eligible Capacity Building and Planning Activities (Select all that apply) ? Maximum 100 points. To make multiple selections, Hold CTRL and click the desired items.

Capacity Building and Planning*: Resilience Plan Development

Is the project area socially vulnerable? (based on ADAPT Virginia?s Social Vulnerability Index Score)

Social Vulnerability Scoring:

Very High Social Vulnerability (More than 1.5)
High Social Vulnerability (1.0 to 1.5)
Moderate Social Vulnerability (0.0 to 1.0)
Low Social Vulnerability (-1.0 to 0.0)
Very Low Social Vulnerability (Less than -1.0)

Socially Vulnerable*: Low Social Vulnerability (-1.0 to 0.0)

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

NFIP*: No

Is the proposed project in a low-income geographic area as defined below?

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

Low-Income Geographic Area*: No

Does this project provide ?community scale? benefits?

Community Scale Benefits*: More than one census block

Comments:

The countywide resilience plan will cover all census blocks within the County and provide community-scale benefits.

Scope of Work and Budget Narrative - Capacity Building and Planning - Round 4

Scope of Work - General Information

Upload your Scope of Work

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

Scope of Work Attachment*: CID510201_JamesCityCounty_CFPF_SOW.pdf

Comments:

Includes Scope of Work Narrative: need, social vulnerability, need for a county resilience plan (inc. goals and objectives), work plan, evaluation, assessment of capacity and planning needs, and list of supporting appendices.

Budget Narrative

Budget Narrative Attachment*: 510201_JamesCityCounty_CFPF_BudgetAll.pdf

Comments:

Includes the estimated total project cost, amount of funds requested, amount and source of funds available, budget narrative table, a table of budget by task, authorization to request funding (signed letter and resolution), & evidence of match

Scope of Work Supporting Information - Capacity Building and Planning

Scope of Work Supporting Information

Describe identified resource needs including financial, human, technical assistance, and training needs

Resource need identification*:

James City County does not currently have the staffing capacity to develop a resilience plan. Besides a limited county Stormwater and Resource Protection Division Capital Improvement Program that addresses flood mitigation efforts as funds permit, there are no resources dedicated to flood resilience. Without a comprehensive and forward-looking approach, the County is taking an ad hoc approach to flood resilience and is unable to apply for funds that would enhance local resilience to coastal flood hazards. Enhanced local resilience results in costs saved on natural disaster cleanup efforts, improved durability and longevity of local infrastructure, and saved opportunity costs that can be applied to other critical services within the County. The funding requested as part of this proposal will help the County meet resource needs by requesting funds that will support the hiring of a third-party consultant to develop and draft a plan, inclusive of comprehensive community engagement and outreach strategies.

Describe the plan for developing, increasing, or strengthening knowledge, skills and abilities of existing or new staff. This may include training of existing staff, hiring personnel, contracting consultants or advisors

Development of Existing or New Staff*:

During plan development, third-party consultants will frequently engage with staff on planning approaches and strategies. Once the final plan is approved, County staff will have a comprehensive understanding flood risks, impacts, and actionable steps to implement projects in the community.

Where capacity is limited by funding, what strategies will be developed to increase resources in the local government? (This may include work with non-governmental organization, or applying for grants, loans, or other funding sources)

Resource Development Strategies*:

The resilience plan will develop strategies to increase resources through work on the goals and objectives developed for the Scope of Work. Goal 3 is to leverage existing County and regional efforts to build on existing efforts and coordinate future action. Goal 4 is to identify and prioritize actions for flood mitigation and adaptation that align with regional and state resilience actions. Goal 6 is to better prepare the County to acquire funds for resilience actions. Each of these goals contain objectives that further articulate steps to maximize existing staff and stakeholder expertise, align the County's resilience plan to align with funding sources, and develop an action plan and funding plan. This work will allow the County to optimize its existing resources and realize new ones through grants. loans, and other funding sources.

Describe policy management and/or development plans

Policy management and/or development*:

With the aid of a new plan, County officials will be better able to integrate policies that advance flood resilience and hazard mitigation into local codes and ordinances.

Describe plans for stakeholder identification, outreach, and education strategies

Stakeholder identification, outreach, and education strategies*:

Integral to the development of the JCC Resilience Plan will be the identification of stakeholders and associated community outreach. Historically underserved and marginalized communities will be mapped with the help of the Project Management Team and Steering Committee for targeted outreach, and local actors involved in past hazard mitigation planning activities will also be called upon. Involving community members and organizations in the identification of flood hazards, data collection, and storytelling will result in a more comprehensive view of local conditions and appropriate resilience actions. This process will also educate the community about resilience planning efforts already underway and increase

collective understanding of and appreciation for adaption and mitigation updates to critical infrastructure.

Budget

Budget Summary

Grant Matching Requirement*:

Planning and Capacity Building - Fund 75%/Match 25%
*Match requirements for Planning and Capacity Building in low-income geographic areas will not require match for applications requesting less than $3,000.
Is a match waiver being requested?

Match Waiver Request No
Note: only low-income communities are eligible for a match waiver.
*:

Total Project Amount (Request + Match)*: $291,000.00
**This amount should equal the sum of your request and match figures

REQUIRED Match Percentage Amount: $72,750.00

BUDGET TOTALS

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

Match Percentage: 25.00%
Verify that your match percentage matches your required match percentage amount above.

Total Requested Fund Amount: $218,250.00

Total Match Amount: $72,750.00

TOTAL: $291,000.00

Personnel

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

Fringe Benefits

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

Travel

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

Equipment

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

Supplies

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

Construction

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

Contracts

Description	Requested Fund Amount	Match Amount	Match Source
Contract Costs for Resilience Plan	$218,250.00	$72,750.00	James City County SRP Division CIP Budget
	$218,250.00	**$72,750.00**	

Pre-Award and Startup Costs

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

Other Direct Costs

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

Supporting Documentation - General

Supporting Documentation

Named Attachment	Required	Description	File Name	Type	Size	Upload Date
Detailed map of the project area(s) (Projects/Studies)						
FIRMette of the project area(s) (Projects/Studies)						
Historic flood damage data and/or images (Projects/Studies)						
A link to or a copy of the current floodplain ordinance		Appendix A - James City County Floodplain Ordinances	CID510201_JamesCityCounty_CFPF_Appx_A_CurrentFloodplainOrdinances.pdf	pdf	4 MB	01/23/2025 01:56 PM
Maintenance and management plan for project						
A link to or a copy of the current hazard mitigation plan		Appendix C - James City County Hazard Mitigation Plan	CID510201_JamesCityCounty_CFPF_Appx_C_HazardMitigationPlan.pdf	pdf	121 MB	01/23/2025 01:58 PM
A link to or a copy of the current comprehensive plan		Appendix B - James City County 2045 Comprehensive Plan	CID510201_JamesCityCounty_CFPF_Appx_B_ComprehensivePlan.pdf	pdf	75 MB	01/23/2025 01:59 PM
Social vulnerability index score(s) for the project area		CFPF SVI County Averages	CFPF SVI County Averages.xlsx	xlsx	936 KB	01/23/2025 02:03 PM

Authorization to request funding from the Fund from governing body or chief executive of the local government	Letter of Authorization from County Administrator and Resolution of Support from Board of Supervisors	CID510201_JamesCityCounty_CFPF_Authorization.pdf	pdf	301 KB	01/23/2025 02:08 PM
Signed pledge agreement from each contributing organization					
Maintenance Plan					

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

Benefit Cost Analysis					
Other Relevant Attachments	Links to Appendices D, E, F, G, H - Powhatan Creek, Yarmouth, and Diascund Creek Watershed Management Plans, Grove Drainage Study, and James City County FY2025 Budget	CID510201_JamesCityCounty_CFPF_LinksAppxDEFGH.pdf	pdf	113 KB	01/23/2025 03:05 PM

Letters of Support

Description	File Name	Type	Size	Upload Date
No files attached.				

James City County Flood Resilience Plan

Community Flood Preparedness Fund Grant Round 5 Application



Scope of Work Narrative

Need

Introduction

James City County (JCC) is located between three tributaries of the Chesapeake Bay in eastern Virginia and has a population of over 80,000 people. JCC participates in the Hampton Roads Planning District Commission (HRPDC), which is one of 21 regional planning bodies in the Commonwealth of Virginia. The Hampton Roads region experiences some of the highest rates of sea level rise on the Atlantic Coast, which is worsened by higher than average land sinking (subsidence). This makes the region particularly vulnerable to flood damage, especially in densely populated and fully developed areas.[1]

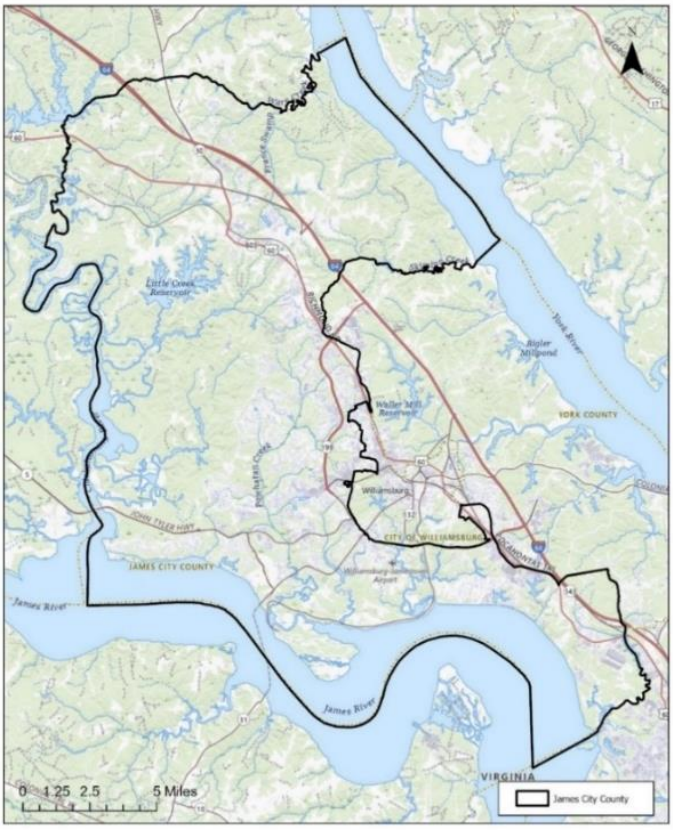


Figure 1 - Project Area

JCC itself is situated on a narrow, hilly, and wooded peninsula between three major rivers that flow into the Chesapeake Bay: the York, the James, and the Chickahominy. The County manages more than 150 miles of shoreline along the James, York, and Chickahominy Rivers.[2] The County also features extensive wetlands, unstable soils, steep slopes, scenic views, wildlife corridors, and forested areas. The County is home to numerous historical archaeological sites, many of which are at risk from rising sea levels. James City County is historically significant as it hosts the site of the first permanent English settlement in North America – Jamestown. Critical facilities like sanitary pump stations and water utilities are also located in areas prone to flooding impacts. Additionally, the region's position along the eastern seaboard makes it susceptible to hurricanes and tropical storms. The local economy is diverse, with key sectors including healthcare and social assistance, retail trade, accommodation and food services, arts, entertainment, recreation, and manufacturing in addition to being home to five Fortune 500 firms. [3]

Flood Risk

JCC is exposed to multiple types of flooding including rainfall-driven flooding, coastal flooding, and riverine flooding. This flood risk is exacerbated by increased development, aging infrastructure, loss of natural infrastructure, and climate change. Currently, only separate watershed management plans provide piecemeal data about at-risk areas and structures in the County. These plans were developed to provide watershed-specific information and to set goals and objectives for watershed protections; therefore, they did not focus specifically on flood risk. Through the completion of the most recent watershed management plans, County staff have recognized that their approach to understanding and addressing flood risks is insufficient, so long as they continue to review individual watersheds and not consider the County as a whole. For example, they recently evaluated locations across three watersheds where emergency access

[1] Commonwealth of Virginia Hazard Mitigation Plan, 2023.
[2] James City County 2045 Comprehensive Plan, 2021.
[3] James City County 2045 Comprehensive Plan, 2021.

or evacuation could be disrupted during flood events due to roadway flooding - potentially isolating whole communities. However, the evaluation was limited to the three respective watershed boundaries and did not consider how access routes could be further disrupted when extending into adjacent watersheds. The majority of these plans have also been limited to future projections that only considered coastal storm surge flooding due to limited ability for comprehensive hydrologic and hydraulic modeling, but most watersheds have higher vulnerability to riverine flooding than could be evaluated. The County would like to prioritize areas for riverine and rainfall-driven flood modeling in the coming years and have already started putting some funding aside. Support from the Department of Conservation and Recreation's (DCR) Community Flood Preparedness Fund (CFPF) would help refine and widen this effort. Additionally, the County would like to advance beyond its capacity building phase so that practical solutions can be implemented in a proactive manner before further flood damages are experienced.

The JCC Resilience Plan funded by this request would bring together existing efforts and provide a countywide assessment for a data-driven understanding of how to comprehensively identify, plan, design, and implement projects that account for climate hazards, impacts, and recovery. The following section details flood risk in JCC based on available data sources and County experience.

Flooding Hotspots in James City County

Based on County experience, the following flooding hotspots have been identified although they are not a comprehensive list of flood impacts within the County.

- **Jamestown 1607:** A townhome community with multi-family buildings located in mapped flood hazard areas is expected to see greater exposure to flooding in the future, based on recent watershed planning projections. Flooding is exacerbated by a narrow opening for a bridge over Powhatan Creek. Photos of sunny day flooding are shown in Figure 2 and Figure 3. Buildings located in the mapped flood hazard areas are shown in Figure 4.

- **Neck-o-Land / Powhatan Shores:** A flood prone area nestled between two major creeks; this neighborhood has a large number of properties in flood hazard areas as shown in Figure 5. Additionally, there are repetitive loss structures in this area.

- **Chickahominy Haven:** A very flood prone area surrounded by the Chickahominy River that has experienced repeated flood exposure. The neighborhood is accessed by one road that has been closed from high tide flooding in recent years. Most structures in the area are within the existing flood zone as shown in Figure 8. Over 55% of repetitive loss structures in the County are located in this neighborhood.

- **James Terrace and Winston Terrace:** Two older neighborhoods representing a significant amount of the affordable housing within James City County are prone to rainfall-driven flooding issues that the County has worked to address with stormwater management solutions. The creation of the proposed JCC Resilience Plan would help fund further work that would address these problem areas and similar locations throughout the County.

- **Grove:** Historically, this area has faced repeated stormwater flooding issues. A 2017 drainage study included in Appendix G found that the existing drainage system has inadequate capacity to convey a 10-year design flow, pipes within the system are clogged with sediment, debris, or have collapsed therefore restricting flow, and that several cross-pipes are not located at low-points which limits functionality. The assessment results are shown in Figure 9. Additionally, the area is one of the most socially vulnerable parts of the County with identified moderate to high social vulnerability and is the only designated qualified opportunity zone in JCC.

- **Jamestown Island**: Jamestown is facing inundation by flooding from major storm events, sea level rise, and historic tides. Although this area has fewer structures and infrastructure than other hotspots, inundation in this area has presented other risks: endangering irreplaceable artifacts,

disrupting operations and programming, and jeopardizing the ability to share the story of America's birthplace to the hundreds of thousands of visitors to the Historic Triangle each year.



Figure 2 - Sunny Day Flooding near Jamestown 1607 not associated with a major storm event, limiting access to a sanitary pump station.



Figure 3 – Sunny Day Flooding near Jamestown 1607 not associated with a major storm event affecting utilities and encroaching upon residences.

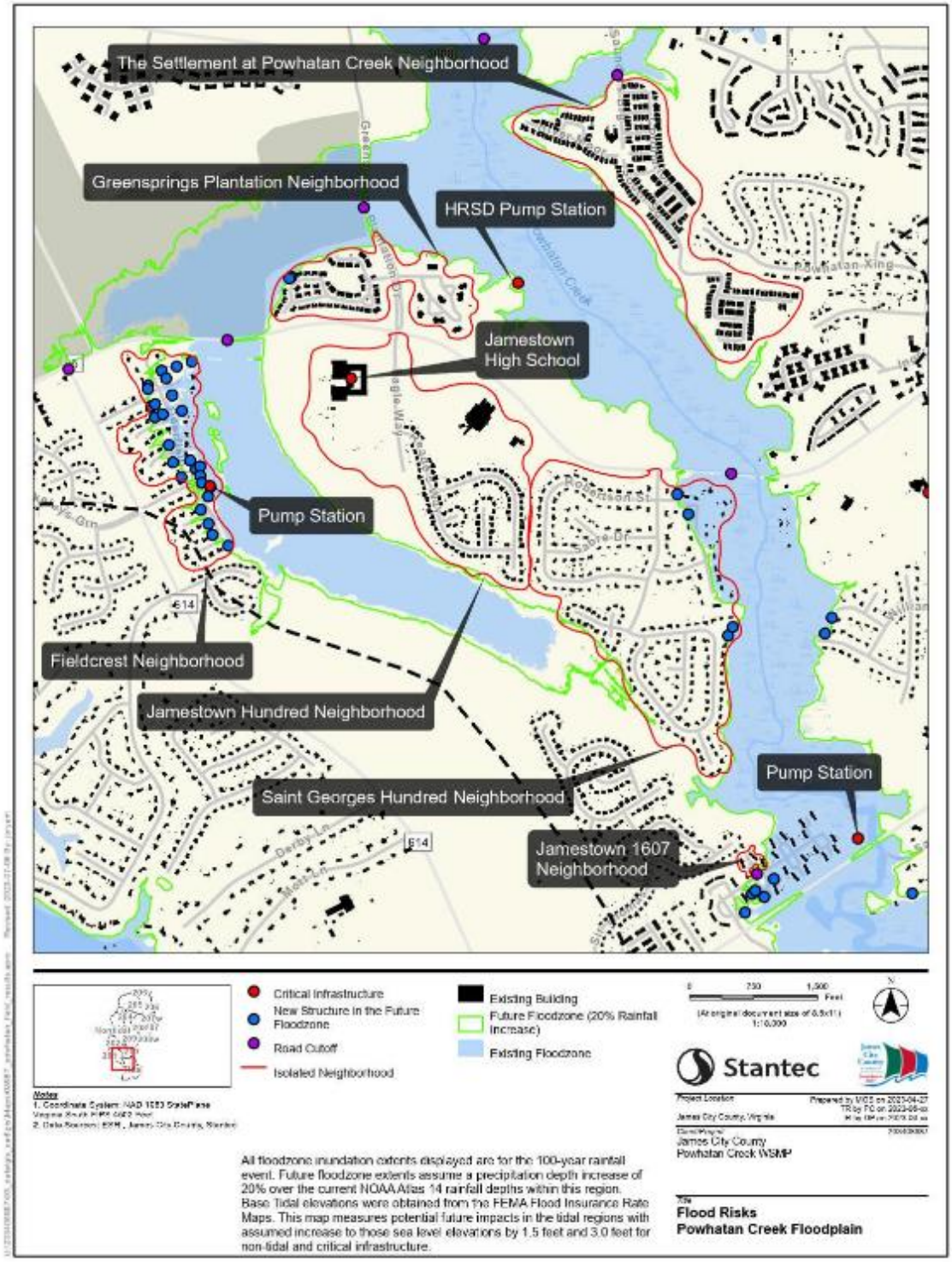


Figure 4 - Existing and Future Flood Risk Assessment for Jamestown 1607 and Surrounding Areas[4]

[4] *Powhatan Creek Watershed Management Plan, 2023*

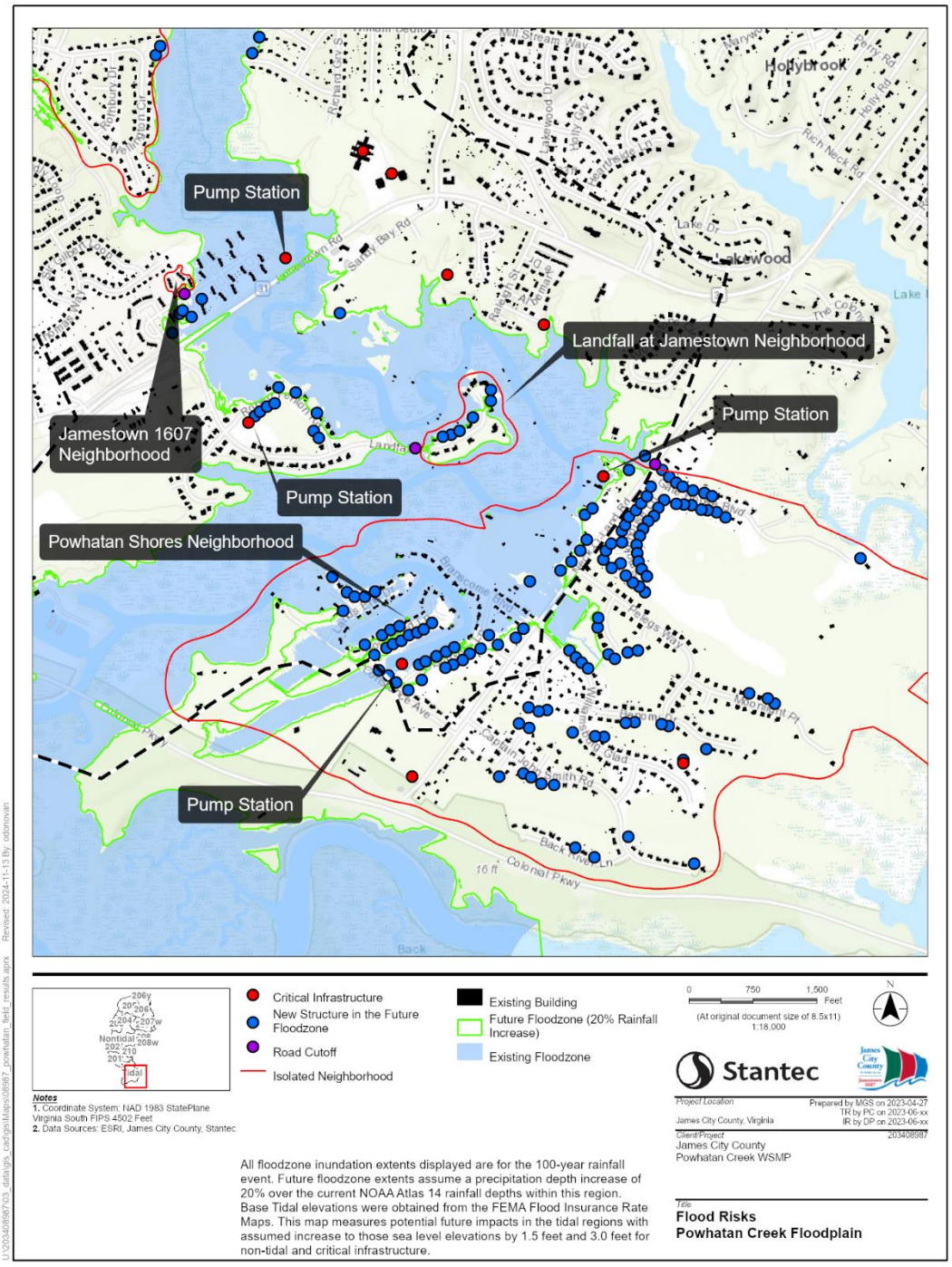


Figure 5 - Existing and Future Flood Risk Assessment for Powhatan Shores and Surrounding Areas[5]

[5] *Powhatan Creek Watershed Management Plan, 2023*



Figure 6 - Flooding at Powhatan Shores, 2009



Figure 7 - Flooding in the Neck-o-Land area of JCC

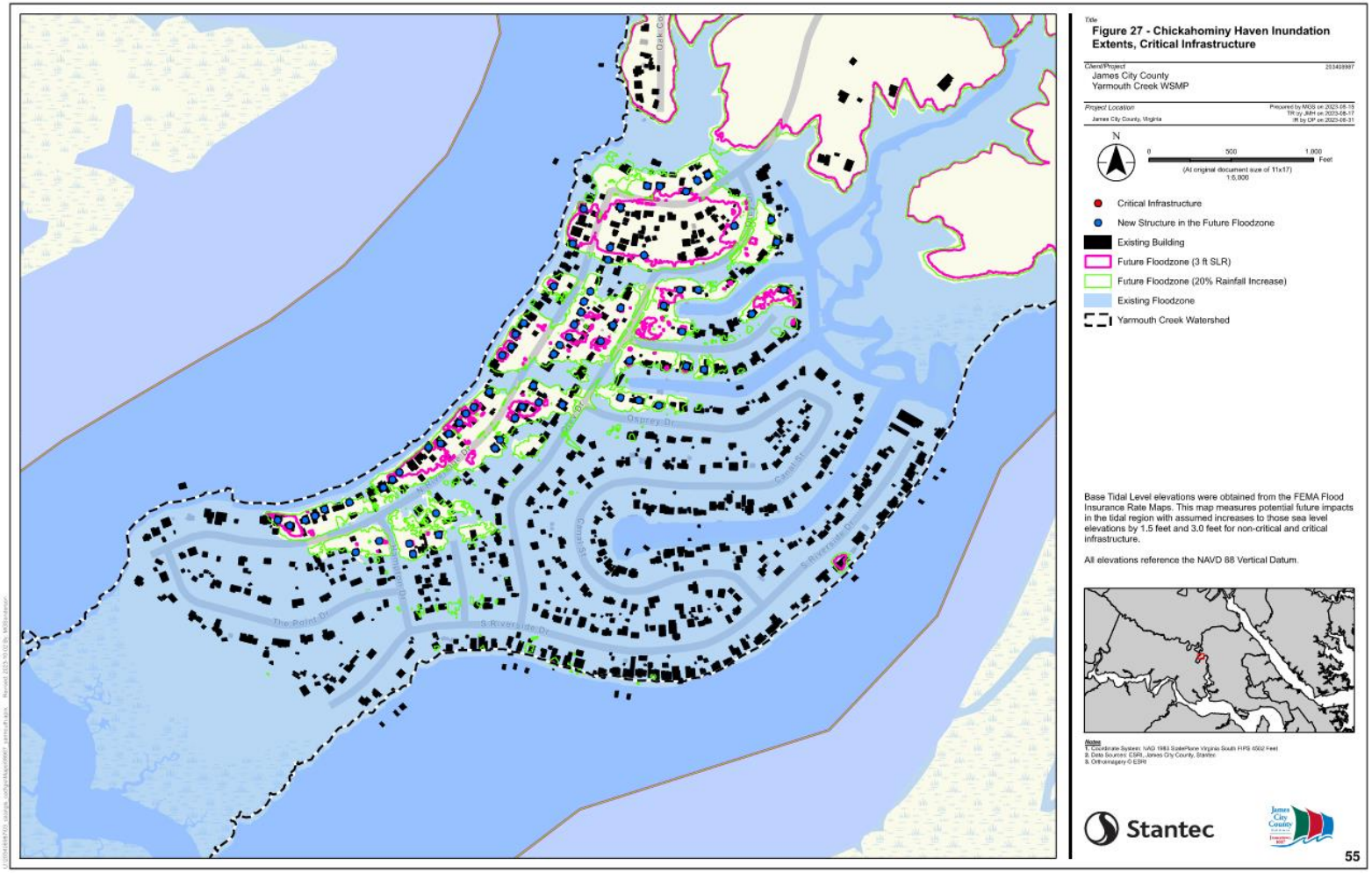


Figure 8 - Existing and Future Flood Risk Assessment for Chickahominy Haven[6]

[6] Yarmouth Creek Watershed Management Plan, 2023

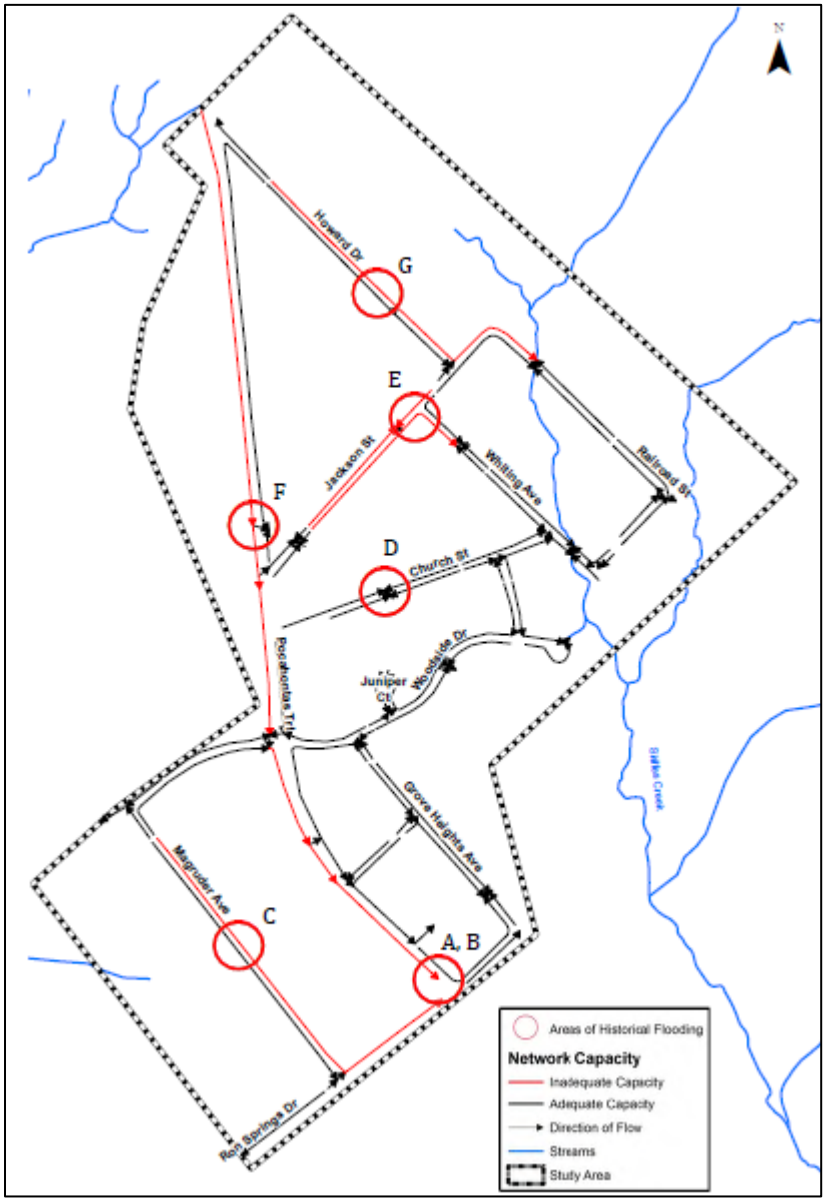


Figure 9 – Grove Stormwater System Assessment Results[7]

Dam Failure Flood Risk

At least five significant hazard dams, three high hazard dams, and 11 low hazard dams are present within the County and pose an increased risk to downstream areas not fully captured by traditional floodplain mapping efforts. A few notable instances of past dam failures or present concerns are highlighted below.

- **Lake Powell Dam:** In the 1990s, the private Lake Powell Dam was breached by heavy flooding due to back-to-back tropical storms and never repaired. Properties upstream from the dam lost their waterfronts and decreased in property value.

- **Little Creek Reservoir Dam:** This dam has experienced seepage issues in recent years. The County has been in coordination with the dam owner (Newport News Waterworks) who has implemented initial phases of the Emergency Action Plan, drawn down the water levels to alleviate pressures, and is actively pursuing rehabilitation solutions for construction next year.

[7] Grove Area Stormwater Improvements Assessment Study – Phase 1 & 2, 2017

- **Diascund Creek Reservoir Dam:** Downstream of the dam is one of only two hurricane evacuation routes in the County. If the dam were to breach, it could inundate Route 60 and hamper evacuation and emergency response efforts during major flood events.

Roadway Flooding Impacts

The following areas of concern have been located where roadway flooding can isolate residents from emergency services and evacuation routes based on County experience and recent watershed planning efforts. The County started evaluating roadway flooding impacts during its recent watershed planning process that only covered portions of the County. Extending the vulnerability assessment throughout the entirety of the County is desired to better understand where similar risks may exist.

- **Route 5:** Roadway flooding has the potential to isolate several neighborhoods and a high school.

- **Evacuation Routes:** Route 60 and Interstate 64 are the only two formal evacuation routes serving the Peninsula, as well as supporting more populated areas in Southside Hampton Roads. At-risk areas of both of these roadways have experienced flooding in the past, which could result in regional effects if impacted by future flood events.

- **Route 199:** One location along this local primary arterial road has been identified as potentially susceptible to flooding and would disrupt traffic operations for much of the County during a major evacuation if flooded.

- **Isolated Neighborhoods:** A number of other residential subdivisions have been identified as susceptible to isolation during major flood events due to limited ingress and egress routes potentially impacted by flooding.

Notable Previous Occurrences

JCC has experienced several notable instances of extreme flooding over the years. The following recent major storms have caused some of the worst damages.

- **Hurricane Floyd (1999):** This storm was an extreme rain event for southeastern Virginia. In James City County, it caused significant flooding at Jamestown 1607, washed out Jamestown Road, damaged water and sewer utilities and breached Lake Powell Dam.

- **Hurricane Isabel (2003):** High storm surge and heavy rainfall caused extensive flooding in low-lying areas, and tree falls blocked roads and damaged homes. The storm's eye passed near James City County and led to the largest power outage in Virginia's history. Hurricane Isabel caused an estimated $1.85 billion in damages across the Commonwealth.[8]

- **Hurricane Irene (2011):** Impacts seen in James City County included debris and roadway flooding.

- **Hurricane Matthew (2016):** This storm hit other parts of the Hampton Roads region harder, but caused power outages, downed trees, roadway flooding, and property damage in James City County.

- **Hurricane Florence (2018):** This storm overwhelmed drainage systems and led to substantial flooding, though not as impactful as previous hurricanes.

[8] *Virginia Hurricane History*, Virginia Department of Emergency Management, 2012.



Figure 10 - Washed-out Jamestown Road After Hurricane Floyd



Figure 11 - Representative example of treefall damages experienced during Hurricane Isabel[9]

James City County Repetitive Loss Data

James City County has 33 Repetitive Loss (RL) properties and 19 of the 33 RL properties are in the tidal or coastal portion of the Chickahominy River in a subdivision called Chickahominy Haven. One additional RL property is outside of the subdivision but in the floodplain of the Chickahominy River. All 20 of these RL properties are affected by overbank flooding from the river. Most of these 20 RL properties were flooded in 2003, 2006, 2009 and 2015 when hurricanes or nor'easters came through the County. One of these RL properties has been mitigated with the removal of the structure. The Chickahominy Haven area is shown in Figure 8.

Eleven other RL properties are located along Powhatan Creek with seven in the tidal or coastal portion of the

[9] WAVY, 2023, Remembering Hurricane Isabel: The Aftermath

creek and the other four in the riverine portion of the creek. These 11 properties were also flooded when hurricanes and nor'easters visited the County as stated above. These Powhatan Creek areas are shown in Figure 4 and Figure 5. One of the tidal properties was mitigated by removing the structure from the floodplain. Two additional RL properties are in areas with poorly maintained drainage and are flooded when the drainage system capacity is exceeded.

Flood Exposure and Impacts from the Virginia Coastal Resilience Master Plan

The following data from the 2021 Virginia Coastal Resilience Master Plan paints a picture of what flood exposure currently looks like in the Hampton Roads region and how climate change impacts and land subsidence will influence exposure in the future. This type of data is not yet available for James City County, but it is anticipated that regional trends are mirrored at the county level. Based on the Virginia Coastal Resilience Master Plan (2021), data indicates the following risks and impacts for the Hampton Roads region which includes JCC.

- **Structures at Risk:** As of 2022, research shows that 560,000 structures in the Hampton Roads region, valued at $204 billion, are at risk due to flooding.
- **Future Projections:** By 2080, approximately 113,300 additional acres of land will be inundated daily during high tide.
- **Extreme Coastal Flooding:** The number of buildings exposed to extreme coastal floods (0.2% annual exceedance probability) is expected to increase by nearly 150% by 2080.
- **Flood Damages:** Annualized flood damages are projected to rise by more than 930% by 2080, potentially reaching $5.7 billion in cumulative damages.
- **Population Impact:** Between 2020 and 2080, the residential population exposed to high tide flooding in the Hampton Roads region will increase by 6,485%, and those exposed to extreme flooding will increase by 172%.
- **Structure Losses:** Annualized structure losses for residential properties are expected to increase by over 1,200%, totaling $3.1 billion by 2080.
- **Marsh Vulnerability:** By 2080, 171,000 acres of tidal wetland habitat in the Hampton Roads region are expected to become open water. This loss will expose inland areas to even more severe flooding impacts, unchecked by coastal marshes.

Economic and Environmental Impacts

Aside from conventional threats to infrastructure and public health that flood waters pose, the geography and economy of the Hampton Roads region including JCC also necessitate the consideration of the following, regional-specific impacts:

- **Marsh Vulnerability:** Large marsh complexes within the County help protect more inland areas from the worst impacts of flooding. For example, in lower segments of the Chickahominy River, the FEMA base flood elevation is approximately 10 feet; however, the large marsh complexes in upper portions of the river help break up the fetch distance and reduce wave runup enough to lower the FEMA base flood elevation to around 7 feet at Chickahominy Haven. In recent years, local marshes have begun to lose wetland vegetation to open water due to storm surge, sea-level rise, land subsidence, wave erosion, internal degradation, and development. This loss of marshland could also mean a loss of protection for properties previously shielded by them. The County would like to conduct a marsh vulnerability assessment to better understand the causes and best practices for restoration and protection moving forward.

- **Critical Facilities:** Military bases, water treatment plants, sanitary pump stations, and energy assets are at risk. By 2080, the exposure of these facilities to high tide is expected to increase in studied areas within the County. Disruptions caused by flooding to these facilities can result in weakened security and prolonged disaster recovery times.

- **Cultural Resources:** James City County's numerous archeological sites, including Jamestown and others related to its location as the first permanent English settlement established in the Americas, are at risk of being lost to rising floodwaters. Additionally, archeological sites from pre-colonial tribes can be found along waterways throughout the County. Most of the County's shoreline remains natural, without erosion management infrastructure like bulkheads or breakwaters. This can lead to more advanced erosion rates, sometimes up to two feet per year, that pose a threat to these cultural resources.[10]

Social Vulnerability

As a Phase II MS4 community, James City County is a smaller community compared to other localities within the Hampton Roads region and has fewer resources to dedicate to these issues. The following section details known social vulnerability in JCC. As a part of the resilience planning process, the County wants to continue studying and understanding social vulnerability and its correlation to flood vulnerability. This will help JCC prioritize actions within communities with flood vulnerability and social vulnerability that may face larger barriers to recovery.

Unique Development Pattern

Given its expansive waterfront area, James City County has developed in a unique pattern that can dilute how social vulnerability appears in available data. Wealthy neighborhoods along the waterfront are intermixed in census tracts with socially vulnerable areas. This leads to an underrepresentation of social vulnerability in the County. For example, Jamestown 1607, a neighborhood with a significant amount of affordable housing and social vulnerability, is located across the street from a wealthier neighborhood. The area does not show up as having high social vulnerability in available tools due to the polarization of economic status. However, the majority of the flood prone properties in that area are within the more vulnerable Jamestown 1607.

A similar dilution of social vulnerability scoring is present within Chickahominy Haven. While many longtime residents were drawn to Chickahominy Haven due to its availability of more affordable housing on small lots with water access, these properties are low-lying and frequently flooded. However, in recent years there has been a trend of wealthier residents seeking opportunities to build new large homes along the waterfront, purchasing some of these older lots and elevating them. The result is a blended community where these higher-value, better protected homes balance out many of the lower-income households that remain, though the latter are much more impacted by flooding.

Additionally, rising housing costs have resulted in many of the remaining affordable areas being older homes within the floodplain. This is leading to disproportionate impacts on the most socially vulnerable community members. New home builds and retrofits are including more robust designs that include modifications such as requirements for the lowest floor to be elevated above the Base Flood Elevation. Due to the historical requirements or lack of requirements at the time, homes in the older and more affordable communities were not designed with flood resilience in mind and many homeowners are not able to retrofit the properties to increase resilience. For many community members, their home is their largest and most stable economic asset. The inability to recover from a single flood event can be devastating. Newer neighborhoods have more robust stormwater management design, leaving the older neighborhoods, and the affordable housing stock naturally occurring within them, with higher risk of flooding due to aging and undersized drainage infrastructure.

[10] James City County 2045 Comprehensive Plan, 2021.

Virginia Flood Risk Information System (VFRIS)

The Virginia Flood Risk Information System (VFRIS, 2020) features a Social Vulnerability Index (SVI) for census tracts within James City County.[11] The SVI includes socioeconomic and demographic data, which can be intersected with environmental data to contextualize the potential or current adverse impacts on communities. The index score can be used to leverage and inform appropriate flood resilience actions, especially for areas with high social vulnerability. For James City County, census tract values range from very low vulnerability to those with heavy concentrations of high to very high vulnerability (highest SVI score is 1.58). Within JCC, over 15% of the total census tract block groups have high or very high social vulnerability scores. Approximately 40% of census blocks have moderate social vulnerability or higher. These areas are shown in Figure 12.

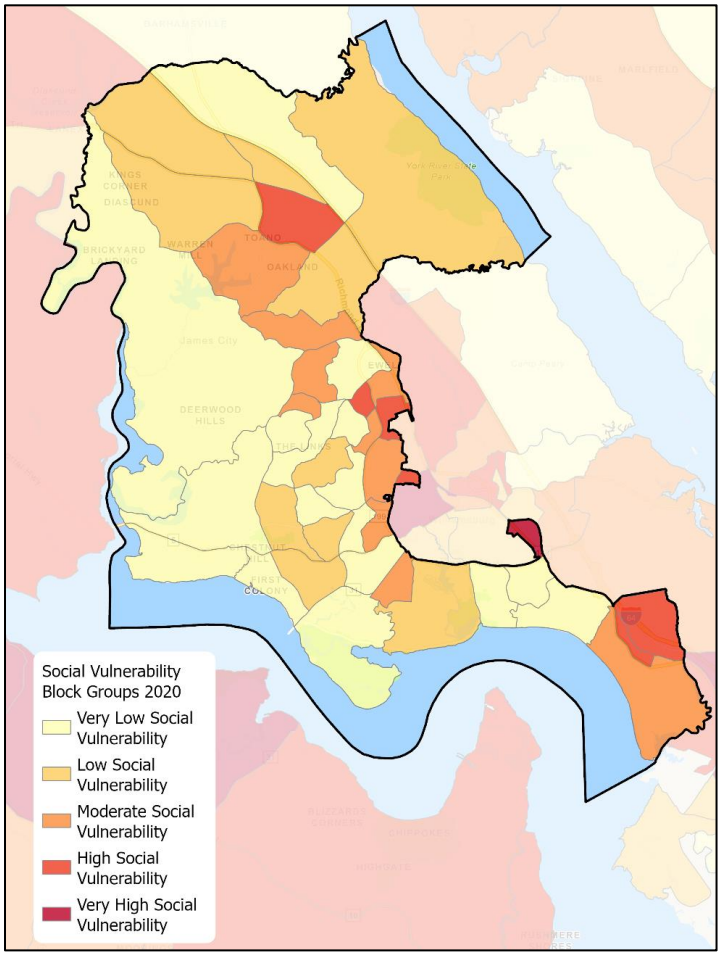


Figure 12 - Virginia Flood Risk Information System

Qualified Opportunity Zone

Qualified opportunity zones are federally designated economically distressed communities that offer tax incentives to encourage long-term investments. There is one qualified opportunity zone in JCC in the Grove Area as shown in Figure 13. This community was initially built by freed enslaved workers from Carter's Grove Plantation and this area has high social vulnerability. A comprehensive watershed plan has not been developed for this area but is proposed in the Stormwater Capital Improvement Program 5-year budget. As discussed previously, the County has performed a targeted drainage study for this area, noting that it has historically been impacted by stormwater flooding. James City County wants to better understand existing and future flood risks in this area and help prioritize needed improvements.

[11] Virigina Flood Risk Information System. Map | VFRIS



Figure 13 - Qualified Opportunity Zone – Census Tract 51095080102

Housing Rehabilitation Zones

Housing rehabilitation zones were established to allow projects to be eligible for housing revitalization funding that are affordable at a variety of income levels. Per the James City County 2045 Comprehensive Plan, the 2016 James City County Housing Conditions Study evaluated 19,259 residential exteriors finding that approximately 10% were in troubled conditions. The map presented in Figure 14 shows where houses in troubled conditions are located and indicates designated housing rehabilitation zones.[12] These areas are spread geographically throughout the County and closely follow the pattern of social vulnerability laid out by the VFRIS Social Vulnerability Index map. A full understanding of flood vulnerability in these areas is not available based on past evaluations that were limited in scope, but the County will seek to gain a better understanding as part of this project.

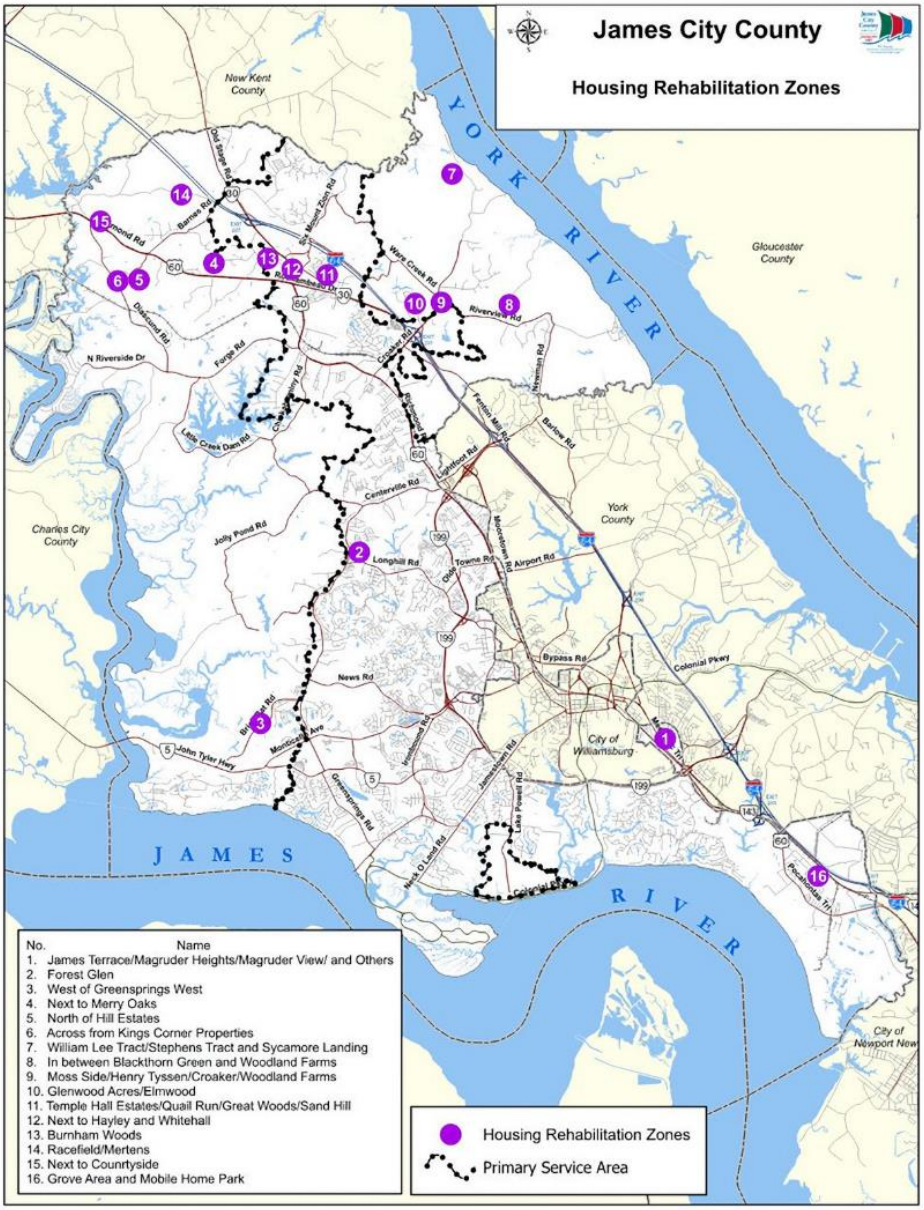


Figure 14 - Housing Rehabilitation Zones

[12] James City County 2045 Comprehensive Plan, 2021.

Social Vulnerability Summary

James City County has areas of social vulnerability throughout the County. Given the unique development patterns of the County, the social vulnerability is not fully captured in available tools. As a part of the JCC Resilience Plan ("the Plan"), the County will work with stakeholders and available data sources to perform a social vulnerability mapping exercise to help understand areas with social vulnerability and ensure their engagement in the Plan. The following composite map (Figure 15) highlights the known distribution of social vulnerability throughout the County.

From flooding in Jamestown 1607 and Chickahominy Haven, where more isolated lower income areas are at greater risk, to interior drainage problems in James Terrace, Winston Terrace, and Grove that represent some of the more underserved parts of the County, the need to identify and adapt to flooding is clear.

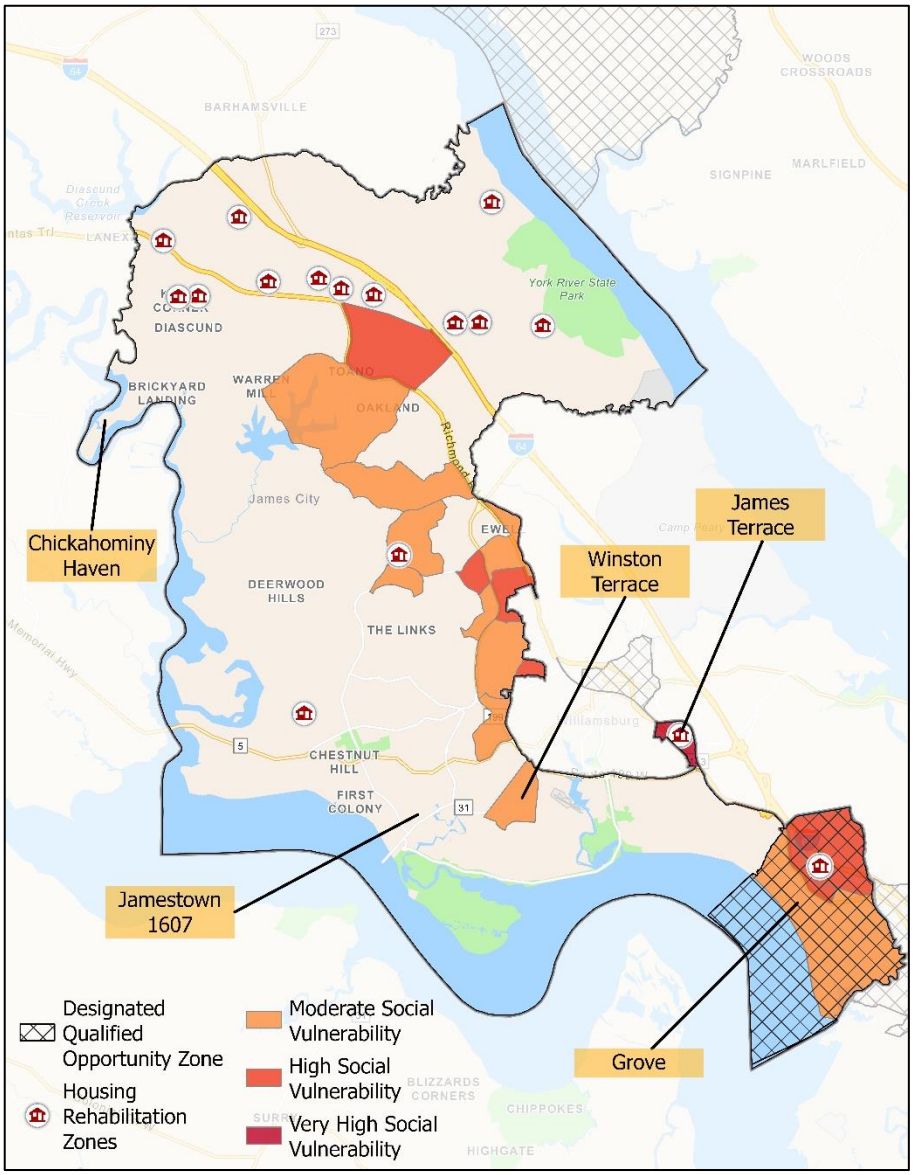


Figure 15 - Composite Social Vulnerability Map

Need for a County Resilience Plan

Identified Needs

James City County is currently lacking a project-based, targeted resilience plan which would support capacity building and planning to mitigate flood risk. The JCC Resilience Plan will develop a framework to understand county-level vulnerabilities and risks and will result in identified and prioritized resilience actions to mitigate flood risk. The County has taken some action to address resilience, but it has been on an opportunistic basis and is de-centralized. Recent watershed planning efforts in parts of the County have highlighted the need for more comprehensive resilience planning. Table 1 displays the resources that have been developed and support resilience planning, which demonstrates a need and desire for this type of work.

Table 1 - Existing Resilience Planning Efforts in James City County

Year	Resource Name	Resilience Insights
2011-2023	Watershed Management Plans (Gordon Creek, Mill Creek, Powhatan Creek, Skimino Creek, Ware Creek, Diascund Creek, Yarmouth Creek)	Contain flood risk studies and desktop reviews that can be leveraged for future vulnerability assessments. Latest three plans include review of structures and critical facilities at risk. Include existing and future conditions data for limited types of flooding.
2018	Flood Hazard Program Guidelines for Homeowners	Contains resident-facing information on flood resilience strategies.
2018	Debris Management Annex	From James City County Emergency Operations Plan. Outlines appropriate response following natural disaster.
2021	2045 Comprehensive Plan	Contains high-level strategies and actions that support resilience within the Environmental and Land Use sections.
2022	Strategies for Conserving James City County's Natural and Cultural Assets	Includes high-level overview on understanding and mitigating future risks to natural and cultural assets.
2023	Floodplain Management Annual Report	Provides floodplain management goals and actions.

The County has also implemented a Flood Mitigation Pilot Program to assist property owners on the FEMA repetitive loss list, but these grants are capped at $3,000 per property. Other flood mitigation efforts are conducted by the County Stormwater and Resource Protection Division as part of the 5-year Capital Improvement Program (CIP). As funding permits, the division conducts studies, evaluates problem areas, and fixes drainage and/or conveyance systems to reduce localized flooding. The County currently lacks capacity for targeted, long-term flood resilience planning and resilience action implementation.

Funds from this request would support the development of a county-wide resilience plan that would consolidate existing floodplain management efforts and result in more comprehensive and deliberate investments in resilience moving forward.

Currently, the Hampton Roads region at-large has limited policy guidance on sea level rise: the 2018 Sea Level Rise Planning Policy and Approach and a study from 2013 describing local sea level rise scenarios, impacts, and methods for incorporating adaptation into local planning procedures. These documents lack the specificity needed for an actionable and targeted local planning approach and only address one aspect of coastal flooding – sea level rise. More developed localities with greater resources like Hampton, Norfolk, and Virginia Beach have already begun implementing robust coastal adaptation plans.

Identified Solutions

Developing a resilience plan to assess the impacts of current and future flood hazards, and identifying and prioritizing resilience actions, will enable the County to take strategic action toward flood resilience.

The JCC Resilience Plan will use best available science, work to improve equity, place emphasis on nature-based solutions, engage in community-scale planning, and focus on cost-effective solutions to protect residential communities, critical infrastructure, businesses, and archaeological sites representative of important national heritage. It will also align with and complement regional and state-wide resilience efforts by leveraging work completed in previous plans and data available from the Coastal Resilience Master Plan Phase II. Importantly, these actions will fulfill the goals, strategies, and actions from the James City County Comprehensive Plan to better understand how natural hazards impact community spaces, to identify the overlap between climate action and population changes, to modernize infrastructure, to conduct a marsh vulnerability assessment, and to more efficiently utilize taxpayer funds through a prioritized planning approach.

Without a county-specific resilience plan, James City County will continue approaching flood mitigation with limited capacity, limited understanding of prioritization, and on an opportunistic basis. A resilience plan will allow James City County to be more holistic in its understanding and more proactive and strategic in addressing flooding issues and leveraging state and federal grants. This will continue to require that James City County rely primarily on general funds for its Stormwater and Resource Protection Division Capital Improvement Program that has limited capacity to plan for future risk and resilience.

Goals and Objectives

Goals represent long-term outcomes the project aims to achieve to provide direction and focus on solving identified problems. Objectives are the specific, measurable, and timebound actions to achieve the goals. The following preliminary goals and objectives have been identified by the County for the JCC Resilience Plan. When the planning process begins, the goals and objectives will be confirmed with the steering committee. Estimated time frames in the table below represent when the objective will be completed relevant to project start time.

Table 2 – Preliminary Goals and Objectives

Goals	Objectives	Time Frame
1 Understand how to reduce the impacts of flooding by better understanding the impacts of climate change and identifying vulnerable assets within the County.	1.1 Identify critical assets within the County. 1.2 Map existing and future flood hazards in relation to critical assets. 1.3 Identify highly vulnerable assets including physical, natural, and cultural assets. 1.4 Identify focus areas with existing highly vulnerable assets or areas with the highest future risk without intervention.	By Month 9
2 Understand flood impacts and concerns from stakeholders, residents, and disadvantaged communities throughout the County.	2.1 Engage a steering committee at key milestones throughout the project. 2.2 Facilitate meaningful public engagement opportunities providing in-person and virtual opportunities for feedback at key milestones. 2.3 Identify disadvantaged and historically underserved communities within the County and perform strategic engagement.	By Month 6
3 Leverage existing County and regional efforts to build on existing efforts and coordinate future action.	3.1 Review existing plans and identified resilience actions for inclusion in the JCC Resilience Plan. 3.2 Invite stakeholders involved in hazard mitigation to participate in the steering committee. 3.3 Align JCC Resilience Plan updates with other regional initiatives.	By Month 6

Goals	Objectives	Time Frame
4 Identify and prioritize actions for flood mitigation and adaptation that align with regional and state resilience actions.	4.1 From the existing plan review, update actions from the regional hazard mitigation plan and Coastal Master Plan as appropriate. 4.2 Based on the vulnerability assessment and engagement identify new resilience actions for the County. 4.3 With stakeholders, prioritize a range of resilience actions using a structured process.	By Month 11
5 Adopt JCC Resilience Plan to guide the County's resilience efforts.	5.1 Provide the public, key stakeholders, and review boards with a review and comment period. 5.2 Present the Plan to the County Planning Commission. 5.3 Present the plan to the County Board of Supervisors at a public hearing and vote to adopt the Plan.	By Month 14
6 Better prepare the County to acquire funds for resilience actions.	6.1 Develop the JCC Resilience Plan in line with DCR's requirements in the *CFPF Round 5 Grant Manual*. 6.2 Develop an Action Plan that includes clear actionable steps and problem understanding to support funding applications for specific projects and initiatives. 6.3 Develop a Funding Plan to align identified actions with available funding sources. 6.4 Submit the Plan to DCR for review and approval to become eligible for CFPF project funds.	By Month 14

Work Plan

The work plan below details the major tasks and activities to be carried out by the selected third-party consultant for the development of the JCC Resilience Plan upon notice of funding award. Generally, the County will work closely with the selected consultant over a period of 14 months to set project management goals and processes, collect data to understand existing conditions, conduct a County-wide flood vulnerability and risk assessment, and develop targeted resilience actions for implementation. This plan will make the County eligible to apply for other funds that can aid in additional studies and implementation of prioritized resilience actions. Following the work plan, additional sections summarize expected partnerships, roles and responsibilities of involved parties, a draft implementation timeframe, expected deliverables, and a maintenance plan.

Major Activities and Tasks

James City County will hire a third-party consultant to draft a county-specific flood resilience plan with the following major tasks and activities:

1. Project Initiation and Management

The first task will initiate the project and set up expectations between the County and the consultant. Additionally, the planning process will be introduced to the steering committee and the public.

1.1. Develop Project Management Plan

The consultant will develop a Project Management Plan including a schedule with key deliverables, communication preferences between the County and the consultant, and identified project risks. Throughout the project, any schedule changes or new risks will be updated within the Project Management Plan.

1.2. Hold Kickoff Meeting

The consultant will hold a 1.5-hour virtual meeting with the JCC Project Management Team to review the Project Management Plan, draft project goals, and kickoff the data collection process.

1.3. Ongoing Project Management Meetings

The consultant will hold regular 1-hour progress meetings with the JCC Project Management Team.

1.4. Steering Committee Meeting #1

The consultant will hold a kickoff meeting with the steering committee to introduce the steering committee to the project, confirm project goals, and perform a hazard mapping exercise. Additionally, the committee will perform an exercise to review the identified historically underserved committees and identified outreach strategies to reach the communities.

1.5. Stakeholder Mapping Exercise

The consultant will review available social vulnerability tools and leverage stakeholder feedback to identify historically underserved communities within James City County. The consultant will draft strategies to foster engagement with these communities throughout the planning process. Strategies may include outreach to community leaders, letters, or door hangers. Additionally, three community specific focus meetings will be held in communities with social vulnerability at strategic points throughout the planning process. The location and timing of these meetings will be confirmed with the steering committee. Communities may include Chickahominy Haven, Grove, Jamestown 1607, or others as identified by the mapping exercise.

1.6. Online Public Engagement Tools

The consultant will establish a project engagement website containing project information, a survey on hazards, and an interactive hazard mapping exercise.

1.7. Public Kickoff Meeting #1

The consultant will host a public meeting to introduce the public to the project and complete a hazard mapping exercise.

2. Data Collection

2.1. Review of Existing Plan, Policies, and Previous Occurrences

The consultant will collect existing plans, policies, internal programs, and previous occurrences to inform the Existing Conditions Summary and Capability and Capacity Assessment deliverables.

2.2. Vulnerability Assessment Data Collection

The consultant will collect hazard data and asset data to inform the vulnerability assessment. Hazard data will predominantly come from the public data sources. Asset data such as physical, natural, and cultural community assets will come from the County or publicly available sources.

2.3. Marsh Vulnerability Assessment Data Collection

The consultant will collect existing site conditions data such as tidal range, elevation, slope, erosion rate, level of development, unvegetated to vegetated wetland ratio (UVVR), and more from publicly available sources and ownership data from County tax parcel information.

3. Understand Existing Conditions and Capabilities

3.1. Summarize Existing Conditions

The consultant will create a summary of existing conditions that influence flood impacts and response such as community history, geography and climate, population and demographics, economy, and previous flood occurrences.

3.2. Capability and Capacity Assessment

The consultant will summarize the programs, policies, plans, staff, and funding sources currently being utilized, as well as document any deficiencies or limitations in flood resilience (e.g., staff, training, data, policy, funding, technical assistance). This will include a review of existing debris management procedures and development procedures within special flood hazard areas, and plans with resilience connections.

3.3. Fast Effective Wins

The consultant will provide additional in-depth review of resilience related projects that have already been identified. This may include reviewing existing projects for additional resilience supplementation, prioritizing existing projects, and further development of identified projects.

4. Risk and Vulnerability Assessment

4.1. Draft Risk and Vulnerability Preliminary Assessment

4.1.1. County Risk and Vulnerability Assessment

The consultant will assess existing and future risk and vulnerability of physical, natural, and cultural community assets with a focus on critical assets and the transportation network. Hazards will include riverine flooding, coastal flooding (sea level rise and storm surge), and stormwater flooding. Critical assets may include police stations, fire stations, County buildings, medical facilities, emergency shelters, key businesses, historical and cultural assets, utilities, and others as determined by the project management team and stakeholders. The assessment will consider cascading hazards such as dam failure. Additionally, current zoning and future land use will be reviewed in relation to flood risk. Data will come from publicly available or JCC sources.

4.1.2. Tidal Marsh Vulnerability Assessment

The consultant will analyze and categorize the vulnerability of JCC's tidal marshes to assess the long-term resilience of these systems at the tributary level. Measurement of existing tidal wetland site conditions like UVVR, elevation, erosion rates, future migration potential, and parcel ownership will be used to categorize marshes and identify recommended management strategies.

4.2. Steering Committee Meeting #2

The Steering Committee will meet to review and garner feedback on preliminary vulnerability assessment results and the capability and capacity assessment.

4.3. Risk and Vulnerability Final Assessment

Interim deliverable of the risk and vulnerability assessment updated based on feedback.

4.4. Steering Committee Meeting #3

The Steering Committee will meet to review final vulnerability assessment results and identify preliminary focus areas and resilience actions.

4.5. Public Meeting #2

The consultant will host a public meeting to review final vulnerability assessment results and identify preliminary focus areas and resilience actions.

5. Resilience Action Development

5.1. Develop Draft Resilience Actions

Based on Vulnerability Assessment results and engagement feedback, the consultant will develop a suite of draft resilience actions including further studies, programmatic initiatives, and projects.

5.2. Steering Committee Meeting #4

The Steering Committee will meet to review and prioritize the proposed resilience actions.

5.3. Public Meeting #3

The consultant will host a public meeting to review and prioritize the proposed resilience actions.

5.4. Finalize Resilience Actions

The consultant will develop resilience action summary sheets including information such as the project description, identified solution, estimated cost, estimated time to implement, action leader, potential funding sources, etc. Actions will vary in type and may include planning activities, future studies, modifications to policies and programs, marsh and wetland restoration or conservation, structural solutions, dam removal, preservation and creation of open space. An emphasis will be placed on nature-based solutions and strategies for debris management to align with CFPF goals and requirements.

6. Resilience Plan

6.1. Draft Plan

Based on project process and previous submittals, the consultant will summarize efforts into a graphically engaging and user-friendly plan.

6.2. Steering Committee Meeting #5

The consultant will hold a meeting to present the draft plan to the Steering Committee and start the Steering Committee review process.

6.3. Final Plan

The consultant will incorporate feedback and finalize the JCC Resilience Plan for public review. The Plan will be presented to the Board of Supervisors and the Planning Commission. County staff will update other groups and share courtesy copies to facilitate public review.

6.4. Public Comment Period

The consultant will facilitate a thirty-day public comment period for the plan.

6.5. Final Report Adjustments

The consultant will incorporate feedback from public comments and finalize the Plan for adoption. The final deliverable will include a pdf of the plan, and the GIS data utilized in the planning process.

6.6. Plan Adoption

The consultant will present the Plan to the James City County Board of Supervisors for adoption.

Responsible Parties

James City County will hire a qualified third-party consultant to develop the JCC Resilience Plan, lead stakeholder engagement efforts, and ensure alignment with DCR requirements. James City County staff will provide oversight, feedback, and guidance. Following the completion of the Plan, James City County will be responsible for implementation of proposed actions in the JCC Resilience Plan, along with future pursuits for funding for implementation assistance. A steering committee will be identified with key stakeholders to provide strategic feedback at key project milestones. Steering committee members will primarily include internal County staff such as personnel with expertise in floodplain management, GIS applications, emergency management, community development, and community engagement. James City County does not have any incorporated localities within the County. The Plan will be reviewed by the County Planning Commission and presented to the County Board of Supervisors for adoption.

Implementation Timeframe

Grant activities will comply with guidance for this funding program by ensuring that commencement begins no later than nine months after award. It is projected that the development of the Plan will take approximately 14-months to complete, falling well within the 60-month deadline for capacity building initiatives provided in the funding manual.

Table 3 - Project Schedule

Tasks	Completed by Month
Project Initiation and Management	Month 1
Data Collection	Month 4
Understand Existing Conditions and Capabilities	Month 6
Risk and Vulnerability Assessment	Month 9
Resilience Action Development	Month 11
Resilience Plan	Month 14

Required Partners

The County will not conduct this resilience planning effort in a vacuum, but rather seek participation from a broad range of potential partners to better inform an understanding of existing conditions, identification of flood risks, and development of locally relevant resilience actions. Partners involved in the creation of the JCC Resilience Plan include County staff, the steering committee, and public stakeholders via participation in open public meetings about plan progress. Additionally, support agencies have been identified which may be included for subject matter expertise regarding action development.

A list of potential partners is provided below.

Steering Committee Representatives

- Internal County Staff
    - Floodplain Management
    - Stormwater and Resource Protection
    - Planning
    - Community Development
    - GIS Applications
    - Emergency Management
    - Community Engagement
    - James City Service Authority

Support Agencies

- HRPDC Resilience Staff
- Virginia Department of Conservation and Recreation
- Additional State Agencies (Virginia Department of Wildlife Resource, Department of Environmental Quality, Department of Forestry, Department of Transportation)

Public Stakeholders

- General Public
- Representatives From Local Community Organizations
- Virginia Conservation Network Staff
- James City County Historical Commission Members
- Chesapeake Bay Foundation
- James River Association
- National Park Service
- Jamestown Yorktown Foundation
- Preservation Virginia
- Hampton Roads Sanitation District
- Newport News Waterworks

Deliverables

The deliverable resulting from the above workplan will be a locally adopted, county-specific resilience plan for James City County that fully meets the resilience plan requirements set forth in Appendix F of the *2024 Funding Manual for the Virginia Community Flood Preparedness Fund Round 5*. The deliverables will include a pdf of the Plan and all GIS data utilized.

Maintenance Plan

Once the Plan is finalized and adopted, the final plan will inform and prioritize subsequent funding requests and project implementation. An annual meeting of the steering committee will be held to evaluate status of the identified resilience actions, successes achieved in the previous year, and modifications to the existing strategy. Dependent on available funding, the Plan will be updated every five years with appropriate climate trend and impact updates integrated and resilience actions modified as implementation moves forward. The Plan will be designed to complement and align with the James City County 2045 Comprehensive Plan, the 2022 Hampton Roads Hazard Mitigation Plan, the Virginia Coastal Resilience Master Plan, and other plans relevant to resilience. As each of these plans are updated, the JCC Resilience Plan will incorporate and align with the most up-to-date data and recommendations.

Evaluation

The evaluation section includes a description of indicators of success including metrics to measure success and an evaluation of cost-effectiveness, deliverables, and project management.

Indicators of Success

In the short-term, the project includes a completed and approved resilience plan for James City County. The Plan will be completed within the 14-month schedule outlined within the Implementation Timeframe section and within the budget further described in the Budget Narrative.

In the long-term, the success of the Resilience Plan will be realized in its contribution to the prioritization, design, funding, and implementation of resilience actions that reduce local risks and impacts from flooding. Sustained collaboration and continued use of this planning document by the County to adapt to changing environmental conditions is the ultimate sign of successful plan adoption and implementation. However, specific metrics have been developed based on the identified goals and objectives for the project.

Table 4 - Metrics for Goals and Objectives

Goals	Objectives	Metrics
1 Understand how to reduce the impacts of flooding by better understanding the impacts of climate change and identifying vulnerable assets within the County.	1.1 Identify critical assets within the County. 1.2 Map existing and future flood hazards in relation to critical assets. 1.3 Identify highly vulnerable assets including physical, natural, and cultural assets. 1.4 Identify focus areas with existing highly vulnerable assets or areas with the highest future risk without intervention.	1.1 Critical assets were identified and mapped in GIS. 1.2 Existing and future flood hazards were mapped in GIS. 1.3 Highly vulnerable assets were identified and mapped in GIS including physical, natural, and cultural assets. 1.4 At least five focus areas were identified for existing conditions and future conditions based on vulnerability and feedback.
2 Understand flood impacts and concerns from stakeholders, residents, and disadvantaged communities throughout the County.	2.1 Engage a steering committee at key milestones throughout the project. 2.2 Facilitate meaningful public engagement opportunities providing in-person and virtual opportunities for feedback at key milestones. 2.3 Identify disadvantaged and historically underserved communities within the County and perform strategic engagement.	2.1 At least three steering committee meetings were held. 2.2 At least three public meetings were held. 2.3 Disadvantaged and historically underserved communities were identified, and at least three strategic engagement meetings were conducted for these communities.
3 Leverage existing County and regional efforts to build on existing efforts and coordinate future action.	3.1 Review existing plans and identified resilience actions for inclusion in the JCC Resilience Plan. 3.2 Invite stakeholders involved in hazard mitigation to participate in the steering committee. 3.3 Align JCC Resilience Plan updates with other regional initiatives.	3.1 Existing plans and identified resilience actions were reviewed and included in the Plan. 3.2 Stakeholders who were involved in hazard mitigation were invited to participate in the steering committee. 3.3 JCC Resilience Plan updates were aligned with hazard mitigation and watershed management plan updates, among other regional initiatives.
4 Identify and prioritize actions for flood mitigation and adaptation that align with regional and state resilience actions.	4.1 From the existing plan review, update actions from the regional hazard mitigation plan and Coastal Master Plan as appropriate. 4.2 Based on the vulnerability assessment and engagement identify new resilience actions for the County. 4.3 With stakeholders, prioritize a range of resilience actions using a structured process.	4.1 From the existing plan review, update actions from the regional hazard mitigation plan and Coastal Master Plan as appropriate. 4.2 At least five new resilience actions were identified for the County. 4.3 Resilience actions were prioritized using a structured process and stakeholder input.

Goals	Objectives	Metrics
5 Adopt JCC Resilience Plan to guide the County's resilience efforts.	5.1 Provide the public, key stakeholders, and review boards with a review and comment period. 5.2 Present the Plan to the County Planning Commission. 5.3 Present the plan to the County Board of Supervisors at a public hearing and vote to adopt the Plan.	5.1 Public was provided with a minimum 30-day review and comment period. Stakeholders, the Planning Commission, and Board of Supervisors were given opportunities for review. 5.2 The Plan was presented to the County Board of Supervisors and Planning Commission. 5.3 County Board of Supervisors held a vote to adopt the Plan
6 Better prepare the County to acquire funds for resilience actions.	6.1 Develop the JCC Resilience Plan in line with DCR's requirements in the *CFPF Round 5 Grant Manual*. 6.2 Develop an Action Plan that includes clear actionable steps and problem understanding to support funding applications for specific projects and initiatives. 6.3 Develop a Funding Plan to align identified actions with available funding sources. 6.4 Submit the Plan to DCR for review and approval to become eligible for CFPF project funds.	6.1 The JCC Resilience Plan was developed in line with DCR's requirements in the *CFPF Round 5 Grant Manual*. 6.2 An Action Plan was developed that includes clear actionable steps and problem understanding to support funding applications for specific projects and initiatives. 6.3 A Funding Plan was developed to align identified actions with available funding sources. 6.4 The Plan was submitted to DCR for review and approved to become eligible for CFPF project funds.

Cost Effectiveness

By developing the Plan, James City County will work toward reducing future flood losses by pursuing project implementation funding. Developing a resilience plan is a strategic investment that yields significant long-term savings and benefits. These benefits can be realized through:

- Reduced damages
- Potential insurance premium savings
- Reduced economic disruptions
- Integration of nature-based solutions

The US Chamber of Commerce asserts that, for every $1 invested in resilience and disaster preparedness, $13 are saved in economic impact, damage, and cleanup costs after a flood event.[13]

Project Management Plan

During the specified timeframe for the Plan development, a Project Management Plan will be developed and implemented to support evaluation of the JCC Resilience Plan and to help ensure that the Plan is completed on time and meets the requirements included in the CFPF Round 5 guidance document. JCC staff will review the Project Management Plan on a regular basis and document any potential schedule delays or other information that may be used to improve the plan update process.

[13] *The Preparedness Payoff: The Economic Benefits of Investing in Climate Resilience*, US Chamber of Commerce, 2024.

Assessment of Capacity and Planning Needs

The following information is provided as supporting documentation for capacity building and planning applications per the guidance from the *2024 Funding Manual for the Virginia Community Flood Preparedness Fund Round 5*.

Resource Development Strategy

James City County does not currently have the staffing capacity to develop a resilience plan. Besides a limited county Stormwater and Resource Protection Division Capital Improvement Program that addresses flood mitigation efforts as funds permit, there are no resources dedicated to flood resilience. Without a comprehensive and forward-looking approach, the County is taking an ad hoc approach to flood resilience and is unable to apply for funds that would enhance local resilience to coastal flood hazards. Enhanced local resilience results in costs saved on natural disaster cleanup efforts, improved durability and longevity of local infrastructure, and saved opportunity costs that can be applied to other critical services within the County. The funding requested as part of this proposal will help the County meet resource needs by requesting funds that will support the hiring of a third-party consultant to develop and draft a plan, inclusive of comprehensive community engagement and outreach strategies.

Skills Management

During plan development, third-party consultants will frequently engage with staff on planning approaches and strategies. Once the final plan is approved, County staff will have a comprehensive understanding flood risks, impacts, and actionable steps to implement projects in the community.

Policy Management

With the aid of a new plan, County officials will be better able to integrate policies that advance flood resilience and hazard mitigation into local codes and ordinances.

Stakeholder Identification, Outreach, and Education Strategies

Integral to the development of the JCC Resilience Plan will be the identification of stakeholders and associated community outreach. Historically underserved and marginalized communities will be mapped with the help of the Project Management Team and Steering Committee for targeted outreach, and local actors involved in past hazard mitigation planning activities will also be called upon. Involving community members and organizations in the identification of flood hazards, data collection, and storytelling will result in a more comprehensive view of local conditions and appropriate resilience actions. This process will also educate the community about resilience planning efforts already underway and increase collective understanding of and appreciation for adaption and mitigation updates to critical infrastructure.

Supporting Appendices

Supporting appendices are provided with additional information for the grant application. The documents included in this section include current floodplain ordinances, current comprehensive plan, and hazard mitigation plan.

Appendix A: *Current Floodplain Ordinances*

James City County's current floodplain ordinance outlines the regulations for all properties and structures in the floodplain area. The ordinance includes development regulations and provisions for activity in flood-prone areas, underscoring compliance with FEMA and local regulations such as the Virginia Uniform Statewide Building Code.

Appendix B: *Current Comprehensive Plan*

The *James City County 2045 Comprehensive Plan* adopted in 2021 is a long-term vision of the County's priorities and aims for resilient measures across topics including economic development, land use, housing, environment, parks and recreation, and transportation.

Appendix C: *Hazard Mitigation Plan*

The *2022 Hampton Roads Hazard Mitigation Plan* outlines natural hazards and potential future impacts on Southeastern Virginia, including James City County in "the Peninsula" area. It details the planning process, a risk assessment and actionable mitigation steps for governments and municipalities to reduce hazard risk. The plan's strategies address climate change impacts and social vulnerability to inform effective mitigation efforts.

Appendix D: *Powhatan Creek Watershed Management Plan*

The updated *Powhatan Creek Watershed Management Plan* was adopted in 2023. The Plan focuses on water quality, impairments, environmental impacts from increased urbanization, increased flood risk, regulatory thresholds for bacteria in streams, and thresholds for sediment and nutrient pollution. The flood risk section of the Plan helped identify a need for a more comprehensive and in-depth county wide flood resilience plan to understand flood risk across the County and perform a more robust vulnerability assessment.

Appendix E: *Yarmouth Creek Watershed Management Plan*

The updated *Yarmouth Creek Watershed Management Plan* was adopted in 2023. The Plan focuses on water quality, impairments, environmental impacts from increased urbanization, increased flood risk, regulatory thresholds for bacteria in streams, and thresholds for sediment and nutrient pollution. The flood risk section of the Plan helped identify a need for a more comprehensive and in-depth county wide flood resilience plan to understand flood risk across the County and perform a more robust vulnerability assessment.

Appendix F: *Diascund Creek Watershed Management Plans*

The *Diascund Creek Watershed Management Plan* was adopted in 2024 and is the first watershed management plan for the Watershed. The Plan focuses on water quality, impairments, environmental impacts from increased urbanization, increased flood risk, regulatory thresholds for bacteria in streams, and thresholds for sediment and nutrient pollution. The flood risk section of the Plan helped identify a need for a more comprehensive and in-depth county wide flood resilience plan to understand flood risk across the County and perform a more robust vulnerability assessment.

Appendix G: *Grove Area Stormwater Improvements Assessment Study*

Phase 1 and Phase 2 of the *Grove Area Stormwater Improvements Assessment Study* was completed in 2017. Phase 1 included an assessment of current drainage conditions, historic flooding problems, and system capacity. Phase 2 included proposed drainage improvements to alleviate flooding and provide adequate drainage capacity. Additionally, water quality improvement alternatives were evaluated and prioritized.

Appendix H: *James City County FY2025 Operating Budget Excerpts*

The *James City County FY2025-FY2026 Adopted Operating Budget & Plan* and *FY2025-FY2029 Adopted Capital Improvement Program* were jointly adopted on May 14, 2024. The selected pages in this appendix detail the County's infrastructure modernization strategy, the budget and associated goals of the Stormwater and Resource Protection Division, and the capital improvement program's expenditures on stormwater management projects.

James City County Flood Resilience Plan

Community Flood Preparedness Fund Grant
Budget Narrative



Budget Narrative

The James City County (JCC) Resilience Plan will help the County understand vulnerabilities and develop strategic actions to increase resilience. The estimated total cost to bring the project to completion is $291,000. Of the total cost, $218,250 is requested from CFPF grant funds and $72,750 (25%) is pledged by JCC as the matching requirement as demonstrated in the match pledge signed by the County Administrator, Scott Stevens.

The source of the match funds is the Stormwater and Resource Protection (SRP) Division Capital Improvement Program (CIP) Budget. The Fiscal Year 25 (FY25) Stormwater CIP budget includes $2.493 million for projects that address drainage concerns in neighborhoods or restore streams damaged by uncontrolled runoff. An average of $250,000 is also set aside annually for maintenance of stormwater infrastructure and previously constructed restoration efforts. Implemented capital projects are considered County assets and are monitored annually to ensure their continued function and structural integrity. Selected pages from the adopted CIP Program budget are included in Appendix H to demonstrate that dedicated local funding is in place.

JCC will be hiring a third-party qualified firm to develop the JCC Resilience Plan with project management support. All funds are expected to be used to hire a third-party firm to develop the Plan. The following budget was developed based on a review of previous CFPF flood resilience plan budgets and costs for previous JCC plans. The costs by task are summarized below including the required budget narrative table from *Appendix B* in *the CFPF Grant Round 5 Manual* (Table 1). The budget was estimated for each proposed task based on estimated staff rates for a third-party contractor as shown in Table 2.

Table 1- Filled in Appendix B Budget Table

Applicant
Name: Community Flood Preparedness Fund &
Resilient Virginia Revolving Loan Fund Detailed Budget Narrative

Period of Performance: March 1, 2025 through March 1, 2027
Submission Date: January 23, 2025

Grand Total State Funding Request	**$ 218,250**
Grant Total Share of Project	$ 218,250
Federal Funding (if applicable)	$ 0
Project Grand Total	$ 291,000
Locality Cost Match	25%

Breakout By Cost Type	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Federal Share (if applicable)	$0	$0	$0	$0	$0	$0	$0	$0	$0
Local Share	$0	$0	$0	$0	$0	$ 72,750	$0	$0	$0
State Share - CFPF Grant	$0	$0	$0	$0	$0	$ 218,250	$0	$0	$0
State Share - RVRF Match Loan	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pre-Award/Startup	$0	$0	$0	$0	$0	$0	$0	$0	$0
Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$ 291,000	$0	$0	$0

Table 2 - Budget by Task

Task	Subtask	Requested CFPF Grant Funds	Estimated JCC Cost	Total Estimated Cost
Task 1: Project Initiation and Management	1.1. Develop Project Management Plan 1.2. Hold Kickoff Meeting 1.3. Ongoing Project Management Meetings 1.4. Steering Committee Meeting #1 1.5. Stakeholder Mapping Exercise 1.6. Online Public Engagement Tools 1.7. Public Kickoff Meeting #1	$36,000	$12,000	$48,000
Task 2: Data Collection	2.1 Review of Existing Plan, Policies, and Previous Occurrences 2.2 Vulnerability Assessment Data Collection 2.3 Marsh Vulnerability Assessment Data Collection	$14,250	$4,750	$19,000
Task 3: Understand Existing Conditions and Capabilities	3.1 Summarize Existing Conditions 3.2 Capability and Capacity Assessment 3.3 Fast Effective Wins	$24,750	$8,250	$33,000
Task 4: Risk and Vulnerability Assessment	4.1 Draft Risk and Vulnerability Preliminary Assessment 4.1.1 County Risk and Vulnerability Assessment 4.1.2 Tidal Marsh Vulnerability Assessment 4.2 Steering Committee Meeting #2 4.3 Risk and Vulnerability Final Assessment 4.4 Steering Committee Meeting #3 4.5 Public Meeting #2	$54,000	$18,000	$72,000
Task 5: Resilience Action Development	5.1 Develop Draft Resilience Actions 5.2 Steering Committee Meeting #4 5.3 Public Meeting #3 5.4 Finalize Resilience Actions	$36,750	$12,250	$49,000
Task 6: Resilience Plan	6.1 Draft Plan 6.2 Steering Committee Meeting #5 6.3 Final Plan 6.4 Public Comment Period 6.5 Final Report Adjustments 6.6 Plan Adoption	$52,500	$17,500	$70,000
Total		**$218,250**	**$72,750**	**$291,000**

County Administration
101-D Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784
P: 757-253-6728

jamescitycountyva.gov

January 17, 2025

Ms. Angela Davis
Director of Dam Safety and Floodplain Management
Virginia Department of Conservation and Recreation
600 E. Main Street, 24th Floor
Richmond, Virginia 23219

RE: Local Authorization for James City County's Community Flood Preparedness Fund Round 5 Application (CID510201B_James City County_CFPF)

Dear Ms. Davis and Members of the Review Team:

James City County staff have my authorization and our Board of Supervisors' support to submit a grant application to the Capacity Building and Planning category of the 2024 Community Flood Preparedness Fund (CFPF). The application will be subject to the approval, amendment, and appropriation of funds by the James City County Board of Supervisors upon award of the grant.

As detailed in the grant application, these grant funds would enable James City County to develop a resilience plan. Although James City County has taken substantial steps toward flood mitigation over the years through our watershed management plans, Comprehensive Plan, regional hazard mitigation plan, and participation in the Community Rating System, these efforts have been limited in scope and/or focused on different geographical areas. We believe a resilience plan will be able to build on these previous efforts and advance to the next stage of our flood preparedness by articulating a comprehensive, county-wide approach to flooding. Through the planning process, we will be better able to understand our exposure to recurrent and future flooding, assess our community's vulnerability and risk from future flood hazards, and identify and prioritize resilience actions. Once adopted, the resilience plan will put us in a position to access state funding for implementation items such flood prevention and protection studies and infrastructure projects.

If awarded, James City County will provide a 25% match, estimated at $72,750 of the resilience plan's total estimated cost of $291,000, to the CFPF application request of $218,250.

Sincerely,

Scott A. Stevens
County Administrator

Attachment – Resolution of Support

RESOLUTION

GRANT APPLICATION TO THE

COMMUNITY FLOOD PREPAREDNESS FUND - ROUND 5

WHEREAS, the Board of Supervisors of James City County, Virginia (the "County"), desires for the County to submit an application requesting up to $291,000 from the Community Flood Preparedness Fund (CFPF) through the Virginia Department of Conservation and Recreation (VDCR) - Round 5; and

WHEREAS, the County has allocated up to $72,750 to match the CFPF, as part of the Fiscal Year 2025 Stormwater and Resource Protection Division Capital Improvements Program budget, consistent with the year of the award; and

WHEREAS, the combined funding from the County and VDCR totaling up to $291,000 is requested to fund a local resilience plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby supports this application for an allocation up to $218,250 through the Community Flood Preparedness Fund and further approves a County contribution for the required match for this project, and hereby authorizes the County Administrator to sign the necessary applications, agreements, and other documentation necessary to administer this project.

James O. Icenhour, Jr.
Chair, Board of Supervisors

ATTEST:

Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
HIPPLE	✓			
NULL	✓			
MCGLENNON	✓			
LARSON	✓			
ICENHOUR	✓			

Adopted by the Board of Supervisors of James City County, Virginia, this 14th day of January, 2025.

CFPFGrantRd5-res

FY2025-FY2026

ADOPTED OPERATING BUDGET & PLAN









FY2025-FY2029

ADOPTED CAPITAL IMPROVEMENT PROGRAM

JAMES CITY COUNTY, VIRGINIA
www.jamescitycountyva.gov

STRATEGIC PLAN

The County's FY2025 Adopted Budget fully integrates the Strategic Plan. The following discussion provides the linkage of the goals contained in the Strategic Plan to the allocation of resources in the budget.

Goal: Modern Infrastructure, Facilities and Technology Systems

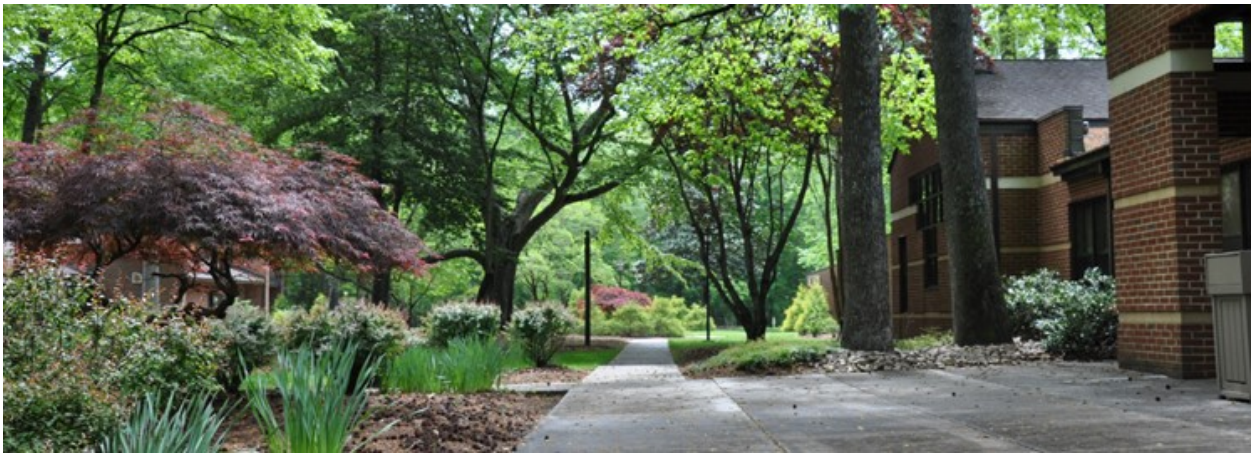
Modernization of our County facilities remains an overarching task. Projects related to County buildings and service roads; stormwater rehabilitation and construction; technology improvements; and business process enhancements affect each resident and business owner in our great County. To handle the infrastructure needs related to future growth and development, stormwater projects and technology platform enhancements are planned over the next five years.



The FY2025 Adopted Budget includes continuing maintenance and improvements for County facilities. These efforts include capital building maintenance, energy improvements, asphalt and concrete repairs, and the ongoing implementation of physical and technological safety measures to enhance the security of County buildings.

Stormwater infrastructure remains an important part of the County's CIP funding. In FY2025, $2.5 million is dedicated to watershed management plan retrofits at Skimino, Powhatan, Yarmouth and Ware Creeks; a flood study at Powhatan Creek; and other retrofits and maintenance projects. Additional stormwater projects are funded in future years, including improvements to Virginia Department of Transportation right-of-way properties.

Based on a recent space needs study, the County currently faces a space needs deficit of over 158,000 square feet. In addition, County facilities are spread throughout various locations, and the ongoing maintenance and expansion of those sites over time is estimated to cost over $91 million. To provide citizens with a convenient location to access County services and to address the County's short- and long-term space needs, a consolidated Government Center is proposed on Longhill Road. Construction costs for this new facility of $96.7 million are planned for FY2026.



Stormwater and Resource Protection



Stormwater and Resource Protection implements programs to manage storm runoff from development and protect residents, businesses, properties, and County waterways. The comprehensive program addresses runoff issues before development occurs, during construction, and after infrastructure is in the ground and operational. The Division develops and implements capital improvements to address damage to County streams and waterways, ensuring that they maintain their recreational uses. The Division also administers the County's State stormwater permit, known as the MS4 permit.

STRATEGIC PLAN GOAL(S) AND MEASURES

Strategic Plan Goal(s)	Key Performance Metric(s)	FY2023 Actual	FY2024 Estimate	FY2025 Target	FY2026 Target
Modern Infrastructure, Facilities, and Technology Systems	# of neighborhoods receiving assistance	95	100	75	75
	# of BMPs inspected	202	200	175	175
Protected Community Character and an Enhanced Built Enviroment	# of projects funded through the Clean Water Heritage Program	15	18	15	15
Exceptional Public Services	# of permit related inspections	9,420	11,500	9,500	9,500
	# of plan reveiws	386	400	350	350

OPERATIONAL INITIATIVE(S)

- Implementation of capital and drainage improvement projects in the Skimino, Powhatan, Yarmouth, and Ware creek watersheds, implementation of an updated Powhatan Creek Flood Study, and updates/upgrades/retrofits related to the TMDL Action Plan totaling approximately $2.4 million.
- Continued maintenance and upgrades/improvements to existing stream restoration and County owned stormwater management facilities.
- Management of the County's state stormwater permit activities, including local stream and Chesapeake Bay pollutant reductions.
- Support of the Clean Water Heritage Stormwater Maintenance and Repair Grant and Turf Love programs.

FINANCIAL SUMMARY

	FY2024 Adopted	FY2025 Adopted	FY2026 Plan
Total	$ 2,484,720	$ 2,762,760	$ 2,760,760
User Fees	(420,000)	(470,000)	(470,000)
Net County Funding	$ 2,064,720	$ 2,292,760	$ 2,290,760
Full-time FTEs	20.0	22.0	22.0

Comments: In January 2024, a Civil Engineer position and an Inspector position were added. The compensation adjustments discussed in the Budget Message are reflected in the budgeted amounts.

Capital Improvement Program Expenditures

GENERAL SERVICES

	FY2025	FY2026	FY2027	FY2028	FY2029	Total
General Services Building	$ -	$ 2,500,000	$ -	$ -	$ -	$ 2,500,000
Stormwater Infrastructure	2,493,000	2,613,000	2,204,000	2,600,000	2,634,000	12,544,000
Chickahominy Riverfront Park Well Replacement	2,042,000	-	-	-	-	2,042,000
Capital Building Maintenance	2,787,000	3,104,000	3,100,000	3,100,000	3,143,000	15,234,000
Asphalt & Concrete Repairs	331,000	200,000	200,000	200,000	200,000	1,131,000
Building Security and Safety	81,000	50,000	35,000	35,000	26,000	227,000
Fuel Sites	787,000	819,000	-	-	-	1,606,000
Curbside Recycling Billing System	-	340,000	-	-	-	340,000
HVAC/Electrical	97,000	171,000	167,000	171,000	161,000	767,000
Stormwater Maintenance	225,000	300,000	210,000	300,000	226,000	1,261,000
Building/Energy Improvement	149,000	298,000	289,000	278,000	255,000	1,269,000
Vehicle Replacement	-	-	-	248,000	211,000	459,000
Courthouse Maintenance	449,000	582,000	233,000	144,000	169,000	1,577,000
Total	$ 9,441,000	$ 10,977,000	$ 6,438,000	$ 7,076,000	$ 7,025,000	$ 40,957,000

Comments

Stormwater funding in FY2025 includes watershed management retrofits at Skimino Creek, Powhatan Creek, Yarmouth Creek, and Ware Creek, as well as water quality improvements across the County. Grant funds are applied for and when awarded, are used to assist in funding these projects.

Capital maintenance continues in County buildings inclusive of improvements to systems to ensure maximum efficiency and enhance security and safety.

Included in FY2025 are funds for the replacement of wells and water distribution points at Chickahominy Riverfront Park and the replacement of County fuel sites to ensure the safe and proper storage of diesel and gasoline used in County vehicles.

Funding in FY2026 is provided to construct a fuel island and furniture and fixtures for the new General Services Building.

Additional funding in FY2026 is provided for technological improvements, namely curbside recycling billing software.





DIVISION 3. - FLOODPLAIN AREA REGULATIONS

Sec. 24-586. - Statement of intent.

(a) This section is adopted pursuant to the authority granted to localities by Virginia Code § 15.2-2280. These regulations are intended to prevent the loss of life and property, the creation of health and safety hazards, the disruption of commerce and governmental services, the extraordinary and unnecessary expenditure of public funds for flood protection and relief, and the impairment of the tax base by:

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

(2) Restricting or prohibiting certain uses, activities and development within districts subject to flooding;

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

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

(b) These regulations comply with the requirements of the National Flood Insurance Program (42 USC 4001-4128) of the Federal Insurance Administration. These regulations are necessary in order for all property owners within the county to be eligible for the National Flood Insurance Program and thereby purchase such insurance at nominal rates.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-228, 9-25-07; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-587. - Applicability.

These regulations shall apply to all property located within an area designated as a floodplain area, and as such shall supplement the regulations of the zoning district within which such property is located. Where these regulations are at variance with other provisions of this chapter, it is intended that these regulations shall apply. These regulations shall only apply to property which is designated as being within a floodplain area.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-338, 1-9-18)

Sec. 24-588. - Compliance, liability, abrogation and severability.

(a) No land shall hereafter be developed and no structure shall be located, relocated, constructed, reconstructed, enlarged or structurally altered except in full compliance with the terms and provisions of these regulations and any other applicable ordinances and regulations; including, but not limited to: the Virginia Uniform Statewide Building Code (USBC), the Virginia Industrialized Building Safety Regulations (IBSR), and the Manufactured Home Safety Regulations (MHSR).

(b) The degree of flood protection sought by the provisions of these regulations is for reasonable regulatory purposes and is based on acceptable engineering methods of study. Larger floods may occur on rare occasions. Flood heights may be increased by man-made or natural causes, such as ice jams and bridge openings restricted by debris. These regulations do not imply that districts outside the floodplain district or that land uses permitted within such district will be free from flooding or flood damage.

(c) Records of actions associated with administering these regulations shall be kept on file and maintained by the director of community development or his designee in perpetuity.

(d) These regulations shall not create liability on the part of the county or any officer or employee thereof for any flood damages that result from reliance on these regulations or any administrative decision lawfully made thereunder.

(e) Any person who fails to comply with any requirement or provision of this article shall be guilty of the appropriate violation and subject to penalties set forth in section 24-22 of this chapter.

(f) To the extent that the provisions are more restrictive than previous requirements, this ordinance supersedes any ordinance currently in effect in flood-prone districts. To the extent that any other existing law or regulation is more restrictive or does not conflict, it shall remain in full force and effect. These regulations are not intended to repeal or abrogate any existing ordinances including subdivision regulations, zoning ordinances, or building codes. In the event of a conflict between these regulations and any other ordinances, the more restrictive shall govern.

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

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-228, 9-25-07; Ord. No. 31A-258, 11-22-11; Ord. No. 31A-291, 8-13-13; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-306, 10-11-16; Ord. No. 31A-338, 1-9-18)

Sec. 24-589. - Definitions and administrator.

The terms used in these regulations are defined in section 24-2 of this chapter except for the board of zoning appeals, which is defined in section 24-645. The administrator of these regulations is set forth in section 24-5 of this chapter.

(Ord. No. 31A-228, 9-25-07; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-590. - Designation of floodplain districts.

(a) The various floodplain districts shall include areas subject to inundation by waters of the one percent annual chance (100-year) flood. The minimum basis for the delineation of these districts shall be, but not be limited to, the December 16, 2015 Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) prepared by the Federal Emergency Management Agency (FEMA), and subsequent revisions or amendments thereto. In areas with no base flood elevation provided by the FIRM/FIS, the best available data for the one percent annual chance (100-year) flood elevations and floodways from federal, state and local sources shall be used when available. Where the specific one percent annual chance (100-year) flood elevation cannot be determined for an area by using available sources of data, then the applicant for the proposed use, development and/or activity shall determine this elevation to the satisfaction of the director of community development or his designee in accordance with hydrologic and hydraulic engineering techniques. Hydrologic and hydraulic analyses shall be undertaken only by professional engineers or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently accepted technical concepts. Studies, analyses, computations, etc. shall consider full development of the watershed and shall be submitted in sufficient detail to allow a thorough review by the director of community development or his designee.

Where flood elevations are provided by the FEMA, these elevations shall not be changed except with FEMA approval. Local sources of flood-prone area data include, but are not limited to, the Mill Creek-Lake Powell Watershed Study, GKY and Associates, 1988 report, locally approved watershed management plans and comprehensive drainage studies.

When base flood elevations have increased or decreased resulting from physical changes affecting flooding conditions, technical or scientific data shall be submitted to FEMA no later than six months after the date such information becomes available. Such submission is necessary so that, upon confirmation of those physical changes affecting flooding conditions, risk premium rates and floodplain management requirement will be based upon current data.

(b) The floodway district, minimally shown on the maps accompanying the flood insurance study, is established for purposes of these regulations using the criterion that certain areas within the floodplain must be kept free of encroachment in order that the one percent annual chance (100-year) flood be conveyed without increasing the water surface areas included in this district.

(c) The flood-fringe district shall be that area of the one percent annual chance (100-year) flood not included in the floodway district. The basis for the outmost boundary of the district shall be the one percent annual chance (100-year) elevations minimally shown as Zones AE and AO on the maps accompanying the flood insurance study.

(d) The approximated floodplain district shall be that floodplain area for which no detailed flood profiles or elevations are provided but where a one percent annual chance (100-year) flood boundary has been approximated. Such areas are minimally shown as Zone A on the maps accompanying the flood insurance study. Consider other available data such as presented in subsection (a) of this section as the basis for elevating residential structures to or above base flood level, and for floodproofing or elevating nonresidential structures to or above base flood level.

(e) Coastal A zones shall be those areas as defined by the Virginia Uniform Statewide Building Code that are subject to wave heights between one and one half feet and three feet and identified on the FIRM as AE areas that are seaward of the Limit of Moderate Wave Action (LiMWA) line.

(f) Coastal high-hazard area districts shall be those portions of land within the coastal floodplain subject to inundations by high velocity waters and wave action greater than three feet. Such areas are minimally shown as Zones V and VE.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-179, 9-8-98; Ord. No. 31A-228, 9-25-07; Ord. No. 31-258, 11-22-11; Ord. No. 31A-286, 12-11-12; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-306, 10-11-16; Ord. No. 31A-338, 1-9-18)

Sec. 24-591. - Official map.

The boundaries of floodway, flood-fringe and approximated floodplain districts in section 24-590(b), (c) and (d) above are established as minimum areas, as shown on the flood insurance rate map dated December 16, 2015, which is declared to be a part of these regulations and which shall be kept on file at the office of the director of community development.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-179, 9-8-98; Ord. No. 31A-228, 9-25-07; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-306, 10-11-16; Ord. No. 31A-338, 1-9-18)

Sec. 24-592. - Permits.

A permit is required for all proposed construction and other developments, including the placement of manufactured homes, within the floodway or any floodplain district. An application for subdivision, site plan, rezoning, building permit, special use permit, Virginia Erosion and Sediment Control Program/Virginia Stormwater Management Program permit, wetlands permit or other local development permit shall be considered an application for development under these regulations. The applicant shall be informed of the provisions of this article as they may apply to the property and no permit shall be issued until the applicant has complied with such provisions. Applications will be reviewed to ensure the proposed construction or other developments will be reasonably safe from flooding.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-593. - Permitted uses.

Permitted uses, special permit uses, accessory uses, dimensional standards and special requirements shall be as established by the underlying zoning district except as specifically modified herein.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-338, 1-9-18)

Sec. 24-594. - Prohibited uses.

(a) The following uses shall be specifically prohibited within all floodplain districts:

(1) Sanitary landfills, junkyards, outdoor storage of inoperative vehicles.

(2) Manufactured homes.

(3) Surface mines and borrow pits.

(4) Manufacture, bulk storage, transformation or distribution of petroleum, chemical or asphalt products or any hazardous materials as defined in either or both of the following:

a. Superfund Amendment and Reauthorization Act of 1986.

b. Identification and Listing of Hazardous Wastes, 40 CFR section 261 (1987).

The following products shall be specifically included:

i. Oil and oil products including petrochemicals.

ii. Radioactive materials.

iii. Any material transported or stored in large commercial quantities (such as 55-gallon drums) which is a very soluble acid or base, causes abnormal growth of an organ or organism, or is highly biodegradable, exerting a strong oxygen demand.

iv. Biologically accumulative poisons.

v. Substances containing the active ingredients of poisons that are or were ever registered in accordance with the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended (7 USC 135 et seq.).

vi. Substances highly lethal to mammalian or aquatic life.

(5) Storage or land application of industrial wastes.

(6) Outdoor storage of equipment, materials or supplies which are buoyant, flammable or explosive.

(b) Nonconforming uses of this chapter notwithstanding, no expansion of any of the above uses located within the floodplain district shall be permitted.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-338, 1-9-18)

Sec. 24-595. - Regulations for construction.

(a) The construction or placement of any structure or obstruction, filling or changing the cross-section or flow characteristics within the one percent annual chance (100-year) flood shall not be permitted unless the project is in conformance with the following requirements:

(1) All construction shall use methods that minimize flood damage and which are in accordance with the Virginia Uniform Statewide Building Code. Structures shall be constructed with materials and equipment resistant to flood damage and shall be anchored to prevent floatation, collapse, or lateral movement.

(2) The finished elevation of the lowest floor, including the basement or cellar of any building, shall have at least two feet freeboard above the one percent annual chance (100-year) flood elevation. For nonresidential structures, excluding accessory structures which conform to 24-595(a)(9), dry floodproofing up to the level of two feet freeboard in accordance with the Virginia Uniform Statewide Building Code may be provided in lieu of the finished grade requirement described herein.

(3) Utility and sanitary facilities, including but not limited to mechanical, plumbing and electrical systems and gas lines, shall be floodproofed up to the level of two feet freeboard above the one percent annual chance (100-year) base flood elevation.

(4) Encroachments, including fill, new construction, substantial improvements and other development are prohibited within the floodway or any floodplain district unless it has been demonstrated through hydrologic and hydraulic analyses that the proposed encroachment would not result in any increase in flood levels during the occurrence of the base flood discharge. Hydrologic and hydraulic analyses shall be undertaken by a professional engineer and shall be submitted in sufficient detail to allow a thorough review by the director of community development or his designee. Hydrologic and hydraulic analyses shall not be required for properties affected only by coastal (tidal) flooding.

(5) All new construction and substantial improved structures in Zone AO shall meet the following requirements:

a. The lowest floor, including basements, shall be at or above the highest adjacent grade and two feet above the FIRM's depth number.

b. Nonresidential structures may use dry floodproofing in accordance with the Virginia Uniform Statewide Building Code in lieu of the finished grade requirement described herein.

c. Adequate drainage paths around structures on slopes shall be provided to guide floodwaters around and away from proposed structures.

(6) All new construction and substantial improvements in Zones V, VE, and Coastal A shall meet the following requirements:

a. The structure shall be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated at least two feet above the base flood level. The pile of column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to effects of wind and water loads acting simultaneously on all building components. A registered design professional engineer or architect shall develop and seal the structural design, specifications and plans for the construction, and shall certify the design and methods of construction.

b. The space below the lowest floor shall be either free of obstruction or constructed with nonsupporting breakaway walls, open wood-lattice work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. Breakaway walls shall collapse from water loads that are less than that which would occur during the base flood.

c. New construction shall be landward of reach of mean high tide.

d. Fill for structural support and alterations of sand dunes are prohibited.

(7) The enclosed space below the lowest floor shall be used solely for parking of vehicles, building access or storage, have permanent openings designed to allow the exit of floodwaters in accordance with the Virginia Statewide Building Code and Federal Code 44CRF Section 60.3 approved by the director of building safety and permits. This requirement applies to all floodplain districts, including Zones V, VE, and Coastal A.

(8) Prior to issuance of a certificate of occupancy, the owner of any structure located in a floodplain district shall submit a completed elevation certificate or floodproofing certificate from a registered professional engineer or architect, as appropriate, to the director of building safety and permits.

(9) Accessory structures shall comply with elevation or dry floodproofing requirements in section 24-595 (a)(2) or shall conform to the following standards:

a. Not located in a floodway;

b. Not be used for human habitation;

c. Be limited to no more than 600 square feet in total floor area;

d. Be usable only for parking of vehicles or limited storage;

e. Be constructed with flood damage-resistant material to the level of two feet freeboard above the one percent annual chance (100-year) base flood elevation;

f. Be constructed and placed to offer the minimum resistance to the flow of floodwaters;

g. Be anchored to prevent flotation;

h. All utilities, including but not limited to mechanical, plumbing and electrical systems and gas lines, shall be elevated or floodproofed up to the level of two feet freeboard above the one percent annual chance (100-year) base flood elevation;

i. Shall be provided with flood openings which shall meet the following criteria:

1. There shall be a minimum of two flood openings on different sides of each enclosed area; if a building has more than one enclosure below the lowest floor, each such enclosure shall have flood openings on exterior walls;

2. The total net area of all flood openings shall be at least one square inch for each square foot of enclosed area (non-engineered flood opening), or the flood openings shall be engineered flood openings that are designed and certified by a licensed professional engineer to automatically allow entry and exit of floodwaters; the certification requirement may be satisfied by an individual certification or an evaluation report issued by ICC Evaluation Service, Inc.;

3. The bottom of each flood opening shall be one foot or less above the higher of the interior floor or grade, or the exterior grade, immediately below the opening;

4. Any louvers, screens or other covers for the flood opening shall allow the automatic flow of floodwaters into and out of the enclosed area.

j. Such accessory structure shall not be used to store any hazardous material as listed in section 24-593 (a)(4).

(10) All other federal and state permits shall be obtained by the applicant before the development will be permitted under this chapter.

(b) It shall be the responsibility of the applicant to provide this data, certified by a licensed surveyor or engineer or other source acceptable to the director of building safety and permits.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-249, 7-26-11; Ord. No. 31A-258, 11-22-11; Ord. No. 31A-286, 12-11-12; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-306, 10-11-16; Ord. No. 31A-338, 1-9-18)

Sec. 24-596. - Regulations for subdivisions and site plans.

The applicant of any subdivision of land or site plan within the county shall submit with his application a statement by a licensed surveyor or engineer as to whether or not any property shown on the plat or plan is at an elevation lower than the one percent annual chance (100-year) flood level. Where a one percent annual chance (100-year) flood level exists, the extent of this area shall be shown on the plat or plan. Further, the elevation of the finished surface of the ground at each building location shall be shown. Lots created after February 6, 1991, which are within a non-coastal (non-tidal) floodplain district, shall contain a natural, unfilled building site at least one foot above the one percent annual chance (100-year) flood

elevation adequate to accommodate all proposed buildings. All buildings shall be constructed solely within such building site and outside of the one percent annual chance (100-year) flood plain. All proposals shall be consistent with the need to minimize flood damage.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-228, 9-25-07; Ord. No. 31A-258, 11-22-11; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-597. - Regulations for replacement manufactured homes.

(a) Replacement manufactured homes shall be elevated on a permanent foundation in accordance with the construction standards identified in section 24-595.

(b) In floodplain areas, replacement manufactured homes shall be anchored to resist flotation, collapse or lateral movement by providing over-the-top and frame ties to ground anchors in either of the following arrangements:

(1) Over-the-top ties at each corner plus one frame tie at the middle of each side; or

(2) Frame ties at each corner plus no less than five evenly spaced additional frame ties per side.

(c) All ties to the ground shall be able to carry a force of 4,800 pounds.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-258, 11-22-11; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-598. - Recreational vehicles.

Recreational vehicles placed on sites must either be on the site for fewer than 180 consecutive days and be fully licensed and ready for highway use or meet requirements for placement, elevation and anchoring requirements for manufactured homes for the floodplain district in which the recreational vehicle is located.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-338, 1-9-18)

Sec. 24-599. - Design criteria for utilities and facilities.

(a) *Sanitary sewer facilities.* All new or replacement sanitary sewer facilities shall be designed to eliminate infiltration of floodwaters into the systems up to the one percent annual chance (100-year) flood level and discharges from the systems into the floodwaters in accordance with the Commonwealth of Virginia, Department of Health, Sewage Collection and Treatment Regulations. In addition, they should be located and constructed to eliminate flood damage and impairment.

(b) *Water facilities.* All new or replacement water facilities shall be designed to eliminate infiltration of floodwaters into the systems and shall be located and constructed to minimize or eliminate flood damages.

(c)

Drainage facilities. All storm drainage facilities shall be designed to convey the flow of surface waters without damage to persons or property. The systems shall ensure drainage away from buildings and on site waste disposal sites.

(d) *Septic tanks.* New or replacement septic tank drain fields shall be placed where they shall not be impaired or contaminated by a base flood. The Virginia Department of Health shall be consulted to verify compliance with this requirement.

(e) *Utilities.* All utilities, such as gas lines, electrical and telephone systems, being placed in flood prone areas should be located and constructed to eliminate the chance of impairment during a 100-year flooding occurrence.

(f) *Streets and sidewalks.* Streets and sidewalks should be designed to minimize their potential for increasing and aggravating the levels of flood flow. Drainage openings shall be required to sufficiently discharge flood flows without unduly increasing flood heights.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-600. - Regulations for filling in flood fringe and approximated floodplain districts.

No permit shall be issued or approved until the site development plan for such fill meets the following requirements:

(1) The filling of land shall be designed and constructed to minimize obstruction to and effect upon the flow of water and more particularly that:

a. Such fill will not result in any increase in flood levels during the occurrence of a one percent annual chance (100-year) flood discharge.

b. The flood-carrying capacity of the watercourse shall be maintained.

(2) Fill shall be effectively protected against erosion by vegetative cover, riprap, gabions, bulkhead or other acceptable method. Any structure, equipment or material permitted shall be firmly anchored to prevent dislocation due to flooding;

(3) Fill shall be of a material that will not pollute surface water or groundwater;

(4) Where, in the opinion of the director of community development or his designee additional topographic, engineering and other data or studies are necessary to determine the effects of flooding on a proposed structure or fill and/or the effect of such structure or fill on the flow of water in flood stage, the applicant shall submit such data or studies.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-228, 9-25-07; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-306, 10-11-16; Ord. No. 31A-338, 1-9-18)

Sec. 24-601. - Watercourse modification.

The Federal Insurance Administrator, adjacent jurisdictions and the Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management shall be notified and all federal and state permits shall be obtained prior to the alteration or relocation of any watercourse. The flood-carrying capacity to such watercourse shall be maintained.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-258, 11-22-11; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-602. - Existing structures in floodplain districts.

A structure or use of a structure or premises which lawfully existed before the enactment of these regulations, but which is not in conformity with these regulations, may be continued subject to the following conditions:

(1) Existing structures in the floodway district shall not be expanded or enlarged unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed expansion would not result in any increase in the one percent annual chance (100-year) flood elevation flood elevation;

(2) Any modification, alteration, repair, reconstruction or improvement of any kind to an existing structure and/or use located in any floodplain area to an extent or amount of less than 50 percent of its market value shall be elevated to conform to the Virginia Uniform Statewide Building Code; and,

(3) The substantial improvement of any kind to a structure and/or use, regardless of its locations in a floodplain area, to an extent or amount of 50 percent or more of its market value shall be undertaken only in full compliance with the provisions of these regulations and the Virginia Uniform Statewide Building Code and shall require that the entire structure be brought into full compliance with these provisions.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-228, 9-25-07; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Sec. 24-603. - Variances; factors to be considered.

(a) *Factors in passing upon applications for variance.* In passing upon applications for variances, the board of zoning appeals shall satisfy all relevant factors and procedures specified in other sections of the zoning ordinance and consider the following additional factors:

(1)

The danger to life and property due to increased flood heights or velocities caused by encroachments. No variance shall be granted for any proposed use, development or activity within any floodway district that will cause any increase in the one percent annual chance (100-year) flood elevation.

(2) The danger that materials may be swept onto other lands or downstream to the injury of others.

(3) The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination and unsanitary conditions.

(4) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owners.

(5) The importance of the services provided by the proposed facility to the community.

(6) The requirements of the facility for a waterfront location.

(7) The availability of alternative locations not subject to flooding for the proposed use.

(8) The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.

(9) The relationship of the proposed use to the comprehensive plan and floodplain management program for the area.

(10) The safety of access by ordinary and emergency vehicles to the property in time of flood.

(11) The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters expected at the site.

(12) The repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

(13) No variance shall be granted for any accessory structure to be wet floodproofed if that structure exceeds 600 square feet.

(14) Such other factors which are relevant to the purposes of this section.

(b) *Referral to qualified persons or agencies for technical assistance.* The board of zoning appeals may refer any application and accompanying documentation pertaining to any request for a variance to any engineer or other qualified person or agency for technical assistance in evaluating the proposed project in relation to flood heights and velocities and the adequacy of the plans for flood protection and other related matters.

(c) *Factors considered in variance application review.* In reviewing all variance applications, the board of zoning appeals shall consider the following factors:

(1) Increases in flood heights;

(2) Additional threats to public safety;

(3) Extraordinary public expense;

(4) Creation of nuisances;

(5) Fraud or victimization of the public; and

(6) Conflicts with local laws or ordinances.

(d) *Issuance.* Variances shall be issued only after the board of zoning appeals has determined that variance will be the minimum required to provide relief from any hardship to the applicant.

(e) *Notification of increased risk.* The board of zoning appeals shall notify the applicant for a variance, in writing, that the issuance of a variance to construct a structure below the one percent annual chance (100-year) flood elevation increases the risks to life and property and will result in increased premium rates for flood insurance.

(f) *Records of variance actions.* A record shall be maintained of the above notification as well as all variance actions, including justification for the issuance of the variances. Any variances which are issued shall be noted in the annual or biennial report submitted to the Federal Insurance Administrator.

(Ord. No. 31A-127, 10-29-90; Ord. No. 31A-301, 10-13-15; Ord. No. 31A-338, 1-9-18)

Secs. 24-604—24-613. - Reserved.

Community Character Public Facilities Land Use Transportation

Population

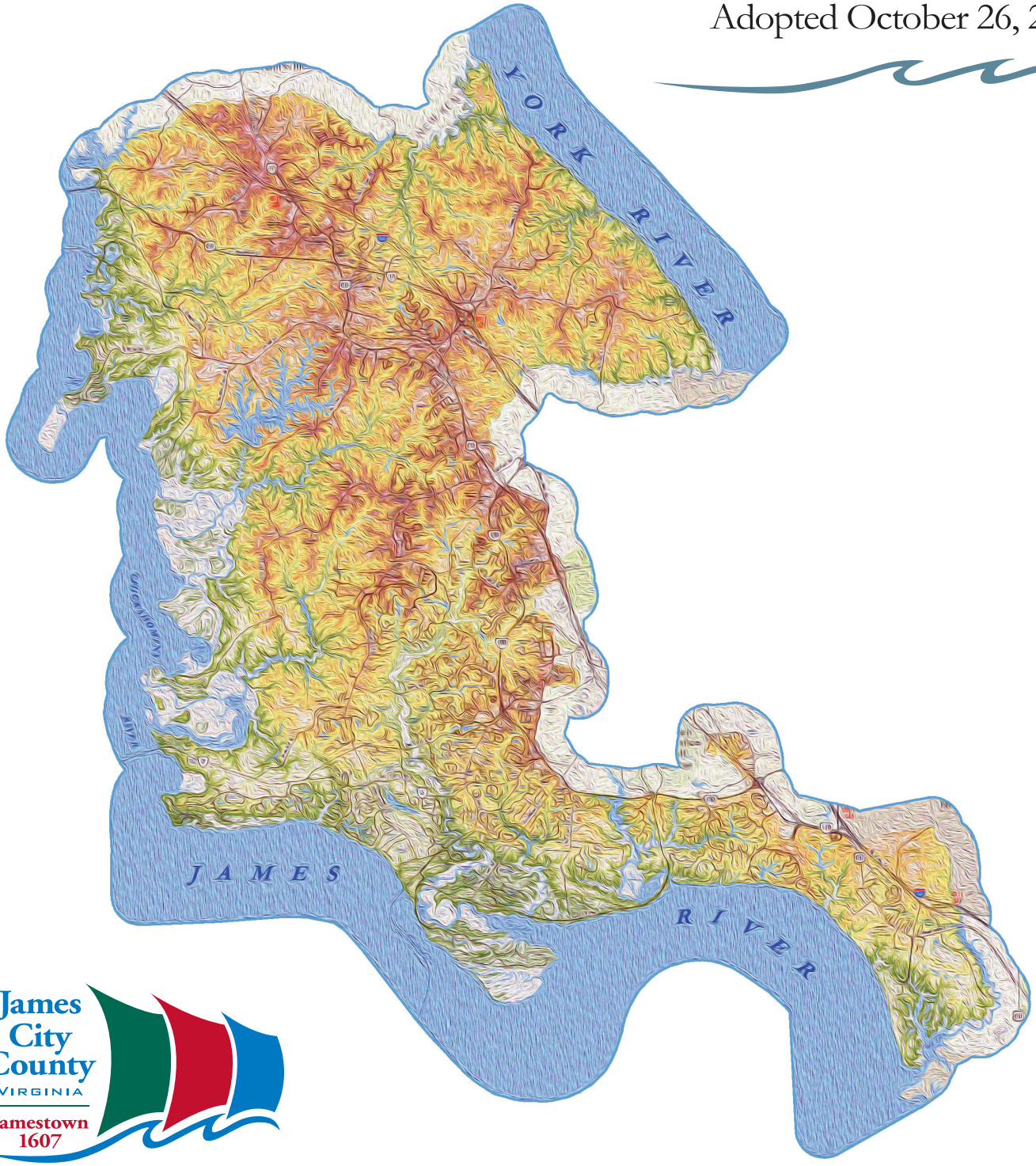
Our County, Our Shared Future

Housing

Parks & Recreation Environment Economic Development

James City County 2045 Comprehensive Plan

Adopted October 26, 2021



James City County
VIRGINIA
Jamestown 1607

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Virginia Housing

Grant funding for Engage 2045 Comprehensive Plan update process provided by Virginia Housing.
On the cover: *James City County Topography Map*

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James City County 2045 Comprehensive Plan

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Appendices

Paper copies of the Appendices are available upon request.
To purchase, please contact the Planning Division at **757-253-6685.**
Electronic versions are available at jamescitycountyva.gov/engage2045.

A. 2019 Citizen Survey Report
B. Round 1 Public Engagement Summary Report
C. Round 2 Public Engagement Summary Report
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F. Preferred Scenario Framework
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INTRODUCTION

Our Plan for a Resilient Future

The Purpose of the Comprehensive Plan

A comprehensive plan is a policy guide for local governments that sets a long-range vision and a strategy for implementing the vision. Developed from direction provided by residents, business owners, community stakeholders, and appointed and elected officials through a process called Engage 2045, this Comprehensive Plan includes a renewed community vision, goals, strategies, and implementation actions to achieve James City County's vision for an array of outcomes based on key community topics: community character, economic development, environment, housing, land use, parks and recreation, population, public facilities, and transportation.

Since 1980, every Virginia locality has been required by State law to have a Comprehensive Plan. James City County's plan - *Our County, Our Shared Future: James City County 2045 Comprehensive Plan* - serves as a guide to landowners, developers, businesses, residents, and County officials for future land use decisions, new community programs, and capital investments. By considering the types and locations of development and services needed or desired for a 20-plus year period, decision makers are better able to evaluate individual proposals in the context of long-term goals. This Plan is an update of the *Toward 2035: Leading the Way* comprehensive plan that was adopted by the County in 2015.

Where We Have Been and Where We Are Today

A Growing Community

James City County has been a growing community for decades. Its picturesque landscape, unique historic places, extensive natural areas, quality built environment, and high quality of life make it a stellar location to live, work, learn, and play. This continued growth has created benefits to the community, such as new tax revenues that pay for quality of life amenities like greenways and parks. This growth has also presented new challenges, such as increasing traffic congestion, growing costs to serve residents, loss of open space, and concerns about changing community character.

Over the last decade (2010-2020), the County added an average of 1,026 new residents per year resulting in a total estimated population of 77,265 residents in 2020. While this growth has been significant, analysis suggests that the County's growth rate is slowing, which aligns with an overall statewide trend of slower growth. While future growth may not occur at the rapid pace experienced in previous decades, the County still has one of the highest population growth rates when compared with other localities in Virginia. During the high population growth rate of the 2000-2010 period, the County was the 5th fastest growing locality in Virginia. Between 2010 and 2018, the County was the 11th fastest growing locality in the state.

Looking to the future, 2045 population projections suggest that the County could add another 27,000 to 44,000 new residents for a total population of approximately 105,000 to 121,000. While James City County is projected to have a higher growth rate when compared to neighboring jurisdictions, actual population growth will ultimately be determined by the local real estate market, guidance provided in this Plan, infrastructure investments, and associated development regulations.

An Aging, Affluent, and Highly Educated Community

Historic population trends are instructive when planning for future growth and the needs of future residents. James City County's 2018 population was older on average (45.5) when compared to the state (38.2) and the Hampton Roads region (36.1). By 2040, the proportion of County residents projected to be aged 65 or older is 34% compared to 27% in 2020. Aging residents have unique needs and demand is expected to grow for the services required to meet these needs.

A majority of the County population is white, with the percentage of white residents remaining relatively unchanged over the past three decades. The percentage of African Americans has been decreasing over time in James City County while other races (e.g., Native American, Asian, etc.) and Hispanics (ethnicity) of any race have been increasing. County residents have higher incomes and more education than residents across the state on average. The average household size in the County was declining but has been on the rise since 2010, possibly due to an increase in multigenerational housing that is happening throughout the nation.

A Community Many Want to Call Home

Much of the growth that has occurred in James City County is through the development of new houses and neighborhoods. The County went from being a rural community in 1970 with approximately 5,000 residential units to nearly 33,000 units in 2018. The housing stock in the County has remained relatively homogenous with single-family detached homes comprising 77.5% of residential units. Nearly 74.5% of residential units in the County are owner-occupied. Because the County's growth has taken place in recent years, its housing stock is relatively new, with more than 1/3 of the County's residential units built after 2000.

Like many communities around the nation, James City County is experiencing a housing affordability challenge. Some workers employed in the County are priced out of available housing in the County and instead live in neighboring communities and commute to work each day. This can create challenges for business recruitment efforts and further burden the regional transportation system. To address this issue, the James City County Board of Supervisors established the Workforce Housing Task Force in 2017 that developed the *2019 James City County Workforce Housing Task Force Findings and Recommendations Report*. This report identifies and describes four critical strategies for addressing the affordability challenge: housing preservation, housing production, housing access, and funding. These strategies are reinforced through this Comprehensive Plan.

A Community Making Strides to Grow and Diversify the Local Economy

In 2018, the total number of jobs located in the County totaled 30,233, resulting in an average annual job growth of 1.13% during the previous decade. Many of these jobs are in the County's top five industries: healthcare and social assistance; retail trade; accommodations and food services; arts, entertainment, and recreation; and manufacturing. With its prominent historical sites, such as Historic Jamestown, the County has a strong tourism and services sector that primarily employs lower skilled workers and pays lower wages. While this is a valued industry in James City County, diversifying the local economy and, in particular, adding new higher paying jobs has long been a goal of the County to ensure long-term fiscal and economic health.

To successfully compete for new businesses and high skill workers, the County needs to consider national and regional trends. Now more than ever, talented members of the workforce are choosing the place they want to live before they choose the place they want to work. For this reason, housing choice, cost of living, and quality of life amenities such as a multimodal transportation network, mixed-use destinations, walkability of developments and neighborhoods, recreation opportunities, and access to domestic and international flights and high-speed broadband play more of a key role in generating new business than ever before.

The COVID-19 pandemic has had an impact on the local economy, specifically a reduction in tourism spending coming into the community. The pandemic has also underscored the importance of broadband connections for businesses and workers to stay connected and competitive. Moving forward, it will be even more important to consider the types of environments that targeted industry workers demand and to support development of those types of places in James City County.

While many workers commute into the County to work each day (19,816 on average in 2019), there are also many workers living in the County commuting out to work each day (19,057 on average in 2019). Many of these workers are commuting to jobs in neighboring communities and the City of Richmond. Future economic development efforts could take advantage of the highly educated workforce that lives in James City County and create more opportunities for workers to work closer to home.

A Community that Manages Growth and Protects Community Character

James City County adopted its first Comprehensive Plan in 1975, which established the foundation for managing growth in the County. The County has a strong planning legacy of managing growth through the use of the Primary Services Area (PSA) and other growth management tools that define the area where land development is appropriate and where public utilities can be provided to support that growth. An analysis of land use, zoning, and approvals to subdivide and develop land within James City County's PSA conducted during Engage 2045 identified that there is a capacity for approximately 10,608 new residential units, approximately 7,400 of which are on designated lots with vested entitlements. Given past development trends, these lands are likely able to accommodate up to 24 years of projected future residential growth. In addition, another approximately 3,500 acres are available for development of nonresidential development. Determining the vision for these remaining lands in the County was a strong focus of this planning effort.

A Community that Values its Rural Landscape

James City County's citizens have shown how much they value their rural areas through many comments in public meetings and responses to surveys. Rural areas include lands inside and outside of the PSA, both of which continue to see development pressure. The greatest reserve of rural areas, however, continues to be outside of the PSA and these areas are traditionally designated as the County's "Rural Lands." Both in this planning process and during outreach in prior comprehensive plans, the citizens of James City County have repeatedly emphasized the great value they place on their rural landscapes, including the high premium citizens put on the quality of life that is derived from the County's pristine natural resources, protected open spaces, scenic rural vistas, and historic and traditional small town and village community character. Many are concerned that the pace, pattern and character of new growth and development may harm this treasured character of the County and many expressed a strong desire both to limit the pace and amount of new development and to direct it away from the rural areas that they value so highly.

A Community that is Facing New Challenges

Guiding the future development of James City County means dealing with many challenges – some longstanding and some new. As this plan is being written, the world is battling a global pandemic and sea level rise is a growing threat to coastal communities like ours. The long-term impacts of the COVID-19 pandemic are still being determined and environmental analysis of sea level rise suggests that changes are needed to protect human life and property from receding shorelines, future flooding, and related impacts. The planning process has acknowledged these and other challenges and the uncertainty of how these impacts will unfold. Using the best available information, this Plan provides a framework for creating a more resilient future for James City County and its future residents.



Where We Are Headed: Our Vision and Goals

Building on past planning efforts and new ideas generated through Engage 2045, several key themes were identified as being central to the vision for James City County's future. These key themes, also called public input priorities have served as critical guides for developing this Plan. These public input priorities – Protect Nature, Preserve Community Character, Support Affordable Workforce Housing, Expand Economic Development, and Enhance Quality of Life – serve as the core components of the Our County, Our Shared Future: *James City County 2045 Comprehensive Plan* vision.

Our Vision Statement

Our Historic Past

James City County is a place of firsts. It was home to the first permanent English settlement and the first colonial government in America. From this region grew a powerful and prosperous collection of colonies that would eventually free itself from English rule and form a new nation. Because of this proud heritage, James City County is a place of special significance, not only for its residents, but also for citizens across the Commonwealth of Virginia and the United States. Given the importance of our unique historical identity, we have a responsibility to preserve and protect our irreplaceable assets for future generations.

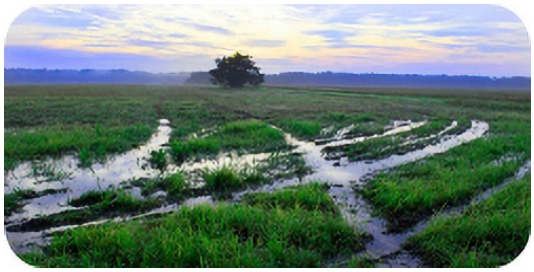
This responsibility requires that we preserve the legacy of our quality of life in James City County through wise planning, policy-making, and legislation. We must strive to manage growth and balance the needs of development with historical and environmental protection, the needs for infrastructure, transportation, quality schools and the availability of water. We will not settle for less than first-class education, medical care, public safety, recreation, and entertainment that strengthen the fabric of our community. But our mission does not end there.

Our County, Our Shared Future

James City County also recognizes the importance of leaving the County in good shape – economically, socially, and ecologically – for present and future residents and visitors. As we look to the future, we will address that which will strengthen and preserve what is best and most special in the County. To this end, we will work to achieve the five public input priorities established during the Engage 2045 process.

Protect Nature

The natural environment is a highly valued component of James City County. We will work to preserve the greenspaces and wetlands that lend their beauty to our community, support the health of our ecosystem, reduce systemic risks due to sea level rise, protect water quality, and create opportunities for residents to recreate and enjoy nature. We will carefully manage growth and development to protect critical natural resources and cooperate with private conservancies and landowners to protect these open spaces.



Preserve Community Character



In addition to the natural environment, we will protect the County's rural community character, including the unique identity of rural communities like Toano, as well as large tracts of open agricultural land outside the County's Primary Service Area (PSA). We will direct new development away from rural lands and rural communities and design our built environment to respect our historical context.

Enhance Quality of Life



We will work to improve opportunities for all of our residents and pay special attention to those most in need or at risk. A safe, efficient transportation network for vehicles, pedestrians and bicyclists will meet the everyday needs of our residents while at the same time fully integrating James City County with the rest of Hampton Roads and Virginia. Quality of life amenities will be provided to all residents, including parks, public water access, expanded recreational facilities, trails for walking and bicycling, transit connections, and other enhancements to existing public facilities. We will continue to provide excellent public education and will partner with the Williamsburg-James City County Public Schools to continue to provide a high quality education to students.

Expand Economic Development



Industries that offer quality employment opportunities and that are compatible with the County's goals will be encouraged. Well-placed and well-planned commercial establishments will add to both the character and economy of our County. We will strive to develop new high paying jobs and career opportunities for all members of the workforce within our County and to provide our population with the best possible education and training so that our citizens may fully realize these opportunities. We will expand the local employment base to not only include tourism as a major economic driver in the County, but also other targets for employment and industries.

Support Affordable Workforce Housing



Residential units will be thoughtfully and logically placed and provide a wide range of choice. We will support development of affordable housing for our County's workers that is designed to complement the County's unique and historic community character.

We will sustain the quality of life and economic vitality in James City County while preserving our special natural and cultural heritage. We will accomplish this by promoting smart growth principles, adopting supporting strategies, providing a variety of housing options, supporting economic development, and providing diverse recreational, cultural and education opportunities for all ages. These actions will be implemented to the benefit of all County residents. James City County will uphold its identity as an exceptional area to visit and a special place to live and work.

Our Goals

To further guide achievement toward the County's vision, the Plan includes nine community goals that define the outcomes to achieve in the future.



Community Character Goal: *The County will be a good steward of the land by preserving and enhancing the scenic, cultural, rural, farm, forestal, natural, and historic qualities that are essential to the County's distinctive character, economic vitality, and overall health and quality of life of its residents.*



Economic Development Goal: *Build a more sustainable local economy that upholds James City County's commitment to community character and environmental protection; results in a diversity of businesses, community investment, and professions that attract higher paying jobs; supports the growth of the County's historic, agri-tourism and eco-tourism sectors; contributes positively to the community's quality of life; and better balances the local tax base.*



Environment Goal: *Continue to improve the high level of environmental quality in James City County and protect rural and sensitive lands and waterways that support the resiliency of our natural systems for the benefit of current and future generations.*



Housing Goal: *Consistent with the four principles of the Workforce Housing Task Force, maintain and develop residential neighborhoods to achieve high quality design and construction, and provide a wide range of choices for both renters and owners in housing types, densities, price ranges, and accessibility that address the needs of the County's residents and workers of all ages and income levels.*



Land Use Goal*: Achieve a pattern of land use and development that reinforces an improves the quality of life for citizens by encouraging infill, redevelopment, and adaptive re-use within the PSA; limiting development on rural and natural lands outside the PSA; and achieving the other eight goals of this Comprehensive Plan.*

Parks and Recreation Goal: *Provide a range of recreational facilities and activities desired by the community that are affordable, accessible, and adequate in number, size, type, and geographic dispersion to accommodate the needs of all County residents and that promote personal growth, social development, and healthy lifestyles.*

Population Goal: *Provide the means for all citizens, especially youth and seniors, to achieve a high quality of life through safe, affordable, and convenient access to programs, services, and activities.*

Public Facilities Goal: *Provide high quality public facilities, including schools, and public services in a manner that balances demand for facilities and services with fiscal impacts.*

Transportation Goal: *Provide citizens, businesses, and visitors of James City County with an efficient, safe, attractive, and resilient multimodal transportation system that encourages use of non-automotive forms of transportation and reinforces or is consistent with the goals and land use patterns of the Comprehensive Plan.*



How We Will Achieve Our Vision: Strategies and Actions

The Engage 2045 planning process began with a professional survey of James City County residents to understand the community's opinions on a broad range of community planning issues. The 2019 Citizen Survey asked respondents to identify the importance of several planning topics and their satisfaction with the current condition of these topics. A comparison of the importance and satisfaction for topics revealed five "satisfaction gaps" where the community thought a planning topic was important but that there was work to be done to improve satisfaction. These topics in order of highest to lowest satisfaction gap include affordable housing (33%), roads and highways (24%), attracting jobs and businesses (20%), preserving rural character (16%), and protecting the environment (15%).

These satisfaction gaps, along with Round 1 public inputs, were the basis for developing the public input priorities. These public input priorities set the stage for later public engagement efforts to update the Plan's goals, strategies, and actions. The four Engage 2045 public engagement rounds were guided by the foundational information included in the 2019 Citizen Survey with a special focus on the satisfaction gaps. The following priority actions were guided by the public inputs provided in this survey and the subsequent rounds of engagement. These priority actions are recommended to have "short term" status when incorporated into the updated James City County Strategic Plan. (To see the full list of implementation actions, see Chapter 5: Implementation.)

Priority Actions Recommended for Short-Term Status in the Strategic Plan	Related Public Input Priorities	Type of Action	Related Actions
CC 1.2 Continue to explore opportunities and cost-sharing arrangements to bury overhead utilities in Community Character Corridors and Community Character Areas through transportation initiatives.	**Preserve Community Character**	**Capital Investments & Funding**	
CC 1.5 Preserve the character of rural roads by identifying roads that should be preserved and work with the Virginia Department of Transportation (VDOT) to maintain their rural character while providing an acceptable level of safety.	**Preserve Community Character**	**Partnership Opportunity**	
CC 3.3.6 Consider incorporating elements of the Character Design Guidelines into the future land use guidelines in the Land Use chapter to ensure consistency between the Community Character and Land Use guidelines.	**Preserve Community Character**	**Further Planning & Initiatives**	
CC 3.3 Continue to improve and protect the character of the County through use of the Character Design Guidelines.	**Preserve Community Character**	**Regulatory & Guideline Updates**	

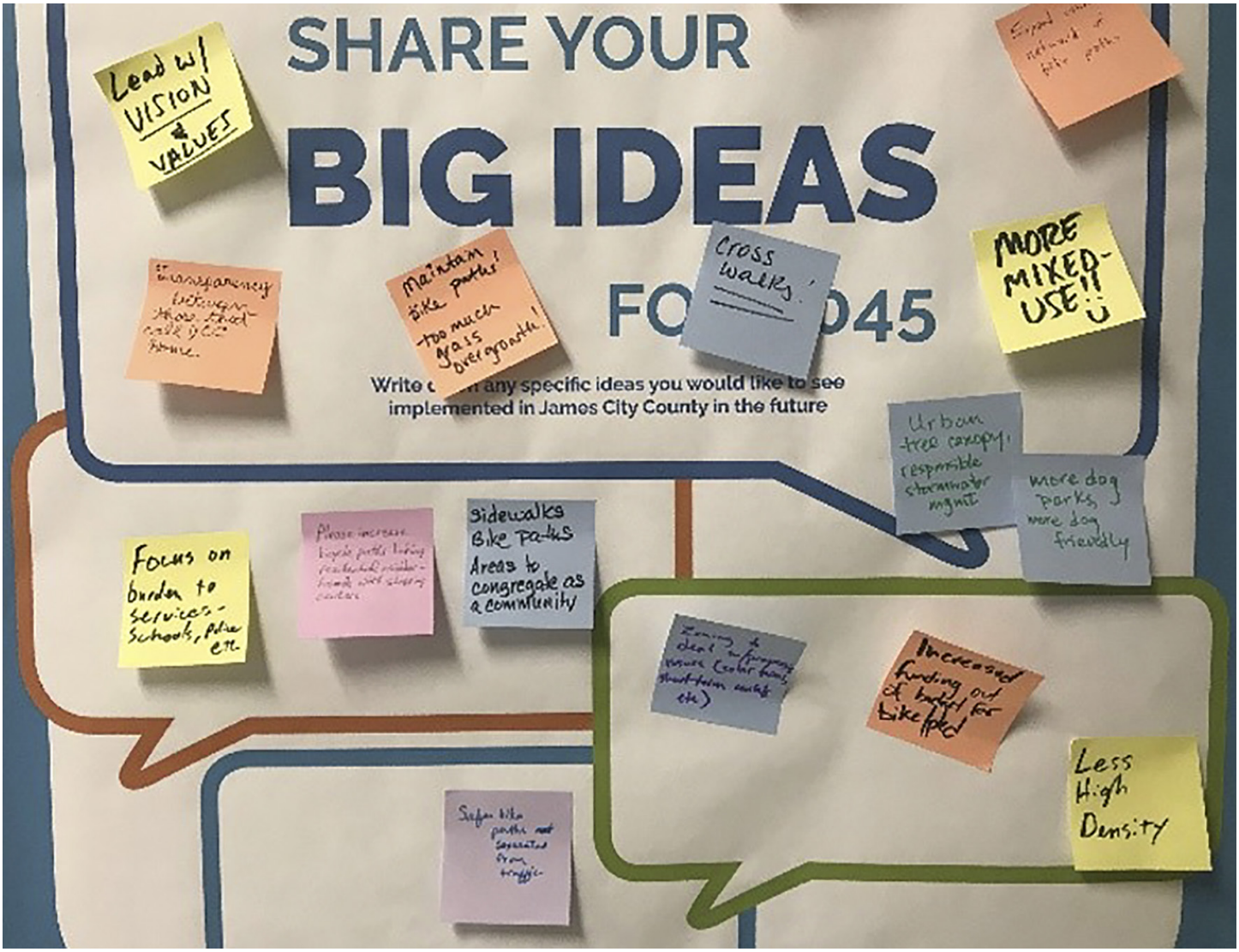
Priority Actions Recommended for Short-Term Status in the Strategic Plan	Related Public Input Priorities	Type of Action	Related Actions
ED 1.3 Continue to pursue and promote incentives available for new and expanding businesses and industries within certain areas in the County, including Opportunity Zones, Foreign Trade Zones, and Tourism Zones, and develop additional incentives for new and existing business development.	Expand Economic Development	Capital Investments & Funding	
ED 1.5 Work with William & Mary, Thomas Nelson Community College, and other entities in support of business attraction and expansion of quality and innovative business ventures.	Expand Economic Development	Partnership Opportunity	
ED 4.5 Continue to support public private partnerships to revitalize unique areas within the County such as Toano.	Preserve Community Character, Expand Economic Development	Partnership Opportunity	
ED 7.2 Review and update County regulations, policies, and procedures to ensure they create clear expectations for developing new businesses in targeted industries, and that land use requirements are flexible to changing market trends.	Expand Economic Development	Regulatory & Guideline Updates	
ENV 1.7 Identify the specific existing and potential uses of County streams and rivers and identify standards necessary to support these uses. Protect the quality and quantity of these surface waters so they will continue to support these uses. Give consideration to protecting existing and potential water resource uses when reviewing land development applications.	Protect Nature	Further Planning & Initiatives	
ENV 1.16 Develop funding and implementation mechanisms for the watershed protection and restoration goals and priorities from watershed management plans adopted by the Board of Supervisors.	Protect Nature	Capital Investments & Funding	
ENV 1.18 Continue to develop regional, cumulative impact-focused hydraulic studies for County waterways vulnerable to flooding and develop strategies to fix identified problems.	Protect Nature	Capital Investments & Funding	
ENV 1.20 Explore Zoning Ordinance amendments that would incorporate recommendations of the Colonial Soil and Water Conservation District as it pertains to equine and other animal stocking rates.	Protect Nature	Regulatory & Guideline Updates	
ENV 1.21 In a joint endeavor by the Stormwater & Resource Protection Division and Stormwater Program Advisory Committee prepare a multi-year, prioritized list of stormwater-related projects, including stream restoration, health, safety, and water quality that includes estimated costs for design and implementation.	Protect Nature, Enhance Quality of Life	Capital Investments & Funding	
ENV 3.7.1 Investigate changes to the Zoning Ordinance including renaming the A-1, General Agricultural District and re-examining lot sizes and clustering provisions to acknowledge and encourage preservation of forested land.	Protect Nature, Preserve Community Character, Enhance Quality of Life	Regulatory & Guideline Updates	LU 6.2, 6.2.1

Priority Actions Recommended for Short-Term Status in the Strategic Plan	Related Public Input Priorities	Type of Action	Related Actions
H 1.1.6 Continue to support, through marketing, partnering, and other means, nonprofit groups such as Housing Partnerships, Inc., Habitat for Humanity, Community Action Agency, and project: HOMES which have programs providing emergency home repair; preventive maintenance; and counseling in home finance, rental assistance, budgeting, and sanitary health conditions.	Support Affordable Workforce Housing	Partnership Opportunity	
H 2.3 Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing: (H 2.3.3) Identify Virginia-based builders/developers with experience in adaptive reuse and convene a public meeting to discuss and better understand the challenges and opportunities with adaptive reuse. (H 2.3.7) Engage owners of properties that are good candidates for redevelopment or adaptive reuse to explore opportunities. (H 2.3.8) Facilitate connections among property owners and developers, and identify resources that could be employed to facilitate adaptive reuse projects.	Preserve Community Character, Expand Economic Development, Support Affordable Workforce Housing	Partnership Opportunity	
H 2.3 Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing: (2.3.5) - Review and modify the use lists for all zones to encourage residential/mixed-use developments along specific corridors and facilitate adaptive reuse opportunities in existing commercial areas. (2.3.9) - Develop a new zoning designation that would simplify motel-to-apartment conversions. (2.3.10) - Consider creating an administrative permitting process for commercial or residential conversions that include workforce housing.	Preserve Community Character, Expand Economic Development, Support Affordable Workforce Housing	Regulatory & Guideline Updates	
H 2.3 Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing: (2.3.6) - Investigate resources that could support adaptive reuse, including the Low-Income Housing Tax Credit, historic tax credits, and programs supporting housing for residents experiencing homelessness. (2.3.11) - Create a fund to assist owners with the cost of demolishing and redeveloping obsolete commercial buildings.	Preserve Community Character, Expand Economic Development, Support Affordable Workforce Housing	Capital Investments & Funding	
LU 1.6 Explore emerging technologies in the renewable energy industry, with the intention of protecting the County's unique rural character, preserving natural resources, and mitigating impacts to neighboring properties.	Protect Nature, Preserve Community Character, Expand Economic Development	Regulatory & Guideline Updates	

Priority Actions Recommended for Short-Term Status in the Strategic Plan	Related Public Input Priorities	Type of Action	Related Actions
LU 5.2 Ensure that developments are subject to zoning or special use permit review to mitigate their impacts through the following means: (5.2.3) - Continue to calculate and make available up-to-date information on the costs of new development in terms of public transportation, public safety, public schools, public parks and recreation, public libraries and cultural centers, groundwater and drinking water resources, watersheds, streams and reservoirs. (5.2.4) - Consider and evaluate the possible use of impact fees to help defray the capital costs of public facilities related to residential development.	Protect Nature, Preserve Community Character, Enhance Quality of Life, Expand Economic Development, Support Affordable Workforce Housing	Further Planning & Initiatives	
LU 6.1 Promote the economic viability of traditional and innovative farming and forestry as industries. (6.1.1) - Support both the use value assessment and Agricultural and Forestal District (AFD) programs to the maximum degree allowed by the Code of Virginia. Explore extending the terms of the County's Districts. (6.1.2) - Seek public and private funding for existing programs, investigate new programs, and support private or nonprofit (such as land trust) actions that promote continued agricultural or forestal use of property. a. Encourage dedication of conservation easements to allow property owners to take advantage of State and Federal tax provisions. Develop a program that would provide information to property owners on the benefits of easement donation, including helping owners consider future possible plans for their property to verify they can be pursued under deed language. b. Seek dedicated funding stream for open space preservation programs. Develop information for property owners on the benefits of participating in open space preservation programs. (6.1.4) - As resources allow, support implementation of the recommendations in the Strategy for Rural Economic Development to maintain and create viable economic options for rural landowners. (6.1.5) - Consider funding a staff position for a rural or agricultural development officer to support and help acquire funding for rural protection programs and to undertake other similar activities.	Protect Nature, Preserve Community Character, Expand Economic Development	Capital Investments & Funding	LU 1.6
LU 6.1 Promote the economic viability of traditional and innovative farming and forestry as industries. (6.1.2) - Seek public and private funding for existing programs, investigate new programs, and support private or nonprofit (such as land trust) actions that promote continued agricultural or forestal use of property. c. Stay informed of State legislation related to Transfer of Development Rights (TDR) and on the status of TDR programs in Virginia peer localities.	Protect Nature, Preserve Community Character, Expand Economic Development	Partnership Opportunity	LU 1.6

Priority Actions Recommended for Short-Term Status in the Strategic Plan	Related Public Input Priorities	Type of Action	Related Actions
LU 6.2 Residential development is not a recommended use in the Rural Lands. Creation of any lots should be in a pattern that protects the economic viability of farm and forestal assets, natural and cultural resources and rural character. Amend the Subdivision Ordinance, Zoning Ordinance, utility regulations, and related policies to promote such an overall pattern. Consider providing more than one option, such as the following, so long as an overall very low density pattern can be achieved, and the design and intensity of the development is consistent with stated Rural Lands designation description and development standards and available infrastructure. (6.2.1) - Revise the R-8 and A-1 zoning districts to set lot sizes to be consistent with stated Rural Lands designation description and development standards. As part of this amendment, consider easing the subdivision requirements such as eliminating the central well requirement or permitting the waiver of the central well requirement and/or allowing private streets in limited circumstances, as part of an overall balanced strategy. (6.2.2) - Revise the rural cluster provisions in the A-1 zoning district to be more consistent with the Rural Lands designation description and development standards. As part of this amendment, consider easing the subdivision requirements such as eliminating the central well requirement or permitting the waiver of the central well requirement, allowing private streets in limited circumstances, making it a streamlined by-right use at certain scales, allowing off-site septic or community drainfields, etc. (6.2.3) - Consider implementing a subdivision phasing program, where the number of blocks that could be created from a parent parcel within a given time period is limited. (6.2.4) - Consider adding strong buffer and expanded setback regulations to the A-1 and R-8 districts, particularly if the permitted densities are not lowered in these districts.	Protect Nature, Preserve Community Character, Expand Economic Development	Regulatory & Guideline Updates	
PF 1.9 Encourage the provision and location of preschool programs and classrooms throughout the County utilizing government sponsored programs, public schools, private schools, private businesses, churches, nonprofits, and where appropriate, home-based preschools.	Enhance Quality of Life	Partnership Opportunity	
PN 3.8 Assess food insecurity for lower income households in the County and examine ways to address any identified issues such as partnerships with the nonprofit sector, or possible development incentives for private sector development (such as a grocery store).	Enhance Quality of Life, Expand Economic Development	Further Planning & Initiatives	
PR 1.2 Prioritize potential property acquisition for parks in underserved areas of the County, as identified in the needs analysis in the current Parks and Recreation Master Plan or the outdoor recreation category of the Conserve Virginia model.	Enhance Quality of Life	Capital Investments & Funding	

Priority Actions Recommended for Short-Term Status in the Strategic Plan	Related Public Input Priorities	Type of Action	Related Actions
PR 3.1 Coordinate outdoor recreation, greenway, Purchase of Development Rights, greenspace, community character and environmental protection programs in order to maximize utility of shared resources and funding.	Protect Nature, Preserve Community Character, Enhance Quality of Life	Further Planning & Initiatives	
T 1.7 Coordinate the County resiliency plan with VDOT to ensure the County road system is resilient to future sea-level rise and recurring tidal and non-tidal flooding by conducting an analysis of roadways and bridges within areas of future high flood risk.	Protect Nature, Preserve Community Character, Enhance Quality of Life	Partnership Opportunity	ENV 3.7.2
T 3.1 Seek funding for a regularly updated list of proposed pedestrian and cycling projects on the Six Year Improvement Program.	Enhance Quality of Life	Capital Investments & Funding	

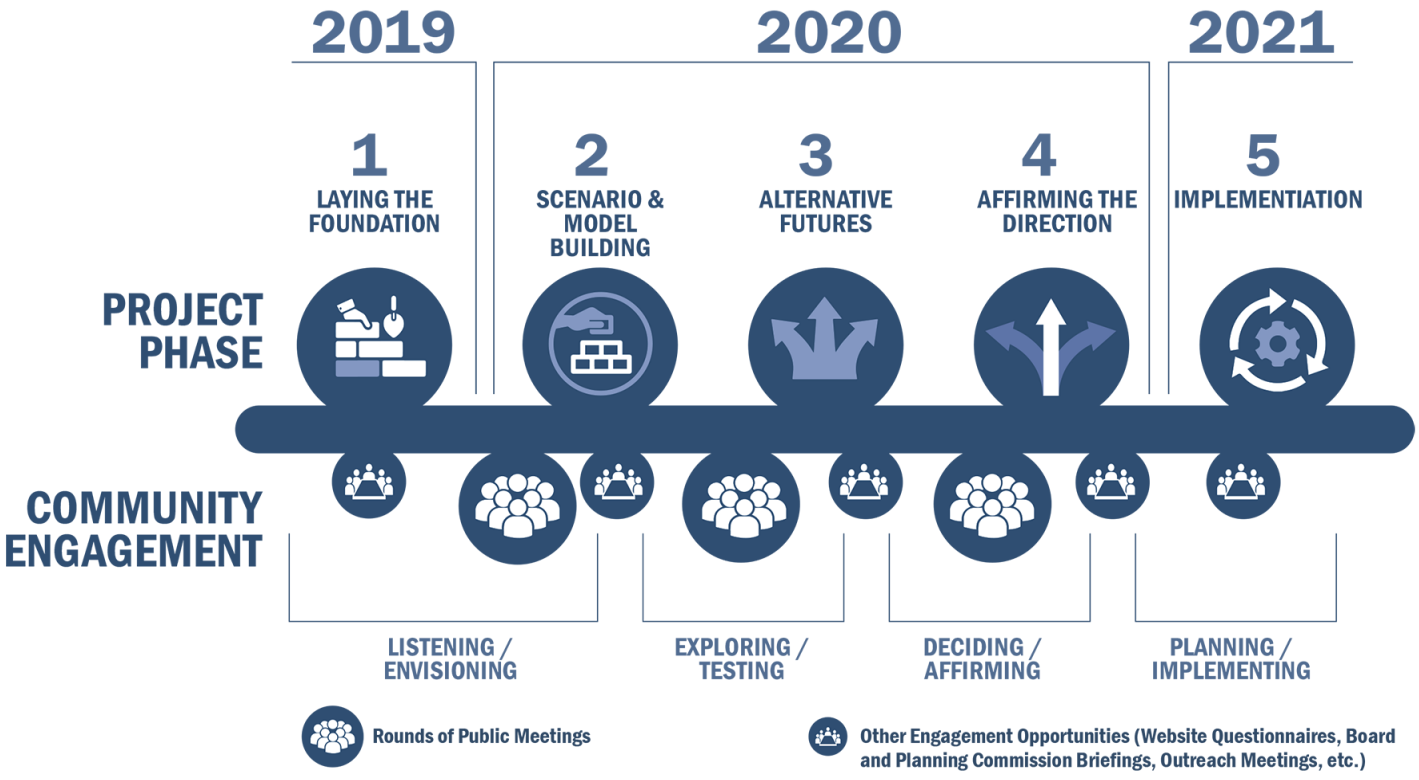


Engage 2045 Planning Process

Virginia state law requires local governments to review their comprehensive plans every five years. To satisfy this requirement, the locality merely has to reaffirm the information contained in the plan. However, it has been the tradition in James City County to undertake a more thorough review and update of the Comprehensive Plan every five years.

ENGAGE 2045
SHARE your ideas SHAPE our community
JAMES CITY COUNTY

Engage 2045, the planning process undertaken to update the Comprehensive Plan, built upon this tradition by employing the County's most robust public engagement effort to date and included scenario analyses that "tested" future growth alternatives and related impacts on community character, the transportation network, community infrastructure needs, and the County's fiscal bottom line. Like previous planning updates, this process was designed to be open, transparent, and participatory. The process included five project phases of plan development and four rounds of community engagement.



Project Leadership

The Engage 2045 process was led by a coordinated team comprised of the Community Participation Team (CPT), the Planning Commission Working Group (PCWG), and the Planning Team (County staff and consultants). Regular briefings to the Board of Supervisors (BOS) also occurred to support development of the Plan and solicit periodic guidance at key project milestones.

38
CPT meetings/ events

The **Community Participation Team (CPT)** was responsible for encouraging, facilitating, and reporting on citizen participation throughout the planning process. The Team primarily worked in partnership with staff, the Planning Commission, and Board of Supervisors in the coordination of publicity efforts, educating the public, sponsoring public meetings and other input opportunities, encouraging fellow residents and business members to participate in the planning process, and overseeing the preparation of summary reports on the public outreach and engagement process and the citizen feedback.

492
CPT volunteer meeting/event hours

The **Planning Commission Working Group (PCWG)** was tasked with leading the review and development of the draft Comprehensive Plan. The PCWG consists of all seven members of the Planning Commission, and a member of the Community Participation Team. The CPT shared inputs from citizens collected during the Engage 2045 planning process with the PCWG to help inform policy direction of the new Plan.

31
PCWG meetings/ events

The charge of the PCWG was to:

- Review community input;
- Guide and monitor the scenario planning and modeling process to evaluate potential futures for James City County and their impacts on the community;
- Review the applications of landowners who wish to change the land use designation of their properties;
- Work with County staff and consultants to develop the vision, plan, and implementation framework; and
- Guide revisions to the draft Comprehensive Plan and forward the updated Plan to the Planning Commission and Board of Supervisors for endorsement and adoption.

471
PCWG volunteer meeting/event hours

Community Engagement Highlights

The Engage 2045 effort produced a community vision, goals, strategies, and actions that were generated through hundreds of hours of effort by community volunteers, residents, elected and appointment officials, and County staff. The County undertook a public engagement approach that was cumulative in nature so that one round of engagement built upon the previous round. Each round was also extensively advertised and publicized through the County's website, social media channels, articles in local newspapers, op-eds, This Week in James City County podcast, flyers, WATA bus advertisements, and other advertising outlets. These extensive efforts were guided by the CPT and are described in more detail in public engagement reports found in the Plan appendices (Appendices A-E). Provided here is a summary of the six main engagement efforts.

2019 Citizens Survey

In January 2019, the James City County Board of Supervisors contracted with the Center for Survey Research at the University of Virginia to design, conduct, and analyze a survey of James City County residents. The goal of the survey was to determine opinions on several issues as the County began the process to update its Comprehensive Plan. The findings from this statistically significant survey served as the foundation for understanding community opinions throughout the planning process. This survey was also instrumental in identifying the five areas of County services or initiatives that residents considered to be very important but were not satisfied with the present status. These "satisfaction gaps" are listed below.

- **Affordable housing** - 33% (83% important vs. 50% satisfied)
- **Roads & highways** - 24% (98% important vs. 74% satisfied)
- **Attracting jobs & businesses** - 20% (88% important vs. 68% satisfied)
- **Preserving rural character** - 16% (85% important vs. 69% satisfied)
- **Protecting environment** - 15% (85% important vs. 70% satisfied)

1,060

survey respondents

Round 1: Listening and Envisioning

The first round of public engagement for Engage 2045 was kicked off at the Summit on the Future event that was held in person at six separate sites and broadcast on local public access Channel 48 to allow residents to participate from home. The Summit offered many station activities to gather feedback from participants. Attendees – in person and online – participated in online polling. The online engagement continued after the Summit, allowing residents the ability to participate at their leisure between November 18 – December 18, 2019.

441

participants

This round of engagement was focused on educating residents about the Engage 2045 planning process and collecting inputs to help guide development of the community vision. Questions were posed that dove deeper into the findings of the Citizen Survey, specifically related to whether the County should do more to address the satisfaction gaps identified in the Survey. Augmenting these efforts were the launch of the project website www.jamescitycountyva.gov/engage2045; a promotional video that aired on the County's YouTube channel, Facebook page, and the County website; and a State of the County presentation that was incorporated into the opening remarks of the Summit on the Future.



A summary of public input priorities was generated from the findings of the 2019 Citizen Survey and the Round 1 engagement efforts. These priorities were the basis for developing the five core components of the Plan's vision. Highlights of engagement responses that supported these public input priorities are listed below. More details can be found in the *Public Engagement Summary Report – Phase 1* included in the Plan appendices (Appendix B).

- **Nature:** 97.4% of participants ranked that it was important for the County to do more to improve efforts to protect and preserve the County's natural environment.
- **Community Character:** 90% of participants ranked that it was important for the County to do more to improve efforts to protect and preserve our rural character in the County.
- **Economic Development:** 87.7% of participants ranked that it was important for the County to do more to expand the local economy by attracting higher paying jobs.
- **Affordable Housing:** 84.4% of participants ranked it was important for the County to do more to provide affordable housing opportunities that are affordable to our workforce.
- **Quality of Life:** Many "big ideas" shared at the Summit requested improvements to or stability of community services, including bicycle and pedestrian pathways and trails, internet service, library improvements, and public water.

Listening Forum

On May 4, 2020, the CPT invited local community organizations to participate in a Listening Forum to provide input for the County's Comprehensive Plan update. The CPT Listening Forum was open to the public electronically pursuant to the Emergency Ordinance adopted March 24, 2020 by the Board of Supervisors. To view a recording of the meeting, please visit the County's YouTube channel.

11
organizations

During the Listening Forum, 11 organizations representing more than 4,000 members and a wide range of interests presented their mission, goals, and challenges in relation to the future of James City County. The CPT asked each organization to describe the greatest need or desired outcome that should be addressed in the Comprehensive Plan update. Each participating group had up to 15 minutes to present information to the CPT. This information was shared with the PCWG. The PCWG considered these important community inputs as it developed the Comprehensive Plan.

Round 2: Exploring and Testing

Building off the public opinion knowledge base generated through the 2019 Citizen Survey and Round 1, the second round of public engagement focused on evaluating the County's currently adopted Plan goals and asking participants to respond to scenarios that represented potential alternative ways the County could grow in the future. This engagement effort occurred during the summer of 2020 just after the COVID-19 pandemic became a national crisis. The original plan to hold in person meetings was amended to provide safe ways for residents to engage online, while also arranging for wi-fi hotspots and providing paper versions of online survey materials to those with limited internet access.

136

participants

The engagement effort was launched at the Exploring Our Future Alternatives Virtual Assembly on August 10, 2020. This online webinar was live streamed over Facebook Live, the County's YouTube channel, and public access Channel 48. At the Assembly, project team members walked participants through the online exercises, provided detailed descriptions of the two alternative scenarios, and answered questions. The online questionnaires were available from August 10 – September 2, 2020. This second round of engagement resulted in several key findings, listed below. A more detailed description of the Scenario Planning exercise is included in a following section.

- Round 2 public inputs were consistent with the 2019 Citizen Survey findings and Round 1 public input priorities.
- Cumulative inputs (Citizen Survey + Round 1 + Round 2) suggest that a more proactive approach is needed to manage growth and change in the community and support implementation of the public input priorities.
- Community responses showed support for:
  - A more compact growth form that protects natural and rural lands and upholds the County's unique community character.
  - More opportunities for affordable workforce housing.
  - More biking and walking facilities.
  - Maintaining or making minor amendments to the nine currently adopted Comprehensive Plan goals, with a focus on more significant amendments to the Housing and Transportation goals.

Round 3: Deciding and Affirming

The third round of public input was focused on getting more detailed feedback on specific policy directions and actions the County should take to implement planning priorities. This round included two main engagement opportunities - three questionnaires provided online and in hard copy at targeted locations, and a series of three Community Chats where participants attended a virtual meeting to learn about the questionnaires and pose questions to the project team. The three questionnaires were:

277

participants

- **The Policies and Actions Questionnaire** with 14 questions that provided options for how the County could implement its vision. The responses to the questionnaire helped the team developing the Plan to better understand the specific policy directions and implementation actions that were supported by the community.
- **The Character Design Guidelines Questionnaire** that sought participants' views on several different alternatives for the design of neighborhoods, commercial and industrial uses, and rural and open space areas. The findings from this questionnaire helped shape the policy direction and design guidance included in the Land Use and Community Character chapters of this Plan and the Character Design Guidelines.
- **The Future Land Use Map Questionnaire** provided an opportunity for residents to react to the 27 Future Land Use Map amendments proposed during the Engage 2045 process. These responses helped inform development of the Future Land Use Map included in the Plan.

The questionnaires and chats were conducted from January 14 - February 21, 2021. This third round of engagement identified several important implementation steps to be included in the Plan as listed below.

- **Nature:** Questionnaire respondents support new development restrictions and public land acquisition to limit development impacts on natural lands and to address impacts of climate change and sea level rise, with a strong focus on protecting water resources. Round 3 respondents also indicated strong support for protecting a wide variety of natural lands.
- **Community Character:** Round 3 respondents showed strong support for styles of development that reduce development intensity supported through the expression of values for natural beauty, agricultural conservation, privacy, walkability, historical architecture, and community. Round 3 participants' primary community character concern was preserving the existing rural and low-density development patterns in James City County. Participants believed that rural residential development must be planned with farmland preservation in mind, but participant comments revealed disagreements in how to achieve this. Participants generally associated high-density development with increased traffic and a lower quality of life. However, there was evidence that middle density land uses could be supported with County-compatible designs and the incorporation of nature and green spaces. Respondents expressed support for higher densities within mixed use and employment contexts that provided walkability and opportunities for interaction.
- **Affordable Workforce Housing:** Round 3 revealed less support for prioritizing resources to support this objective when compared to the other public input priorities. Round 3 respondents identified adaptive reuse and redevelopment of existing commercial and employment locations and transit corridors as the best locations for new affordable workforce housing. Strategies to improve homes in existing residential neighborhoods and stabilize and enhance mobile home parks were also strongly supported.
- **Economic Development:** While there has been consistent public support to diversify the local economy, with a focus on development of higher wage employment, Round 3 revealed less support for allocating resources to this endeavor. Round 3 respondents expressed mixed support for the County investing in infrastructure to serve economic development sites within the PSA. For development of complete communities that can support future economic growth, there was a preference for more mixed-use centers with employment and adding more middle density housing to existing employment areas.
- **Quality of Life:** There was consistent support for enhancing quality of life amenities in James City County, with a strong emphasis on walking and biking facilities -- especially in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways.

Round 4: Planning and Implementing

115

participants

The fourth round of public input focusing on sharing the draft Plan through the public hearing process with the Planning Commission and Board of Supervisors. Throughout the spring of 2021, chapter text and goals, strategies, and actions (GSAs) of the Comprehensive Plan were reviewed by the Planning Commission Working Group (PCWG) in a series of public meetings. At the end of the PCWG process, the members voted to recommend adoption of the revised Comprehensive Plan. Following PCWG review, the Planning Commission received the draft Plan and held a public hearing on June 24, 2021, followed by a vote to recommend adoption of the revised Comprehensive Plan. The Board of Supervisors then held a public hearing on the draft Plan on July 13, 2021. Following discussions on September 28, 2021 and October 26, 2021, the Board of Supervisors unanimously adopted the Plan.

Round 4 engagement focused on providing a final opportunity for public input prior to plan consideration and adoption by the Planning Commission and Board of Supervisors. Public comments were accepted throughout the process. Citizens were able to review the latest draft documents on the website and send in comments via the website, letter, email, or phone call, and to speak at the Planning Commission and Board of Supervisors public hearings. Additionally, although the Future Land Use Map Questionnaire closed in Round 3 of engagement, the public was able to continue submitting general feedback on proposed land use map changes. The Planning Commission and Board of Supervisors received the Round 4 comments with their respective public hearing materials and were able to consider them alongside comments made at the public hearings.

Scenario Planning Process

As part of Round 2 public engagement efforts, James City County conducted a Scenario Planning process intended to provide insight to County decision makers regarding long-term policy choices for land use and public investment in light of potential alternative Future Growth Scenarios. The Scenario Planning process included development of a series of two integrated computer models used to analyze potential future land use patterns. These scenarios were also evaluated to determine modeled impacts on changes in land use, impacts to the transportation system, and the fiscal impacts of providing more services and facilities to serve new residents and businesses. These scenarios and related impacts were then evaluated through the public engagement process. Scenario A (Trend) and Scenario B (Alternative) are described below. A more complete report of the scenario planning process – the Preferred Scenario Framework – is provided in the Plan appendix (Appendix F).

Scenario A (Trend)

- Current land use trends and development patterns continue.
- Dispersed single family development and retail centers.
- Protection of rural areas is encouraged but some level of development of Rural Lands (areas outside the PSA) continues.

Scenario B (Alternative)

- Rural lands outside the PSA used primarily for rural and agricultural purposes instead of development.
- More protections for rural lands.
- More focus on infill and redevelopment.
- Economic development at higher densities in the Primary Service Area but in concert with existing community character.

The CPT and Planning Team developed and implemented a scenario questionnaire (online and paper) during Round 2 to collect input from residents on the two scenarios. The questionnaire was extensive, with over two dozen questions that asked people to study maps, images and summary charts that described the results of computer model testing of each scenario with respect to each of the five public input priorities (Nature & Environment, Community Character, Affordable Workforce Housing, Economic Development and Quality of Life). In total, 136 people completed the survey in the three-week period, which was a considerable response rate for such a complex and detailed survey implemented during the peak of the pandemic. Detailed results of this questionnaire can be found in the Round 2 Public Engagement Presentation Report found in the Plan appendix (Appendix C).

The Preferred Scenario Framework report, included in the Plan appendices (Appendix F), documents the scenario planning process, and identifies key policy themes for each of the five public input priorities as a result of both the scenario testing results and the public opinions as expressed in the questionnaire responses. These policy themes were heavily considered by the PCWG during development of the goals, strategies, and actions for each Plan chapter, with particular focus on the Land Use, Community Character, and Environment chapters. Included in each of the Plan chapters is a section that highlights key policy guidance stemming from the outcomes of the scenario planning process.

Continual Modeling

As part of the scenario planning in this comprehensive plan update process, the County will also acquire the ability to do ongoing modeling of land use, traffic and fiscal impacts resulting from future growth. The models used for the scenario testing process will be customized for County staff use so that they can analyze future development impacts. The final adopted land use map will be entered into this County model so that any changes on a parcel or area-wide level can be tested against the land use, travel demand and fiscal impact models to measure potential impacts.

Implementation and Evaluation of the Comprehensive Plan

This Comprehensive Plan is James City County's long-range master plan for guiding the physical development of our community for the next 25 years and beyond. It is the first step in setting policy priorities for the County, but the County's vision can only be realized by aligning future individual decisions with this vision. Intended outcomes can only be achieved when future decision-making, community investments, and policy decisions support the vision and goals of the Plan.

In 2018, James City County undertook an extensive planning process to (1) identify all the operational initiatives and capital projects included within the Comprehensive Plan and more than 35 other community plans, (2) set priorities among the initiatives and projects included in these plans, and (3) develop a general timing and funding strategy to implement these efforts. The result was the *2035 Strategic Plan: A Guidebook for Investing in the County's Future*.

The Strategic Plan established a new process for defining implementation priorities for James City County. As shown in the graphic above, the Comprehensive Plan and other supportive plans (such as the Parks and Recreation Master Plan) identify long-range policy priorities for the County.



The next step in the cycle is to build off these policy priorities and identify "work" priorities for County departments and divisions through the Strategic Plan. The Strategic Plan then serves as a guide for setting funding priorities through the County's annual budget and Capital Improvement Program (CIP). Finally, after work plans are developed and funding is secured, initiatives and projects are implemented.

Building off this new process for identifying implementation priorities, the County will need to undertake the following steps to fully implement this Comprehensive Plan.

1. Continue to use the Comprehensive Plan as a policy guide when evaluating rezoning cases and other land development proposals.
2. Prepare updates to the County's Zoning Ordinance to fully implement new policy directions and land use guidance included in this Plan.
3. Update the County's 2035 Strategic Plan to incorporate the specific operational initiatives and capital projects identified in this Comprehensive Plan, focusing on identified priorities included within the Plan.
4. Update the guidance for operational initiatives included in the Comprehensive Plan to guide updates to the Strategic Plan as a set of criteria for identifying new operational budget expenditures to include in the County's annual budget.
5. Continue to use the guidance for capital investments included in the Comprehensive Plan to guide updates to the Strategic Plan as criteria for identifying future public capital infrastructure projects to include in the County's Capital Improvement Program (CIP).

Evaluating and Monitoring Plan Implementation

This Plan update relies on established mechanisms of internal tracking, agency reporting and continued transparency as we work towards implementing the vision and goals of this Plan. The strategies and actions contained in this Comprehensive Plan are intended, in some cases, to serve as the interim steps necessary for the County to achieve the stated vision and goals. In other cases, they serve as benchmarks to measure proposals that may come before County officials.

In order for the Comprehensive Plan to have value and remain useful through its planning horizon, it is important to monitor progress in achieving adopted goals, strategies, actions (GSAs) to recognize those that have been completed, identify areas where additional resources are needed, and to re-assess for changing conditions. The Planning Commission will evaluate the progress of implementation efforts and prepare an annual report to the Board of Supervisors that will identify actions that have been completed. The evaluation process will not only measure progress and identify areas that need attention, but also serve as a catalyst to engage the community in dialogue about the future of James City County.

Guide to the Plan

Plan Framework Elements

The Plan Framework Elements – the Plan's Vision, Goals, Strategies, and Actions – are the essential components of the Plan that will guide decision-making, community investments, and operational initiatives for the County. The elements are hierarchical providing the broadest level of community guidance through the Plan's Vision and the most detailed guidance through the Plan's Actions. Goals, Strategies, and Actions (often referred to as GSAs) are the primary policy guidance used on a regular basis by County elected and appointed officials and County staff.

These Plan Framework Elements were developed to carry forward existing policy direction from the previous Plan that is still relevant and establish new policy approaches supported by the community. Implementation of the Plan Framework Elements will require partnerships and collaboration across departments, organizations, public, private, and nonprofit sectors, and the broader community. The table below defines each of the Plan Framework Elements in more detail.

Vision	**The Plan's vision is a set of five statements developed from the public input priorities established early in the Engage 2045 process. The vision statements describe the highest level of community aspiration.**
Goals	**Goals describe end conditions or ongoing results the plan is working toward achieving.**
Strategies	**Strategies describe specific approaches the County will undertake to achieve the Plan's vision and goals.**
Actions	**Actions are specific tangible initiatives or projects that implement the Plan's Strategies.**

Plan Organization

The Comprehensive Plan is set out in a series of 11 chapters organized for easy navigation and to provide a consistent structure throughout the document.

Chapter 1: Introduction serves as an executive summary and snapshot guide for the remaining chapters of the Plan.

Chapters 2-10 are the topical nine policy chapters in the Plan. Each of these chapters include four key sections:

- Key Planning Influences provides data and trends, descriptions of community programs and regulations, and other information that provide a foundation for the GSAs included in the chapter.
- Community Guidance documents the critical community feedback provided during each round of Engage 2045 public engagement that relates to the chapter's policy topic.
- Spotlight on Implementation highlights important achievements and progress made by James City County to achieve the Plan's vision and goals.
- Goals, Strategies, and Actions are the plan framework elements that are used to guide implementation efforts.

Chapter 10: Plan Implementation organizes the Plan's implementation approaches into a priority set of implementation actions, describes the linkage to James City County's Strategic Plan, and provides guidance for updating and monitoring the Plan over time.

Appendices include background documents prepared during the planning process that provide more detailed information and are referenced in the Plan. This includes public engagement reports, research documents, and other supportive materials.



POPULATION

Introduction

James City County is home to a growing population. Knowing the trends that have brought us to where we are today and the possible changes in the future can help us understand our community and their needs for the future.

The information in this chapter can also help us identify specific segments of the community, such as the youth and senior populations, which may require focused attention in the years to come in order to best serve their needs. By building upon the existing framework of services, James City County will be better able to meet the rising demands for all segments of our changing population.

The Population Chapter Goals, Strategies, and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language as written in the 2035 Comprehensive Plan has been re-affirmed and refined. The Goal now States: "Provide the means for all citizens, especially youth and seniors, to achieve a high quality of life through safe, affordable, and convenient access to programs, services, and activities."

Many important actions that benefit the County's population have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the implementation of revised and updated Strategies and Actions will be needed to ensure that the needs of the whole community, one that is inclusive of many ages, incomes, and races and ethnicities are met. The County will continue to strive to provide services and resources equitably to all segments of the County population.

This chapter is intended to shed light on the broader issues related to our population needs and on associated County initiatives. Other chapters of the Comprehensive Plan may reinforce these ideas with more specific discussions and actions. For additional data and information on the County's demographics, please refer to the Comprehensive Plan Technical Appendix (Appendix G).

CHAPTER GOAL

"Provide the means for all citizens, especially youth and seniors, to achieve a high quality of life through safe, affordable, and convenient access to programs, services, and activities."

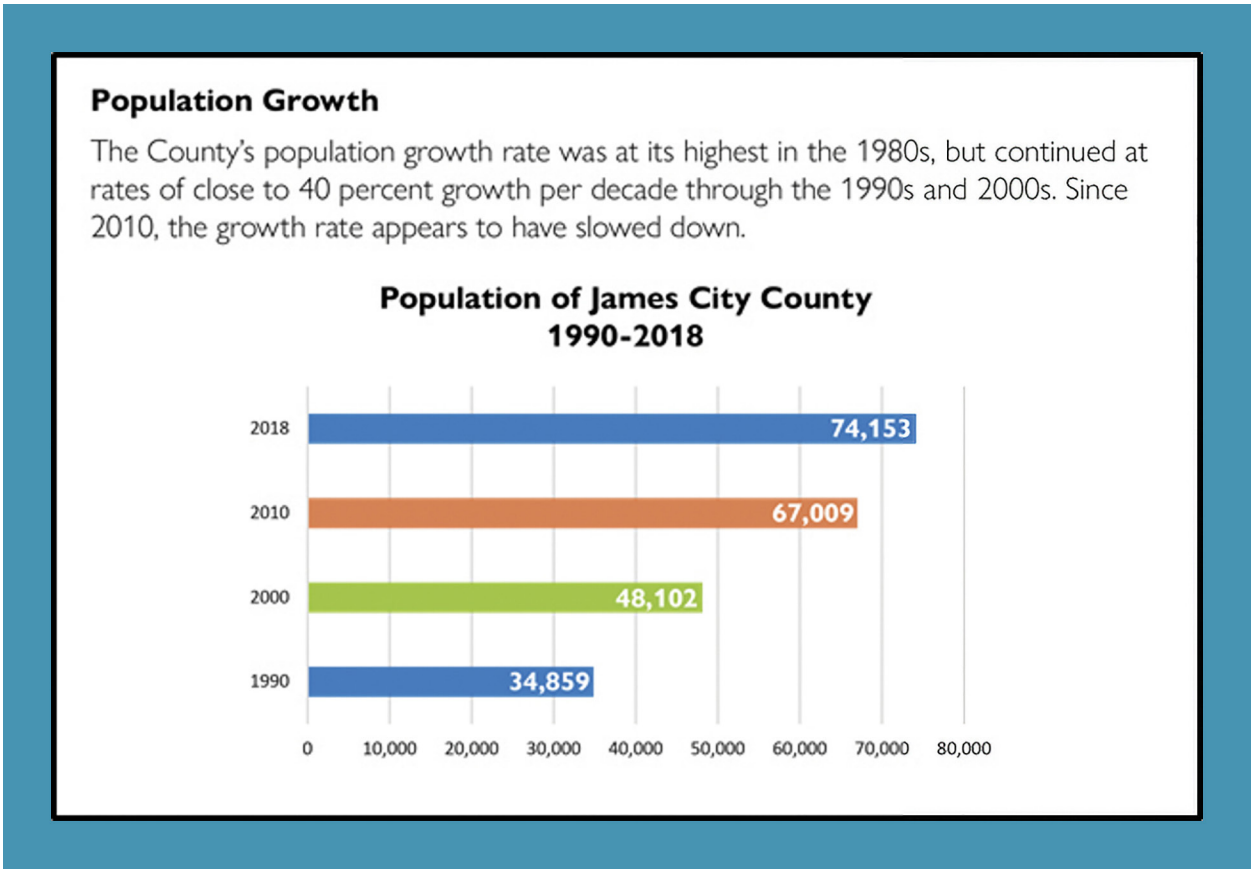
Key Planning Influences

Population Growth

Population is an important element of the Comprehensive Plan, providing a framework to better understand the current and future needs of the community.

Over the past four decades, James City County has experienced significant population growth, and this continued growth has created benefits for the community as well as presented new challenges. Recently, the County's population growth rate has shown signs of slowing, a change that appears to be part of a Statewide trend.

Figure P-1. Population Growth of James City County



Source: Decennial Census and 2018 American Community Survey (ACS) 5-year estimates.

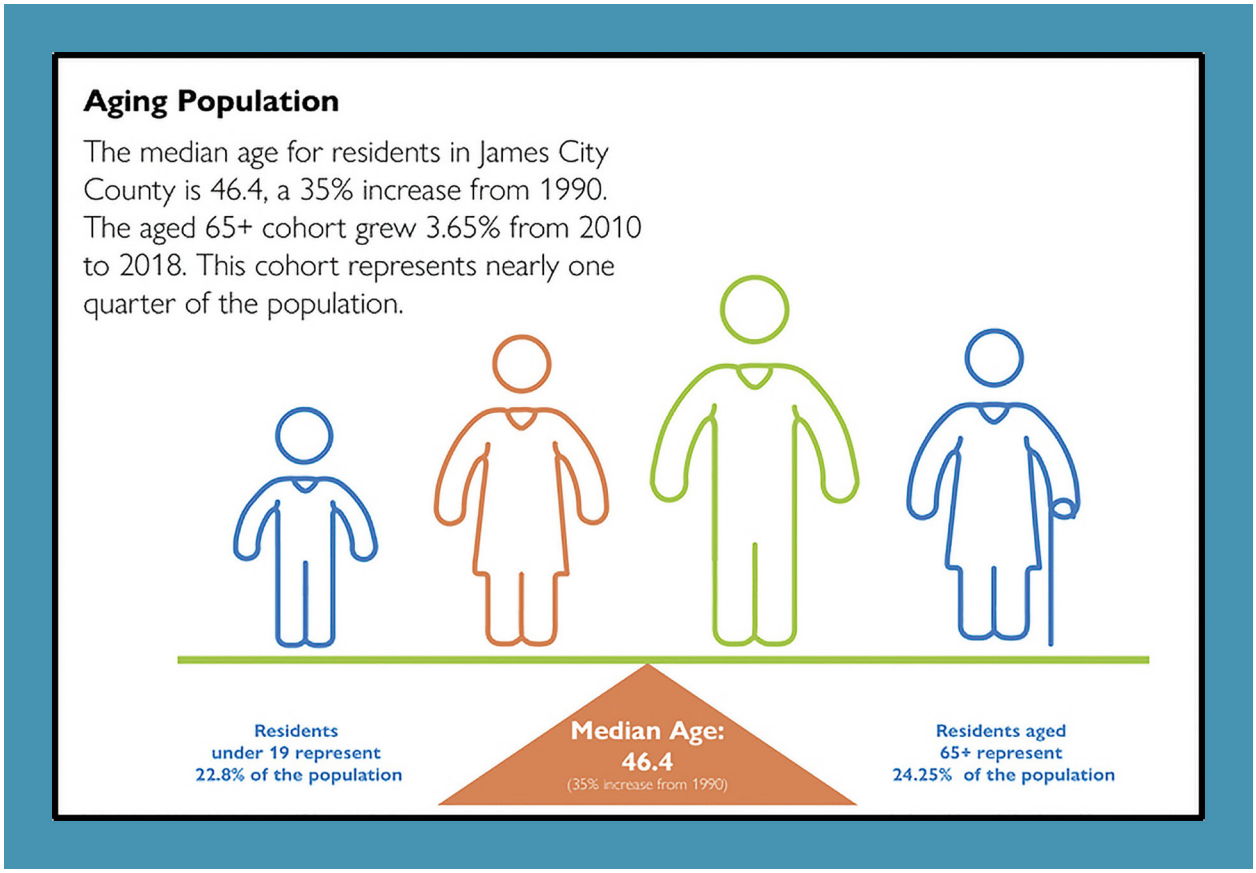
During the 2000-2010 period, the County was the 5th fastest growing locality in Virginia. Although the County's growth rate has declined since then it remains high relative to many other localities. Between 2010 and 2018, the County was the 11th fastest growing locality in the State.

Population By Age

A slight majority of the County's population falls within the 20 to 64 age group; however, over the past decades, this age group has been decreasing as a proportion of the County's Population.

The County's median age and proportion of citizens 65 years and older have increased substantially over the years and remain higher than those of surrounding localities, the Hampton Roads MSA and the State. The growth rate of the youth population (less than 19 years old) has declined slightly over the years. The County had a population with a median age of 46.4 years old in 2018.

Figure P-2. Population by Age in James City County



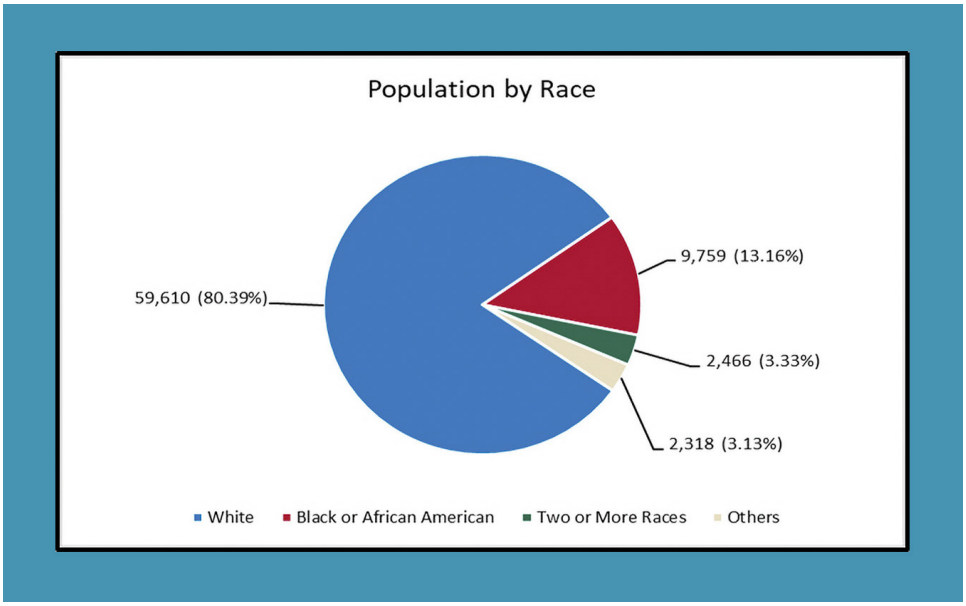
Source: Decennial Census and 2018 ACS 5-year estimates.

The growth rate of the youth population (less than 19 years old) has declined slightly over the years. The County had a population with a median age of 46.4 years old in 2018.

Population by Race and Ethnicity

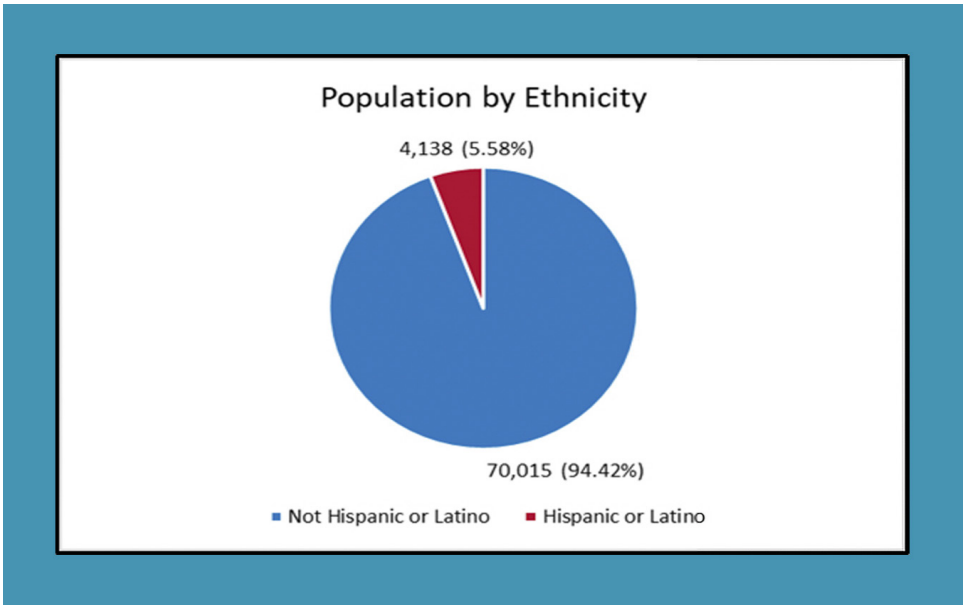
A majority of the County population is white, with the percentage remaining relatively unchanged over the past three decades. The percentage of African Americans in the County's population has been decreasing over time while the representation of other races (e.g., Native American, Asian, etc.) and Hispanics (ethnicity) of any race has been increasing.

Figure P-3. Population by Race in James City County



Source: 2018 ACS 5-year estimates.

Figure P-4. Population by Ethnicity in James City County



Source: 2018 ACS 5-year estimates.

This is reflected in Census data that show increases in both the number of people living in the County who were born outside of the U.S. and in the number of people who speak a language other than English at home.

Historically, the foreign born population in the County has come primarily from Europe, Asia and Latin America.

According to the most recent Census data, the proportion of the foreign born population from Europe has been decreasing over recent decades while the proportion of the foreign born population from Asia and Latin America has been increasing.

The County is somewhat less diverse than the City of Williamsburg and York County. The Hampton Roads MSA and the State also have higher rates of cultural diversity.

Population by Average Household Size

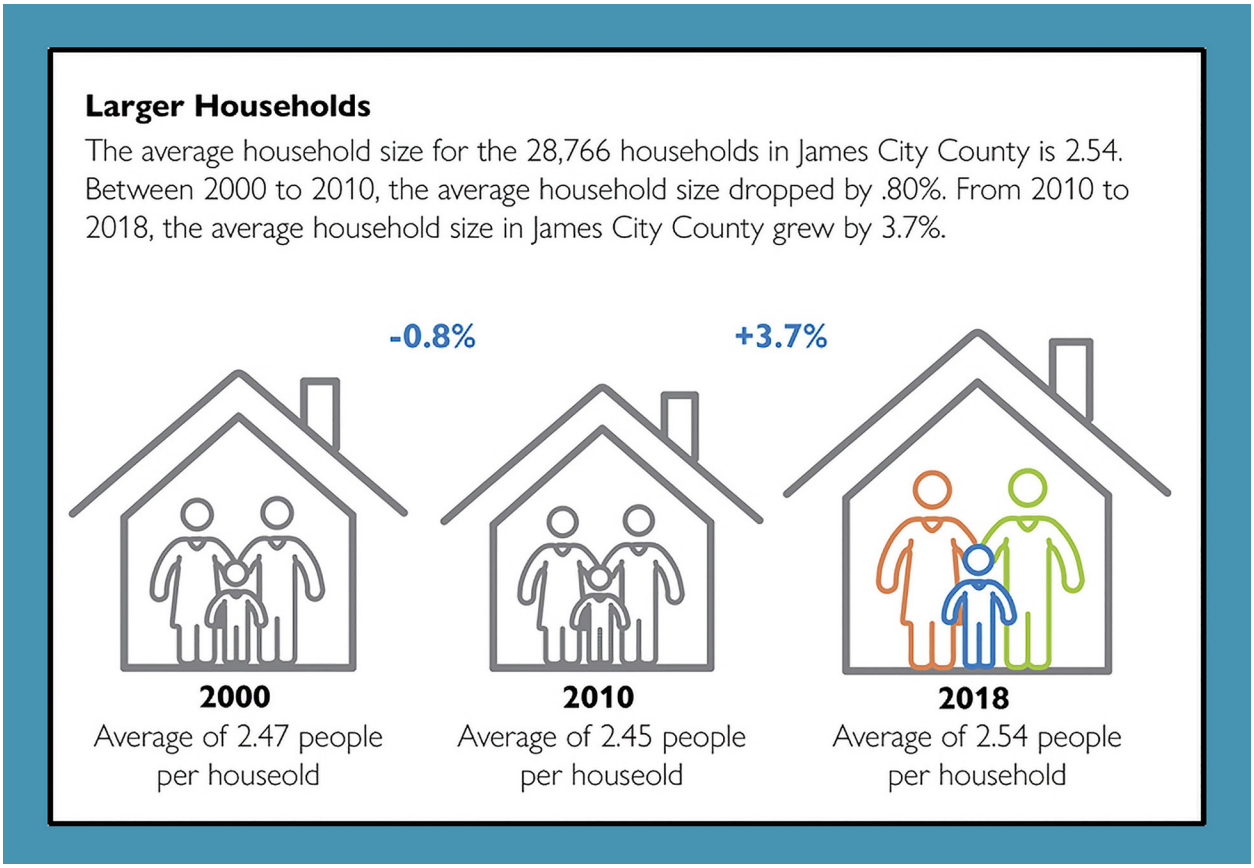
A household includes all persons living in a housing unit. The majority of households in James City County are led by married couples.

In James City County the average household size decreased over the last few decades but has risen since the 2010 Census, a change that appears to be part of a nationwide trend. According to information from the Pew Research Institute, households are increasing in size because the growth in the number of households is trailing population growth.

Further, the upturn in average household size reflects demographic trends such as the growth of population residing in multigenerational family households and more people sharing living quarters.

An increase in the average household size may have implications for the County's housing industry as the trend of more people living together may require fewer housing units or more housing that addresses specific needs.

Figure P-5. Population by Average Household Size in James City County



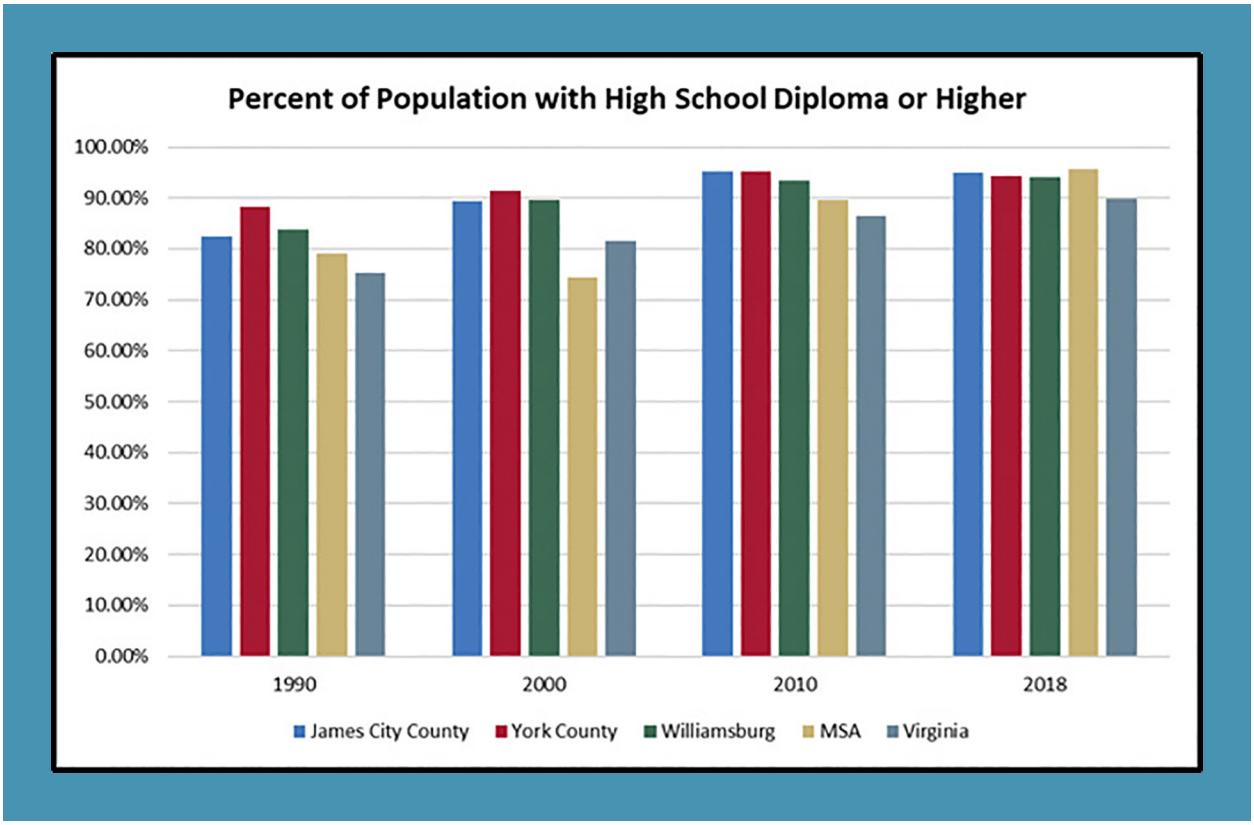
Source: Decennial Census and 2018 ACS 5-year estimates.

Population by Educational Attainment

Overall, the County's population is relatively well-educated. In 2018, more than 90% of the County's population had a high school diploma or higher, which was similar to the percentage in York County and the City of Williamsburg.

In the same year the percentage of the County's population age 25 and over with a bachelor's degree or higher is almost at 50%, slightly higher than York County but lower than the City of Williamsburg. A well-educated population yields a well-educated workforce, which has the potential to provide socio-economic benefits to the community.

Figure P-6. Percent of Population with High School Diploma or Higher

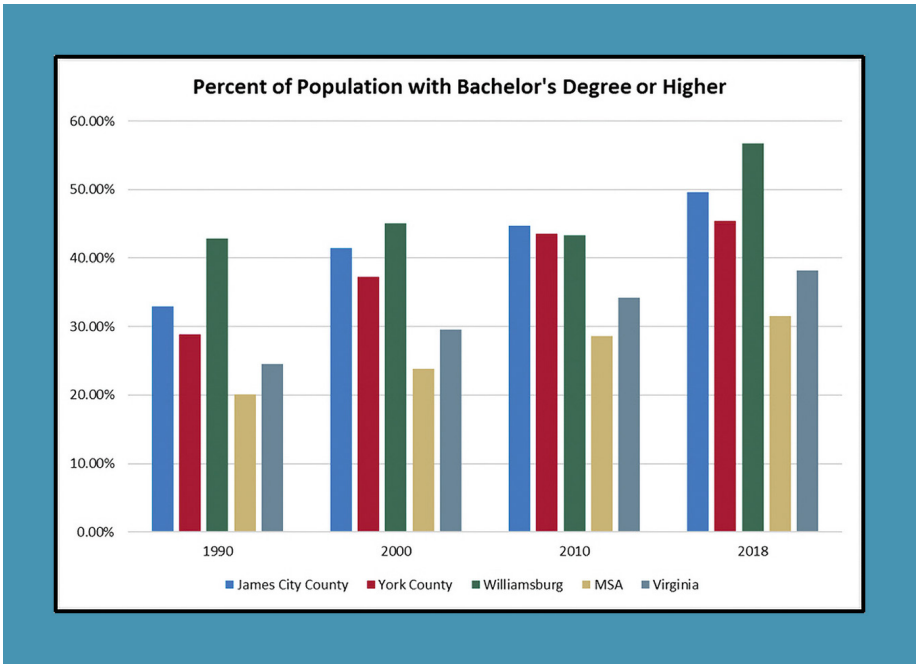


Source: Decennial Census and 2018 ACS 5-year estimate.

A well-educated population yields a well-educated workforce, which has the potential to provide socio-economic benefits to the community.

Population by Educational Attainment

Figure P-7. Percent of Population with Bachelor's Degree or Higher

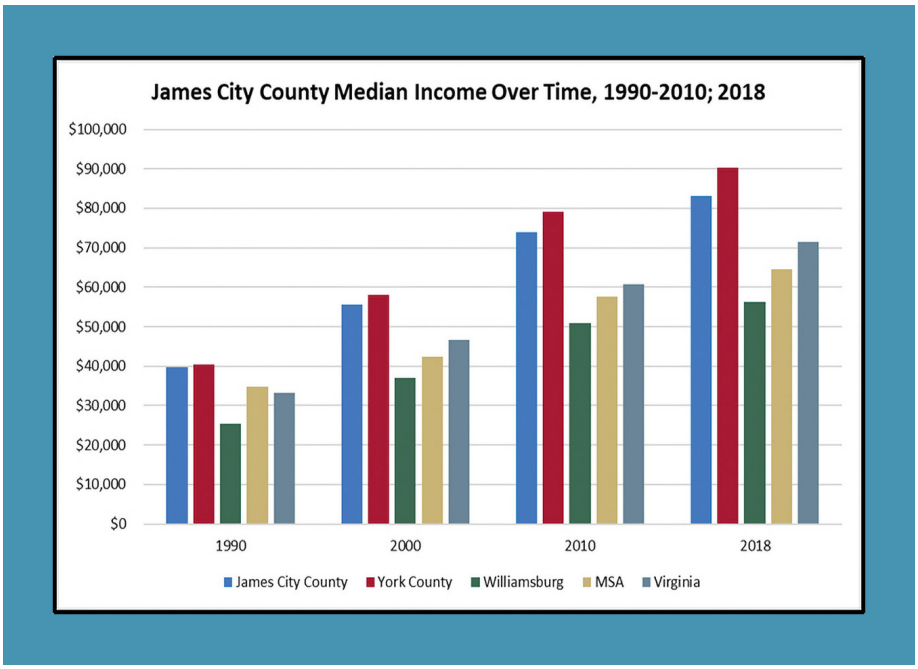


Source: Decennial Census and 2018 ACS 5-year estimates.

Population by Median Household Income and Poverty

Median household income is one measurement of a community's general economic health. The table below shows the gradual increase of median income over time in James City County and other localities including the MSA and the State.

Figure P-8. James City County Median Income Over Time

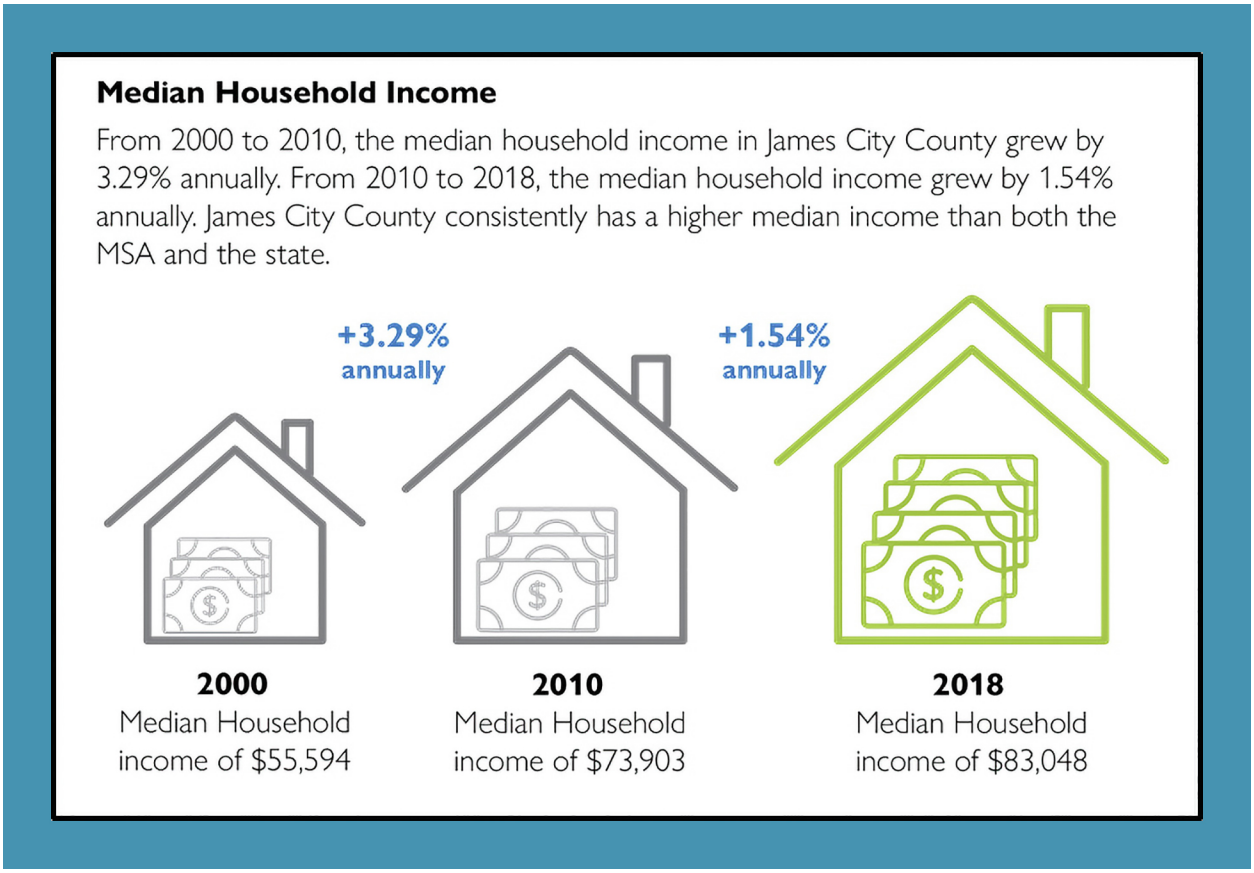


Source: 2018 ACS 5-year estimates and Weldon Cooper Center.

Population by Median Household Income and Poverty

Between 1990 and 2018, a period of 28 years, the median income in the County grew from approximately $40,000 to over $80,000, an annual percent growth rate of approximately 3.57%. Currently, the County has the second highest median income in the Historical Triangle. The County's median income is also well above the median income for the State and the MSA.

Figure P-9. Median Household Income



Source: Decennial Census and 2018 ACS 5-year estimates.

Despite the growth in the median household income, almost 8% of the County's population lives below the poverty line. According to the U.S. Federal Poverty Guidelines in 2018, a household with four persons (two adults and two children) was in poverty if the household income was less than $25,465 annually. Of all age cohorts, children under 18 years old have the highest level of poverty in the County.

Despite a relatively high median household income and a poverty rate substantially lower than that of the MSA, the State, and the Country, it is important that the County continue to consider how to best address the needs of all citizens with an emphasis on the needs of lower-income citizens, ensuring that access to public programs and services is done in an equitable manner.

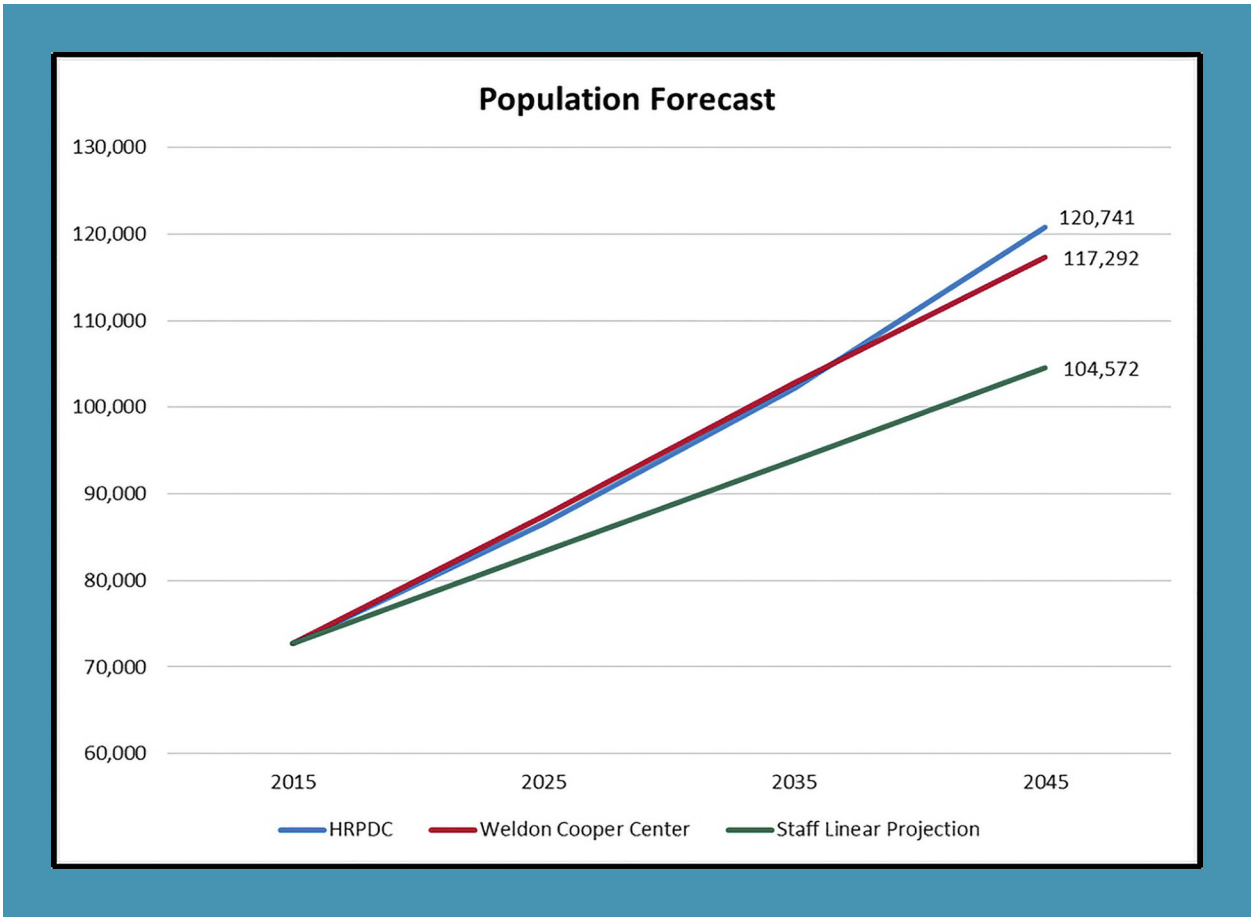
Population Projections

The practice of forecasting population growth into the future is not an exact science. Different factors, such as birth and death rates, in-and-out migration, immigration, economic growth, and State and local regulations are used in combination with a number of different assumptions in the forecasting process.

The Hampton Roads Planning District Commission (HRPDC) and Weldon Cooper Center have prepared population projections for the County for the years 2025, 2035, and 2045. Figure P-10 below compares these two projections along with a third population projection model known as linear projection, chosen for its fit with James City County's historical population trend. It is likely that the County's population in 2025, 2035, and 2045 will fall within the range of these projections.

Even with the uncertainties involved, the exercise of forecasting population into the future is an important tool localities have to proactively address the challenges of future generations.

Figure P-10. Forecast Population Growth

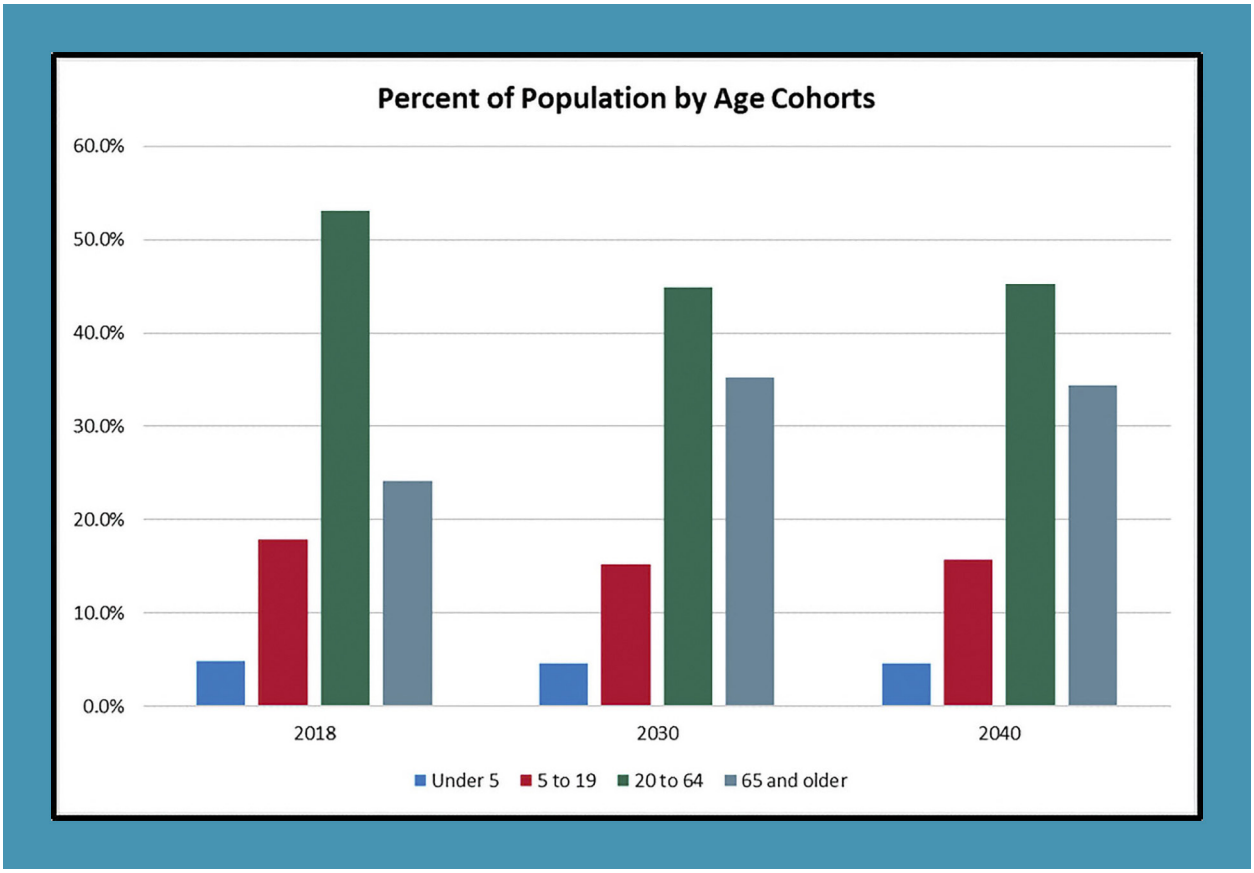


Source: Weldon Cooper, HRPDC, and Planning staff.

Age Cohort Projection [1]

In 2018, slightly more than half of the County's population belonged to the 20 to 64 years age cohort (53.4% of the population), followed by the 65 and older cohort (24.2% of the population) and the 19 years or less cohort (22.8% of the population). As projected by the Weldon Cooper Center, the proportion of the population in the 20 to 64 age cohort will decrease to 45.2% by 2040 and the proportion of the population in the 19 years or less cohort is expected to decline slightly to 20.4% by 2040. The proportion of the population 65 and older is projected to continue to increase, rising to 34.5% of the population by 2040.

Figure P-11. Percentage of Population by Age Cohort



Source: 2018 ACS 5-year estimates and Weldon Cooper Center.

The growing size of the population aged 65 and older and the strong and steady representation of the population less than 19 years old present opportunities and challenges for the County, such as the provision of housing and transportation that meets the needs of seniors, investments in schools and educational programs for youth and seniors, and adequate employment, safety, and recreation considerations.

As noted above, forecasting population and age cohorts is an important tool, but inherently involves uncertainty; making it necessary to continue to monitor projections and forecasts from the sources above, as well as other data sources, to determine needs for school facilities, and other facilities and services, in the future.

[1] Because 2025, 2035, and 2045 age cohort information is not currently available, staff is using age cohort data from available 2020, 2030, and 2040 projections.

Population - Working Age

According to the Census Bureau, the working age population is typically represented by the age group ranging from 15 to 64 years old, while the age groups between 0 to 14 and 65 and older are generally known as the non-working age population.

The working age population, similar to the 20 to 64 age group discussed above, represents the majority of the County's population and is also projected to decrease over the coming years (from 59% in 2018 to 50% in 2040 according to the Weldon Cooper Center).

This working age population is responsible for much of the County's economic health and growth. This group has many needs such as housing, education, and employment. The slower growth rate of the working age population compared with the increase in the numbers of non-working age population (particularly age 65 and over) appears to follow a State and national trend. The County should continue to evaluate different strategies to ensure that the working age population's needs are identified and addressed.

Population - Youth

Although the percentage of the youth population of James City County (less than 19 years old) has been decreasing over the years within the total County population, the number of County residents in this age group has been increasing.

By the year 2040, the Weldon Cooper Center expects this number to rise to 22,367, representing an increase of 32.4% over the next 20 years. This growth will continue to increase the demand for youth services in the County.

Data show that there can be barriers to obtaining youth services. In focus group sessions conducted for the 2001 Community Services Strategic Plan for Children and Youth, participants most frequently responded that lack of awareness was their most significant obstacle to youth services.

Other barriers noted were the lack of space for programs and services, lack of adequate transportation, and direct cost to the client. These barriers also affect the larger considerations of child care, recreation facilities, and community economic development. More current data is needed to understand the degree to which these or other barriers are still in play.

The growing size of the population aged 65 and older and the strong and steady representation of the population less than 19 years old present opportunities and challenges for the County, such as the provision of housing and transportation that meets the needs of seniors, investments in schools and educational programs for youth and seniors, and adequate employment, safety, and recreation considerations.

Youth Services - Addressing Youth Needs

The James City County Parks & Recreation Department has identified key leadership skills that enable youth to gain a better understanding of themselves, their peers, and their community, and has integrated these skills into their programming. Their belief is that youth should be given the opportunity to be involved in decision-making that directly impacts their lives and their communities.

- The Youth Advisory Council and Teens Toward Success Programs. This program provides mechanisms through which young people can shape and influence the decision-making that affects their lives and communities. Since 2015, teens in these programs have volunteered an average of 2,500 service hours annually, building skills and increasing employability. Nearly 40 teens from Teens Toward Success have been hired as recreation leaders by the Department's Recreation Services Division.

- The Teens On Point Program. This program offers camps and after-school care to students age 10-14. Enrollees participate in community service and also mentor youth in REC Connect, the Department's before and after school and camp program for students ages 5-10. Residents of James City County and the City of Williamsburg who are ages 5-17 receive free membership to the Abram Frink Jr. Community Center. By applying to the Discount Assistance Program, qualifying families can receive discounts on many programs including Teens On Point and REC Connect, as well as membership to County recreation centers.

- Neighborhood Outreach Program. In 2015, Parks & Recreation established Neighborhood Outreach as a core program area. The purpose of Neighborhood Outreach is to expand recreation services to lower income neighborhoods. Neighborhood Outreach seeks to reach vulnerable populations of youth, teens, adults, and families who rarely participate in centralized recreation programs due to financial, transportation, cultural, interest or lifestyle barriers.

The James City County Police Department also continues to sponsors numerous community and school educational programs designed to help youth including:

- Every 30 Minutes (annual alcohol awareness event, mock DUI crash);
- Bicycle Rodeos (bike safety program);
- C.O.P.s (Community Outreach Program);
- Police Pathfinders (activities to teach youth about a career in law enforcement);
- Police Science Club (club for Toano Middle School students interested in law enforcement);
- SIDNE (Simulated Impaired Driving Experience teaches the dangers of driving while impaired or distracted); and
- Resisting Aggression Defensively (safety program for children ages 5-12).

The private and nonprofit sectors offer many other programs and services for youth, including organizations such as Big Brothers Big Sisters, Girl Scouts, Boy Scouts, and the YMCA.

An important issue that has been growing over the years that affects both the youth and senior populations is related to kinship caregivers for children. A kinship caregiver is someone related by blood or marriage who has been placed in the role of caregiver for a child. This may be a grandparent, godparent, aunt, uncle, sibling, family friend, or other relative. There is an increasing trend of kinship caregivers in the County, with the majority being grandparents. In 2019, to support the needs of kinship caregivers, James City County started the Greater Williamsburg Regional Kinship Program with the City of Williamsburg and York-Poquoson Social Services.

Population - Seniors

The senior population, ages 65 and older, is the fastest growing age cohort in the County. In 1990 there were 8,097 people aged 65 and older. In 2018 this number had increased to 17,930. By the year 2040, the Weldon Cooper Center projects this number to rise to 46,581 representing an increase of 160% over the next 20 years.

This growth can be attributed both to natural aging of the existing population and to people moving to James City County to retire. This substantial growth of the 65 and older population will continue to increase the demand for senior services in the County.

Senior Services - Addressing the Needs of Seniors

The James City County Department of Community Services has indicated the importance of addressing the needs of seniors in the following areas:

- **Health Care:** The Senior Services Coalition has found that necessary health care services are mainly provided by the private sector at this time. Older adult addictions, the need for additional geriatric psychiatric beds and personal care providers, and increased incidence of dementia, memory loss and Alzheimer's disease have been cited as problems for the senior population. In 2018, 5,512, or 28% of those over 65 and over had a disability. The growing number of aging citizens requires different health care services and increases the need for additional health care service providers in the coming years.

- **Housing:** The number of households headed by individuals aged 65 and older continues to increase in the County; from 15% in 2000 to 37% in 2018. Many older adults want to remain at home, but recognize that they may need to rely upon social and health resources in order to successfully age in place. There are a number of locally available services to help seniors remain at home for as long as is safely possible. Support to enable senior citizens to remain in their houses can be provided by the community's Neighbor to Neighbor Program, Williamsburg Faith in Action, Peninsula Agency on Aging (PAA), area healthcare systems, and paid in-home care providers.

- **Nutrition Assistance:** Due to income constraints, many seniors live in households that are food insecure, with limited access to healthy food. Benefits such as the Supplemental Nutrition Assistance Program (SNAP) and organizations such as Meals on Wheels and the Peninsula Agency on Aging work to address hunger for the senior community.

The senior population, ages 65 and older, is the fastest growing age cohort in the County.

- **Transportation:** Transportation continues to be a great need for seniors in James City County. Peninsula Agency on Aging (PAA), Williamsburg Area Transit Authority (WATA), and Williamsburg Faith in Action provide transportation to seniors. The PAA transportation program RIDES utilizes wheelchair accessible vans as well as community volunteers to transport senior citizens, aged 60 and older, to non-emergency medical appointments.

  WATA provides fully accessible buses for customers on the fixed routes. Buses have the ability to kneel to the ground, and integrated wheelchair ramps provide a smooth transition onto the bus for disabled citizens. For citizens unable to get to or from a bus stop, there is paratransit service. Paratransit is door-to-door, curb-to-curb, or origin destination shared ride service.

  Williamsburg Faith in Action provides door-to-door transportation for non-emergency medical appointments, as well as transportation for grocery shopping, hair appointments, or other errands.

  Housing units that are accessible to seniors, located along public transportation routes, and adequately served by pedestrian facilities can help facilitate mobility for seniors around the community.

- **Employment:** Many seniors are on fixed incomes and are negatively impacted by inflation, forcing them to seek employment to support themselves. Many of these individuals are skilled, well-educated, require little on-site job training, and want to hold part-time employment positions. Efforts to increase and expand the area's job opportunities should include strategies informing employers of the availability of this potential workforce and encouraging them to employ these retirees.

The Parks & Recreation Department plays an important role in filling service gaps for programs and services not offered by the private and nonprofit sectors for seniors, offering programs such as the Lounge, Club 55+, Silver Sneakers, and Renew Active.

Other County Departments are also working to address senior needs. The County Police Department offers programs to assist seniors that include Project Lifesaver, Fraud/Scam Surveys, and Prescription Drug Take Back.

Housing units that are accessible to seniors, located along public transportation routes, and adequately served by pedestrian facilities can help facilitate mobility for seniors around the community.

Addressing the Needs of the Homeless Population

Homelessness is one of the social and economic issues that affects all age groups, including the most vulnerable in our community (e.g., youth, seniors, lower-income residents). According to the Point in Time Count, a survey of people experiencing homelessness across six jurisdictions in the Peninsula prepared by the Greater Virginia Peninsula Homelessness Consortium (GVPHC), in 2019 approximately 37 people experienced homelessness in James City County.

The majority of people experiencing homelessness identified by the Count were single adult males, Black/African American, and over the age of 24. Children under 18 in families are the second highest group of people experiencing homelessness.

Williamsburg-James City County Schools identifies school-aged student homelessness in accordance with the McKinney-Vento Homeless Assistance Act which defines homeless children and youths as individuals who lack a fixed, regular, and adequate nighttime residence (e.g., living in an emergency shelter or transitional housing, living a motel, hotel or campground, sharing housing with relatives or others and living in a car, park public place, bus or train due to economic hardship or lack of housing). The last count for the 2020-2021 school year identified 190 students as homeless.

The County should continue to take actions to address this issue including developing a plan for the health, housing and job placement needs of the homeless population, and continuing to participate in and support the Greater Virginia Peninsula Homeless Consortium and other organizations serving this population.



Community Guidance

Public Engagement

Public input for the Population Chapter was received at key points of the Engage 2045 process. The 2019 Citizen Survey was conducted in the spring of 2019 and the results were reported in the summer. Responses related to the Population Chapter were generally consistent with the results from the 2014 Citizen Survey. Roughly 62% of respondents felt that growth in James City County is happening "a little too fast" or "much too fast," compared to about 32% who felt that the growth rate is "about right." Open-ended responses from the 2019 Citizen Survey showed that respondents had concerns for the rate of growth and development, the needs of senior residents including housing and medical care, and providing career and housing opportunities for young professionals.

The first round of community engagement in the Engage 2045 process was the Summit on the Future event held in the fall of 2019. When asked to indicate their biggest concern for the future, 17% of respondents stated that the County's population growth was their biggest concern. When asked what was most important for the County to accomplish, 48% of respondents selected "managing growth" and 12% of respondents selected "ensure the County is welcoming to a diverse array of people."

Participants also had an opportunity to share their "Big Ideas." Responses included ideas to promote supportive services for at-risk populations such as community support for individuals with mental health issues, homeless shelters, and health care services. Other responses included ideas for increasing school and pre-school capacities by building new school facilities and having dedicated pre-school facilities.

The second round of community engagement was held in the fall of 2020. When asked to compare the Population Needs Goal from the 2035 Comprehensive Plan to the Engage 2045 Public Input Priority for Quality of Life, about 69% of participants stated that the Goal should remain the same. About 25% of respondents indicated that the Goal should change and stated that it should have a greater emphasis on recreational amenities and the needs of at-risk populations. Respondents also compared the future development patterns of Scenario A - Current Trend, and Scenario B - the Alternative, in the Future Alternatives Questionnaire. The results showed a strong preference for Scenario B with responses referencing its' greater walkability between neighborhoods, trails, and future school sites.

During the third round of community engagement, respondents to the Policies and Actions Questionnaire strongly supported enhancing quality of life amenities in the County. In particular, respondents supported prioritizing walking and biking amenities in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways. When asked to hypothetically allocate resources between the five Engage 2045 Public Input Priorities, "expanding existing and creating new quality of life amenities" ranked third at 21.6%.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to Population:

- Create more mixed-use areas that provide greater access to recreation, health services, establishments selling healthy foods, and other quality of life needs proximate to neighborhoods;
- Provide a more compact development pattern that can better support multimodal transportation and provide more transportation options to County citizens;
- Foster walkable environments that increase the health outcomes of residents, including the mental health benefits of experiencing nature and more opportunities to interact with fellow citizens;
- Foster development of more housing choices, increasing housing affordability for lower income members of the County's workforce, seniors, and persons suffering from homelessness; and
- Increase accessibility to educational and job training services for lower income members of the County's workforce, youth, and pre-school aged students.



Spotlight on Implementation

Keeping in mind the demographic trends of the County, careful attention must be given to youth and seniors, who have more specialized needs than the general population. To create a safe and healthy environment and to provide the framework for their future well-being, the County has established a series of strategies and actions designed to provide the means for all citizens, especially youth and seniors, to have safe, affordable, and convenient access to programs, services, and activities.

The work toward promoting enhanced mobility for the County's population, especially for youth and seniors has been on-going. A number of the programs through WATA, the PAA, and Williamsburg Faith in Action are described above. In addition, the County has continued to pursue the development of sidewalks, multi-use trails, and other facilities both through private-sector development and through publicly-funded projects, guided by the Pedestrian Accommodation Plan, Regional Bikeways Master Plan, and Greenway Plan. County ordinances addressing multi-modal facilities have been amended to strengthen the requirements for private-sector development. On the publicly-funded side, one example is the funding received from the Safe Routes to School program to enhance mobility for youth and their families near Clara Byrd Baker Elementary School.

The County and its many partners have also continued to strive to provide educational and recreational activities and locations geared toward specific interests and a wide range of ages. Continuing to support educational programs for early childhood is an important goal for the County. A partnership between the County's Social Services Department, Child Development Resources, and the Williamsburg-James City County Headstart program has supported local efforts to implement Governor Northam's School Readiness Team which strengthens Virginia's early childhood system, including developing a plan to ensure all at-risk three- and four-year olds in Virginia have access to publicly subsidized care and education options by 2025.

In terms of recreation, the County's Parks and Recreation Department has provided many services and programs geared both toward youth and seniors, some of which are described above. The Department has worked to assess programs and services to meet diverse needs, often seeking input from the community in the process, such as the Community Recreation Plan Survey and Analysis that was completed in Grove, and the on-going coordination with Neighborhood Advisory Groups in the Grove and Lafayette neighborhoods. The Department has also partnered with many organizations, including Bacon Street Youth and Family Services, Special Olympics Area 6, and WJCC Schools, which expands their ability to provide services to youth and seniors.

The County is also working toward cost structures that help facilitate the ability of youth and seniors to access the services they need, including health care and housing.

The County is also working toward cost structures that help facilitate the ability of youth and seniors to access the services they need, including health care and housing. To assist low- and moderate-income seniors age in place, James City County was awarded a $350,000 Virginia Housing Rural Rehab Grant and $1 million Scattered Site Community Development Block Grant (CDBG) Housing Rehabilitation grant to address the housing needs of 29 low- to moderate-income, disabled, senior heads of households. The County's Parks & Recreation Department has continued to evaluate cost structures to reduce barriers and has a discount assistance program and free youth passes at the Abram Frink Jr. Community Center, among other programs. Finally, the Social Services Department has worked hard to ensure that County residents are knowledgeable about the services that are available to them, such as the recent expansion of Medicaid.

With the many different programs and services available, helping residents understand and navigate to the best outcomes has continued to be a major goal. One program mentioned above is the Greater Williamsburg Regional Kinship Program. Another example is the Community Outreach Network Educate Care Thrive (CONECT) program, a partnership between Social Services, the Police Department, and the Fire Department. The CONECT program works with citizens 60 years of age and older and citizens 18-59 years old with a disability. The program reaches out to citizens and caregivers that are in need of services, links citizens to community partners in the Greater Williamsburg region, utilizes resources and personal preferences to develop a plan for the future, enhances the health, well-being, and quality of life in our community, and encourages aging in place safely and gracefully.

The many efforts detailed above to meet the needs of our youth and senior populations have been ongoing, but still require further action to ensure the County's vision is realized.



Goals, Strategies, & Actions

Goal

PN - Provide the means for all citizens, especially youth and seniors, to achieve a high quality of life through safe, affordable, and convenient access to programs, services, and activities.

Strategies and Actions

PN 1 - Promote public transportation services and multi-modal access, including future greenway connections, in partnership with the Williamsburg Area Transit Authority.

PN 1.1 - Promote public transportation and mobile services stops, within or adjacent to, new high density and multifamily housing and senior living communities.

PN 1.2 - Encourage retrofit of existing high density and multifamily developments and senior living communities to provide stops for public transportation and mobile services.

PN 1.3 - Make destinations more accessible from home and school for all citizens, with an emphasis on youth and seniors, by implementing the Greenway Master Plan, the Pedestrian Accommodation Master Plan, the Regional Bikeway Master Plan, and theParks and Recreation master plans and integrating them into the design of new development proposals and other projects.

PN 1.4 - Develop new partnerships and alternative means to improve multimodal transportation services within the County.

PN 1.5 - Promote a variety of transportation options to address the needs of individuals with special health issues and a range of physical abilities.

PN 2 - Promote facilities and services that provide care, education, or recreational opportunities geared toward specific interests and ages of youth, adults, and seniors.

PN 2.1 - Ensure that youth have adequate and safe facilities where they may participate in programs and services.

PN 2.2 - Expand access to quality preschool service and affordable childcare through the Bright Beginnings Program and collaborations with Child Development Resources, Advancing Community Excellence (formerly the Community Action Agency) and other partners.

PN 2.3 - Encourage and promote additional safe and licensed child care businesses, including home-based child care, near adequate and accessible transportation routes.

Strategies and Actions

PN 2.4 - Ensure that seniors have adequate and safe facilities where they may participate in programs and services.

PN 2.5 - Encourage and promote additional safe and licensed adult care businesses, including home-based adult care, near adequate and accessible transportation routes.

PN 2.6 - Assess recreational interests of all citizens, with emphasis on youth and seniors, and form partnerships to create or enhance programs and facilities to serve these interests.

PN 2.7 - Promote recreational activities inclusive of all ages and cultures and internally prioritizing programs that meet these needs.

PN 2.8 - Support the efforts of the Youth Advisory Council to conduct surveys such as electronic (internet/web-based) surveys to identify and prioritize ideas for recreational activities/location for youth.

PN 3 - Maintain and improve the affordability of programs, services, and events to all citizens.

PN 3.1 - Continue to offer discounts to facilities, programs and services based on income eligibility and Parks and Recreation's Discount Assistance Program guidelines.

PN 3.2 - Continue to provide free access to the Abram Frink Jr. Community Center for youth.

PN 3.3 - Promote safety net clinics for all citizens with an emphasis on income constrained households.

PN 3.4 - Develop and operate a mobile integrated healthcare/community paramedicine program.

PN 3.5 - Encourage and increase awareness of affordable senior housing options, from independent living to Continuing Care Retirement Communities (CCRCs) and skilled care, for all.

PN 3.6 - Seek grant funding to assist local, nonprofit groups with constructing affordable senior housing.

PN 3.7 - Increase the participation of eligible families enrolled in the Family Access to Medical Insurance Security Plan (FAMIS), Cover Virginia and Supplemental Nutrition Assistance Program (SNAP) by increasing their awareness of the plans.

PN 3.8 - Assess food insecurity for lower income households in the County and examine ways to address any identified issues such as partnerships with the nonprofit sector, or possible development incentives for private sector development (such as a grocery store).

Strategies and Actions

PN 4 - Improve coordination between public and private programs and services and increase awareness of these services among all citizens, especially youth and seniors.

PN 4.1 - Provide education and promote awareness of physical health, mental health, and social service benefits to all citizens.

PN 4.2. - Develop and update a Strategic Plan for Seniors (Health, Housing, and Transportation).

PN 4.3 - Work with senior-serving agencies to coordinate services to seniors.

PN 4.4 - Participate in the development of community-wide needs assessments and strategic plans initiated by community organizations and develop a process for staff to report on the progress of these efforts to the Board of Supervisors.

PN 4.5 - Continue to participate in the Greater Virginia Peninsula Homelessness Consortium and support organizations and/or programs that provide relief for homelessness such as shelter, food, medication, and education.

PN. 4.6. - Develop a plan to address the health, housing and job placement needs of homeless, lower income, and special needs populations.

PN. 4.7. - Continue to support the concept of "aging in place" by promoting strategies such as multigenerational housing for a portion of units in major subdivisions or multifamily projects and/or units built based on the principle of Universal Design making them accessible to all people, regardless of age, disability, or other factors.

PN 5 - Promote citizen access to, and knowledge about, technological resources.

PN 5.1 - Facilitate extension or improvement of communications coverage in under-served areas of the County.

PN 5.2 - Actively improve citizen awareness of computer technology and web-based services to improve their access to goods, services and employment opportunities.

HOUSING

Introduction

A mixture of private and public decisions determines the location, cost, size, and type of housing in a community. Housing is not only shelter, a taxable commodity, and a determinant of transportation needs, but also plays an important role in ensuring individual and family well-being and supporting local economic growth.

The provision of diverse housing stock and related infrastructure addresses the current and projected needs created by population growth, and positions James City County as a community that is inclusive of many ages, incomes, and other demographic variables. Through careful consideration of the implications of different types and amounts of housing development, the County seeks a balanced outcome that protects the natural environment, character, and fiscal health, while providing shelter, building community, and underpinning the County's economy.

This Comprehensive Plan Housing section presents the characteristic of and different factors affecting housing in James City County including the number, type, and conditions of existing units, household income, housing affordability, the current state of homelessness, and senior housing needs.

The Housing Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language as written in the 2035 Comprehensive Plan has been revised to incorporate the vision of the Workforce Housing Task Force, acknowledge both renters and owners, and discuss meeting the needs of the County's residents and workers of all ages and income levels. The Goal now states: "Consistent with the four principles of the Workforce Housing Task Force, maintain and develop residential neighborhoods to achieve high-quality design and construction, and provide a wide range of choices for both renters and owners in housing types, densities, price ranges, and accessibility that address the needs of the County's residents and workers of all ages and income levels."

Many important Housing Chapter implementation activities have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the revised and updated Strategies and Actions will be needed.

CHAPTER GOAL

"Consistent with the four principles of the Workforce Housing Task Force, maintain and develop residential neighborhoods to achieve high-quality design and construction, and provide a wide range of choices for both renters and owners in housing types, densities, price ranges, and accessibility that address the needs of the County's residents and workers of all ages and income levels."

Key Planning Influences

Housing Trends Data

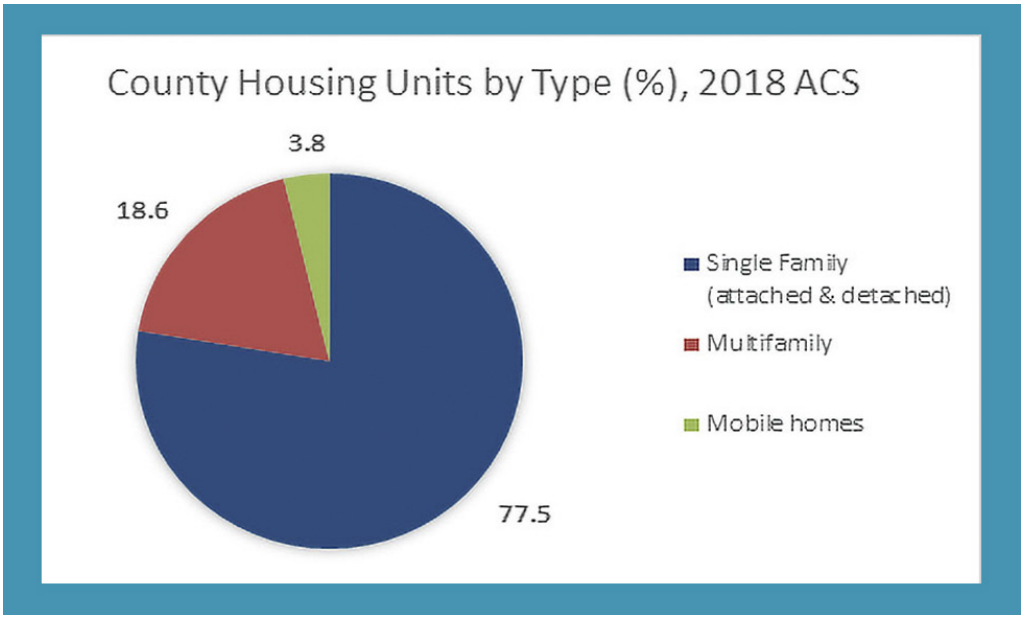
General

The number of housing units in James City County has increased rapidly over the past 40 years. From a mainly rural county with 5,000 residential units in 1970, the County has grown to be a more suburban one with approximately 32,838 residential units according to the 2018 American Community Survey (ACS)[1].

While the number of housing units has grown significantly, the dominant unit type has remained the same. Single-family dwellings have represented approximately 70% or more of the County's housing units in every decade since 1970 (U.S. Census and 2018 ACS). According to the 2018 ACS, the 25,438 single-family units (attached and detached) represent 77.5% of the County's housing stock, followed by 6,137 multifamily units and 1,314 mobile homes (Figure H-1).

Between the 2012 and 2018 ACS, the percentage of multifamily units has risen slightly while single-family and mobile homes have decreased slightly. The County's percentage of single-family dwellings in 2018 was slightly less than York County's, well above the City of Williamsburg's, and slightly higher than that of the Metropolitan Statistical Area (MSA) and Virginia.

Figure H-1. County Housing Units by Type



James City County's housing stock is relatively new. According to the 2018 ACS data, housing built after 2000 represented 36.5% of the County's housing stock. Only 3,122 of the total County's housing units were constructed prior to 1969, representing 9.5% of all housing units. By comparison, housing units constructed prior to 1969 represented 17.2 and 33.3%, respectively, of the York County and City of Williamsburg housing stock and 31.8 and 31.6% of the MSA and Virginia housing stock.

While most of the housing units in James City County are presumed to be of higher quality based on the date of construction, others lack basic facilities and do not meet the U.S. Department of Housing and Urban Development (HUD) Housing Quality Standards. According to the 2018 ACS, approximately 81 units lacked complete plumbing facilities, 204 lacked complete kitchen facilities, and 253 had no telephone service.

[1] The ACS is a national survey conducted by the Census Bureau providing demographic, socio-economic information and housing characteristics such as type, age, condition, and housing tenure during inter-census years.

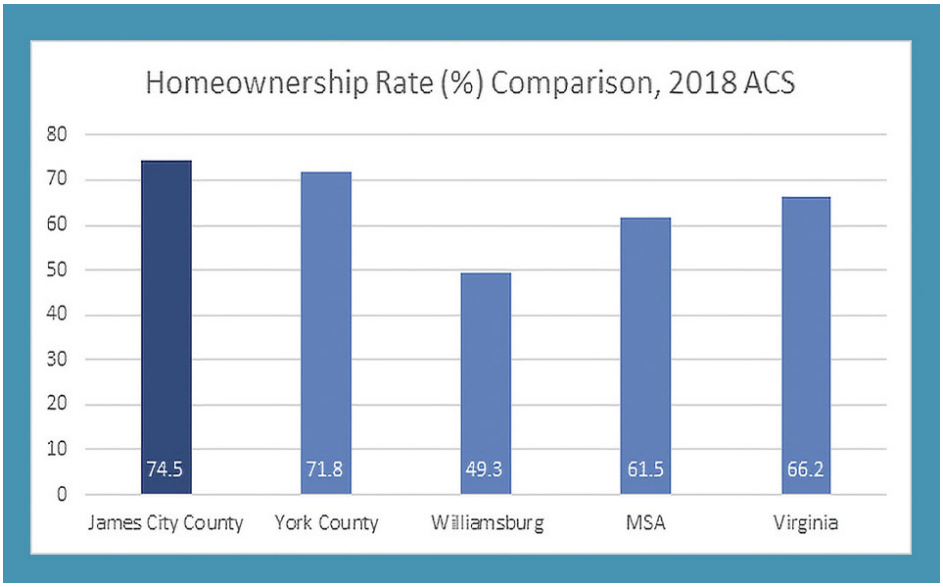
The 2016 James City County Housing Conditions Study (Conditions Study), which evaluated 19,259 residential exteriors, found that just over 90% appeared to be in average or above average condition. Approximately 1,000 houses sampled were in troubled condition. The highest concentrations of troubled properties were in the northern and southernmost regions of the County. The Conditions Study estimated that there are at least 82 dilapidated single-family residences built before 2000 in the County.

One of the findings of the Conditions Study demonstrated how household by income in the County corresponded with home-buying power and monthly affordable rent (Figure H-2). Information from this study was a cornerstone of understanding the housing situation in the County.

Figure H-2. Household by Income and Corresponding House-buying Power



Figure H-3. Homeownership Rate Comparison



According to ACS data, the homeownership rate in the County was approximately 74.5% in 2018, exceeding the homeownership rates of York County and the City of Williamsburg, as well as homeownership rates in the MSA and Virginia (Figure H-3).

Homeownership is a good indicator of a community's stability; however, having sufficient rental opportunities in a community is also essential because the rental stock can serve those households in the County who either cannot afford or choose not to own. For example, without sufficient rental or other "starter" opportunities, young professionals just coming into the market or established residents experiencing a need to downsize may find few housing options and be forced to seek housing elsewhere.

[2] The ACS uses manufactured home and mobile home interchangeably, and the ACS uses the term mobile home in the Housing Characteristics data. The ACS considers modular home as a type of construction. https://www.census.gov/construction/chars/definitions/#hudThe County Ordinance differentiates between manufactured home and mobile home using definitions found in the glossary.

Affordability

Over time both the County and other agencies have defined affordability and the term for housing affordability in different ways. These terms include affordable and workforce housing. For purposes of this chapter, *workforce housing* is housing that is affordable to households with incomes making less than 80% AMI and will be used to include multiple types of housing affordability.

On November 22, 2016, the County's Board of Supervisors adopted the 2035 Strategic Plan, which includes the goal of "Expanding and Diversifying the Local Economy." As part of meeting that goal, the 2035 Strategic Plan calls for "…supporting strategies to facilitate the development of affordable and workforce housing." The County Board of Supervisors established the Workforce Housing Task Force (WHTF) to develop those strategies. The WHTF was comprised of a group of volunteer citizens representing a range of community interests. In collaboration with County staff and a consultant team, the WHTF met monthly from December 2017 through February 2019, to better understand workforce housing needs in the County and develop proposals to address those needs.

The WHTF defined workforce housing generally as the types of housing that are needed in James City County to ensure that the County can attract and retain the workers needed to sustain the local economy. This definition includes all types of housing affordable to households in the workforce, though the emphasis is on working households with incomes below 100% of area median income for whom the lack of housing opportunities in the County is the greatest.

The 2019 James City County Workforce Housing Task Force Findings and Recommendations (WHTF Report) provides in-depth data on housing affordability issues in the County [3]. Key analysis points in the WHTF Report and other sources include:

- The incomes of many workers in the County - even workers advanced in their occupations or who share rent with another person - were insufficient to afford to buy or even rent a home in the County, at the average home prices and average rents cited in the WHTF Report.

- Households spending more than 30% of their gross household income for housing are considered cost-burdened. According to the Comprehensive Housing Affordability Strategy (CHAS) report compiled from the 2013-2017 ACS, 10,840 households in the County were cost-burdened, accounting for about 30% of all households. Among these, 9,175 (almost 85%) had incomes below 80% Area Median Income (AMI).

- In 2018, the median home price in James City County was $292,300 [4]. A household (individual or family) would need an income of at least $62,000 to afford the median-priced home. Using the ACS data, it is impossible to determine the exact number of households that earn less than $62,000. However, ACS data show that 29% of households had incomes below $50,000, none of which could afford to purchase a median-priced home. Another 16% had incomes between $50,000 and $74,999; some portion of those households would not be able to purchase the median-priced home. Also, note that the median income for the 8,303 nonfamily households, which could be singles or unrelated people sharing a home, was $44,855. Therefore, a majority of nonfamily households would not be able to afford to purchase more than half of the homes in the County [5].

[3] View the full WHTF Report at https://jamescitycountyva.gov/DocumentCenter/View/21386/Workforce-Housing-Task-Force-Report-Findings--Recommendations-PDF?bidId=.
[4] James City County Department of Financial and Management Services
[5] U.S. Census Bureau, 2018 American Community Survey 5-Year Estimate, Incomes in the past 12 months

- In 2018, there were 7,332 renter-occupied housing units [6]. The median rent was $1,248 [7]. A household would need an income of at least $49,920 to afford the median rent. The median household income for renters was $45,789. Approximately 3,957 households earned less than $49,999 and most would be cost-burdened if paying the median rent.

- In 2018, there were approximately 2,007 units rented for less than $1,000, affordable to a household with an income of $36,000 or less. Approximately 5,264 households had income lower than $35,000. Therefore, approximately 3,257 households would not have affordable rental options in the County.

- The County has significant numbers of both in- and out-commuters (estimated at 17,500 and 18,000, respectively). Based on wage and housing data, it is likely that some workers in the County reside elsewhere because they cannot find appropriate, affordable housing closer to their jobs in the County.

There is a significant deficit in the County of housing affordable to lower-income workers, below 50% of AMI. The data shows that the majority of the County's jobs provide insufficient income to allow working families with many housing options in the County. Although median household income in the County was relatively high, at $83,048 in 2018, median earned income is considerably lower at $53,614 for full-time year-round workers. Of the 23,065 full-time, year-round workers in the County, 6,106 (26.5%), earn less than $34,999 and another 4,274 (18.5%) earn between $35,000 and $49,990. Thirty percent of AMI in 2018 was $17,350 for a 1-person household and $26,200 for a four-person household.

The WHTF concluded that "James City County has virtually no available units that are affordable to those earning less than 30% of AMI… In order to obtain housing, households in this income category must have access to below-market-cost units, accept substandard housing, or spend a disproportionately high share of their income on housing."

For working households, adding transportation costs to housing costs provides a more comprehensive understanding of housing affordability. The WHTF stated, "Although housing costs are regularly accounted for in location decisions, transportation costs often are not adequately considered when making decisions about where to live and work. Consequently, housing affordability indexes that do not account for transportation costs cannot provide an accurate assessment of the cost of housing choices."

[6] U.S. Census Bureau, 2018 American Community Survey 5-Year Estimate, Selected Housing Characteristics
[7] U.S. Census Bureau, 2018 American Community Survey 5-year file, Estimate of median gross rent.

Workforce Housing

The WHTF Report provides a clear statement of the importance of affordable housing in the County:

> "High-quality, affordable housing is important to ensuring individual and family physical and mental health and well-being. Housing is also the bedrock for positive educational outcomes - children living in stable and affordable housing do better in school and school districts overall perform better when families have secure, affordable housing. In addition, housing availability and affordability are critically important to James City County's economic vitality and prosperity. If there is an insufficient supply of housing affordable to workers at all income levels, individual workers, businesses, and the County's well-being will all suffer. If the County does not plan for housing that meets the needs of current and future workers, it will become increasingly difficult for James City County to attract and retain a diverse workforce and continue to grow a strong, sustainable local economy."

The Vision stated in the WHTF Report was that "James City County will be a diverse community offering a high quality of life and quality affordable housing options in safe, well-maintained, and inclusive neighborhoods." The Guiding Principles were listed as follows:

1. Workers in James City County should be able to afford to live in the County if they choose.
2. James City County should promote strategies that create and sustain mixed-income neighborhoods.
3. Creating a range of attainable housing options in James City County requires partnerships among the public, private, and nonprofit sectors.
4. James City County's solutions for workforce housing should be designed to respect the County's unique natural, historic, and cultural resources.

The WHTF offered recommendations for improving housing availability and affordability in four categories, which are listed below. The WHTF recommendations focus on strategies that serve low- and moderate-income workers with incomes between 30% and 100% of AMI who represent the largest share of cost-burdened households and were identified as having the greatest lack of opportunities to find affordable housing.

1. **Housing Preservation:** Strategies to rehabilitate, restore, and preserve existing housing in the County.
2. **Housing Production:** Strategies to facilitate the private-sector production of new workforce housing in the County.
3. **Housing Access:** Strategies to connect James City County workers with affordable housing in the County.
4. **Funding:** Strategies for expanding funding sources to support workforce housing initiatives.

Affordable housing can refer to a spectrum of housing options, from single-family residences to townhomes, duplexes, triplexes, quadplexes, and apartment complexes. Those who may benefit from a greater variety of housing options include recent graduates, young families, seniors who are downsizing, those who are aging in place with a live-in caretaker, cost-burdened households, and low-wage earners.

A discussion about affordable housing must include mobile homes and mobile home parks, which account for 3.8% of the County's housing stock. While manufactured and mobile homes are an important source of affordable housing, some units in the County have deteriorated. There are mobile home parks whose commercial zoning provides little protection for the residents against conversion to another use. To preserve this housing stock, policies to address zoning and park improvements should be considered.

In the past, the County Zoning Ordinance incentivized developers to provide affordable housing in exchange for a density bonus - that is, more units could be built on a given parcel size than would ordinarily be allowed by the Zoning Ordinance. In 2012, the County adopted the Housing Opportunity Policy (HOP) to update the use of proffers for affordable housing.

The HOP was designed to increase affordable and workforce housing by reducing proffer fees and increasing density in exchange for dwelling units affordable to households earning 30 to 120% of AMI. In 2016, in response to changes in the State Code, the HOP was repealed for new applications for residential rezoning. The existing Zoning Ordinance language and any remaining HOP provisions should be re-evaluated in conjunction with moving forward with the WHTF recommendations.

Based in part on the WHTF Report, guidance for new residential development moving forward is as follows:

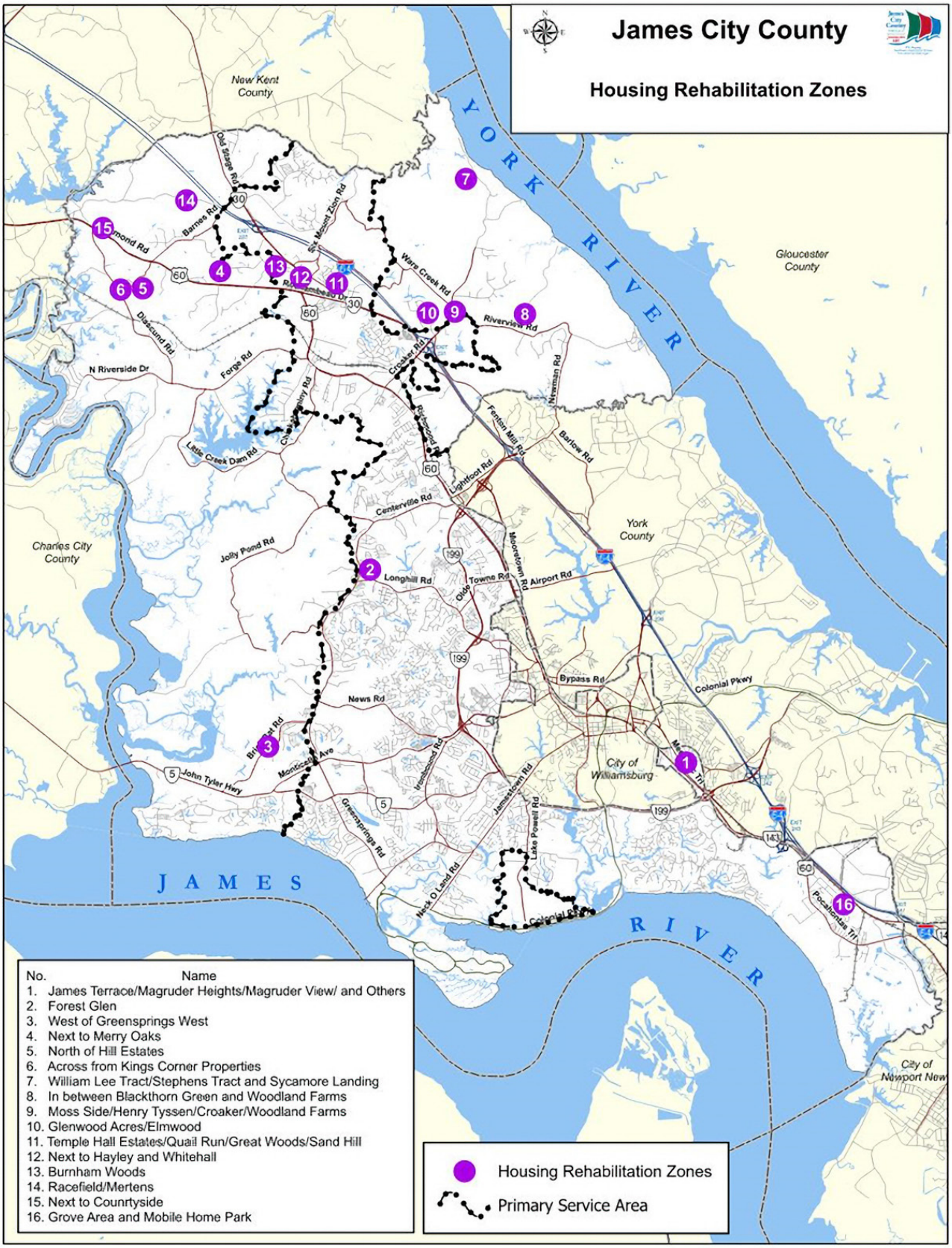
- Offer housing affordable to workers with incomes up to 80% of AMI, with the housing cost representing no more than 30% of gross household income.
- Offer housing at a range of income levels (mixed-income neighborhoods), with at least 20% targeted to the AMI levels cited above.
    - Offer housing that is of good quality, with general consistency in architecture and finishes among units designed for various income levels.
- Offer housing within a neighborhood that is located near, or provides:
    - Facilities for multi-modal mobility, particularly connections to public facilities (e.g., schools, etc.), job centers, and shopping areas.
    - Appropriate recreational amenities.

Rehabilitation Zones/Revitalization Areas

Code of Virginia § 36-55.64 authorizes the County to create, by ordinance, local housing rehabilitation zones where the County can provide incentives and regulatory flexibility. The establishment of housing rehabilitation zones allows projects that are affordable at a variety of incomes to be eligible for housing revitalization financing.

The WHTF Report recommended the designation of revitalization or rehabilitation zones to allow the County, private, and non-profit developers to take advantage of funding offered to improve housing and neighborhood conditions in the County. The 2016 James City County Housing Conditions Study evaluated 19,259 residential exteriors finding that approximately 10% were in troubled conditions. The map in Figure H-4 shows areas where housing in poor conditions is concentrated and therefore should be designated as rehabilitation zones. The Housing Conditions Study is located here: https://jamescitycountyva.gov/3051/Housing-Conditions-Study.

Figure H-4. Housing Rehabilitation Zones



Homelessness

A discussion about housing is not complete without mention of homelessness. According to the National Coalition for the Homeless (NCH), foreclosure, poverty, declining employment opportunities and income, declining public assistance, lack of affordable housing, health care issues, domestic violence, mental illness, and addiction are all factors that contribute to homelessness. Five of these factors (foreclosure, poverty, employment, public assistance, and health care) are economic issues. The remaining three factors (domestic violence, mental illness, and addiction) may interrupt an individual's or family's ability to afford housing. Homelessness results from complex circumstances that require people to choose between food, shelter, and other basic needs. Only a concerted effort to address all of these issues will end homelessness.

Counting the number of people suffering from homelessness is difficult because programs and agencies define homelessness differently. For example, County schools consider children living in motels as homeless. In contrast, the 2019 Virginia Homeless Solutions Grant only counts those not living in a permanent structure as homeless. Further complicating the count, some people suffering from homelessness want to remain anonymous and avoid situations where they can be counted.

The 2019 "Point-in-Time" count identified 427 people suffering from homelessness across the six jurisdictions in the Greater Virginia Peninsula Homelessness Consortium (GVPHC) [8], compared to 439 counted in 2018. In James City County, 37 people suffering from homelessness were reported, the third-highest homeless population on the Peninsula. Newport News had 231, and Hampton had 126 people reported as homeless. In James City County, many of the people suffering from homelessness were staying in a shelter operated by the Community of Faith Outreach Ministry or in a hotel room paid for by a nonprofit organization such as the Salvation Army, Avalon Shelter for Women, or the United Way of Greater Williamsburg.

The Housing Unit of the County's Social Services Department (Housing) assists low- and moderate-income residents with a variety of housing needs. Services include assistance to people suffering from homelessness, administering HUD Housing Choice Vouchers, supporting first-time homebuyer assistance, and facilitating home repairs. Housing works closely with community organizations, the private sector, and federal, state, and local agencies, to provide services to residents.

Counting the number of people suffering from homelessness is difficult because programs and agencies define homelessness differently.

[8] Includes the cities of Hampton, Newport News, Poquoson, Williamsburg, and the counties of James City and York.

As of 2020, Housing was administering two programs that serve people suffering from homelessness and those at risk of becoming homeless. The Virginia Homeless Solutions Program aims to rapidly rehouse people suffering from homelessness or those who would otherwise be homeless without this assistance. The United States Department of Housing and Urban Development (HUD) Section 8 Housing Choice Voucher Program aims to provide permanent rental assistance to those earning below 50% of AMI.

Housing has the flexibility to adapt to changing conditions based on funding available. For example, Housing administered flood mitigation funding after Hurricane Isabel in 2003, and as a result of the increased unemployment during the 2020 COVID-19 Pandemic, the County administered the James City County Subsistence Payment Project, funded by a Department of Housing and Community Development (DHCD) Urgent Need (Covid-19) Community Development Block Grant, to assist the persons suffering from homelessness and those in jeopardy of becoming homeless.

Housing also coordinates with the Salvation Army and Avalon Shelter for Women to serve this at-risk population. The Salvation Army offers transitional housing programs to the temporarily displaced, to the chronically homeless population, and to young adults who have aged out of the foster care system. The Avalon Shelter for Women's primary mission is to serve females who are victims of domestic violence and also provide emergency shelter for other persons suffering from homelessness when space permits.

Various other local charities, churches, and individuals also offer emergency and winter shelters to people suffering from homelessness. The James City County Division of Social Services, the United Way, some area nonprofits, and churches provide payment for short stays at motels or other temporary lodgings.

In addition to the programs and approaches described above, James City County participates in the Peninsula Mayors and Chairs Commission on Homelessness. The Commission includes representation from all six jurisdictions on the Peninsula. Its primary function is to coordinate regional efforts to address homelessness on the Peninsula and act as a conduit to elected leadership on these matters.

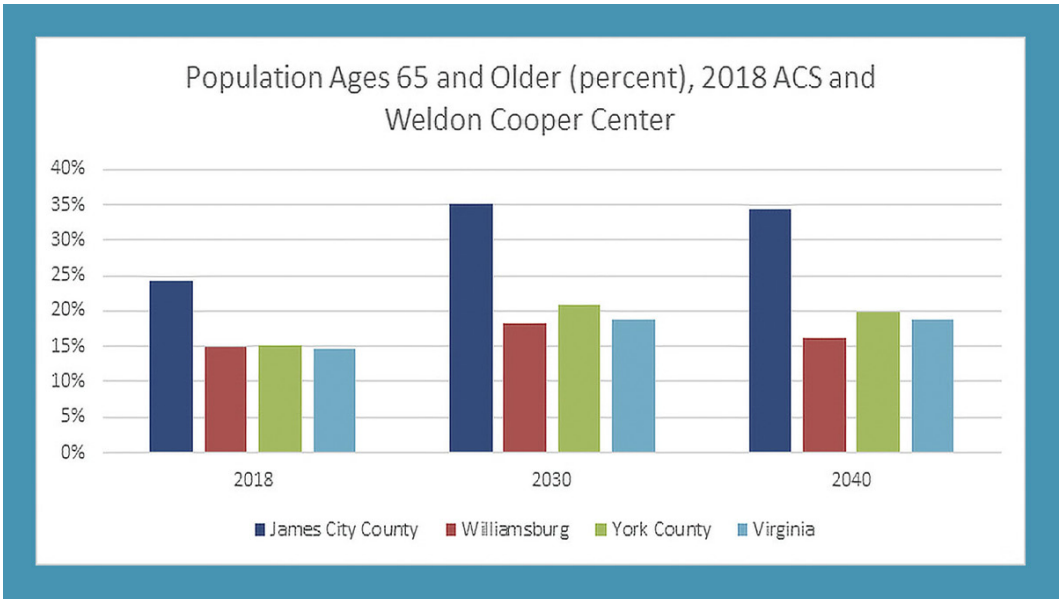
The Commission provides funding for a regional coordinator to analyze the Homeless Management Information System (HMIS) data and monitor for compliance with HUD programs within the region. All service providers in the region have adopted HMIS allowing for better utilization of scarce funding and the provision of effective direct services.



Senior Housing

According to the 2018 American Community Survey (ACS) and noted in the Population chapter, approximately 24% of the County's population was 65 years and older (Figure H-5). This percentage has grown in the years since the 2010 decennial Census when it was 21%. Population projections by the Weldon Cooper Center for Public Service at the University of Virginia show that this segment of the population may rise to 35% by 2030 and settle at 34% by 2040. This cohort is projected to grow at a faster rate and make up a larger proportion of the population of James City County when compared to the City of Williamsburg, York County, and the Commonwealth of Virginia. The continuing growth of this population cohort represents challenges to various aspects of our community such as transportation, public services, and housing.

Figure H-5. Population Ages 65 and Older



In James City County, senior housing options vary. There is a mix of active senior adult communities (age-restricted) such as Colonial Heritage and the Settlement at Powhatan Creek; continuing care retirement communities such as Williamsburg Landing, Patriots Colony, and Windsor Meade; assisted living facilities such as Brookdale and Edgeworth Park at New Town, and several nursing homes. While many senior citizens seek these communities and the range of facilities and services they provide, others prefer to live and age in their own homes, a concept known as "aging in place." There is a range of tools and approaches that can aid seniors aging in place, with an important one being the use of universal design. Universal design promotes the design of products and environments to be used by all people to the greatest extent possible, without the need for adaption or specialized design. It also promotes the construction of environments that are compatible with the physical and sensory impairments associated with aging.

The County has made some strides toward addressing senior-related housing issues. Over the years, revisions to the Zoning Ordinance related to accessory apartments have provided for additional flexibility in senior housing. Other revisions to the Zoning Ordinance clarified the terminology and, in some cases, eased the permitting process for group homes, independent living facilities, assisted living facilities, skilled nursing facilities (nursing homes), and continuing care retirement facilities. Changes to the Ordinance also included the addition of universal design guidelines as an option for density bonuses for developments in certain zoning districts.

Community Guidance

Public Engagement

Through the multiple rounds of public engagement, one of the public engagement themes that most related to this chapter was the following: "Supporting the development of affordable workforce housing has emerged as an important issue to community members. Residential growth should be balanced in a way that provides housing opportunities for people at all income levels. Development of additional housing must also be balanced with the preservation of the County's unique community character."

Overall, there was consistent public support to provide more opportunities for affordable workforce housing during the planning process. During the 2019 Citizen Survey, 83% of respondents stated that affordable workforce housing opportunities were "very important" or "somewhat important". However, 50% of respondents indicated that they were "very unsatisfied" or "unsatisfied" with the County's current affordable workforce housing opportunities representing a 33% gap in satisfaction. This gap in satisfaction was the largest identified in the survey. Respondents to the 2019 Citizen Survey also showed support for encouraging a greater variety and mix of housing types and price levels.

Public support for expanding the availability of workforce housing continued with the Engage 2045 process. During the first round of community engagement in November 2019, 84.4% of respondents indicated that it was very or somewhat important to provide more housing opportunities that are affordable to our workforce. Additionally, 17.2% of respondents stated that their biggest concern was the rising cost of living and housing.

The second round of community engagement included the Establishing Our Goals Questionnaire and the Alternative Future Survey. The Establishing Our Goals Questionnaire asked respondents to compare the Housing goal from the 2035 Comprehensive Plan with the Affordable Housing Engage 2045 Public Input Priority. About 55% of respondents indicated that the goal should remain the same as the 2035 Comprehensive Plan goal while about 36% stated it should be changed. Suggested changes included providing additional specificity and clarity about affordable workforce housing and the County's target market for housing. For the Alternative Future Survey, respondents indicated that Scenario B had more opportunities for providing affordable workforce housing when compared to Scenario A.

While the results from the previous stages of public input showed consistent support for affordable workforce housing, the results from the third round of community engagement showed there was less support for prioritizing resources to support this objective. The Policies and Actions Questionnaire asked respondents to hypothetically allocate resources between the five Engage 2045 Public Input Themes. When compared to the other Engage 2045 Public Input Themes, "supporting the development of affordable workforce housing" ranked fifth at 13.9%. Respondents to the Policies and Action Questionnaire also identified repurposing older, vacant, or underutilized commercial buildings as the best strategy to increase the availability of affordable workforce housing.

Strategies to improve homes in existing residential neighborhoods and stabilize and enhance mobile home parks were also strongly supported. When asked where new affordable workforce housing should be located, respondents strongly supported locations near employment and shopping centers with access to multimodal transportation, and locations along major transportation corridors. Some support was also given to locating affordable workforce housing in new mixed-income residential developments and within existing mixed-residential neighborhoods.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to Housing:

- Foster the development of "complete communities" by locating new housing proximate to transit service, shopping, employment areas, recreational areas, schools, and community facilities;
- Encourage infill housing on vacant parcels within communities or on redeveloped parcels to reduce sprawl and to locate new housing closer to existing facilities and amenities;
- Provide more housing options that increase the ability for workers to live locally and for households entering new lifestyle periods, such as first-time homebuyers and empty nesters, to have options that allow them to continue to live in the County;
- Emphasize "missing middle" housing types such as attached units, townhomes, duplexes, and small-scale low-rise multifamily housing; and
- Design new housing developments to maintain a high visual and structural quality.



Spotlight on Implementation

Housing and the Neighborhood Development division of the Community Development Department manage neighborhood revitalization programs that address critical community needs, including housing production and rehabilitation, and improvements to neighborhood infrastructure. Funding for these projects comes from local, state, and federal sources, primarily the competitive Community Development Block Grant (CDBG) program administered by the DHCD. Examples include:

- Between Fiscal Years 2014 and 2019, the Neighbors Drive project provided housing rehabilitation, a paved public road, sidewalk, multiuse path on Richmond Road, and seven new lots for affordable homes. The project was funded by the County, DHCD, and Virginia Department of Transportation.

- In 2017, DHCD awarded James City County $350,000 for the Rural Homeowner Housing Rehabilitation Program which repaired 10 homes for low- and moderate-income households.

- In 2019, DHCD awarded James City County $1,000,000 for the Scattered Site Housing Rehabilitation Program, which will replace or repair 16 owner-occupied homes for low- and moderate-income households. The Scattered Site Program will continue until January of 2022.

In addition to community revitalization and neighborhood-centered projects, Housing manages County-wide programs that promote homeownership and provide housing rehabilitation and rental assistance including the following:

Home Ownership / Home-buying Assistance

- The Affordable Housing Incentive Program (AHIP) is a flexible partnership established in 1990 to provide incentives to the private sector to build housing affordable for first-time homebuyers to help low- and moderate-income County residents and workers. The County may assist developers and builders by providing low-cost land and reducing or eliminating the builder's marketing costs when providing homes for qualified first-time homebuyers.

- Housing assists first-time homebuyers with federal and state funding such as Virginia Housing Development Authority (VHDA) reduced-rate mortgages, and down payment assistance from the Hampton Roads Loan Fund Partnership, administered by the Hampton Roads Planning District Commission (HRPDC), when such funds are available.

- The County Employer Assisted Homeownership Program (EAHP) encourages employees of James City County to purchase a primary residence in the County by matching the employees' closing funds, dollar-for-dollar, up to $3,000. EAHP funds may be used for the down payment or closing costs.

Housing Quality and Repair Assistance

- The Emergency Home Repair Program offers low-income, elderly, or disabled homeowners up to $2,000 for emergency repairs where housing conditions pose a risk to the inhabitants' health or safety. Assistance is generally available for heating, plumbing, electrical, and roof repairs.
- The James City Service Authority Low-income Installment Payment Program assists low- and moderate-income households that cannot otherwise afford to connect to public water and sewer.
- The Unsafe Building and Structure Program provides loan and grant assistance to owners and occupants of homes declared to be unsafe, according to the James City County Building Safety Code. Funds may assist with repairs or relocation of occupants to a safe home.
- **Financing Failed Septic Repairs:** The Indoor Plumbing Rehabilitation Program (IPR) administered by DHCD improves homes of low- and moderate-income residents to meet the Housing Quality Standards established by the DHCD. The program primarily improves homes with inadequate plumbing, water, or sewage systems. Housing participates in the regional IPR program; however, competition for the funding limits the number of households that Housing can serve to one or two a year. IPR provides zero-interest loans for low-income households living in unsanitary conditions, such as failed septic systems and wells or lack of running water, allowing the homeowners to remain in their homes.
- **Energy-Efficiency Improvement Programs:** Lower energy costs reduce the total cost of homeownership or rental housing. Housing's Home Energy Loss Prevention (HELP) program offers technical and financial assistance with energy efficiency improvements; however, funding is currently limited.

Rental Assistance and Homlessness Prevention

- DHCD-funded homelessness prevention programs vary year-to-year. They usually provide short-term rental assistance to households that are homeless or at risk of becoming homeless.
- The HUD-funded Housing Choice Voucher Program provides long-term rental assistance to low-income families, the elderly, veterans, and disabled persons based on their income.



Neighbors Drive Before



Neighbors Drive After

Education and Grants

- The Housing Fund allocated by the James City County Board of Supervisors and administered by the Neighborhood Development Division assists with a variety of the programs described above and is often used as leverage to obtain grant funds from federal and state programs. The General Fund provided $100,000 to the Housing Fund for Fiscal Year (FY) 2020. In FY 20, a majority of the Housing Fund was allocated as leverage for the James City County Scattered Site Housing Rehabilitation Program.
- Educational opportunities such as the VDHA First-time Homebuyer classes are led by Housing approximately six times each year.
- The Family Self-Sufficiency Program (FSS) is designed to reduce the dependency of low-income families on HUD Housing Choice Vouchers, welfare, and other public assistance. FSS helps clients set goals, connects them with community resources (including job training and job opportunities), and provides educational opportunities. These efforts are all designed to help the clients increase their income and better manage their finances. As Housing Choice Voucher holders increase their incomes, the assistance provided to them is reduced.
- Home maintenance education classes, led by the Housing Rehabilitation Specialist and a Housing Counselor, teach owners how to cost-effectively maintain and repair their homes and how to budget for household needs.
- During the 2020 COVID-19 Pandemic, two grants were obtained to assist homeowners and renters affected by the Pandemic in paying their rent or mortgage payments.

Figure H-6 and Figure H-7 display the results of Housing projects and funding sources, respectively, which provide financial and technical assistance.

Figure H-6. Households Assisted by Housing Programs

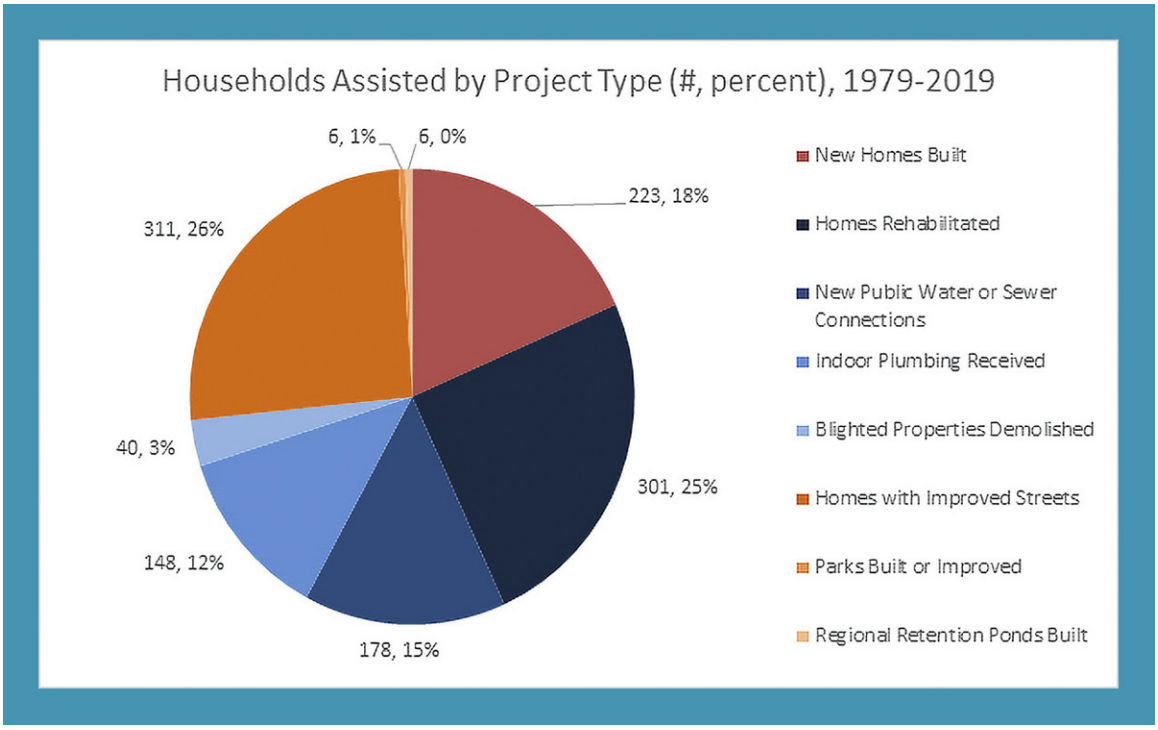
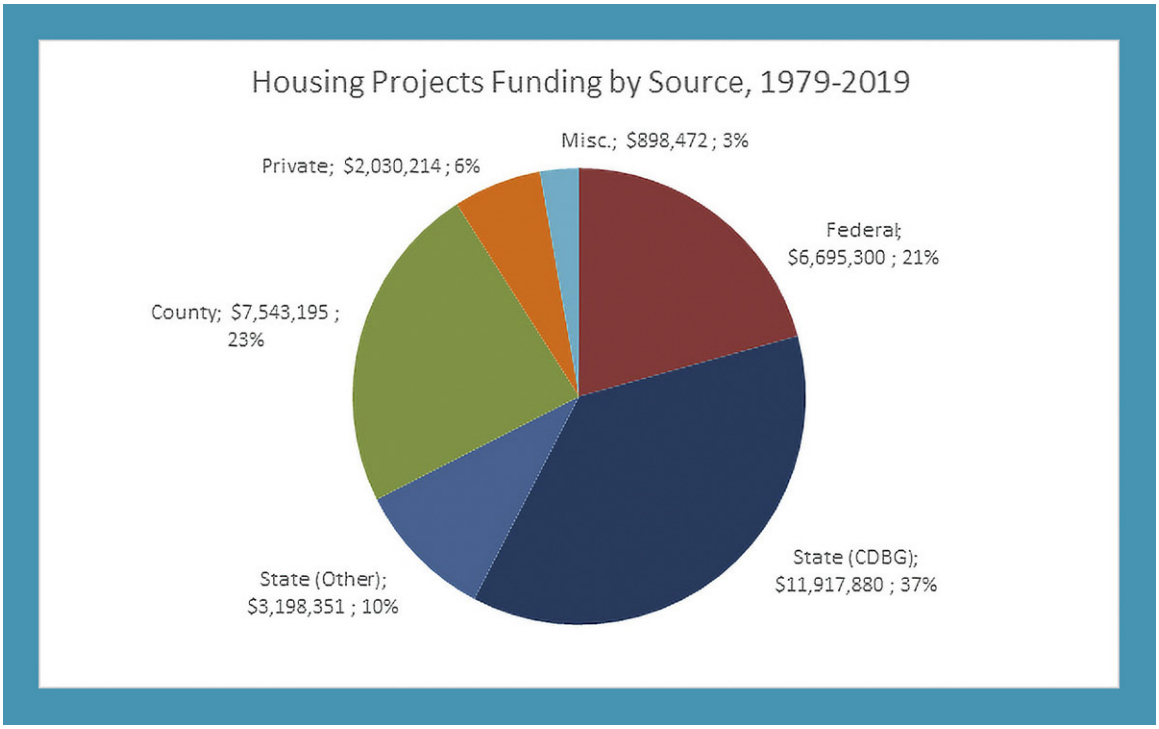


Figure H-7. Housing Project Funding



Note that Housing anticipates receiving $3.5 million in loan repayments from these projects, thereby reducing the County's overall expenditures to $4.1 million.

Housing often works with nonprofit agencies to provide housing services. Examples include:

- Housing Partnerships, Inc. (HPI) repairs and replaces substandard housing in the Greater Williamsburg Area using volunteer labor and donated funds and materials. James City County provided General Funds of $60,000 in FY19 to HPI to support its work in the County. The funds are in the Housing and Neighborhood Development Fund budget. HPI reports annually to the County, accounting for the funds received and expended, the number of people served, and the services provided.

- Habitat for Humanity Peninsula and Greater Williamsburg (Habitat) develops partnerships with homebuyers, community volunteers, builders, and contributors to build new homes with donated labor and materials for low-income families. The County makes lots available to Habitat for new housing. In 2019, Habitat purchased four lots located in the Forest Heights Road revitalization area from the County. Habitat and the County also collaborated on a repair blitz in Forest Glen to improve the exteriors of 15 homes.

- The Community Action Agency addresses a variety of community concerns, including homelessness.

- The newest partner for Housing is project:HOMES, a Richmond-based nonprofit that uses state grant funds to weatherize homes for low-income households.

In addition to continuing the many programs and initiatives described above, it is a priority to implement the Workforce Housing Task Force recommendations by 2045.

Goals, Strategies, & Actions

Goal

H - Consistent with the four principles of the Workforce Housing Task Force, maintain and develop residential neighborhoods to achieve high quality design and construction, and provide a wide range of choices for both renters and owners in housing types, densities, price ranges, and accessibility that address the needs of the County's residents and workers of all ages and income levels.

Strategies and Actions

H 1 - Rehabilitate and preserve existing housing to maintain the existing housing stock that is affordable for County residents.

H 1.1 - Promote housing rehabilitation to extend the life of existing homes and maintain community character.

H 1.1.1 - Increase the resources the County dedicates to rehabilitations of single-family homes, prioritizing the homes identified in the 2016 Housing Needs Study and Housing Conditions Study; rehabilitate 10 single-family homes annually to HUD Housing Quality Standards.

H 1.1.2 - Seek additional resources and staffing to be able to rehabilitate a total of 25 homes annually.

H 1.1.3 - Hold an annual "Rehab Blitz" day modeled after the partnership with Habitat for Humanity and other nonprofits to target exterior rehabilitation activities in a particular neighborhood.

H 1.1.4 - Offer property tax/abatement/exemption for owners of deteriorating single-family homes that make improvements and either continue to live in the home or enter into an agreement with the County to rent the home to a low- or moderate-income working individual or family. Ensure the exemptions/abatements apply to the value of the improvements and not the entire property.

H 1.1.5 - Develop a pattern book to guide housing maintenance and rehabilitation that could include sections on home accessibility modification and aging in place.

H 1.1.6 - Continue to support, through marketing, partnering, and other means, nonprofit groups such as Housing Partnerships, Inc., Habitat for Humanity, Community Action Agency, and project:HOMES which have programs providing emergency home repair; preventive maintenance; and counseling in home finance, rental assistance, budgeting, and sanitary health conditions.

H 1.1.7 - Promote water/sewer connections for low- and moderate-income households by processing applications for the James City Service Authority's deferred payment plan.

H 1.1.8 - Use neighborhood improvement programs and County Code enforcement to discourage blight and the deterioration of housing and neighborhoods.

Goals, Strategies, & Actions

H 1.2 - Pursue the preservation and redevelopment of manufactured homes and mobile home parks to prevent further deterioration of these homes and protect the current residents.

H 1.2.1 - Assess the opportunities for improving current mobile home parks.

H 1.2.2 - Look for opportunities that either attempt to prevent loss of mobile homes or promote responsible redevelopment of mobile home parks while protecting current residents.

H 1.2.3 - Review and evaluate the current conditions of mobile home parks.

H 1.2.4 - Establish goals for individual mobile home parks.

H 1.2.5 - Develop guidelines and engage park owners and residents to discuss needs and options to improve parks.

H 1.2.6 - Explore the option of the County buying out parks and either retaining control temporarily or transferring control, winding down agreements with current owners by 2030.

H 1.2.7 - Explore adding cottage homes to the housing stock in the mobile home parks, including identifying zoning and other regulations that are needed.

H 1.2.8 - Advocate for a state-supported mobile home replacement program.

H. 1.2.9 - Coordinate a County mobile-home replacement program.

H. 1.2.10 - Develop a County mobile home decommissioning and recycling plan.

H 1.3 - Define specific redevelopment/revitalization areas as a means to access additional funding to rehabilitate existing homes and subsidize new workforce housing.

H 1.3.1 - Periodically review and update the Housing Conditions Study.

H 1.3.2 - Use the Housing Conditions Study and other sources to affirm or update the identified Housing Rehabilitation Areas shown in Figure H-3.

H 1.3.3 - Support private and nonprofit developers and builders that provide or preserve workforce housing by assisting them in obtaining funding and offering technical assistance.

H 1.3.4 - Apply for funding from Virginia Housing that supports projects in defined redevelopment and revitalization areas.

H 1.3.5 - Solicit public input to identify areas for rehabilitation/improvement projects and neighborhood or area plans.

Goals, Strategies, & Actions

H2 - Promote housing production that results in housing choices for all County residents and workers and is designed to respect the County's unique natural, historic and cultural resources.

H 2.1 - Guide new developments to incorporate high housing quality and design.

H 2.1.1 - Promote residential development that provides a range of home types and prices, includes open space and recreational amenities, and permits walking and biking.

H 2.1.2 - Require adequate street lighting, safe and convenient pedestrian circulation, and appropriate interconnections between residential developments.

H 2.1.3 - Guide new residential development to areas served by public utilities and that are convenient to public transportation, major thoroughfares, employment centers, schools, recreation facilities, and shopping facilities.

H 2.1.4 - Propose additional amendments to residential zoning districts to promote diversity within new residential developments by allowing more diverse structure types.

H 2.1.5 - Promote a scale and density of residential development that is contextually compatible with adjacent and surrounding land uses, supporting infrastructure, and environmental conditions.

H 2.1.6 - Locate moderate density residential development, including developments within areas of appropriate Mixed-Use designations, in proximity to employment centers and service destinations.

H 2. 2 - Amend the Zoning Ordinance to facilitate a wider range of housing choices affordable to households with incomes of less than 80% of Area Median Income.

H 2.2.1 - Review the allowed uses in each zoning district, modify the uses allowed to reflect the current types of uses that exist in the County, and ensure that diverse housing types are specifically included in the use-lists in zoning districts where housing is permitted.

H 2.2.2 - Reduce site and lot area minimums to facilitate smaller home types and to encourage the development of workforce housing, including by smaller, nonprofit developers.

H 2.2.3 - Examine options for allowing by-right development of workforce housing.

H 2.2.4 - Consider form-based zoning to preserve neighborhood character while allowing flexibility in housing options.

H 2.2.5 - Increase the number of units permitted in multi-family structures in select zones.

H 2.2.6 - Increase the maximum number of units per acre in all developments that provide for workforce housing.

Goals, Strategies, & Actions

H 2.3 - Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing.

H 2.3.1 - Inventory the potential adaptive reuse and conversion sites within the County. Include the location, condition, ownership, zoning, and other information about the properties.

H 2.3.2 - Establish priorities, processes, and guidelines for adaptive reuse projects in the County.

H 2.3.3 - Identify Virginia-based builders/developers with experience in adaptive reuse and convene a public meeting to discuss and better understand the challenges and opportunities with adaptive reuse.

H 2.3.4 - Conduct corridor studies to evaluate underutilized commercial properties.

H 2.3.5 - Review and modify the use lists for all zones to encourage residential/mixed-use developments along specific corridors, and facilitate adaptive reuse opportunities in existing commercial areas.

H 2.3.6 - Investigate resources that could support adaptive reuse, including the Low-Income Housing Tax Credit, historic tax credits, and programs supporting housing for residents experiencing homelessness.

H 2.3.7 - Engage owners of properties that are good candidates for redevelopment or adaptive reuse to explore opportunities.

H 2.3.8 - Facilitate connections among property owners and developers, and identify resources that could be employed to facilitate adaptive reuse projects.

H 2.3.9 - Develop a new zoning designation that would simplify motel-to-apartment conversions.

H 2.3.10 - Consider creating an administrative permitting process for commercial or residential conversions that include workforce housing.

H 2.3.11 - Create a fund to assist owners with the cost of demolishing and redeveloping obsolete commercial buildings.

H 2.4 - Support the development of accessory apartments as one type of workforce housing, while retaining the residential character of existing neighborhoods.

H 2.4.1 - Modify the Zoning Ordinance to facilitate the development of more accessory units while retaining the residential character of existing neighborhoods.

H 2.4.2 - Develop a pattern book, training sessions, and other technical assistance documentation to help homeowners construct accessory units

H 2.4.3 - Revise Ordinances to increase the maximum size of detached accessory units to be large enough to accommodate a "reasonably-sized" one-bedroom unit (e.g., up to 750 square feet).

H 2.4.4 - Revise Ordinances to modify setback, parking, and other requirements to make it easier to build an accessory apartment.

H 2.4.5 - Offer incentives for accessory apartments, such as waived fees for Special Use Permit applications or utility hook-ups, when apartments are rented to people holding jobs in James City County or other targeted populations (e.g., elderly relatives).

H 2.4.6 - Develop a loan program to help lower-income households build accessory apartments.

H 2.4.7 - Encourage Homeowners Associations to revise covenants that prohibit accessory units.

H 2.5 - Explore the use of public land for the development of workforce housing.

H 2.5.1 - Develop a comprehensive inventory of publicly owned sites, noting whether each site is vacant or has underutilized development capacity.

H 2.5.2 - Develop criteria for evaluating sites' appropriateness, prioritizing characteristics such as proximity to transit infrastructure and employment areas.

H 2.5.3 - Identify which publicly owned land is suitable for workforce housing.

H 2.5.4 - Write a briefing paper outlining the benefits of and process for creating a housing land trust or land bank to serve as a mechanism for acquiring, holding, and, ultimately, deploying public land specifically for workforce housing.

H 2.5.5 - Create a pilot project to develop workforce housing on public land through a public/private partnership.

H 2.5.6 - Amend the County's Capital Improvement Program process to ensure that opportunities for creating housing options on public land are considered in conjunction with planning and development of public facilities.

H 2.5.7 - Identify land that would be suitable for purchase by the County and made available for the development or redevelopment of workforce housing.

Goals, Strategies, & Actions

H 2.6 - Establish an incentive-based inclusionary zoning program to support the development of workforce housing.

H 2.6.1 - Bring together community stakeholders and staff to recommend new incentive-based, inclusionary housing policies.

H 2.6.2 - Review the County's existing density bonus system in the Zoning Ordinance. Determine whether providing workforce housing should be a bonus-density priority or a requirement (rather than an option) for any developments proposed over the current baseline density.

H 2.6.3 - Develop a detailed method for calculating affordable price points based on AMI.

H 2.6.4 - Evaluate the use of a sliding density bonus scale based on the quantity of units and affordability of the product.

H 2.6.5 - Amend the Zoning Ordinance to establish an Affordable Dwelling Unit (ADU) program under the Code of Virginia Affordable Dwelling Unit Ordinances.

H 2.7 - Periodically review and update the Housing Needs Study.

H 3 - Provide adequate housing opportunities for special needs populations, including persons with all forms of disabilities, and senior citizens.

H 3.1 - Review existing ordinances to identify barriers to respond to housing needs for special needs populations, including senior citizens, and make amendments, as necessary.

H 3.2 - Support the concept of "aging in place" by promoting universal design for a portion of units in major subdivisions or multi-family projects.

H 3.3 - Continue County support of organizations that address housing for special needs populations, including senior citizens.

H 3.4 - Promote supportive housing, including rental assistance, coupled with case management services for individuals with special needs and individuals who are homeless or at risk of becoming homeless.

H 3.5 - Promote affordable senior housing options, from independent living to Continuing Care Retirement (CCRCs) and skilled care, for all.

H 3.6 - Seek grant funding to construct affordable senior housing.

Goals, Strategies, & Actions

H 4 - Utilize incentives to promote the production of workforce housing.

H 4.1 - Expand expedited permitting to incentivize production of workforce housing.

H 4.1.1 - Establish an income threshold not exceeding 80% of AMI necessary for a project to qualify for an expedited review.

H 4.1.2 - Develop a fast-track subdivision, site plan, and building permit process for qualified workforce housing developments.

H 4.1.3 - Consider a program to waive, reduce, or rebate development fees for qualified workforce housing developments.

H 4.2 - Create tax incentives to support the production of workforce housing.

H 4.2.1 - Create a property tax exemption or abatement for residential properties that guarantee units will be affordable to, and leased to, individuals and families with incomes at or below 60% of AMI.

H 4.2.2 - Investigate using utility, building permit, and water connection fees and property taxes to incentivize new affordable housing and to be a disincentive for new market-rate housing.

H 5 - Improve access to housing resources and expand financial housing assistance.

H 5.1 - Support and expand access to regional housing resources.

H 5.1.1 - Financially support the Hampton Roads Housing Resource Portal.

H 5.1.2 - Link County resources to the regional portal.

H 5.2 - Expand the local home-buying assistance program.

H 5.2.1 - Expand down-payment and closing-cost assistance to annually assist 50 income-qualified first-time homebuyers who work in James City County and want to purchase a home in the County.

H 5.3 - Develop a local rental assistance program.

H 5.3.1 - Research the experiences of other localities in Virginia that have a locally funded rental assistance program.

H 5.3.2 - Develop a locally funded rental assistance program (rules and priorities).

H 5.3.3 - Provide education and outreach to eligible households and landlords.

H 5.3.4 - Serve 25 families annually through a local rental housing subsidy.

H 5.4 - Participate in regional planning efforts to address regional housing issues.

H 5.4.1 - Coordinate with neighboring jurisdictions to address regional housing concerns and needs.

H 5.4.2 - Participate in Greater Williamsburg Area and Hampton Roads public/private partnerships to identify and address regional housing issues.

H 6 - Seek funding for housing programs

H 6.1 - Create a dedicated funding source to help produce and preserve for-sale and rental housing affordable to working households.

H 6.2 - Continue efforts to attract funds from federal and state sources for housing and neighborhood rehabilitation.

H 6.3 - Create a dedicated funding source for a local housing voucher or rental subsidy program.

H 6.4 - Create a local housing trust fund and relevant policies to support housing development and preservation.

ECONOMIC DEVELOPMENT

Introduction

James City County is a unique place and destination, making it a desirable community in which to visit, live, and work. Among other factors, the County's high quality of life is made possible by its sense of place, its rich history and architecture, its green spaces and environmental features, its commitment to education and the arts as well as the presence of other amenities that are often only available in larger cities. This high quality of life is a major attractor of business. Furthermore, the uniqueness of the community is an important asset which can be used to promote and nurture economic development in the County. To remain economically competitive in the 21st century, communities are learning that they need to focus on growing and attracting high quality talent.

Now more than ever, talented members of the workforce are choosing the place they want to live before they choose the place they want to work. Attracting high-paying jobs that drive the economy means creating the quality of life that will attract those workers that are employed in knowledge, tech, professional, and creative fields. The County has historically recognized the need for quality of life amenities in order to attract and retain businesses and workers. Housing choice, cost of living, and quality of life amenities such as transit, mixed-use destinations, walkability, and recreation play more of a key role in generating new business than ever before. Moving forward, it will be even more important to consider the types of community environments that targeted industry workers demand and to support development of those types of environments in James City County.

The Economic Development Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language maintains the emphasis on the importance of a diverse economy, but has been revised to emphasize the need for economic development that retains community character and ensures environmental conservation. The Goal now states: "Build a more sustainable local economy that upholds James City County's commitment to community character and environmental protection; results in a diversity of businesses, community investment, and professions that attract higher paying jobs; supports the growth of the County's historic, agri-tourism and eco-tourism sectors; contributes positively to the community's quality of life; and better balances the local tax base." Many important Economic Development Chapter implementation activities have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the revised and updated Strategies and Actions will be needed to ensure that the business climate in the County is conducive to business growth and development, especially that which complements and enhances the distinct character of our community. This continued implementation of strategies and policies is critical in order for the County to provide a diverse, competitive, and prosperous economy for all its citizens.

CHAPTER GOAL

"Build a more sustainable local economy that upholds James City County's commitment to community character and environmental protection; results in a diversity of businesses, community investment, and professions that attract higher paying jobs; supports the growth of the County's historic, agri-tourism and eco-tourism sectors; contributes positively to the community's quality of life; and better balances the local tax base."

Key Planning Influences

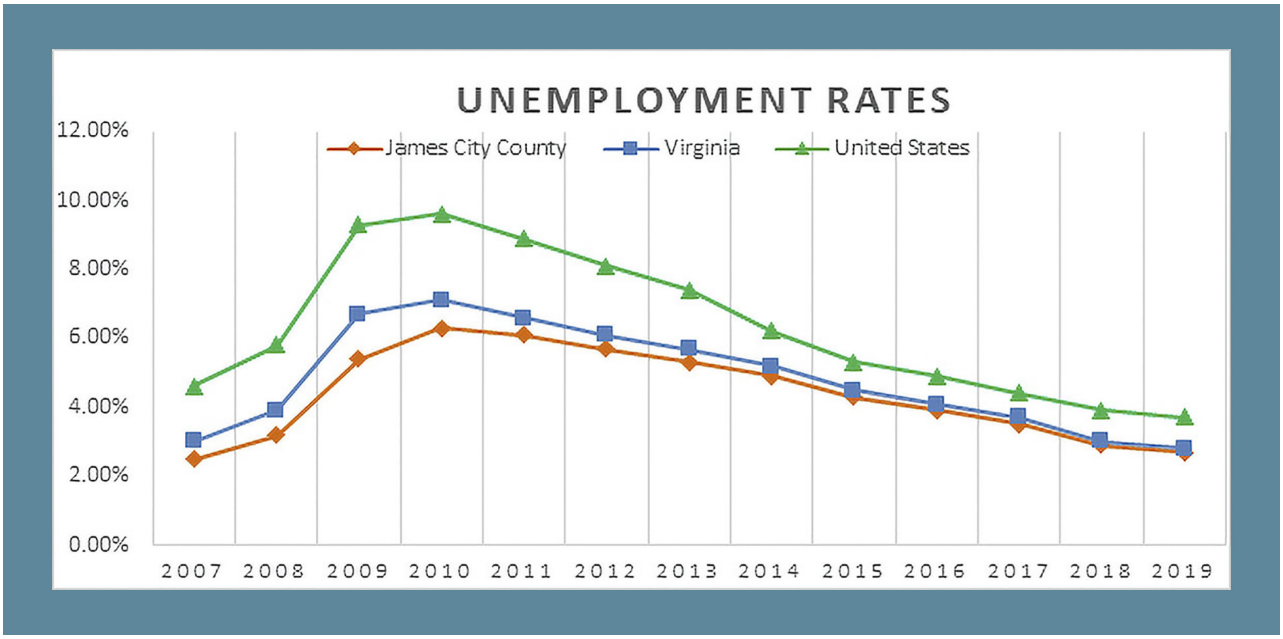
Workforce

Employment, Unemployment, and Commuting Patterns

Rather than being isolated, James City County's local economy is subject to national trends and market pressures. The economic indicators of James City County can be measured relative to other localities to gain a better understanding of how County specific actions and policies affect the local economic outlook.

As shown in Figure ED-1, James City County experienced a steady decrease in the unemployment rate from 2013 to 2019. According to the Virginia Employment Commission (VEC), the unemployment rate dropped from 5.3% to 2.7% during this period, while the rate in Virginia and the United States dropped from 5.7% to 2.8% and 7.4% to 3.7%, respectively.

Figure ED-1. Unemployment Rates



Source: Virginia Employment Commission, Local Area Unemployment Statistics.

According to VEC total annual employment statistics, James City County had 30,351 jobs as of the third quarter of 2019. Overall, James City County has fared better than York County, the City of Williamsburg, and the Hampton Roads region in job growth rate during the past 10 years and has exceeded the state job growth rate during the same period (See Table ED-1 on the following page.)

Table ED-1. Total Annual Employment

Total Annual Employment					
	James City County	York	Williamsburg	Hampton Roads	Virginia
2008	27,262	21,898	15,093	740,397	3,665,654
2009	26,277	21,269	14,259	712,354	3,545,623
2010	26,180	20,971	14,197	705,714	3,536,676
2011	26,390	21,319	13,388	705,315	3,578,848
2012	26,991	20,804	13,709	711,311	3,619,176
2013	26,779	21,106	13,599	717,380	3,640,209
2014	27,639	20,874	12,880	716,657	3,654,831
2015	27,822	21,759	13,110	729,414	3,735,713
2016	28,975	21,738	13,064	733,970	3,789,744
2017	29,563	21,599	13,016	744,262	3,838,368
2018	30,233	21,700	13,008	753,482	3,893,254
2019*	30,351	21,517	12,778	761,707	3,931,376
Annualized 10 Year Growth	1.13%	-0.17%	-1.53%	0.29%	0.72%

**3rd Quarter*
Source: Quarterly Census of Employment and Wages.

The economy in James City County relies a great deal on healthcare and social assistance; retail trade; accommodations and food services; arts, entertainment, and recreation; and manufacturing. These are the top five private employment industries in James City County as shown in highlighted text below in Table ED-2. James City County seeks not only to keep those industries strong, but also to diversify and attract new businesses that will offer additional jobs for our labor force.

Such diversification can increase the resiliency of the County when tested by major unexpected economic shocks, such as a sudden decline in the housing market or retraction of the tourism industry, as was the result of the COVID-19 pandemic. It is also worth noting that close to 1,800 jobs come from manufacturing industries. These jobs generally encompass many desirable traits for employees, including higher pay, full-time/year-round employment, and benefits. Continuing to attract these high quality jobs is an important goal for James City County.

Table ED-2. James City County Private Industry Employment 2019

James City County Private Industry Employment 2019 (Ranked From Highest to Lowest)		
Meaning of NAICS Code	**Number of employees**	**%**
Health care and social assistance	4,020	13%
Retail trade	3,959	13%
Accommodation and food services	3,454	11%
Arts, entertainment, and recreation	3,042	10%
Manufacturing	1,777	6%
Construction	1,458	5%
Professional, scientific, and technical services	1,421	4.6%
Administrative and support and waste management and remediation services	1,271	4%
Real estate and rental and leasing	807	2.6%
Wholesale trade	764	2.5%
Finance and insurance	486	1.6%
Educational services	315	1%
Information	136	0%
Agriculture, Forestry, Fishing & Hunting	*	
Mining, Quarrying, and Oil & Gas Extraction	*	
Utilities	*	
Transportation and warehousing	*	
Total for all Sectors	26,169	100%

*Indicates non-disclosable data.
Note: Public employment (i.e., government employment) excluded from this summary.

Source: Table based on information from Virginia Employment Commission, Economic Information & Analytics, Quarterly Census of Employment and Wages (QCEW), 4th Quarter (October, November, December) 2019.

Looking beyond the number of jobs offered in James City County to the people who hold them, the U.S. Census Bureau found that approximately 19,816 workers commuted into the County for work, whereas 19,057 commuted out of James City County for work in 2019. This shows a shift in commuting patterns, as the County has gone from having a slight out-migration, as was the case in previous years, to a slight in-migration currently.

Workplace and Business

Major Employers

The largest employers in the County, categorized by industry sector, are detailed in the table below:

Table ED-3. Largest Employers by Industry

Industry Sector	Firm
Accommodation Services	Williamsburg Plantation (A vacation resort offering on site amenities to guest and owners.)
Administrative Services	BKD Employee Services, LLC, G & A Outsourcing, Mastercorp Inc. (Each firm provides services for other businesses, such as payroll management, human resources, etc.)
Arts, Entertainment, and Recreation	Busch Entertainment, Jamestown-Yorktown Foundation
Educational Services	Williamsburg-James City County Schools
Finance	Citizen's and Farmer's Bank
Government	James City County
Healthcare and Social Services	Riverside Regional Medical Center, Eastern State Hospital, and Williamsburg Landing
Manufacturing	Anheuser-Busch Inc., Greystone of Lincoln Inc., Owens-Brockway
Retail Trade	Under Amour Retail Inc., Food Lion, Harris Teeter
Wholesale Trade	Avid Medical and Walmart

According to the Virginia Employment Commission Quarterly Census of Employment and Wages for the 4th Quarter 2019, each of the employers on the list above had 100 or more employees. Table ED-4 lists the number of establishments in the County by number of employees. Establishments with one to four employees account for the largest number of business establishments in the County, representing 57% of the total number of disclosed establishments, which shows the importance of small businesses and new start-up firms to the local economy.

Table ED-4. Size of Business

Establishment Size	Number of Establishments
0-4 employees*	1,125
5-9 employees	313
10-19 employees	275
20-49 employees	169
50-99 employees	59
100-249 employees	35
250-499 employees	7
500-999 employees	**
1000+ employees	**
TOTAL	1,983

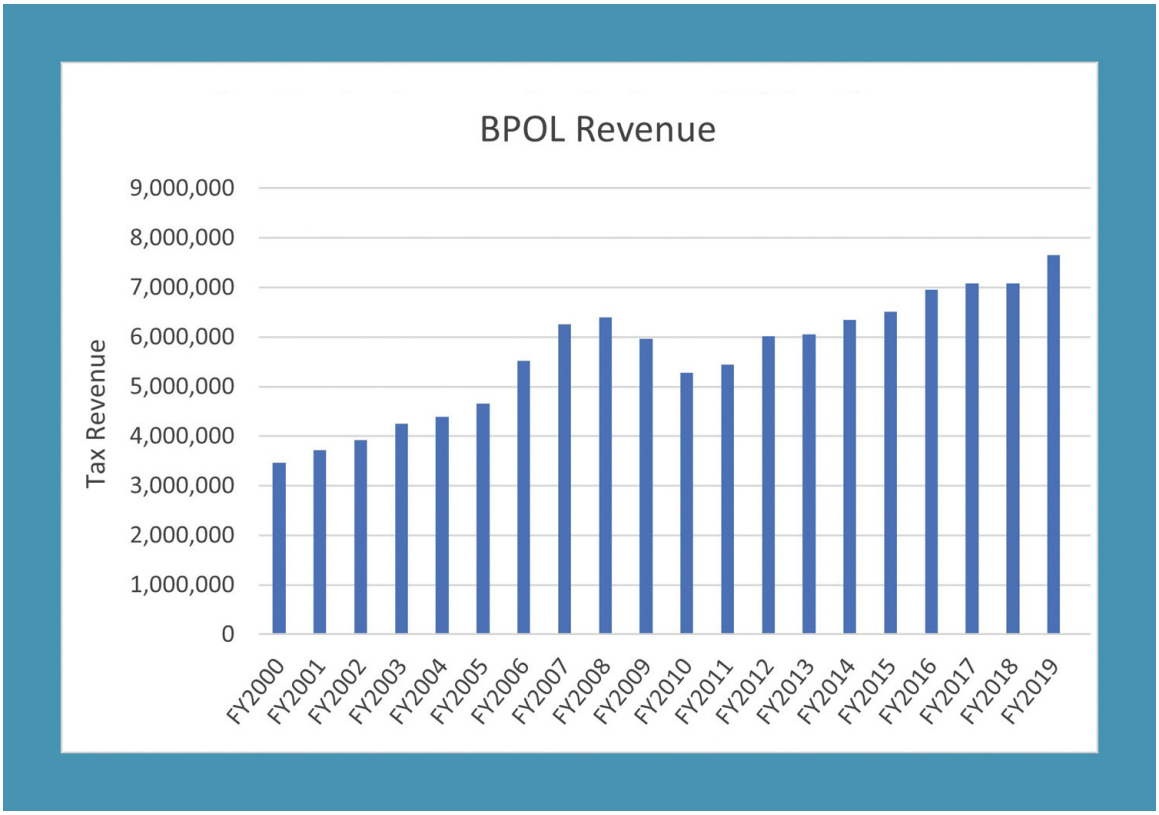
*Zero employees typically represent new start-up firm or sole proprietorships.
**Non-disclosable data.

Source: James City County Economic Profile, VEC, which used VED, Quarterly Census of Employment and Wages (QCEW), 4th Quarter (October, November, December) 2019.

Business Growth

One important measure of business growth is the Business, Professional, and Occupational License (BPOL) tax paid annually by businesses when renewing their business licenses in the County. A business license is required of all businesses (except manufacturing businesses) and is based upon gross receipts or anticipated gross receipts. The tax revenue generated from business licenses sharply increased in fiscal years 2006-2008. After declines in 2009 and 2010, BPOL revenue once again saw increases starting in 2011. There was a slight decrease in 2018, but a sharp upturn was seen in 2019. Figure ED-2 shows the upward trend the County has experienced in BPOL revenue since 2000. This positive trend is a result of new business activity and the growth of existing business.

Figure ED-2. BPOL Tax Revenue



Another measure of business growth is the amount of capital investment made by businesses in the County. Between 2014 and 2019, the Office of Economic Development (OED) worked directly with nine existing businesses generating investments totaling $83 million to expand existing operations in the County.

Additionally, during the same time, OED worked with six new businesses with investments totaling $11.8 million. Keeping in mind that this number is representative of only those businesses that worked directly with OED, the total capital investment made in the County is actually much higher, but ultimately cannot be tracked. The diversity of the businesses that OED worked with during this time is noteworthy and includes companies from healthcare to manufacturing and a new agricultural operation.

Business growth remains strong in James City County. In addition to being home to five Fortune 500 firms, the County continues to see significant growth in both the number of small businesses and start-up companies. According to information from the VEC's Labor Market Information (LMI), James City County continues to see the largest increase in new start-up firms in the Greater Williamsburg region. Overall, between 2017 and 2019, the number of new start-up firms increased by 245 in James City County, as compared to 145 in York County and 36 for the City of Williamsburg. Start-up companies and other small businesses have played and will continue to play a significant role in the County's growing economy.

Wages and Income

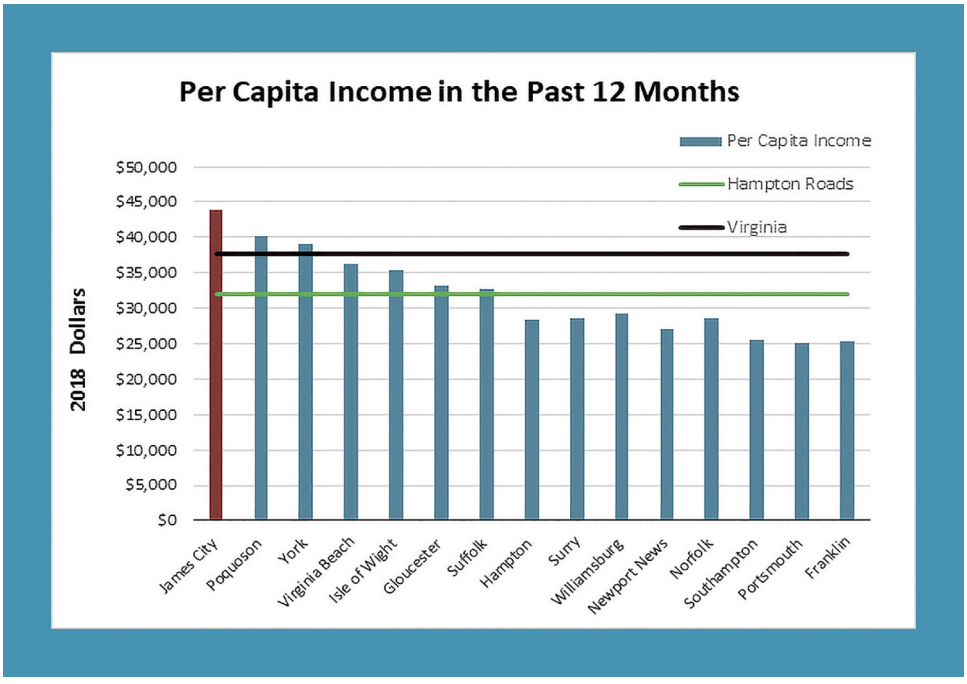
According to the VEC, the average weekly employee wage in James City County was $808 in the fourth quarter of 2019. This figure is equivalent to $20.02 per hour or $41,642 per year, assuming a 40-hour week year round. The County's average hourly wage was lower than that in the City of Williamsburg ($21.55) and York County ($20.83). When compared to the Metropolitan Statistical Area (MSA) and state average weekly employee wages ($23.85 per hour and $27.27 per hour respectively), the localities in Greater Williamsburg as a whole had much lower than average wages, likely due to the high number of service sector workers. This wage data is impacted by the federal minimum wage, as well as the minimum wage set by the Commonwealth. Per approved legislation, the minimum wage in Virginia is scheduled to increase over the coming years. The County will monitor this change and its impact on the County.

Per Capita Income (PCI)

According to the U.S. Census, per capita income (PCI) is one of the most comprehensive ways to measure household income. Per capita income (PCI) is defined as "the average obtained by dividing aggregate income by total population of an area." The American Community Survey reported the average 2018 PCI for James City County as $43,815. This PCI ranked 116% of the state average, $37,763, and 129% of the national average, $33,831 (see Figure ED-3 for more details).

When analyzing and comparing the wage and income data for this area to the PCI, it becomes apparent that while wages are lower on average in James City County in comparison to neighboring communities, the household income is higher. This discrepancy may be due to the number of higher income households within the County whose members work outside of the County, as opposed to wage owners working within the County, as well as the number of high-income retirees in the County.

Figure ED-3. 2018 Per Capita Income



Household Income

The U.S. Census Bureau defines household income as "the sum of money income received in a calendar year by all household members 15 years old and over, including household members not related to the householder, people living alone, and other non-family household members." The median household income provides income information by dividing households into two equal parts with the first half of the households earning less than the median household income and the other half earning more.

The most recent data on median household income is provided by the 2018 U.S. Census American Community Survey. In 2018, James City County had a median household income of $83,048. The other two localities within Greater Williamsburg, York County and the City of Williamsburg, had median incomes of $90,367 and $56,163, respectively.

Poverty

According to the 2018 American Community Survey, the poverty rate for James City County (for individuals 18 to 64) was 8.9%, which was below the poverty rates for both the MSA, 10.6%, and the state, 10.5%. The poverty rate for married-couple households with related children under 18 in James City County was 7.2%, while the rate for female-headed households with children under 18 was 21.4%. In the MSA, the poverty rate for married-couple households with related children under 18 was 4.1%, while rate for female-headed households with children under 18 was 33.7%. This is in comparison to the state of Virginia where the poverty rate for married-couple households with related children under the age of 18 was 4.3%, while the rate for female head households under the age of 18 was 32.7%.

As one tool in the effort to alleviate poverty, James City County has cooperated with the Commonwealth of Virginia to establish a Federal Opportunity Zone in the southeastern portion of the County. This opportunity zone, which was established due to the 2017 Tax Cuts and Jobs Act, offers a tax incentive to induce community development, which grants a pathway for investors to support and build up the economic base of distressed communities. The three benefits offered by this incentive are tax deferral, tax reduction through long-term investment, and the exclusion of certain kinds of capital gains tax.

The most recent data on median household income is provided by the 2018 U.S. Census American Community Survey. In 2018, James City County had a median household income of $83,048.

Taxes

Tax Rates

In 2015, the real estate tax increased from 77 cents per $100 to 84 cents per $100. Although this remains slightly higher than York County (79.5 cents) and Williamsburg (60 cents), it compares favorably to other Peninsula localities such as Newport News ($1.22) and Hampton ($1.24). James City County's general personal property tax rate (not including business equipment, machinery, and tools), has remained constant for the last 20 years at $4 per $100 of assessed value. York County has the same tax rate. Williamsburg has a slightly lower personal property tax rate at $3.50 per $100, while Newport News and Hampton each have a slightly higher tax rate at $4.50 per $100 of assessed value.

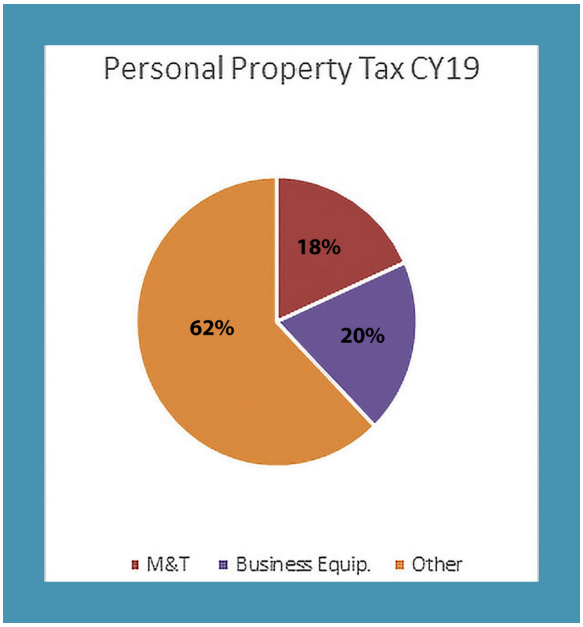
Principle Taxpayers

According to information provided by the Department of Financial and Management Services, Anheuser-Busch was the overall highest taxpayer in 2019 with $5.2 million in property taxes assessed or 3.58% of all taxable real estate revenue for the County. SeaWorld Parks and Entertainment was the second highest taxpayer with $2.13 million, representing 1.50% of total County revenues, followed by Virginia Electric and Power Company (0.85%), Premium Outlets of Williamsburg (0.84%), Walmart, Inc. (0.80%), Williamsburg Plantation Owners Association (0.75%), Powhatan Plantation Owners Association (0.70%), Williamsburg Landing, Inc. (0.66%), Ball Metal Container (0.58%), and Marriot Manor Club at Ford's Colony (0.47%).

It is important to note that the percentage of the County total revenues attributed to the 10 largest business/industries has been gradually diminishing over the past 16 years, an indication that the business tax base has been diversifying. For the 2003 fiscal year, property taxes assessed on 10 of the largest businesses/industries contributed 14.8% of total County revenues or $10.9 million; for the 2019 fiscal year, the 10 largest businesses contributed approximately 10.73% of the total revenues or $15.6 million.

Commercial and industrial properties constitute a small part of the total properties in the County, but generate higher real estate tax revenues. In Fiscal Year (FY) 2019, 3.88% of the taxable parcels in the County were commercial/industrial properties; those parcels generated 13.4% of the total assessed value for the County. By contrast, 94.7% of all taxable parcels in the County were single-family residential; those parcels generated 79.6% of the total assessed value for the County. Balancing revenue sources is important to the County; in 2003, commercial and industrial properties accounted for 19.43% of all total assessed value in the County, while residential properties accounted for 72.7% of the total. Like County residents, County businesses pay Personal Property Tax in addition to paying Real Estate Property Tax. Personal Property Tax is assessed on vehicles, as well as on other Business Equipment, Machinery, and Tools (M&T). For CY19, 18.3% of the total Personal Property Tax was from M&T and 19.44% was from Business Equipment. The remaining 62.2% included both revenue from businesses for business vehicles and revenue from residents for personal vehicles.

Figure ED-4. Personal Property Revenue

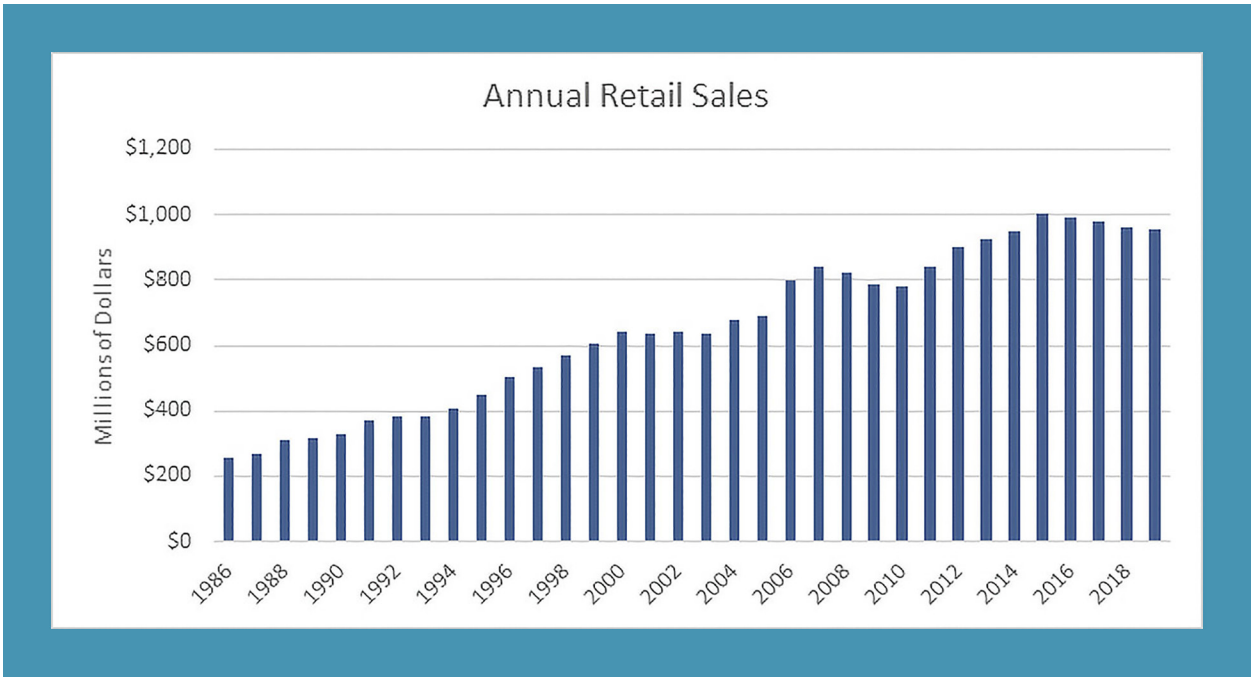


Retail Sales

According to the Weldon Cooper Center for Economic and Policy Studies, in 2019, the Total Taxable Sales in James City County was approximately $955.0 million, which represented an increase of 0.48% from 2014 (See Figure ED-5). During the same time, the City of Williamsburg saw an increase of 13.1%, the state saw an increase of 11.5%, and York County saw an increase of 9.3%.

Additionally, the County has seen significant growth in Local Option Sales Tax (LOST), which is the taxable portion of retail sales that remains with the locality. Between 2014 and 2019, the LOST for James City County grew approximately by 11%. One important consideration regarding retail trends is the transition from brick and mortar stores to online shopping, which impacts consumer spending habits and existing commercial developments with a retail component. The County will continue to monitor these trends and their impacts on the local economy.

Figure ED-5. James City County Retail Sales



Source: Weldon Cooper Center for Economic and Policy Studies.

According to the Weldon Cooper Center for Economic and Policy Studies, in 2019, the Total Taxable Sales in James City County was approximately $995.0 Million.

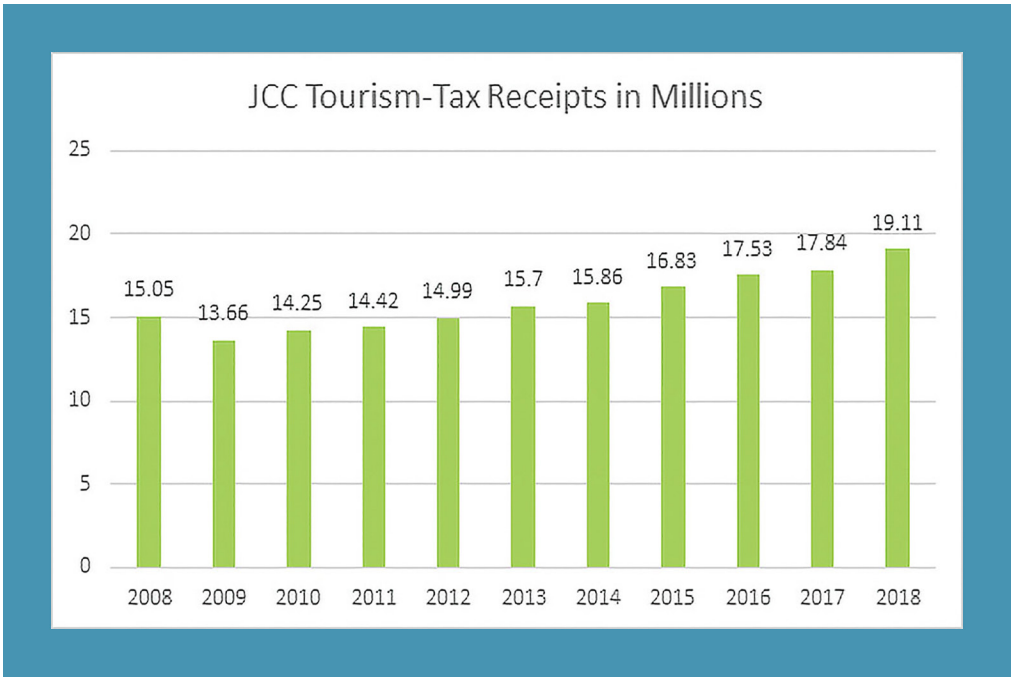
Tourism

Tourism plays an important role in both the regional and state economies. A study prepared for the Virginia Tourism Corporation (VTC), *Economic Impact of Domestic Travel Expenditures on Virginia Counties 2018*, found that domestic travelers spent close to $26 billion on transportation, lodging, food, amusement and recreation, as well as retail shopping, in Virginia. According to the 2018 report, domestic travel expenditures in the state directly supported 235,000 jobs within Virginia. Additionally, tax revenue generated by domestic travel in Virginia reached $1.8 billion, up 4.4% from 2017.

The Coastal Virginia (Hampton Roads) region is well known for its tourist attractions and hospitality industry. In 2018, approximately $442 million was spent in James City County on items related to tourism (e.g., transportation, lodging, food, entertainment, recreation, etc.), which ranked fourth among the 17 localities within the region behind Virginia Beach, the City of Norfolk, and the City of Williamsburg. Local Tax Receipts for the County were $19.11 million in 2018, an increase of 7.1% over 2017 and the continuation of annual growth beginning in 2009 (See Figure ED-6).

Tourism in James City County includes subcategories: agri-tourism and outdoor recreation, which includes eco-tourism. Outdoor recreation has been rising in popularity over the last several years with parks, trails, and water access being key areas of interest for the County. According to the 2018 Virginia Outdoors Plan, outdoor recreation contributes approximately $76.74 per capita spending in James City County. Outdoor recreation assets in the County include 48 miles of trails in 17 parks covering more than 1,500 acres of land and the Virginia Capital Trail.

Figure ED-6. Tourism Tax Receipts



Source: Virginia Locality Economic Impact of Travel Data.

Agriculture

The impact of traditional agricultural activities on the County's economy has been gradually declining over recent years; however, there has been a renewed interest in smaller niche agricultural markets, locally grown foods and agri-tourism activities. This has been manifested in a small increase in the number of farms in the County but a decreasing average farm size.

Agricultural activities represent a small percentage of the County's overall economy, but there is significant room for the industry to grow and meet surrounding market demand, especially with regard to traditional agricultural and forestry activities on a smaller scale, value-added enterprises, rural tourism, carbon sequestration markets and outdoor recreation.

In 2014, a Strategy for Rural Economic Development was prepared for the County. The Strategy notes that a vital, robust, rural economy will contribute to the diversification of the County's overall economy and provide more choices and opportunities for rural landowners, while preserving the rural landscape.

The Strategy contained five goals: assist existing agriculture and forestry-based businesses to grow and succeed; identify and create opportunities for new business ventures; grow and diversify the local tax base; enhance tourism via agri-tourism and specialty food/restaurant businesses; and identify and celebrate the uniqueness of James City County.

The Strategy also lists 13 projects in three broad categories (marketing/public relations, business development, and facilities/capital projects) that could help increase the economic contribution of the County's rural lands. A Rural Economic Development Committee (REDC) assisted in the development of the Strategy and worked on implementation activities through 2015. The OED continues to assist and promote agri-tourism businesses and activities in the County.



Economic Opportunities

Location

James City County is strategically located on the Virginia Peninsula, midway between the Cities of Richmond and Virginia Beach, along the Interstate 64 corridor. This location provides access to a number of economic drivers including the military, technical, and research and development establishments in the Hampton Roads area such as NASA Langley Research Center and Thomas Jefferson National Accelerator Facility, as well as the Port of Virginia, providing increased opportunities and options for exporting and importing activities through cooperation with regional partners. Also, proximity to academic research and workforce development activities at the College of William and Mary (W&M), Thomas Nelson Community College (TNCC), Christopher Newport University, and Old Dominion University present additional economic opportunities in a number of fields, including business, medical, multiple scientific and marine industries, and advanced manufacturing.

Office of Economic Development (OED)

The mission of James City County's OED is "to foster the development and expansion of a diversified and healthy base of primary business and industry that will better balance the tax base, increase job opportunities, and enhance both the quality and standard of living in James City County." The OED works to accomplish this mission through its efforts to increase commercial tax revenue, to attract improved job opportunities for County citizens, and to enhance the quality of life for local residents. To accomplish these tasks, OED's core efforts are focused on business retention, expansion, attraction, and creation. The OED is located at 101-D Mounts Bay Road at the County Government Complex and can be accessed online at www.yesjamescitycountyva.com.

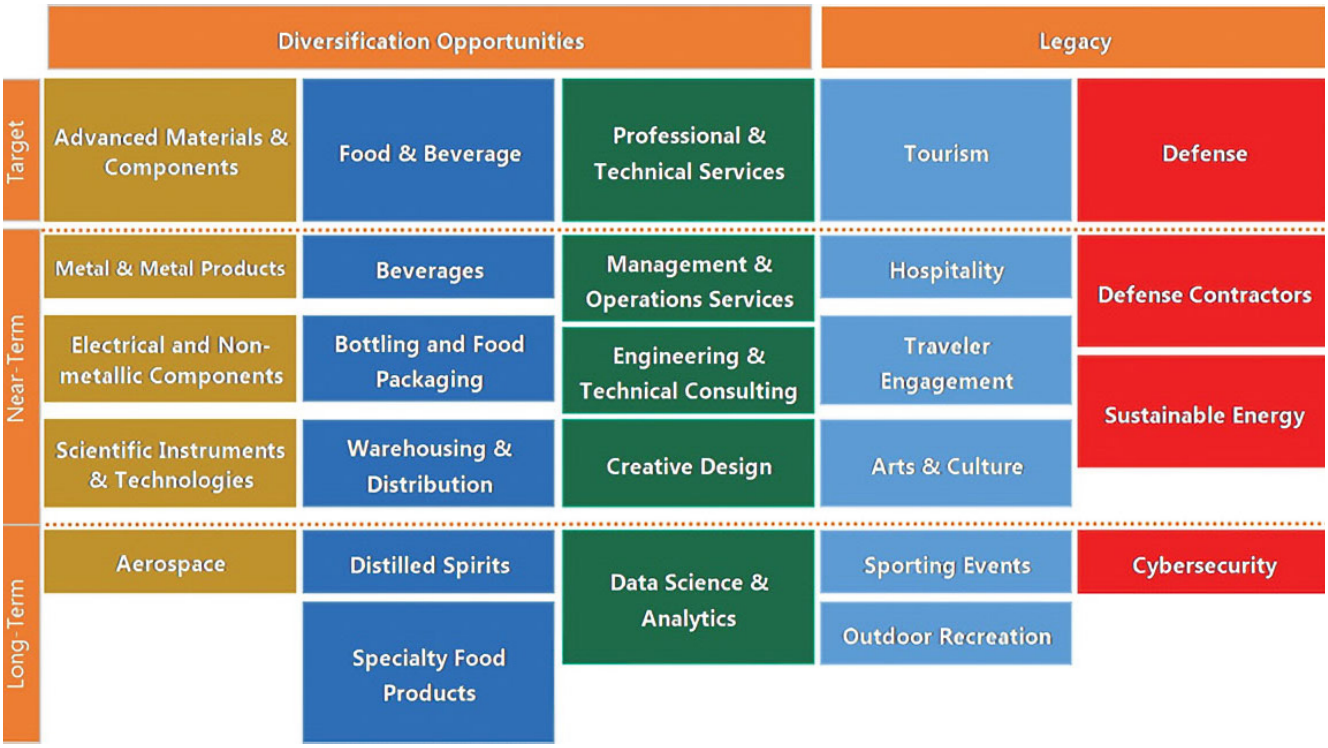
Economic Development Authority of James City County (EDA)

The EDA is a seven-member voluntary board whose members are appointed by the County Board of Supervisors and serve staggered four-year terms. The EDA's purpose is to assist the County and the OED in expanding James City County's business tax base in order to maintain and enhance the quality of life for County's citizens. The EDA also acts as a conduit for issuing Industrial Revenue Bonds for manufacturing projects and qualifying medical, assisted living, nonprofit, or public facilities, pursuant to the mandates and regulations of the Virginia State Code. The EDA can be reached by contacting the OED at the address above or via phone at 757-253-6607 or by email at yesjcc@jamescitycountyva.gov.

Target Sector Analysis - Greater Williamsburg

The Greater Williamsburg Target Sector Analysis is designed to assist the localities in the region (James City County, York County, and the City of Williamsburg) in developing recommendations to recruit new businesses to the region, as well as providing guidance in business retention and expansion. Market Street, who performed the analysis, recommended five, top-level target sectors for the community efforts. Several current and future niche opportunities were identified for each target sector. According to the report, this information represents the Greater Williamsburg area's current competitive strengths, while planning for future opportunities. See Figure ED-7.

Figure ED-7. Greater Williamsburg Target Sectors and Niche Opportunities



Source: Executive Summary: Greater Williamsburg Target Sector Analysis, August 2016.

Public-Private Partnerships

One of the tools used by the Office of Economic Development to strengthen the economic base within the County is public-private partnerships. Essentially, a public-private partnership is a contractual relationship in which the public and private sector agree to share the risks and rewards associated with a public asset.

Typically, the County has managed these partnerships by providing private developers or entities with access to publicly owned land, while the private partner builds the facilities and provides the services. Typically, these partnerships have been specialized within the tourism and recreation industries, with Billsburg Brewery at the James City County Marina being a recent example of a successful partnership. As the County continues to pursue these partnerships, broadening into other sectors could be a potential approach to strengthening the economic base.

James City County is strategically located on the Virginia Peninsula, midway between the Cities of Richmond and Virginia Beach, along the Interstate 64 corridor. This location provides access to a number of economic drivers including the military, technical, and research and development establishments in the Hampton Roads area.

Land Suitability

One of the key factors in developing a sound economic development strategy is determining the suitability of land for specific development types. The three key factors from a planning perspective that are used to determine suitability are the adequacy of public infrastructure to support the proposal, the property's Land Use Designation, and the zoning district for the parcel. The adequacy of infrastructure is aided greatly by the proposal being located inside the Primary Service Area (PSA) of the County. Furthermore, the County's analysis of the non-residential capacity within the PSA is a helpful reference when considering the impact and capacity of a proposal within the PSA, while the County's Strategy for Rural Economic Development is a helpful reference for considering proposals outside the PSA.

The Land Use Designation is the community's expression of the desired future development type for a property, which is based on public input gathered during each update of the Comprehensive Plan. The property's zoning is a legal classification that determines, among other things, the regulations for proposed and existing developments, such as minimum lot sizes, setback requirements, and which uses are permitted and which are not. For more information regarding Land Use designations, refer to the Land Use Map Descriptions and Development Standards section of the Comprehensive Plan.

Regional Efforts

The economic development offices of the three localities of Greater Williamsburg collaborate on many ongoing initiatives in support of the local economic base. Examples include the Launchpad, supported by the Economic Development Authorities (EDA) of each locality and W&M, which provides tangible hands-on support to start-up and small businesses; Start! Peninsula, an annual event to encourage entrepreneurship activity within the Peninsula; and the Economic Progress Committee (in partnership with the Greater Williamsburg Chamber and Tourism Alliance). The Greater Williamsburg Partnership is an organization that seeks to "market the Greater Williamsburg region as a preferred business location; facilitate new business investment and high-wage job creation; enhance industry diversification efforts and overall increase economic prosperity for citizens in the communities of Williamsburg, James City County and York County."

OED collaborates with Williamsburg-James City County (WJCC) Schools to help students explore careers in various sectors represented by local and regional employers. Since 2013, Manufacturing Day has been hosted by manufacturing firms located in the County to allow high school students to tour facilities, explore the processes involved in making the final products, and learn about various careers, skillsets and pay scales tied to the manufacturing sector. OED and WJCC also collaborated with TNCC to host a summit of healthcare employers to identify those skills and jobs most needed in the healthcare industry and how best to attract and train students for those positions. The result was an expansion of the courses offered by TNCC and WJCC that provides both high school and college credits, as well as certification that can be used for immediate employment and/or further education. Similar efforts are being planned for the trades and manufacturing sector and other opportunities will be explored as efforts continue to expand student awareness and job exploration.

The College of William and Mary

The College of William and Mary remains a strong resource for the community. Through its numerous affiliations, the College has been active in linking companies to the development of new, cutting-edge technologies and ongoing research in areas such as sensors, modeling and simulation, material and applied sciences, alternative energy, bioscience, bioinformatics, aging and geriatric health, and marine science. Furthermore, research and development activities have the potential to cluster and create an environment that is attractive to knowledge-based businesses.

Thomas Nelson Community College-Historic Triangle Campus

Throughout the years, Thomas Nelson Community College (TNCC) has played an increasingly important role in serving the workforce development needs of the business community and in helping individual citizens achieve their educational goals. TNCC first began providing classes in the Historic Triangle in the late 1990s. In 2009, a new permanent campus was established in James City County. The campus includes a 120,000-square-foot facility with classrooms, five science laboratories, a nursing laboratory, the Learning Resources Center, and a state-of-the-art facility encompassing the College's Dental Hygiene Program.

TNCC offers a variety of programs at both its Hampton and Historic Triangle Campuses ranging from academic to career studies certificates. It also offers a dual enrollment program allowing high school students from Williamsburg-James City County Schools to earn college and high school credit concurrently. One of the college's major focuses is to meet the educational and workforce development needs in the Historic Triangle by providing cooperative education (co-op) programs for business, government and community employers, just-in-time education, and customized training.

To this end, TNCC has established the Thomas Nelson Workforce Center on Ironbound Road in the New Town area of the County. The Center offers first-class training and economic and workforce development services for public and private organizations, including the business community, company employees, and entrepreneurs.

Throughout the years, Thomas Nelson Community College (TNCC) has played an increasingly important role in serving the workforce development needs of the business community and in helping individual citizens achieve their educational goals.

Community Guidance

Public Engagement

One of the public engagement themes identified during this Comprehensive Plan update that most directly relates to this chapter is: "Respondents support economic development that results in recruitment of businesses with higher paying jobs as one way of making the community more economically resilient and appealing to younger professionals. While tourism is a major economic driver in the County, it should be balanced with other employment and industries." Respondents to the 2019 Citizen Survey were asked about the County's efforts to attract jobs and new businesses. Approximately 88% of respondents found this service to be very important or somewhat important, while approximately 68% were very or somewhat satisfied. This difference between the importance and satisfaction is the "satisfaction gap" - for efforts to attract jobs and new businesses. The satisfaction gap was 20%, which is the third largest documented within the survey.

In the first round of the Engage 2045 process, the County hosted the Summit on the Future in the fall of 2019 to engage with citizens to determine their vision for the future of the County. During the polling portion of the Summit and online polling that continued weeks after, 88% of the respondents said it was somewhat or very important for the County to do more to expand the local economy by attracting higher paying jobs. When asked about retail space, respondents had concerns that new retail space would replace open space, rural land, or natural habitat. They also indicated that new retail space would increase the overall retail vacancy within the County.

During one of the stations at the Summit, many respondents gave similar responses relating to economic development. In no particular order, these responses include: a focus on redeveloping older commercial spaces, encouraging infill development rather than greenfield development, the importance of retaining "small-town" community character, and the challenge of retail vacancy and store turnover.

The second round of the Engage 2045 process, held in the fall of 2020, offered respondents the opportunity to indicate whether the Economic Development goal in the 2035 Comprehensive Plan should be modified in the new plan. About two-thirds of respondents indicated satisfaction with the 2035 goal, while about one-third suggested changes aimed at putting greater emphasis diversifying the tax base with businesses that have higher paying jobs and jobs that are more appealing to younger professionals, and that would be less affected by economic downturns than the tourism-based businesses that dominate the local economy.

The third round of community engagement was held in the winter of 2021. This round solicited input on policy directions the County should pursue and actions it should take to enable citizens' vision for the future of our community to be realized.

Overall, there was consistent support to diversify the local economy with a focus on development of higher wage employment. In Round 3, this topic had less support for prioritizing resources to this endeavor, but still strongly supported as an overall objective. Round 3 respondents expressed mixed support for the County investing in infrastructure to serve economic development sites within the PSA. For development of complete communities that can support future economic growth, there was a preference for more mixed-use centers with employment and adding more middle density housing to existing employment areas.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to Economic Development:

- Create "complete communities" with walkable environments and a mix of residential and commercial uses that 21st century businesses and employees desire;
- Include new retail and office growth as part of mixed use "complete communities" rather than as standalone retail centers or office parks separated from residential areas;
- Protect natural features and rural areas as critical community character assets that attract new businesses and workers and are the foundation for agri-tourism and eco-tourism industries;
- Reduce commuting times by locating homes, businesses, and supportive uses in closer proximity within the PSA; and
- Encourage localized job development to create higher-paying jobs in James City County, create better jobs to housing balance, and reduce the need for cross-county commuting to other job locations or in-commuting to jobs for workers that cannot afford to live in here.



Spotlight on Implementation

In order to build a multifaceted, balanced economy, James City County seeks to utilize strategies that produce an adaptive, resilient, and vibrant economic base that provides high quality jobs and stability for County residents. A diverse employment base, for example, is one of the features which can be used to gauge the vitality of James City County's economy. Such diversity also strengthens the local economy and allows for greater resilience in the face of unexpected economic swings, such as the housing market crash of 2008 or the effects from the 2020 COVID-19 pandemic. Income that meets the needs of workers and reduction of poverty rates are also important indicators.

Since 2014, a number of efforts have helped encourage a balanced mixture of business expansion and redevelopment. For instance, OED has worked with 15 businesses that accounted for $94.8 million dollars in capital investments. Of that $94.8 million, $26.2 million was associated with expansions to Manufacturing/Wholesale Trade industries. Specifically, the County has seen expansions to the Anheuser-Busch plant, as well as the opening of the first craft brewery in the County.

County staff have also worked diligently on site-readiness for property zoned M-1 and M-2 throughout the County. Another focus of economic development has been agri-tourism and eco-tourism activities in the County. The Sweethaven Lavender Farm is one such example of this trend. The farm opened in 2019 and maintains more than 100 acres of rural lands for agricultural purposes. This operation also offers value added products for distribution and hosts an annual festival during the lavender's peak bloom.

The County also coordinates and informs prospects of current financial incentives at the local, state and national level, including customized programs for individual businesses, working with the Virginia Economic Development Partnership, and providing information on the Foreign Trade Zone.

James City County collaborates with a number of different regional organizations to further entrepreneurship and develop the transportation system. Work with the Thomas Nelson Workforce Center, the College of William and Mary, as well as adjacent localities' cooperation with Launchpad, have helped foster development of the workforce in our County and have provided training opportunities and support for small businesses and start-ups.

With respect to transportation improvements, County staff has worked on a number of initiatives to further the economic interests of the area, including the Mooretown Road extended corridor study, Route 60 relocated/Skiffes Creek connector project, and the widening of I-64.

Goals, Strategies, & Actions

Goals

ED - Build a more sustainable local economy that upholds James City County's commitment to community character and environmental protection; results in a diversity of businesses, community investment, and professions that attract higher paying jobs; supports the growth of the County's historic, agri-tourism and eco-tourism sectors; contributes positively to the community's quality of life; and better balances the local tax base.

Strategies and Actions

ED 1 - Continue to support existing businesses and foster new businesses within James City County through local initiatives and the leveraging of state and federal resources.

ED 1.1 - Maintain an active and effective economic development strategy, which includes existing business retention and expansion, assistance to new business, new business recruitment and support to the tourism industry.

ED 1.2 - Develop and promote strategies and programs to encourage the creation of new and retention of existing small businesses, home-based businesses, and entrepreneurial efforts including women-owned and minority-owned businesses and companies that successfully graduate from the Launchpad Business Incubator.

ED 1.2.1 - Fostering new and supporting existing programs to assist small businesses, home-based businesses, and entrepreneurial efforts.

ED 1.2.2 - Developing strategies that strive to retain those companies who successfully graduate from the Launchpad Business Incubator.

ED 1.3 - Continue to pursue and promote incentives available for new and expanding businesses and industries within certain areas in the County, including Opportunity Zones, Foreign Trade Zones, and Tourism Zones, and develop additional incentives for new and existing business development.

ED 1.4 - Cultivate and sustain regional and state partnerships that contribute to economic development efforts, including business attraction, business retention, tourism, small and emerging business support, workforce, education, and quality of life.

ED 1.5 - Work with William & Mary, Thomas Nelson Community College, and other entities in support of business attraction and expansion of quality and innovative business ventures.

ED 1.6 - Promote the creation and retention of businesses that provide full-time job opportunities with wages and benefits sufficient to make housing attainable for employees.

ED 1.7 - Encourage private/public partnerships or similar initiatives to ensure the development and attraction of quality and innovative business ventures.

Goals, Strategies, & Actions

ED 2 - Continue to explore opportunities to diversify James City County's economy in order to strengthen the economic base and long-term resilience.

ED 2.1 - Promote tourism, including eco-tourism and agri-tourism and associated industries as a year-round asset.

ED 2.2 - Support the recommendations of the Greater Williamsburg Target Sector Analysis with a particular emphasis on supporting the development of those businesses identified as legacy and emerging businesses within this study.

ED 2.2.1 - Foster the opportunities for development and expansion of advanced materials and components, food & beverage manufacturing/supply chain, and professional & technical services.

ED 2.2.2 - Explore partnerships with William & Mary and other entities to attract and expand technology companies, particularly those in the areas of sensor, robotics, modeling and simulation, bioscience, unmanned systems, and emerging technologies.

ED 2.3 - Support viable traditional and emerging rural economic development initiatives as recommended in the County's Strategy for Rural Economic Development.

ED 3 - Foster the development, training/retraining, diversification, and retention of the James City County workforce.

ED 3.1 - Support public and private entities that engage in workforce development, like the Greater Peninsula Workforce Board.

ED 3.2 - Continue working with Williamsburg/James City County Schools (WJCC), New Horizons Regional Education Center, and local colleges and universities to facilitate technical and professional opportunities for high school and college students through internship, training, and mentorship programs, with the intent of locating more of these opportunities within County.

ED 3.3 - Leverage the resources of local colleges and universities to companies seeking technical and research assistance and job training.

ED 3.4 - Support businesses, programs, and developments that attract young professionals and retain the community's graduates.

ED 3.5 - Support collaborations with the William & Mary Office of Economic Development and TNCC to enhance training opportunities that meet the needs of our existing business community and target industry sectors.

Goals, Strategies, & Actions

ED 4 - Encourage infill development, the redevelopment of existing parcels, and the adaptive reuse of existing buildings that efficiently uses infrastructure and natural resources, as well as establishes or enhances the area's sense of place and community character.

ED 4.1 - Encourage the rehabilitation of abandoned and/or underutilized facilities by promoting them to new business.

ED 4.2 - Encourage new development and redevelopment of non-residential uses to occur mainly in areas where public utilities are either available or accessible within the Primary Service Area (PSA) and infrastructure is supportive.

ED 4.3 - Promote environmental conservation techniques among new and existing business, including water conservation (such as reclamation of rain or grey water), energy efficiency, and materials management (such as recycling, composting, and material life-cycle considerations).

ED 4.4 - Promote desirable economic growth in designated industrial and commercial areas through the provision of water and sewer infrastructure consistent with the Comprehensive Plan policies and the regulations governing utility service in partnership with the James City Service Authority (JCSA), Newport News Waterworks, and HRSD.

ED 4.5 - Continue to support public private partnerships to revitalize unique areas within the County such as Toano.

ED 4.6 - Adopt the Virginia C-PACE program to incentivize private development that utilizes environmental conservation techniques.

ED 5 - Protect the County's existing physical transportation infrastructure that is critical to economic development. Plan and promote the development and coordination of transportation systems with the location of non-residential uses in a manner that maximizes the County's economic potential consistent with the policies of the Comprehensive Plan and is sensitive to its context.

ED 5.1 - Collaborate with the Virginia Department of Transportation (VDOT) and adjacent localities to improve access to interstate and major arterials such as improving Route 60 East and extending Greenmount Parkway.

ED 5.2 - Assess and collaborate on opportunities and advocate for public transit (e.g. commuter rail, light rail, or bus rapid transit service) to economic and business centers within James City County.

ED 5.3 - Improve the utilization of rail/interstate highway nodes and access to deep water ports to facilitate commercial freight access to and from local industries and for tourism access.

ED 5.4 - Support continued local access to general aviation facilities.

ED 5.5 - Work with regional airport facilities to promote additional direct commercial flights to serve the destinations preferred by James City County businesses.

Goals, Strategies, & Actions

ED 6 - Support the tourism industry of the Greater Williamsburg region and promote James City County as a destination of choice in the region.

ED 6.1 - Foster tourism development in James City County and the Historic Triangle by continuing to partner with the Williamsburg Tourism Council.

ED 6.2 - Identify and protect historic sites that are important to the heritage of James City County, allowing them to be preserved for future generations.

ED 6.3 - Promote existing ecotourism and agri-tourism venues and support the establishment of new ones, where appropriate.

ED 6.4 - Support the development of sporting events and facilities that promote the County as a sports tourism destination and other special events in James City County.

ED 6.5 - Support tourism initiatives that promote the Historic Triangle as an arts destination, including cultural and culinary activities.

ED 7 - Continue to monitor the County's regulatory framework to ensure best practices are in place.

ED 7.1 - Review and update the Zoning Ordinance to ensure it promotes best practices for home occupations and other small businesses consistent with neighborhood and community character.

ED 7.2 - Review and update County regulations, policies, and procedures to ensure they create clear expectations for developing new businesses in targeted industries, and that land use requirements are flexible to changing market trends.

ED 7.3 - Examine and update County regulations to ensure that the County maintains best practices while continuing to accommodate new industries spurred by innovations and changes in technology.

ED 7.4 - Continue to monitor the available capacity for non-residential development within the County's Primary Service Area (PSA) and utilize this information when considering land use designation changes as part of the Comprehensive Plan update process.

ED 8 - Continue to monitor the broader economic factors and forces that shape the County's local economy, including global issues such as the COVID-19 pandemic, national industry trends such as the retail industry transitioning from brick and mortar to the online marketplace, and statewide policies, such as scheduled increases in the minimum wage.

ED 8.1 - Examine the effects of the COVID-19 pandemic on small-businesses and work to develop tools to help prepare the County to mitigate the impacts of future similar scenarios.

ENVIRONMENT

Introduction

James City County's natural environment is one of its most valuable assets, and at the same time, one of its most vulnerable. The County is located on a narrow, hilly, wooded peninsula between three major rivers that feed into the Chesapeake Bay. There are extensive waterways, wetlands, unstable soils, steep slopes, scenic vistas, wildlife corridors and woodland areas.

The County continues to experience growth, mostly due to its location between two major metropolitan areas and its growing attraction as a retirement community and tourist destination. While the continued investment in the community can be heralded as a measure of economic vitality, efforts must be maintained to manage and direct growth as well as mitigate the impacts of growth. Impacts, if left unmitigated, could lead to decreased water quality; increased soil erosion and stormwater runoff; loss of scenic vistas, agricultural lands, and historic sites; destruction of wildlife habitats; deforestation; and air pollution. Beyond impacts to the natural environment and local ecosystems, the impacts of unmitigated growth would also likely lead to economic decline.

Recognizing the value in its natural resources, the County has endeavored to better understand these resources and has successfully worked with the community to employ practices to minimize impacts and protect resources.

The Environment Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language as written in the 2035 Comprehensive Plan has been updated to emphasize improving environmental quality in the County, to incorporate protection of rural lands, to include support for the resiliency of our natural systems, and to acknowledge the benefit to the current generation as well as future generations from these efforts. The Goal now states: "Continue to improve the high level of environmental quality in James City County and protect rural and sensitive lands and waterways that support the resiliency of our natural systems for the benefit of current and future generations."

Many important Environment Chapter implementation activities have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the revised and updated Strategies and Actions will be needed.

CHAPTER GOAL

"Continue to improve the high level of environmental quality in James City County and protect rural and sensitive lands and waterways that support the resiliency of our natural systems for the benefit of current and future generations."

Key Planning Influences

Location and Area

James City County is located on a peninsula approximately 50 miles southeast of Richmond and 40 miles northwest of Norfolk. The County is bounded by three rivers: the James to the south, the York to the northeast, and the Chickahominy to the west. Total land area, including inland water, is about 144 square miles or approximately 92,400 acres. There are 152 miles of shoreline along the three rivers, containing about 138 miles of marshlands and 14 miles of beach. Along these shores are both tidal and nontidal wetlands.

Geology and Soils

Knowledge of the topography, underlying geologic formations, soils, hydrographic features, and mineral resources is necessary to promote the best land uses for James City County and contributes to an appreciation of the County's lands and resources. According to multiple publications by Dr. Gerald Johnson, Professor Emeritus at the College of William and Mary, and his colleagues, the landscape of James City County is comprised of a series of terraces that descend step-wise in elevation from the York-James Peninsula, 149 feet above sea level in the northwestern part of the County, to sea level along the York, James, and Chickahominy Rivers, and lesser tidal creeks.

Each riser, or scarp, of a stair step is an abandoned ancient shoreline and the adjacent flat is the developing floor of a shallow sea or tidal river. Streams have carved valleys into the terraces creating the rolling hills and deep valleys of the County.

Underneath James City County's surface are more than 1,000 feet of sediments deposited in ancient seas, bays, and estuaries. This sediment layer dips gently seaward and rests on metamorphic, igneous, and sedimentary rocks of even greater age, from over 200 million years to possibly more than a billion years old. The porous beds of sand, shell, and gravel make up the aquifers from which James City County extracts most of its water supply. The aquifers are recharged by surface water and water moving down from the west in a process that takes hundreds to hundreds of thousands of years to occur.

James City County has mineral resources for pottery manufacturing, road and construction projects, and agricultural uses. Sand, gravel, and lime, as well as beds rich in minerals and other nutrients are present in the Yorktown Formation and were used by colonists for mortar, walkways, and land applications.

Effects of Land Use and Protection of Soils

Most County soils are highly erodible, meaning that disturbances can lead soils to wear away and be re-deposited elsewhere, which disrupt drainage patterns and can adversely impact wetland, forest, and wildlife habitat.

Education, regulation, and land use policy are the three primary methods of protecting soils and other natural resources. Soil surveys and other inventories help identify areas that are vulnerable to poor development and land use practices. The County Erosion and Sediment Control Ordinance, Floodplain Ordinance, Chesapeake Bay Preservation Ordinance, Virginia Stormwater Management Program Ordinance and other regulations attempt to address development issues regarding soils. Additionally, the Land Use Map, Zoning Ordinance, and watershed management plans all play a role in encouraging proposed land uses to locate on more compatible, well-suited soils. Good stewardship of private property is also a critical element of protection. A thorough analysis by a geotechnical engineer or soil scientist is recommended before beginning any construction activity that relies heavily on the engineering properties and characteristics of soils.

Soil Suitability for On-Site Sewage Disposal Systems

On-site sewage disposal systems provide sewage treatment and disposal for developments that are not connected to public sewer lines. Most systems distribute sewage effluent into the soil through absorption fields. The systems range from a traditional septic tank effluent system dispersed by gravity, to a system with a higher level of treatment and distribution to an above grade dispersal area. Various factors such as soil permeability, a high water table or seasonally fluctuating high water table, depth of impermeable soil layers, existing vegetation and flooding may affect the ability of the natural soil to absorb effluent. *The Soil Survey of James City and York Counties and the City of Williamsburg*[1] (Soil Survey) describes the different soil types of the area and classifies them into three categories according to their suitability for on-site sewage disposal systems:

- **Slight** - Soil properties and site features are generally favorable for on-site sewage disposal systems and limitations are minor and easily overcome.
- **Moderate** - Soil properties or site features are not favorable for on-site sewage disposal systems and special planning, design, or maintenance is needed to overcome or minimize limitations.
- **Severe** - Soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Map ENV-1 illustrates the areas where on-site sewage disposal systems are able to function best and where use may be limited by soil type. The majority of land in the County consists of soils in the severe category; however, there are many areas of the County with severe soil types that have well-functioning on-site sewage disposal systems. While the soil survey may show an area to contain soil not suitable for an on-site sewage disposal system, a site and soil evaluation may reveal a feasible location within that area that can sustain a properly functioning system. Advanced treatment systems may be an option for property owners who do not have soils suitable for a traditional on-site sewage disposal system. For this reason it is important for owners to have a site and soil evaluation performed by a licensed on-site soil evaluator (OSE), before determining whether a specific lot is suitable for an on-site sewage disposal system.

[1] US Department of Agriculture Natural Resources Conservation Service, Web Soil Survey, modified 07/31/19. websoilsurvey.sc.egov.usda.gov/

Map ENV-1. On-site Sewage Disposal System Suitability [2]



[2] Data Source: US Department of Agriculture Natural Resources Conservation Service, Web Soil Survey, modified 07/31/19. websoilsurvey.sc.egov.usda.gov/

County and State Policies and Regulations for On-Site Sewage Disposal Systems

The County and state have several policies and regulations regarding the installation, maintenance, and use of on-site sewage disposal systems. Implementation of these regulations, along with proper use and care by property owners, can help minimize the potential harmful effects of sewage disposal systems on water quality.

State

Any locality may require the installation, maintenance, and operation of on-site sewage disposal systems when public sewers or sewage disposal facilities are not available. Counties may also require the maintenance and operation of septic tanks or such other means of disposing of sewage when they contribute or are likely to contribute to the pollution of public or private water supplies. Any on-site waste disposal permit is valid for 18 months following the date of issuance unless there has been a substantial, intervening change in the soil or site conditions where the system is to be located.

County

James City County requires on-site sewage disposal systems for developments where public sewer is not available, generally anywhere outside the Primary Service Area (PSA). The County does not permit the creation of a new lot without primary and reserve drain fields and approval by the Virginia Department of Health (VDH). The Chesapeake Bay Preservation Ordinance also requires on-site sewage disposal systems to be pumped out at least once every five years.

Farmland, Forestland, and Ecosystems

The County has extensive lands that are farmed or forested, and a variety of different ecosystems.

Farmland

Prime farmland, as defined by the U.S. Department of Agriculture (USDA), is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management.

In 2015, the Virginia Department of Conservation and Recreation (DCR) released the Virginia Agricultural Model, a collaborative effort between DCR, the USDA Natural Resources Conservation Service (NRCS), and the Virginia Department of Agriculture and Consumer Services (VDACS). In this model, agricultural value is assessed primarily based on inherent soil suitability, but also accounts for current land cover as well as travel time between agricultural producers and consumers. The Virginia Agricultural Model is one of several in a suite of conservation planning and prioritization models developed by the Virginia Natural Heritage Program and partners, known collectively as *Virginia Conservation Vision*. Current datasets, including agriculture conservation values, provided by the DCR Natural Heritage Program can be explored via DCR's Virginia Natural Heritage Data Explorer here: https://vanhde.org/content/map.

Prime farmland is also very attractive for development projects because the soils are generally the most stable, the topography is relatively flat, the land is suitably cleared, and the ownership is generally consolidated in large parcels. Many of the County's prime farmland soils are developed or intended for development. The loss of agricultural lands to other uses puts pressure on marginal lands, which are generally wet, erodible, or difficult to cultivate. Careful consideration of prime farmland soils must be given to future land use cases involving conversion.

Compared to the mid-20th century, when the County's farmland totaled over 40,000 acres, there is considerably less farmland today. Per the 2017 Census of Agriculture, there were 6,630 acres of farmland in the County; however, this also represents an increase of approximately 1,000 acres since 2012. Farm size averaged 92 acres, with a median of 22 acres in 2017, compared to 67 acres and 32 acres, respectively, in 2012.

As traditional farming activities decrease, there has been an increased interest in agri-tourism as an economic driver, both through direct visits to farms and wineries and through partnerships with local restaurants and farmers markets. This helps provide economic alternatives for farmland that may otherwise be subject to development pressures. According to the 2014 *Strategy for Rural Economic Development*, tourism activity is an important part of the County's rural economy. Tourists drawn to the area for its historic and cultural offerings are more likely to visit local attractions and restaurants, which are more likely to be supplied by local farmers. In 2017, the Board of Supervisors also approved new regulations to allow event facilities in the A-1, General Agricultural Zoning District, providing additional opportunities for income on farm properties.

Forestland

According to the *Forest Resources of the United States, 2017*, approximately 60,338 acres or 52% of land in the County is currently forested. Since 1992, this represents a net loss of approximately 4,635 acres, but a gain of 1,383 acres since 2011. Some of this variation may be attributed to timber harvesting and regrowth patterns. In some cases, high value stands of trees have become established, while low-quality and low-value stands are typical in other areas. Hardwood stands continue to decrease in quality due to the misapplication of selective cutting practices, which take only the highest quality trees and leave the lowest quality trees.

Forests contribute more than just wildlife habitats and timber. Tree roots have been proven to be the best natural device to hold streamside soil in place, and also create soil conditions that promote the infiltration of rainwater into soil. Trees also serve as a natural stormwater facility by helping to slow down and temporarily store runoff. They reduce pollutants by absorbing them through their roots and then transforming these pollutants into less harmful substances. Forested riparian buffers (those adjacent to water bodies) are particularly valuable for improving water quality and preserving biological diversity. These forested areas filter runoff before it enters the waterway, stabilize eroding soils, and provide wildlife habitats for many sensitive species. Current datasets, including forest conservation values and natural habitat and ecosystem diversity, are provided by the DCR Natural Heritage Program can be explored via DCR's Virginia Natural Heritage Data Explorer here: https://vanhde.org/content/map.

Ecosystems

James City County contains a wide variety of ecosystems. According to the 1990 technical report *A Natural Areas Inventory of the Lower Peninsula of Virginia* by the Virginia Department of Conservation and Recreation (DCR), the uplands are largely hardwood or pine forest, while the bottomlands are unforested, with the exception of several swamps containing a mixture of bald cypress, black gum, red maple, sweetgum, and bottomland oaks. The County also contains freshwater marshes where plants such as pickerel weed, duck potato, and wild rice grow.

These ecosystems provide important habitat for a wide range of species in the County. Many birds rely on the marshes and extensive waterways for food and nesting grounds. Common mammals include white-tailed deer, foxes, beavers, and raccoons. The forests, marshes, and streambanks are also home to reptiles, amphibians, insects, and various native plant species, some of which face the threat of extinction due to loss of habitat. Examples of threatened or endangered flora and fauna in James City County include the small whorled pogonia, Mabee's salamander, and rare skipper butterfly.

The Virginia DCR's Natural Heritage Program collects information on biodiversity and community types and has created an inventory of locations where sensitive ecosystems exist. The County has used this inventory to set conservation priorities to protect natural areas using a variety of tools, including the County's Natural Resource Policy for legislative land use cases (i.e., rezoning and special use permits) which require natural resource inventories for sensitive areas. In 2018, this policy was converted to a Zoning Ordinance requirement for by-right development, ensuring that non-legislative projects must also submit natural resource inventories when located in potentially sensitive areas. Further, the Chesapeake Bay Preservation Ordinance requires environmental inventories for site and subdivision plans.

Green Infrastructure and Ecosystem Services

Green infrastructure is typically used as a broad term that refers to the network of land and ecosystems discussed above as well as throughout this chapter, including waterways, woodlands, wildlife habitats, parks, greenways, farms, ranches, wilderness, and other open spaces that sustain life in a community. As noted by the Green Infrastructure Center, green infrastructure planning helps community stakeholders conserve these resources through a process of setting goals, inventorying and mapping natural and cultural assets, assessing risk and determining opportunities to protect, restore, and integrate these resources in various types of planning efforts. An effective green infrastructure strategy can protect core habitats and corridors while also creating a more resilient ecosystem, and achieve multiple objectives toward recreation, environmental protection, community character, transportation and economic development goals. Closely aligned with this concept is the concept of ecosystem services, which recognizes that this green infrastructure helps - among many other things - support native species and native ecological processes, sustain clean air and water resources, sequester carbon, produce food and fuel, provide flood control, provide plant and crop pollination, and contribute to health and quality of life.

Ecosystem services provide many benefits that have economic value. For example, forests play a critical role in maintaining water quality, sequestering carbon, and healthy forests reduce the costs of treating drinking water for local governments. Protecting existing natural resources or re-establishing natural resources can be more cost effective than building or expanding facilities, or installing devices to replicate or replace natural functions.

James City County is working toward protecting or conserving ecosystem services through approaches such as open space preservation programs and incentives such as tax benefits (e.g., the Agricultural and Forestal Districts and the Land Use Assessment program). This can also be accomplished in the future through policies and regulations pertaining to specific uses or development proposals, such as working with solar farms to include plantings that support bees and other pollinating insects.

In addition, in recent years ecosystem services markets have emerged to compensate landowners for the benefit their land provides through environmental credit markets. Examples include wetland banks and carbon sequestration payments. This subject relates to actions in ENV Strategy 1 and 3.

Shorelines

James City County is divided into two major drainage basins or watersheds, the James River watershed and the York River watershed (*1998 James City County Comprehensive Plan Shoreline and Groundwater Element, and 2015 James City County Shoreline Management Plan*). Of the 152 miles of total shoreline in the County, about 17 are located in the York River watershed. The James River and its associated tributaries, including the Chickahominy River, make up the largest portion of the County's shorelines.

Natural (Unaltered) Shoreline Features

Much of the County's shoreline remains in its natural unaltered state, as opposed to having artificial erosion control structures such as bulkheads, breakwaters, and riprap along its bank. In general, the following types of natural shoreline features existed in the County at the time inventories were conducted by the Virginia Institute of Marine Science (VIMS) in 1995: fringing intertidal marshes, extensive intertidal marshes, supratidal marshes, fresh water marshes and swamps, sheltered and exposed tidal flats, coarse sand beaches, and sheltered and exposed fine sand beaches.

Natural shorelines perform a vast array of functions by way of shoreline stabilization, improved water quality, and provision of habitat. Tidal wetland areas and marshes absorb wave energy and buffer erosion of upland areas. Nontidal wetland areas are important for flood control purposes. In addition, many of these features have aesthetic and recreational value. Knowing where natural shoreline features exist and their relative size, health, and role in water quality protection is important. Recognizing these areas and developing effective management strategies to protect them is an important part of the planning process.

Shoreline Erosion

The health of the County's shorelines can be determined by examining their specific conditions, such as erosion rates and flushing characteristics. Along the majority of the shoreline, erosion ranges from zero to two feet per year. A 2010 study conducted by VIMS evaluated the evolution of shoreline erosion in the area since 1937. *The James City County Shoreline Situation Report* notes that severe erosion is generally limited to the James River shoreline north of Jamestown Island. Erosion along other parts of the James River and along the York River is moderate, though more prevalent along the James. Tributary creeks to the York River appear to be stable; however, the shorelines of tributary creeks to the James River appear to be eroding.

Erosion rates provide a relatively simple and concise tool to measure and compare the cumulative impacts of natural and human effects on the shoreline. As such, this information has various applications for land use planning and decision-making. It can assist the planners in determining appropriate locations for future development and redevelopment and the most appropriate methods for addressing erosion issues. For example, where data identifies a shoreline area to be in a state of "severe erosion" (greater than or equal to three feet per year), this information can be used to develop appropriate building setback policies and/or to direct shoreline development to areas which are experiencing less intense erosion.

Methods to Address Shoreline Erosion - Comprehensive Coastal Resource Management

The placement of certain shoreline erosion control structures (bulkheads, breakwaters, and riprap structures) and water access points can present a very real threat to water quality. Inappropriate or unnecessary shoreline erosion control techniques can potentially exacerbate erosion at the site, and/or create an erosion problem on an adjacent property or downdrift or updrift areas. Additionally, shoreline erosion controls can create an unsuitable environment for the persistence of wetlands, submerged aquatic vegetation, and beaches. As a result, water quality can be degraded either locally or on a regional level.

Where shoreline stabilization is necessary, a full spectrum of living shoreline design options is available to address the various energy settings and erosion problems found. Depending on the site characteristics, they range from marsh plantings to the use of rock sills in combination with beach nourishment. Living shoreline approaches combat shoreline erosion, minimize impacts to the natural coastal ecosystem, and reinforce the principle that an integrated approach for managing tidal shorelines enhances the probability that the resources will be sustained.

Use of these approaches is reinforced by 2020 state legislation changes (SB776) that require living shorelines as the primary method for stabilizing eroding shorelines. The Board of Supervisors amended the County Code to reflect this requirement on July 14, 2020. With this amendment, living shorelines are required unless proven to be unsuitable under specific circumstances on a case-by-case basis, further protecting shorelines and sensitive coastal habitats. Per the 2015 *James City County Shoreline Management Plan*, much of the County's shoreline is suitable for living shorelines.

Coastal resource guidance, found within the Comprehensive Coastal Resource Management Portal, has been prepared by Virginia Institute for Marine Science for localities in the Tidewater region of Virginia. Within the James City County portal (https://www.vims.edu/ccrm/ccrmp/portals/james_city/index.php), available resources include updated local shoreline inventories and the *James City County Shoreline Management Plan*, which recommends various strategies for effective shore protection that create, preserve, and enhance wetland, beach, and dune habitats. The portal also includes an interactive GIS mapping viewer and sea level rise risk/vulnerability tool.

The County will look for outreach opportunities to educate citizens and stakeholders on new shoreline management strategies including living shorelines and will evaluate and consider cost sharing opportunities for construction of living shorelines. A possible partnership with the Colonial Soil and Water Conservation District (CSWCD) for a shoreline evaluation program is being pursued to provide technical and educational assistance to shorefront property owners. The CSWCD is in the process of developing a pilot shoreline evaluation program to educate and aid shoreline landowners in understanding and meeting new shoreline regulations. Via the CSWCD, James City County partnerships are extended to Virginia Cooperative Extension Master Gardeners and Master Naturalists for training on meeting with landowners to provide shoreline evaluation assistance.

Bathymetry

Bathymetry is the measure of the depth of bodies of water. According to the 2000 *James City County Comprehensive Plan Shoreline and Groundwater Element*, the Chesapeake Bay region contains one of the fastest growing populations in the United States. Associated with this increase in population has been a rapid rate of both upland and shoreline development, which is considered to be one of the primary causes of increased overall sediment loadings into the Bay, its larger tributaries and its smaller tidal creeks. Land disturbance activities and the creation of impervious areas through development activities have led to an increase in the volume and peak rate of stormwater runoff and erosion and subsequent sediment transport. In addition, valuable tidal wetland areas, which trap sediment before it reaches the water and provide a buffer for wave-induced shoreline erosion, have been lost. Due to this increased sediment transport and deposition and natural erosion processes, a large number of tidal creeks that once contained navigable depths at mean low water are now impassable at low tide, impeding recreational use of these waterways.

In order to maintain access to tidal creeks that historically have been used for boating activities, it is often necessary to conduct maintenance dredging, which can be very expensive. Proper disposal of dredge material can be a problem, too, particularly when the material is contaminated. Dredging activities can disturb extremely productive habitats and be detrimental to sensitive living resources. Comparing historical and current bathymetric data, or underwater depth, for a given waterway can identify shoreline areas with water depths that are adequate to accommodate desired boating activities, not only for the present but also into the future. Integrating bathymetric data into the planning process to determine future recreational access areas could help ensure that new access points will be located in areas where dredging can be minimized or altogether avoided. The County does not currently integrate bathymetric data into the planning process, but this information is used by the Army Corps of Engineers.

Flushing Characteristics and Water Flow

The circulation of water in a water body is perhaps the most important factor governing the response of coastal ecosystems to environmental disturbance. This characteristic should be a predominant consideration and controlling factor in the type and intensity of land uses permitted along the adjacent shoreline and their related water uses. In a tidal river or estuary, pollutants released into the water are transported upstream as well as downstream from the discharge point. Tides serve to flush out contaminants in many estuaries and a rapidly flushing estuary can potentially take in more point and nonpoint source pollutants than a slow-flushing estuary.

When excessive amounts of nitrogen and phosphorus are introduced into coastal and estuarine waters from the surrounding watershed, eutrophication is accelerated. Excessive nutrient loading can cause algae blooms, decreased water clarity, and declines in submerged aquatic vegetation beds, which are important shellfish and finfish habitats. As phosphorus binds to sediment and accumulates, it may be transported away from the point of entry through tidal circulation. This is significant for future development because even low intensity development along shoreline areas can result in the disruption of flushing characteristics and interfere with proper assimilation of nonpoint source pollutants.

Significant change in the natural water flow patterns should be avoided by minimizing construction in the water catchment area. The ecological disturbance potential increases as the water body becomes smaller or as the flushing rate drops. This is important in planning general land uses, but it is specifically critical in assessing waterways for appropriateness for the development of water access facilities, such as marinas or piers.



Resources

Rivers, waterways, and wetlands are important resources in James City County, for both their environmental aspects and economic impacts. These areas and the associated living organisms provide an abundance of benefits to the region. Protecting them remains a priority for the County.

Recreational and Commercial Fisheries

As stated in a 2005 report entitled *Economic Contributions of Virginia's Commercial Seafood and Recreational Fishing Industries: A User's Manual for Assessing Economic Impacts*, the direct impacts of recreational fishing in James City County were estimated at $1,379,000 and accounted for 26 full- or part-time jobs. The Virginia Department of Wildlife Resources (DWR) describes recreational fisheries for the James River and the Chickahominy River. According to the DWR, the Chickahominy River is home to a nationally recognized large-mouth bass fishery, and of all Virginia tidal rivers, the tidal Chickahominy typically has the highest largemouth catch rates.

The DWR also notes the presence of yellow perch, white perch, and black crappie, chain pickerel, bowfin, blue catfish and channel catfish, common carp and long-nose gar. The DWR indicates that the tidal James River system also supports a nationally recognized largemouth bass fishery. In addition to excellent bass fishing, the tidal James supports a nationally recognized trophy blue catfish fishery, with hundreds of 30- to 60-pound blue catfish caught from the tidal James and its tributaries each year. Other species of note include striped bass (rockfish) and shad.

In terms of commercial fishing in James City County, the following value estimates were provided by the Virginia Marine Resources Commission (VMRC):

Year	Sum Value
2014	$473,606.57
2015	$580,506.15
2016	$519,667.49
2017	$859,418.87
2018	$361,431.00

Tidal Wetlands

Tidal wetlands are ecologically important and valuable for flood and erosion control qualities. Shoreline inventory data made available in 2014 through VIMS[3] estimated approximately 5,939 acres of tidal marsh, down from 7,005 acres in 1980[4]. According to U.S. Fish and Wildlife Service, there are seven priority wetland areas in the County, and a past program publication known as the *Chesapeake Bay Local Assistance Manual* identified two additional areas. Protection of wetlands is an important strategy for deterring erosion of shorelines. See Map ENV-2 for an illustration of all wetland locations in James City County.

Submerged Aquatic Vegetation (SAV)

Submerged aquatic vegetation (SAV) beds are critical living resources and can be degraded by land use activities that contribute excessive pollutants into adjacent waterways. Boating activities can also significantly impact SAV. Adjacent land use intensity and private pier and dock development allowed through zoning and subdivision laws can permit or restrict boating activity along certain waterways where SAV beds exist or have the potential to grow. Additionally, shoreline structures themselves can negatively impact submerged aquatic vegetation by reflecting wave energy and blocking available sunlight.

Shoreline Access

According to the 2017 Virginia Outdoors Demand Survey conducted by DCR, 43% of Hampton Roads residents consider water access a most-needed recreation opportunity. In response to this demand, James City County has purchased and made improvements to the shoreline access facilities at Chickahominy Riverfront Park, Jamestown Beach Campground, and James City County Marina. In 2020, the Board of Supervisors approved the purchase of 119 acres at Brickyard Landing to provide additional shoreline access opportunities and expand the existing facility, which is currently located on a small portion of the site.



[3] Virginia Institute of Marine Science, Virginia Shoreline Inventory Report, 2014.
[4] Virginia Institute of Marine Science, James City County Tidal Marsh Inventory, 1980.

Marinas

Any form of shoreline access may potentially impact water quality in some way. The magnitude of the impact depends on the type of access, with marinas presenting the greatest impacts. Marinas can potentially impact water quality in the following ways:

- Resuspension of bottom sediments;
- Discharge of sanitary wastes from shore-side facilities and boats;
- Transportation of nonpoint source pollutants in stormwater runoff from impervious surfaces;
- Discharge of oil, fuel, and pollutants associated with boat engines and maintenance;
- Decrease in water circulation and aquatic habitat due to built structures; and
- Increase in risk potential for spills due to proximity to water resources.

Marina owners can learn about designing or retrofitting their facilities to incorporate environmentally sound practices that address runoff, maintenance activities, sanitary facilities, and spill prevention plans through the Virginia Clean Marina Program. James City County is in the process of designing improvements to the James City County Marina that will incorporate improvements to its fuel dispensing system, sanitary facilities, stormwater runoff, and shoreline protection.

The construction and operation of boat ramps will have many of the same impacts on water quality as marinas, but usually to a lesser degree. Compared to marinas and boat ramps, non-motorized boating access, such as canoe or kayak access, presents few adverse impacts to water quality. Potential impacts from pier and bank fishing and pedestrian access are minimal, with the exception of the construction of docks and piers and fish cleaning activities.



Map ENV-2. Wetlands in James City County [5]



[5] Data source: U.S. Fish and Wildlife, National Wetlands Inventory.

Piers and Docks

As of 1993, overall pier and dock density along the County's shoreline was 0.19 piers and docks per 1,000 linear feet, with higher pier densities found in Powhatan Creek, Powhatan Shores, and the Chickahominy Haven area. Revised shoreline inventories by VIMS from 2014 indicate roughly 0.21 docks per 1,000 linear feet. While the individual impact of private piers and docks may be minimal, the cumulative impacts to the surrounding aquatic ecosystem may be significant, particularly in high densities. Virginia's Clean Marina Program can educate private owners on pier and dock dimensions, building materials, and other ways to preserve Virginia's waterways. Clustering development away from shorelines can retain the waterfront area as community open space and provide a community pier. Larger minimum lot sizes for waterfront property can reduce the concentration of piers and docks and thereby disperse their impact.

Surface Water Quality

Waterways are a vital part of James City County's environment. The rivers and creeks provide habitat, natural beauty, and places to recreate. It is important to ensure that these water bodies are vibrant and healthy.

303(d) Impaired Waters and Total Maximum Daily Load (TMDL) Program

In response to requirements under the federal Clean Water Act, the Virginia Department of Environmental Quality (DEQ) tests Virginia's rivers, lakes, and tidal waters for pollutants. Over 130 different pollutants are monitored annually to determine whether the waters can be used for swimming, fishing, and drinking. Waters not meeting water quality standards are included in the *303(d) Report on Impaired Waters in Virginia*.

Similar to other communities in Virginia, most of James City County's waterways are included in the *Virginia Water Quality Assessment 305(b)/303(d) Integrated Report*. If a waterbody exceeds the pollutant level allowed by water quality criteria, or is below a specified threshold for supporting aquatic life, it will not support one or more of its designated uses. Such waters are considered "impaired" and placed on the List of Impaired Waters. When a waterbody is classified as impaired, DEQ initiates a watershed study that determines the Total Maximum Daily Load (TMDL) allowed for the affected area.

To restore water quality, pollutant levels in an impaired waterway need to be reduced to the TMDL amount. Following development of a TMDL, a cleanup plan describing the ways to reduce pollution levels in the waterway, must be outlined. This plan is developed by the state with input from the local government and other interested stakeholders. The final step in the cleanup process is to implement the best management practices (BMPs) established in the plan.

The County's waterways included in the *Virginia Water Quality Assessment 305(b)/303(d) Integrated Report* along with the type of impairment and schedule for development of a TMDL are listed in Table ENV-1.

Table ENV-1. Impaired Waterways[6]

Name of Waterbody	Impairment Category	Cause of Impairment	EPA Approved TMDL Date
Bird Creek	Aquatic Life	Benthic Macroinvertebrate Bioassessments	TMDL not yet developed
Carter Creek	Aquatic Life	Benthic Macroinvertebrate Bioassessments	TMDL not yet developed
Carter Creek	Shellfishing	Fecal Coliform	TMDL not yet developed
Chickahominy River	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
Chickahominy River	Aquatic Life	Estuarine Bioassessments	TMDL not yet developed
Chickahominy River	Fish Consumption	PCBs in Fish Tissue	TMDL not yet developed
College Creek	Aquatic Life	Estuarine Bioassessments	TMDL not yet developed
Diascund Creek Reservoir	Fish Consumption	Mercury in Fish Tissue	TMDL not yet developed
Diascund Creek	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
Diascund Creek	Recreation	Enterococcus	TMDL approved 2017
France Swamp	Recreation	Escherichia coli (E. Coli)	TMDL approved 2010
Gordon Creek	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
James River	Aquatic Life	Aquatic Plants (Macrophytes)	CBPA TMDL approved 2010
James River	Aquatic Life	Estuarine Bioassessments	TMDL not yet developed
James River	Fish Consumption	PCBs in Fish Tissue	TMDL not yet developed
Mill Creek	Aquatic Life	Estuarine Bioassessments	TMDL not yet developed
Mill Creek	Recreation	Enterococcus	TMDL approved 2009
Mill Creek	Recreation	Escherichia coli (E. coli)	TMDL approved 2009
Powhatan Creek	Aquatic Life	Benthic Macroinvertebrate Bioassessments	TMDL not yet developed
Powhatan Creek	Aquatic Life	Estuarine Bioassessments	TMDL not yet developed
Powhatan Creek	Recreation	Enterococcus	TMDL approved 2009
Skiffes Creek	Aquatic Life	Aquatic Plants (Macrophytes)	CBPA TMDL approved 2010

[6] Data source: Virginia Department of Environmental Quality.

Name of Waterbody	Impairment Category	Cause of Impairment	EPA Approved TMDL Date
Skiffes Creek	Aquatic Life	Estuarine Bioassessments	TMDL not yet developed
Skiffes Creek	Fish Consumption	PCBs in Fish Tissue	TMDL not yet developed
Skimino Creek	Aquatic Life	Aquatic Plants (Macrophytes)	CBPA TMDL approved 2010
Skimino Creek	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
Skimino Creek	Shellfishing	Fecal Coliform	TMDL approved 2010
Taskinas Creek	Aquatic Life	Aquatic Plants (Macrophytes)	CBPA TMDL approved 2010
Taskinas Creek	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
Taskinas Creek	Shellfishing	Fecal Coliform	TMDL approved 2010
Ware Creek	Aquatic Life	Aquatic Plants (Macrophytes)	CBPA TMDL approved 2010
Ware Creek	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
Ware Creek	Shellfishing	Fecal Coliform	TMDL approved 2010
Yarmouth Creek	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
York River	Aquatic Life	Aquatic Plants (Macrophytes)	CBPA TMDL approved 2010
York River	Aquatic Life	Dissolved Oxygen	CBPA TMDL approved 2010
York River	Aquatic Life	Estuarine Bioassessments	TMDL not yet developed
York River	Fish Consumption	PCBs in Fish Tissue	TMDL not yet developed

Soil Infiltration

As defined in *The Soil Survey of James City and York Counties and the City of Williamsburg* (Soil Survey), the term "hydrologic soil groups" refers to soils grouped according to their runoff-producing characteristics. Soils in hydrologic groups A and B have the greatest capacity to permit infiltration when thoroughly wet. Conversely, soils in hydrologic groups C and D have the least infiltration capacity. Over two-thirds of James City County soils are included in the latter category. These soils can hold water on the surface for several hours and even days after a storm event. Knowledge of the hydrologic soil group on a property can help estimate runoff from storm events, which can be helpful in the evaluation of sites for certain types of conservation measures and Low Impact Development (LID) features.

Impacts of Land Development on Water Quality

Development in the form of increased impervious cover can potentially have a significant impact on water quality. Negative impacts are readily seen when comparing a stream within a developed area to one located in a more natural setting.

The hydrology of a stream changes in response to initial land disturbing activities including site clearing and grading. Trees that had intercepted rainfall are cleared and natural depressions which had temporarily held water are flattened. The thick humus forest layer that once absorbed rainfall is scraped off and erodes away. Having lost much of its natural storage capacity, the cleared and graded site can no longer prevent rainfall from being rapidly converted to surface runoff.

Once construction is completed, rooftops, roads, parking lots, sidewalks, and driveways make much of the site impervious to rainfall. Unable to percolate into the soil, rainfall is almost completely converted into runoff. The excess runoff becomes too great for the existing waterways to handle and leads to an increase in pollutants which has a negative effect on water quality. As a result, stormwater facilities including BMPs must be installed to manage/reduce runoff and remove pollutants.

Impervious Cover Model (ICM)

Research by the Center for Watershed Protection has revealed an inverse correlation between impervious cover (roofs, streets, parking lots, etc.) and various indicators of water quality. Studies have established a link between impervious cover and stream condition typically showing that impacts to a stream fall into four general categories: hydrologic impacts, geomorphic impacts, water quality impacts, and biological impacts. More specifically, when natural land is converted into impervious cover, a greater fraction of annual rainfall is converted into surface runoff and a smaller volume recharges the groundwater. This increased surface runoff volume causes higher peak flows that can erode stream channels and lower baseflow, resulting in habitat degradation. In addition, surface runoff carries pollutants that degrade water quality. Research also suggests a link between increased impervious cover having negative effects on the diversity, richness, and abundance of aquatic life.

Based on the relationship between impervious thresholds and water quality, the Center for Watershed Protection constructed a stream classification scheme known as the Impervious Cover Model (ICM). The model serves as a planning tool to screen the condition of a watershed based on existing impervious cover. The model also provides a classification system with management options to address the protection and mitigation needs of a watershed and predicts the existing and future quality of streams based on the measurable change in impervious cover. The Impervious Cover Model was used in the creation of many of the County adopted watershed management plans and will be useful in the creation of future watershed management plans. To protect the local waterways, the County's Chesapeake Bay Preservation Area program requires that new developments have no more than 60% impervious cover as a performance standard.

Flexibility was added into this general performance standard provision to allow higher percentages of impervious cover for sites beyond the 60% limit if it can be demonstrated by use of equivalent water quality measures or by an approved master stormwater management plan that a project, if higher than 60% impervious, will have the same impact on water quality as the project would have if it were 60% impervious or less.

Impact on Tidal Areas

The potential impacts and costs associated with an increase of impervious cover on receiving waters, including tidal streams, necessitates mitigation measures. Researchers from various parts of the country have studied the impact of development on coastal areas and estuaries. Increased volumes of stormwater runoff may also have a physical effect on important wetland resources. According to the ICM, coastal/ estuarine systems, such as shellfish beds and wetlands, have found increased degradation thresholds when impervious cover exceeds 10%. Decreases in water quality due to pollutant loading may have an adverse impact on valuable spawning habitat and on the ability of some fish to travel from sea to freshwater spawning grounds.

Degradation of Aquatic Ecosystems

The aquatic ecosystems found in developed headwater streams are particularly susceptible to degradation. Changes seen in natural flows and channel conditions reduce the habitat value of the stream. The cumulative impacts of many individual factors such as erosion, sedimentation, scouring, increased flooding, lower summer flows, higher water temperatures, and pollution are responsible for the progressive degradation of stream ecosystems.

Impacts of Pollutants on Receiving Waters

The net effect of land development is increased pollutant export (more pollution and more movement) that exceeds pre-development levels. The impact of the higher export is felt not only on adjacent streams, but also on downstream receiving waters such as lakes, rivers, and estuaries. The impacts of the developed environment include sediment and nutrient loading, increased bacteria, increased oxygen demand, oil and grease pollution, trace metals, high levels of chlorides, and damaging thermal fluctuations.

Overused and inappropriately used fertilizer and other lawn chemicals are a signification portion of this impact. Via the Colonial Soil and Water Conservation District (CSWCD), James City County supports a voluntary Turf Love program to reduce this impact. Under the Turf Love program, a soil sample is taken and analyzed to provide a certified nutrient management plan based on the landowner's goals for and use of the property. After this data has been collected, a final report is issued to the landowner detailing results and recommendations of the assessment, providing further information about lawn management best practices, and directing them to further assistance if necessary.

Through educational programing and a variety of outreach efforts including volunteers, the CSWCD works closely with owners of developed properties and lawns to assist in the implementation of methods to mitigate impacts of impervious cover and lawns on water quality and other stormwater issues. In addition to the Turf Love program the CSWCD also offers the Virginia Conservation Assistance Program (VCAP). VCAP provides cost-share incentives to assist with installing residential scale stormwater management/infiltration BMPs on developed property.

Hampton Roads Sanitation District and the Sanitary Sewer System

HRSD works cooperatively with 13 Hampton Roads localities, including the County, to provide wastewater treatment. By enhancing system capacity and reducing inflow and infiltration of groundwater into the sanitary sewer system HRSD will reduce Sanitary Sewer Overflows (SSOs) and inhibit the release of harmful contaminants into surface and groundwater.

As part of HRSD's Regional Wet Weather Management Plan (RWWMP), they have proposed to implement an initiative known as the Sustainable Water Initiative for Tomorrow (SWIFT). SWIFT is an innovative water treatment project in eastern Virginia designed to further protect the region's environment, enhance the sustainability of the region's long-term groundwater supply and help address environmental pressures such as Chesapeake Bay restoration, sea level rise, and saltwater intrusion. SWIFT takes highly treated water that would otherwise be discharged into the Elizabeth, James, or York Rivers and puts it through additional rounds of advanced water treatment to meet drinking water quality standards. The SWIFT water is then added to the Potomac Aquifer, the primary source of groundwater throughout eastern Virginia.

Restoring the health and productivity of the Chesapeake Bay largely depends on reducing the amount of nutrients and sediment that enter Chesapeake Bay waters. By 2030, HRSD's SWIFT Water is projected to effectively eliminate more than 90% of HRSD's discharge to local waters. This will reduce the total amount of nutrients, such as phosphorous and nitrogen, reaching the receiving streams, and ultimately the Bay.

The SWIFT Research Center at HRSD's Nansemond Treatment Plant began injecting water into the aquifer in May of 2018. In February 2020 HRSD announced the program celebrated replenishing the Potomac Aquifer with 100 million gallons of SWIFT water. Since it takes about 180 years for groundwater to travel a mile, that treated water will not reach wells for a long time. Similar systems have been operating in California since 1962, and the Upper Occoquan Service Authority has been injecting treated wastewater into a Northern Virginia aquifer to maintain groundwater pressures since 1978. After 2030 HRSD intends to implement region-wide rehabilitation and capacity enhancement projects to reduce surface water inflow and groundwater infiltration (I/I) and minimize SSOs.

Restoring the health and productivity of the Chesapeake Bay largely depends on reducing the amount of nutrients and sediment that enter Chesapeake Bay waters.

Sanitary Sewer Overflows

Sanitary Sewer Overflows (SSOs) are unintended discharges of wastewater from the sanitary sewer system. SSOs impact water quality by releasing untreated sewage, containing microbial pathogens and toxins, into the environment. The overflows can be caused by pipeline strikes from construction activity, utility bores, system blockages, and equipment failure. Most commonly, however, SSOs occur during severe storm events as a result of surface water inflow and groundwater infiltration (I/I) entering the sanitary sewer system via pipe and manhole defects.

In 2007, the James City Service Authority (JCSA), 13 other regional localities, and the Hampton Roads Sanitation District (HRSD) were placed under a Consent Order by the Virginia DEQ for the purpose of reducing wet weather-related SSOs. The Consent Order required extensive study of the wastewater collection and conveyance system to identify basins where wet weather I/I is most pervasive. Capacity assessments were completed to identify deficiencies within the sanitary sewer system. Thorough inspections of wastewater pipes and manholes were conducted to identify defects in the collection system. Ultimately, rehabilitation and capacity enhancement plans were developed in conjunction with HRSD to address identified defects and capacity deficiencies.

HRSD entered into an agreement in 2014 with the localities and regulators to fund and implement rehabilitation and capacity enhancement on a regional basis, where issues could be resolved providing the greatest benefit for the least overall costs. The plan is currently being reviewed by the DEQ and the United States Environmental Protection Agency (EPA) for approval. Until that plan is fully enacted, JCSA is obligated to continue its ongoing pipeline and manhole inspection program and address significant defects that are identified. JCSA has consistently completed upgrades and repairs to the sewer system that have cumulatively led to an overall improvement in the system's response to I/I and reduced occurrences of SSOs. Additionally, the "Find and Fix" program has resulted in a number of smaller point repairs to sewer mains and laterals.



State and County Water Quality Improvement Regulations

With the Virginia General Assembly passage of the Integration Bill (HB1065) starting July 1, 2013, the State Water Control Board became the statutory authority and the Virginia DEQ, in cooperation with local government programs, became the lead state agency for developing and implementing most land development-related statewide nonpoint source pollution control programs to protect the state's water quality and quantity. Nonpoint source pollution is water pollution caused by stormwater runoff that is not confined to a single source, such as wastewater treatment plants or industrial discharge pipes. One of the main ways to control nonpoint source pollution from land disturbing and land development activities is through a Stormwater Pollution Prevention Plan (SWPPP) which includes an erosion and sediment control plan, a stormwater management plan, and a pollution prevention plan.

Erosion and Sediment Control Ordinance

In accordance with Virginia Erosion and Sediment Control Law and Regulations, James City County is a designated Virginia Erosion and Sediment Control Program (VESCP) authority responsible to implement a local erosion and sediment control program, which includes a construction site runoff program in accordance with the County's Municipal Separate Storm Sewer System (MS4) program. This program helps prevent impact to property and natural resources caused by soil erosion, sedimentation, and non-agricultural runoff from regulated land disturbing activities. The regulations specify the minimum standards that must be followed on all regulated activities including criteria, techniques, and policies. Implementation of the minimum standards and associated conservation practices can prevent soil movement or loss, enhance project aesthetics, and minimize damage to adjacent or downstream properties or resources. This program also requires review and approval of site erosion and sediment control plans for land disturbing activities associated with development activities and issuance of local land disturbing permits and also compliance inspection and enforcement. County staff must secure and maintain certifications in accordance with Virginia Erosion and Sediment Control Certification Regulations, and DEQ performs a local program review every five years.

Municipal Separate Storm Sewer System (MS4)

James City County owns and operates stormwater management facilities and is required to have a Virginia Pollutant Discharge Elimination System (VPDES) permit to discharge stormwater into local waterways. The specific permit is referred to as the MS4 General Permit and is issued by the Virginia DEQ. The County's current permit became effective November 1, 2018, and will be in place through October 31, 2023, at which time the County will be required to secure a new permit.

The current permit requires the County to develop a stormwater management program that addresses six minimum control measures, including:

1. Public education and outreach on stormwater impacts;
2. Public involvement and participation;
3. Illicit discharge detection and elimination (IDDE);
4. Construction site stormwater runoff control;
5. Post-construction stormwater management for new development and development on prior developed lands; and
6. Pollution prevention and good housekeeping for facilities owned or operated by the County within the MS4 service area.

In addition to the above minimum control measures, the County must update the Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan and the TMDL Action Plan for Powhatan, Mill, and Skiffes Creeks.

Virginia Stormwater Management Program (VSMP)

As of July 1, 2014, the County operates as a Virginia Stormwater Management Program (VSMP) Authority implementing the provisions of the VSMP regulations and the Stormwater Management Act. James City County is required to implement these state-mandated programs because the County is a Tidewater locality subject to the provisions of the Chesapeake Bay Act and Chesapeake Bay Preservation Area Designation and Management Regulations and also because the County is an operator of an MS4 program. The regulations stress property protection, runoff reduction and consolidation of state-local programs. The program includes a permit fee schedule, statewide standards for water quality, options for off-site compliance for water quality, quantity control methods for channel/flood protection, BMP design standards using the Virginia BMP clearinghouse website (vwrrc.vt.edu/swc/), and information from the revised Virginia Stormwater Management Handbook. More information about the VSMP can be found on the County's website at https://jamescitycountyva.gov/857/Stormwater-Resource-Protection.

General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities

James City County has certain responsibilities under the VSMP regulations. These regulations authorize stormwater discharges from regulated small and large construction activities under the General VPDES Permit for Discharges of Stormwater from Construction Activities. The construction general permit is issued in concert with local erosion and sediment control and other VSMP programs and requires submittal of a registration statement, development of a SWPPP which includes an approved erosion and sediment control plan, an approved stormwater management plan and a pollution prevention plan for construction activities. The program authorizes construction site operators to perform self-inspections of onsite activities with oversight from local government VESCP and VSMP authorities.

Chesapeake Bay Preservation Ordinance

On August 6, 1990, James City County became the first locality in Virginia to implement the requirements of the Chesapeake Bay Preservation Act. Due to the region's geography and environmental sensitivity, the Chesapeake Bay Preservation Act and regulations are of particular local importance, and James City County responded by designating all County land as a Chesapeake Bay Preservation Area. The Chesapeake Bay Preservation Area has two components, resource protection areas (RPAs) and resource management areas (RMAs). The RPA consists of lands at or near a shoreline that have water quality value due to the ecological and biological processes they perform or that are sensitive to impacts which may result in significant degradation to the quality of state waters. RPAs include tidal wetlands, tidal shores, nontidal wetlands (connected by surface flow and contiguous to tidal wetlands or to perennial streams), and a 100-foot-wide buffer adjacent to and landward of other RPA components. In James City County, the RMA is any land not classified as an RPA (i.e., the remainder of the County). Lands of particular sensitivity include, but are not limited to, floodplains, steep slopes, highly erodible soils, highly permeable soils, and hydric soils. See Map ENV-3 for the location of RPAs.

In addition, the James City County Chesapeake Bay Preservation Ordinance prohibits land disturbing activities on slopes 25% or greater, limits impervious cover to 60% of a site (with the flexibility to be higher if master stormwater management planning or equivalent water quality is demonstrated), and requires the preservation of existing trees (except in impervious areas) over 12 inches in diameter at breast height. Development in the RPA is only allowed if it is water dependent or constitutes redevelopment. Certain permitted buffer modifications are allowed, if approved by the County, for activities within RPA such as dead-diseased-dying tree removals, sight lines, homeowner access paths to water, and for certain shoreline erosion control projects.

Map ENV-3. Resource Protection Areas [7]



All existing vegetation within the RPA is to remain in its natural undisturbed state, except vegetation weakened by age, storm, fire, or other natural causes. For all development, a clearing plan and an environmental inventory are required to show the locations of existing trees, RPA components, and lands of particular sensitivity as outlined previously.

Site specific locations of RPA areas are verified during the plan of development review process by the environmental inventory and perennial flow determination provisions of the Chesapeake Bay Preservation Area (CBPA) ordinance and program.

[7] Data Source: James City County Stormwater and Resource Protection Division.

Environmental Site Design (ESD) and Low Impact Development (LID)

Environmental site design (ESD) involves small-scale stormwater management practices, non-structural practices, and better site planning to mimic the natural hydrologic runoff characteristics and minimize the impact of land development on water resources. The LID approach, which is included in ESD, consists of combining hydrologically-functional site design with pollution prevention measures to reduce site and development impacts and to compensate for the degradation of water quality. The ultimate goal of LID is to maintain a developed site's stormwater runoff, peak runoff rates, and frequency to imitate pre-development runoff conditions at the source, rather than just at the end of pipe treatment (wet and dry ponds). LID, in theory, should maintain predevelopment hydrology. ESD techniques and practices, including using LID principles and practices, will continue to be encouraged by implementation of the runoff reduction methods embedded in VSMP regulations. Use of these practices will continue to offer flexibility to the development community by being available for stormwater compliance purposes under the VSMP requirements.

Watershed Management

The County is made up of 14 watersheds, as illustrated on Map ENV-4. To date, six watershed management plans have been adopted by resolution of the Board. Each watershed management plan has different goals, priorities, and recommendations based on specific baseline assessments and public/private stakeholder input, some of which are global in scope while others are site specific at the sub-watershed or catchment level. Methods and strategies for implementation can include both incentive-based and conservation-oriented initiatives. Priorities are implemented on a site-by-site basis when parcels are developed or by County initiation after prioritization and as funding becomes available. Additionally, the Virginia Coastal Zone Management Program is funding a five-year study of the Lower Chickahominy River and its watershed, to be facilitated by PlanRVA, which is the Planning District Commission for the Greater Richmond region.

Powhatan Creek Watershed Management Plan

The 22-square-mile Powhatan Creek watershed, which discharges into the James River near Jamestown Island, is a state and national treasure with a historic past and significant biodiversity. Rare, threatened, and endangered organisms such as the small whorled pogonia, Virginia least trillium, bald eagle, and heron colonies are found here. Continued development pressures, however, can threaten the vitality of the watershed. The Board adopted the eight goals and 21 priorities associated with the Powhatan Creek Watershed Management Plan by resolution dated February 26, 2002. On October 10, 2006, the Board revised the plan to include mainstream buffers, non-RPA and intermittent stream buffers for legislative cases.

As the floodplain mapping information for Powhatan Creek was based on an engineering study performed in 1976, the County began a process in 2010 to update the mapping to reflect the current development conditions in the Powhatan Creek watershed. This process lasted several years and after approval by FEMA, culminated in a revised floodplain map for Powhatan Creek that is now incorporated into the official effective FEMA floodplain map for the County. The map was adopted by the Board on December 16, 2015, and presents a much more accurate depiction of the floodplain and flood risks associated with Powhatan Creek.

Yarmouth Creek Watershed Management Plan

Yarmouth Creek is a predominantly forested watershed of about 12 square miles located in the lower James River Basin. The creek drains into the Chickahominy River, which discharges into the James River. A natural areas inventory classified almost half of the watershed as moderate to high in terms of biodiversity present. The watershed contains extensive complexes of wooded swamp, freshwater wetland, and rare tidal freshwater marsh which support at least one heron rookery and seven globally rare or state rare species among other flora and fauna. The Board adopted the six goals and 14 priorities associated with the Yarmouth Creek Watershed Management Plan by resolution dated October 14, 2003. On October 10, 2006, the Board revised the plan to include mainstream buffers, non-RPA, and intermittent stream buffers for legislative cases.

Gordon Creek Watershed Management Plan

Gordon Creek is a 13.8-square-mile watershed situated in the west central portion of the County. The Creek drains to a large tidal freshwater marsh which enters the Chickahominy River near its confluence with the James River. The watershed is primarily forested with low impervious cover and large parcels, but faces moderate development pressure. This particular watershed management plan, by completion of baseline assessments and stakeholder input, incorporated three watershed-wide protection and restoration goals and 17 strategic actions for watershed protection and restoration, as well as specific sub-watershed level recommendations. The Board adopted the Gordon Creek Watershed Management Plan on June 28, 2011.

Mill Creek Watershed Management Plan

Mill Creek is a 5.7-square-mile watershed situated in the south central portion of the County and encompasses the beginning stretches of the Jamestown Road and John Tyler Highway corridors off of U.S. Route 199. The Creek area is highly developed and mostly drains to Lake Powell and the tidal main-stem portion of the watershed at the south end of the watershed bordering the Colonial Parkway along the James River. This particular watershed management plan, by completion of baseline assessments and stakeholder input, incorporated a strategic action plan consisting of a variety of watershed protection tools and strategic actions or evaluation measures as well as specific sub-watershed level recommendations. The Board adopted the Mill Creek Watershed Management Plan on June 28, 2011.

Ware Creek Watershed Management Plan

Ware Creek is a 17.8-square-mile watershed situated in the northern portion of the County, making it the second largest watershed within the County borders. The Creek is a major tributary to the York River. The majority of this watershed is undeveloped and forested but is experiencing some development pressure. The Board adopted four goals and 21 priorities associated with the Ware Creek Watershed Management Plan by resolution dated September 27, 2016.

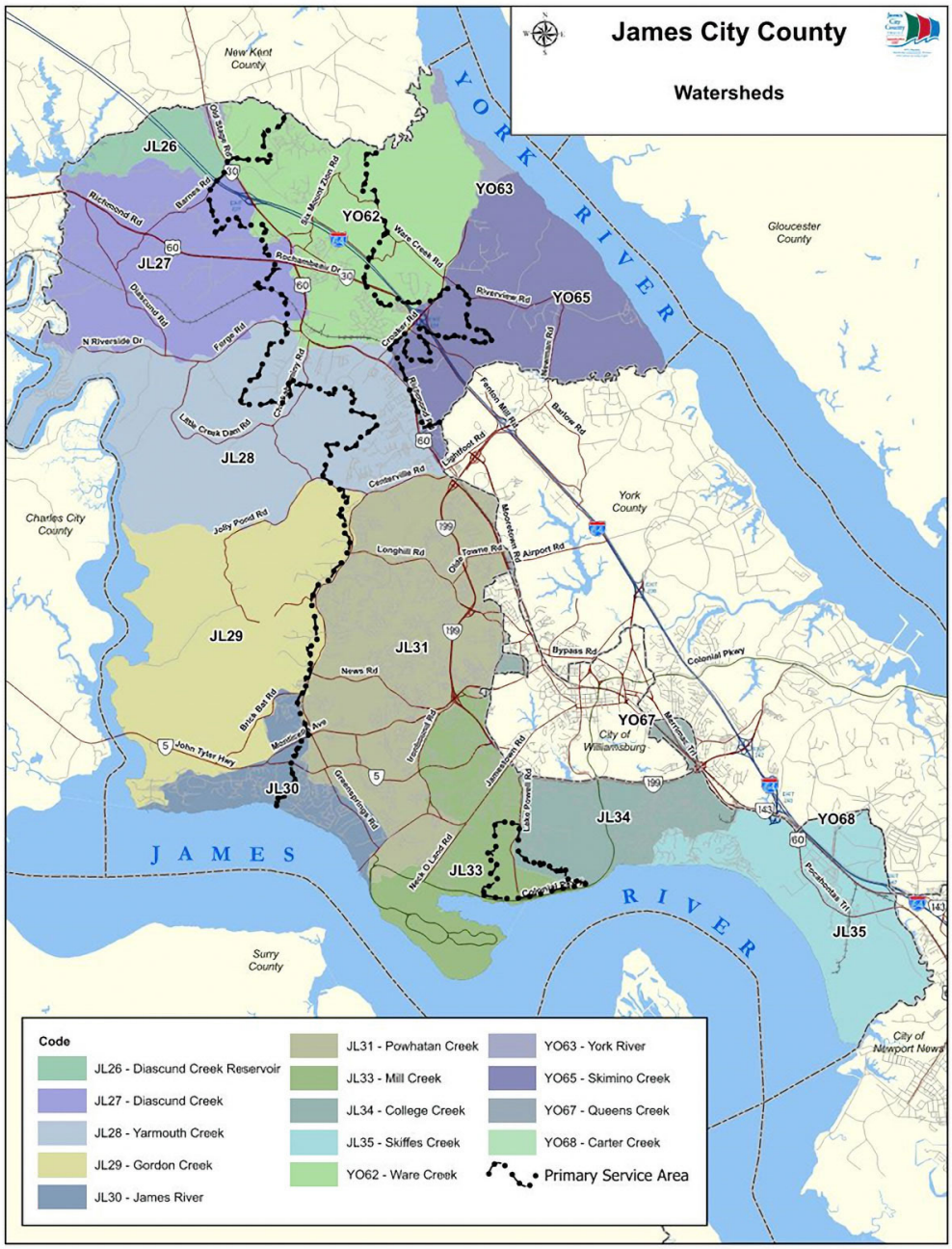
Skimino Creek Watershed Management Plan

Skimino Creek is a 15-square-mile watershed situated in the northeast portion of the County, draining into the York River. The Creek area is largely undeveloped, with the existing development being relatively old. The Board adopted four goals and 21 priorities associated with the Skimino Creek Watershed Management Plan by resolution on May 12, 2020.

Lower Chickahominy Study

The Lower Chickahominy watershed is home to a variety of flora and fauna, containing some of the most pristine freshwater wetland communities in the mid-Atlantic region. PlanRVA will study the natural resources present in the Lower Chickahominy watershed and work with stakeholders to develop policy and action steps to accomplish a dual goal: natural resource conservation and economic development. The focus area includes James City County, Charles City County, and New Kent County and covers approximately 608 square miles of land and water. County staff is actively participating in the stakeholder group to provide feedback and information for best preserving this valuable resource. More information can be found at: ttps://planrva.org/environment/lower-chickahominy/

Map ENV-4. Watersheds [8]



[8] Data Source: Virginia Department of Conservation and Recreation.

Impacts of Agriculture on Surface Water Quality

Pollution that cannot be traced to a direct source, such as a particular factory, is referred to as nonpoint source (NPS) pollution. Agriculture-related pollution falls into this category. Three types of contaminants generally occur as a result of agricultural activities: nutrients, sediments, and toxicants.

State Policy

Virginia has a responsibility under its constitution to protect its waters from pollution. Agriculture is one possible land use which may contribute pollution to the state's water systems. In accordance with the Chesapeake Bay Preservation Act and other regulations, the DEQ Chesapeake Bay Local Assistance Division helps local governments with Bay Act-related agricultural activities. Technical and financial assistance made available by the state in conjunction with the Virginia DCR, local Soil and Water Conservation Districts, and individual property owners all work to protect waterways from pollution.

Other program initiatives supported by the state include the Virginia Agricultural Best Management Practices Cost-Share Program (VACS), Virginia's Nutrient Management Program, the Virginia Agricultural Stewardship Act (ASA), the Virginia Resource Management Program (RMP), and the DEQ Agricultural BMP Loan Program.

The state also provides further financial incentives in the form of tax relief for those conscientious about reducing pollutants in their farming efforts. Any individual engaged in agricultural production for market that has an approved soil conservation plan in place may receive tax credits.

County Policy

The primary means by which the County directly seeks to make improvements in water quality is through the Chesapeake Bay Preservation, Erosion and Sediment Control, and VSMP ordinances as described previously.

The County's Chesapeake Bay Preservation Ordinance requires that agricultural buffers be managed to prevent concentrated flows of surface water from breaching and noxious weeds from invading the buffer area. The ordinance also sets a goal to reduce nonpoint source pollution from agricultural uses. To help achieve this goal, the ordinance states that land used for agricultural activities shall have a soil and water quality conservation plan based upon the *Field Office Technical Guide* of the USDA Soil Conservation Service.

Any individual engaged in agricultural production for market that has an approved soil conservation plan in place may receive tax credits.

Strategies for Reducing Negative Impacts of Agriculture on Water Quality

Commonly used BMPs for row crop production include: cover crops, conservation tillage, erosion control measures, integrated pest management, nutrient management planning, and soil conservation and water quality planning (also known as farm plans). James City County works in partnership with the Colonial Soil and Water Conservation District (CSWCD) to support the use of BMPs for decreasing the impact of agricultural practices on water quality.

The high cost of failure coupled with site-specific complexities that must be considered prior to the application of BMPs can deter farmers from trying new methods. Environmental features such as soil composition and topography are just two site-specific variables that must be weighed prior to the application of new farming methods. Through educational programing and a variety of outreach efforts, the CSWCD works closely with the farming community to assist in the implementation of methods to mitigate agricultural impacts on water quality and the loss of soil. Among the services provided by CSWCD is administering agricultural cost share programs to assist farmers with installing appropriate agricultural BMPs.

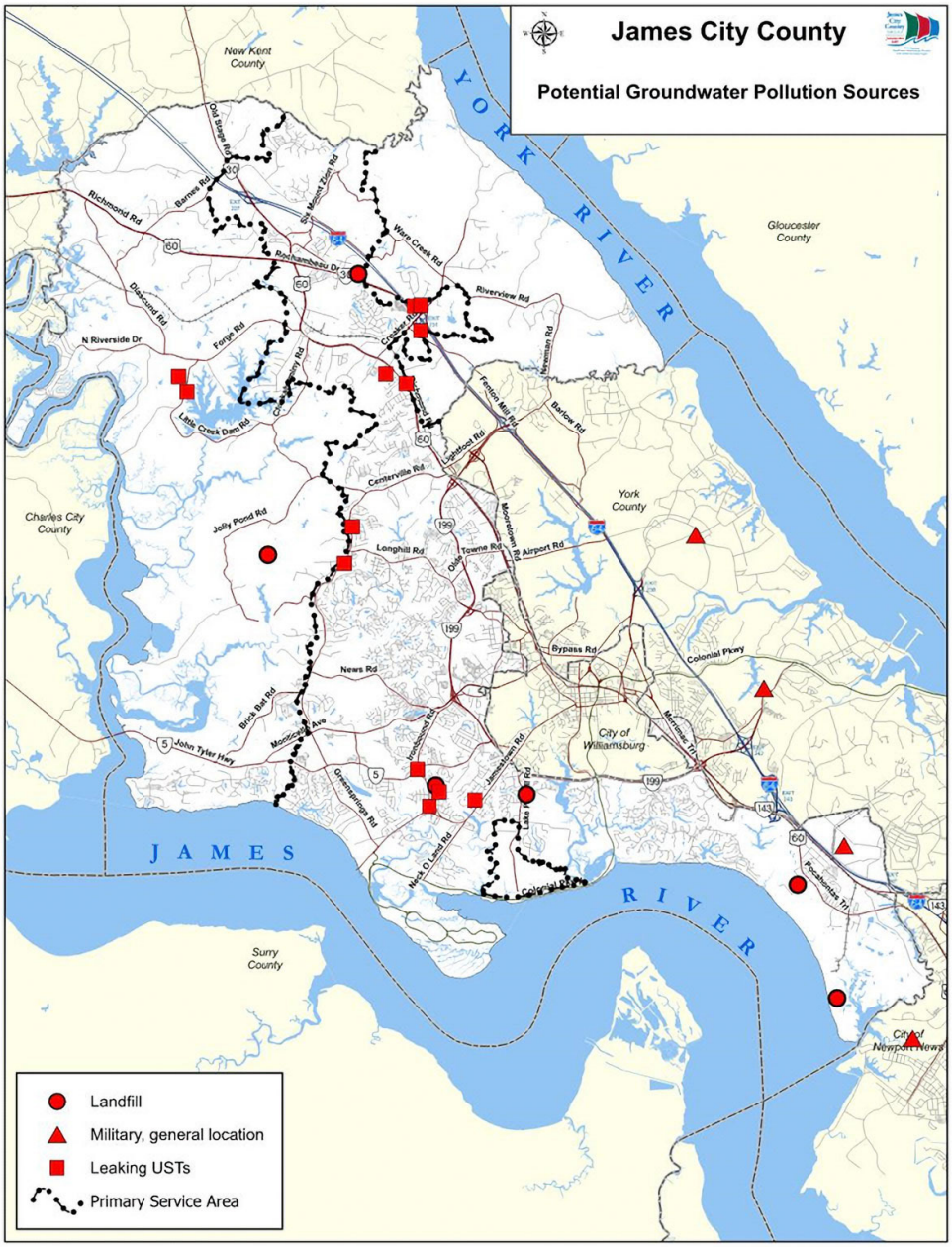
CSWCD also provides education and assistance to localities within its jurisdiction to help governing bodies better understand how local ordinances can help facilitate best agricultural practices. One example is a Phase 1 equine study undertaken by CSWCD in 2018 to quantify current horse inventory in the area, and a Phase 2 study has been proposed for further assessment. Per CSWCD research and equine plan implementations, at least one acre per horse is recommended to be cited in local zoning regulations, with two to three acres per horse recommended as a best practice, along with appropriate rotational grazing patterns. This helps provide a healthy environment for the animals and reduces negative impacts such as soil erosion or water contamination.



Groundwater

James City County has access to relatively large quantities of water, but not all of it is potable. In addition, some of the surface water is difficult and expensive to treat, while groundwater withdrawals have led to concerns related to lower aquifer levels. The County is particularly vulnerable to water pollution because of its reliance on groundwater sources and increasing population. JCSA uses 100% groundwater, while portions of the County (Kingsmill and areas to east) are served by Newport News Waterworks, which predominantly uses surface water. Wells with naturally occurring substances in concentrations above limits for human consumption, older wells with unknown construction histories, wells in close proximity to harmful land uses, erosion, failing septic tanks, leaking underground storage tanks, landfills, activities on military facilities, and pesticide and fertilizer runoff can all impact surface and groundwater quality. See Map ENV-5 for the location of potential groundwater pollution sources.

Map ENV-5. Potential Groundwater Pollution Sources [9]



Fortunately, public water systems relying on groundwater can use treatment techniques to protect the drinking water supply.

JCSA's 2019 Annual Water Quality Report states that local aquifers actually have high quality water, but contaminants and pollutants such as those discussed above are treated and removed through various processes before the water is supplied to the public.

[9] Data Source: James City County.

Groundwater Management

Regulatory programs relating to groundwater protection can be found at federal, state, and local levels. The state created the Virginia Groundwater Protection Steering Committee (GWPSC) to assess current problems, identify program needs, and set priorities for new groundwater protection programs.

The state administers programs addressing at least three of the major concerns for groundwater identified by the GWPSC, including landfills, pesticides, and underground storage tanks (UST). James City County has also implemented a range of water quality protection ordinances in an effort to minimize the impact of current and future land development on water quality:

- Erosion and Sediment Control and VSMP Ordinance (Code of the County of James City Chapter 8);
- Landfill Ordinance (Chapter 11, Article 2);
- Sewers and Sewage Ordinance (Chapter 17);
- Illicit Discharge Ordinance (Chapter 18A);
- Chesapeake Bay Preservation Ordinance (Chapter 23);
- Subdivision Ordinance (Chapter 19);
- Zoning Ordinance (Chapter 24); and
- Cluster and Floodplain Overlay District Ordinances (Chapter 24, Article 6)

The County has actively participated in the Hampton Roads Planning District Commission (HRPDC) Regional Groundwater Mitigation Program since 1990. This program provides groundwater hydrology, computer modeling expertise and technical support to participating local governments.

In addition to groundwater contamination issues, concerns regarding the quantity of available potable groundwater have also been raised in recent years. James City County is included as part of the Eastern Virginia Groundwater Management Area (EVGMA). The EVGMA was designated by the State Water Control Board as part of the Groundwater Management Act which provides for reasonable control of all groundwater resources to preserve and protect groundwater uses.

Designation as a groundwater management area requires all withdrawals of 300,000 gallons per month or more to be subject to a withdrawal permit. Groundwater withdrawals under this threshold, which includes most residential domestic and irrigation wells, do not require a withdrawal permit at the current time.

James City County has implemented a range of water quality protection ordinances in an effort to minimize the impact of current and future land development on water quality.

Potential Groundwater Management Alternatives

Appropriate groundwater management options in James City County vary significantly based on the aquifer in question. County residents draw water from several different aquifers, each of which is susceptible to different sources of contamination. The *James City County Groundwater Element Technical Guide* should be consulted for more detailed information concerning these different aquifers. As a condition of the DEQ groundwater withdrawal permit issued to JCSA in 2017, JCSA must evaluate alternative water supplies to meet future needs which may include purchased water, surface water, or continued use of groundwater. Several programs and practices are employed by the County to help manage groundwater:

Well Data Collection

The normal monitoring of public wells, which are distributed throughout the County, provides comprehensive water quality data for public wells and the great majority of private wells. A substantial amount of water provided by the JCSA and most private wells draw from the Chickahominy/Piney Point Aquifer. In addition, JCSA is responsible for tracking pertinent groundwater data, such as analysis for contaminants, for its public water supplies. The data can allow the County to more quickly assess cumulative land use impacts on groundwater and track ongoing contamination problems or threats. JCSA has begun tracking available groundwater level data for its well production facilities. This data will allow JCSA to establish trends in groundwater levels to help support future water supply decisions.

Wellhead Protection Program

The term "wellhead protection" refers to a process for assessing land uses and activities that could pose potential threats to groundwater, managing land uses and activities in close proximity to wells, and taking steps to avoid potential conflicts between land use and groundwater quality. JCSA has already undertaken components of a wellhead protection program that include compiling a list of public and private wells, and mapping the location of each public well. Of particular concern are abandoned wells. In addition to these activities, the County, JCSA, and the Health Department will continue to enforce construction standards for public and private wells.

Design Standards

Design standards are used to regulate the design and construction of various land use activities. Design standards usually apply to the installation and construction of physical structures such as double-walled underground storage tanks, runoff collection systems, and stream or ditch channels. Many existing state and federal statutes already dictate design standards, and therefore many of these are already in use in the County. When used in coordination with site plan review, Special Use Permits (SUPs), or rezoning, design standards can be an effective technique in preventing groundwater contamination in wellhead protection areas.

Operating Standards

Operating standards are procedures to prevent pollution during the normal activities of land use, such as procedures for pesticide application or management of hazardous substances. Groundwater protection operating standards include the use of Best Management Practices BMPs, which are structural, vegetative, or managerial practices used to treat, prevent, or reduce water pollution. BMPs are useful for preventing contamination from industrial or commercial activities, particularly those involving the storage and handling of hazardous materials. Some standards include restrictions on hazardous materials storage or disposal, limits on the use of road salts and de-icing chemicals, and requirements for periodic testing and system checks.

Flooding

James City County contains broad tidal and tributary floodplains adjacent to most streams and rivers. These important floodplain areas help reduce the impacts of flooding by slowing and temporarily storing floodwaters during large storm events. Additionally, as the majority of floodplains in the County are comprised of an intact mix of wetland and non-wetland habitats, the floodplains also serve as both important wildlife habitats and migratory corridors.

Floodplain areas are protected from activities that would degrade their usefulness as a flood conveyance system. The primary way this is accomplished is through the County's floodplain management regulations contained in the Zoning Ordinance. These regulations, administered cooperatively by the Departments of Community Development and General Services, establish the criteria by which development is either allowed or prohibited in the floodplain, with the intent of preventing or minimizing the loss of life and property. In 2015, the County adopted updated Flood Insurance Rate Maps and incorporated changes to the floodplain regulations to promote safe construction and reduce damage caused by storm-induced coastal flooding. Additional updates were approved in 2018 to address the construction of accessory structures in the special flood hazard area.

The County also participates in the Community Rating System which recognizes communities that go beyond the minimum requirements of the National Flood Insurance Program providing additional protections to floodplains and potentially impacted structures. The Community Rating System not only benefits citizens through increased protection from flooding but also through reduced flood insurance premiums. See Map ENV-6 for flood zones. Monitoring and updating the floodplain regulations will continue to be very important as the number of heavy precipitation events continues to grow, and rising sea levels continue to increase the threat and frequency of flooding.

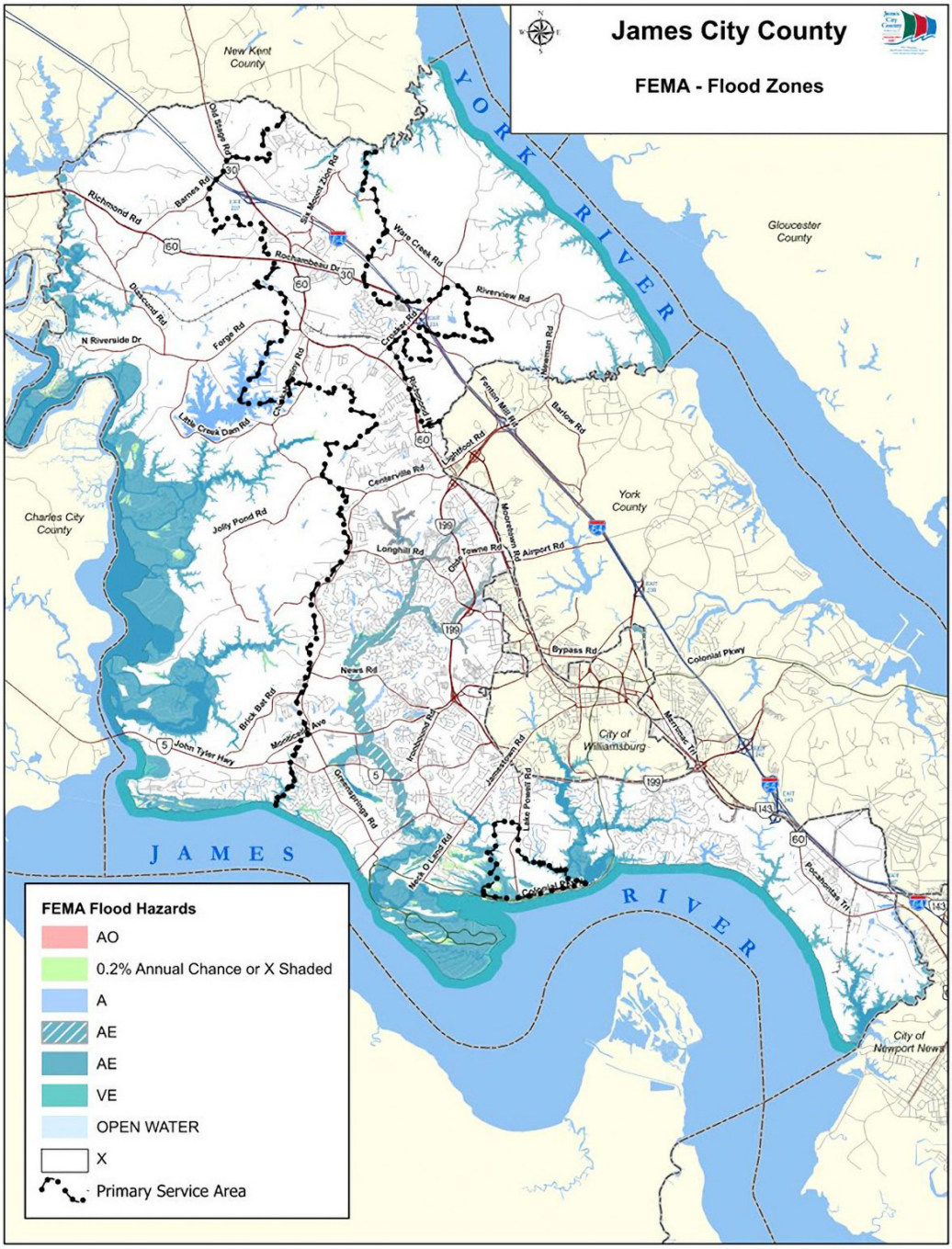
The Virginia Dam Safety Act and Virginia Impounding Structure Regulations require that precautionary measures are taken for new development proposed within mapped dam break inundation zones. If the state determines that a proposed plan of development would change the spillway design of an existing dam, the locality shall not permit the development to move forward within the mapped dam break inundation zone unless the developer agrees to alter the plan so that it does not alter the spillway design of the dam, or the developer contributes payment necessary to upgrade the dam structure. State statutes also outline requirements for new dam or water impoundment facility proposals.

The Community Rating System not only benefits citizens through increased protection from flooding but also through reduced flood insurance premiums.

Localized Flooding

In addition to flooding associated with the larger water bodies and floodplains in the County, there are also localized areas that flood during storm events. This flooding is caused by inadequate or failed drainage conveyance systems. The James City County Stormwater Division was established in 2007 to improve maintenance and operation of the County's drainage infrastructure, and was merged with the Engineering and Resource Protection Division in 2017. As funding permits, the Stormwater and Resource Protection Division conducts studies to evaluate problem areas and take corrective actions to reduce these localized flooding problems.

Map ENV-6. Flood Zones [10]



Quantity control/flood protection requirements of the VSMP regulations and the County's VSMP Ordinance include specific design requirements to address new development proposals which discharge concentrated stormwater flow into existing stormwater conveyance systems that currently experience localized flooding.

[10] Data Source: Hampton Roads Regional Planning District and Federal Emergency Management Agency.

Climate Change

As first discussed in the 2009 Comprehensive Plan, climate change is a long-term, significant change in the average weather, including average temperature, precipitation, and wind patterns, and is predicted to increase heat waves, heavy precipitation events, areas affected by drought, intense cyclone activity, and sea level over the 21st century. According to the Environmental Protection Agency (EPA), the insulating gases that cause climate change include carbon dioxide, methane, nitrous oxide, and fluorinated gases. Some of these gases occur naturally while others are produced by human activity.

The 2018 Virginia Energy Plan (VEP) is a 10-year state energy plan created by the Virginia Department of Mines, Minerals, and Energy. The VEP focuses on recommendations regarding five specific policy tracks:

1. Solar and Onshore Wind,
2. Offshore Wind,
3. Energy Efficiency,
4. Energy Storage, and
5. Electric Vehicles and Advanced Transportation.

Transportation is the leading source of carbon dioxide in Virginia, and the transportation sector consumes more energy than industrial, commercial, or residential uses. Land use also plays an important role in climate change. Sprawling development patterns foster greater vehicle miles traveled, which increase fuel consumption. In addition, carbon dioxide is released when forests are cut and burned, and when trees are cleared, their natural capacity to remove carbon dioxide from the air and capture carbon is lost.

The VEP estimated that carbon dioxide emissions in the state totaled approximately 130 metric tons in 2005. Between 1990 and 2004, carbon dioxide emissions had been rapidly increasing. However, carbon dioxide emissions in Virginia decreased overall between 2004 and 2015. To help continue emissions reductions, the 2018 VEP included recommendations for joining the Regional Greenhouse Gas Initiative (RGGI), a market-based collaborative effort among Northeast and Mid-Atlantic states to reduce greenhouse gas emissions from the power sector while driving economic growth through a regional cap-and-trade program. In July 2020, Virginia officially became the first southern state to join. Since 2009, RGGI has achieved over 50% reduction in carbon pollution; the emissions cap has declined by 2.5% annually through 2020 and is expected to decline 3% per year from 2021 to 2030. The health benefits of reduced carbon and other pollutants were valued at $5.7 billion for the period of 2009 to 2014.

As a local government, James City County has concentrated on actions at County facilities. By reducing energy consumption in buildings and in our fleet, the County not only saves a significant amount of taxpayers' money, but also reduces carbon dioxide emissions.

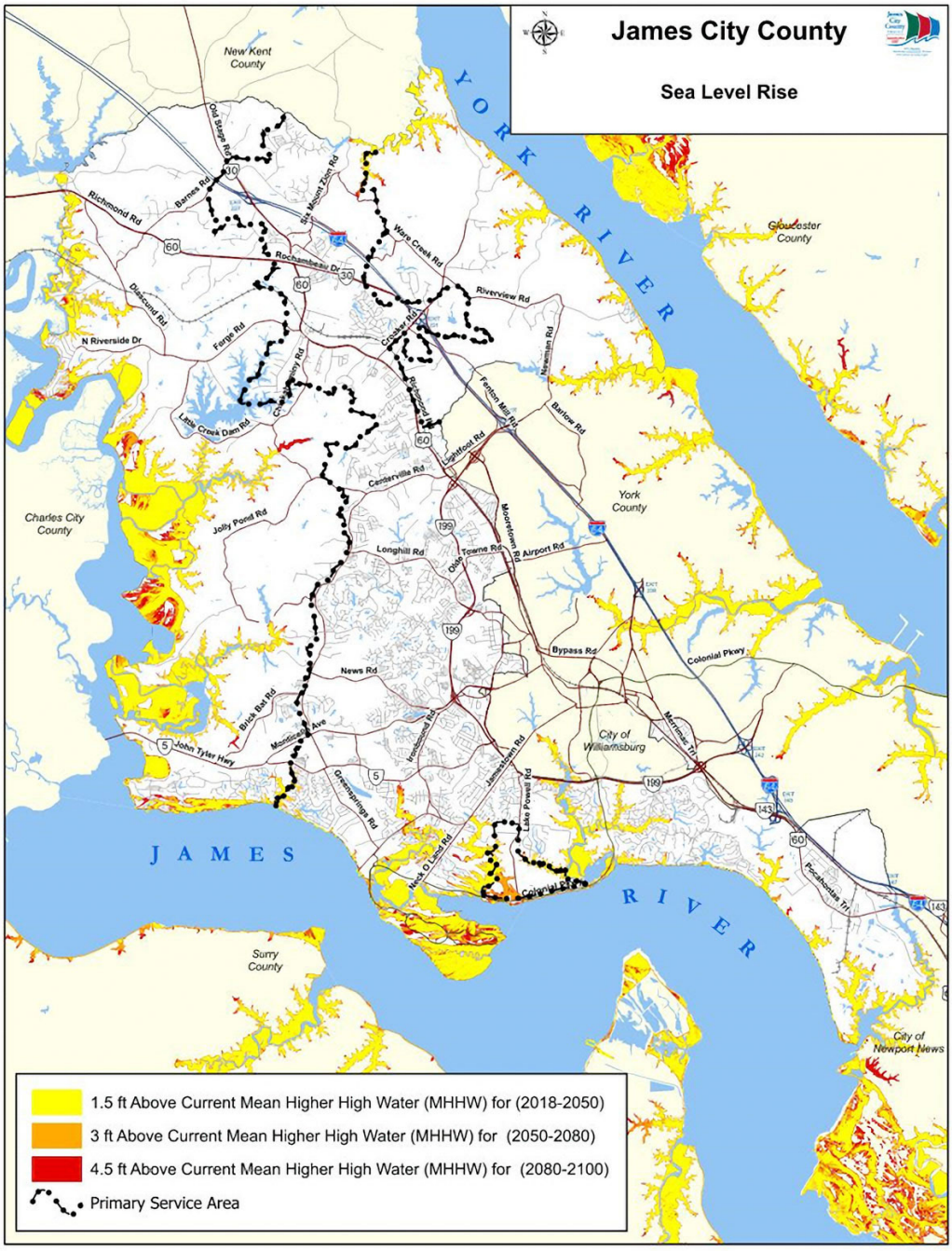
In addition to these efforts on the part of the public sector, other actions can be taken to address climate change. In 2012 the Board endorsed the Green Building Incentives Policy. Incentives were established to support those projects that make the commitment to achieve green building certification through Leadership in Energy and Environmental Design (LEED), Earthcraft or another equivalent certification program. Existing ordinances and policies can be examined to determine whether further modifications can encourage desirable development or remove barriers to developing in an environmentally friendly manner. Other examples of development that promote environmental health are Transit Oriented Design, pedestrian connections, and use of renewable energy.

Sea Level Rise

James City County participates in regional planning efforts related to sea level rise through HRPDC. On October 18, 2018, the HRPDC Board adopted the *Sea Level Rise Planning Policy and Approach*, which posits the following relative sea level rise scenarios for planning and engineering decisions (Map ENV-7):

- 1.5 feet above current mean higher high water (MHHW) for near-term (2018-2050)
- 3 feet above current mean higher high water (MHHW) for mid-term (2050-2080)
- 4.5 feet above current mean higher high water (MHHW) for long-term (2080-2100)

Map ENV-7. Projected Sea Level Rise [11]



[11] Data Source: Hampton Roads Regional Planning District.

Planning for sea level rise, in the form of land use and other policy decision-making, should use estimates of sea level rise that are based on observational data and a range of scenarios for future conditions. Such values can be used to help implement zoning overlay districts or new building requirements.

Another potential use for these scenarios is as a set of screening values, which can be used to identify vulnerable areas and facilities for further study. Sea level rise projections should be considered when making decisions about the siting of new or expanded public facilities and infrastructure.

Air Quality

Criteria air pollutants are common throughout the United States and are created by three general sources: mobile sources, area sources, or point sources. These pollutants can damage health, harm the environment, and cause property damage. The EPA has identified the following six criteria pollutants (a description of these pollutants can be found in the Glossary):

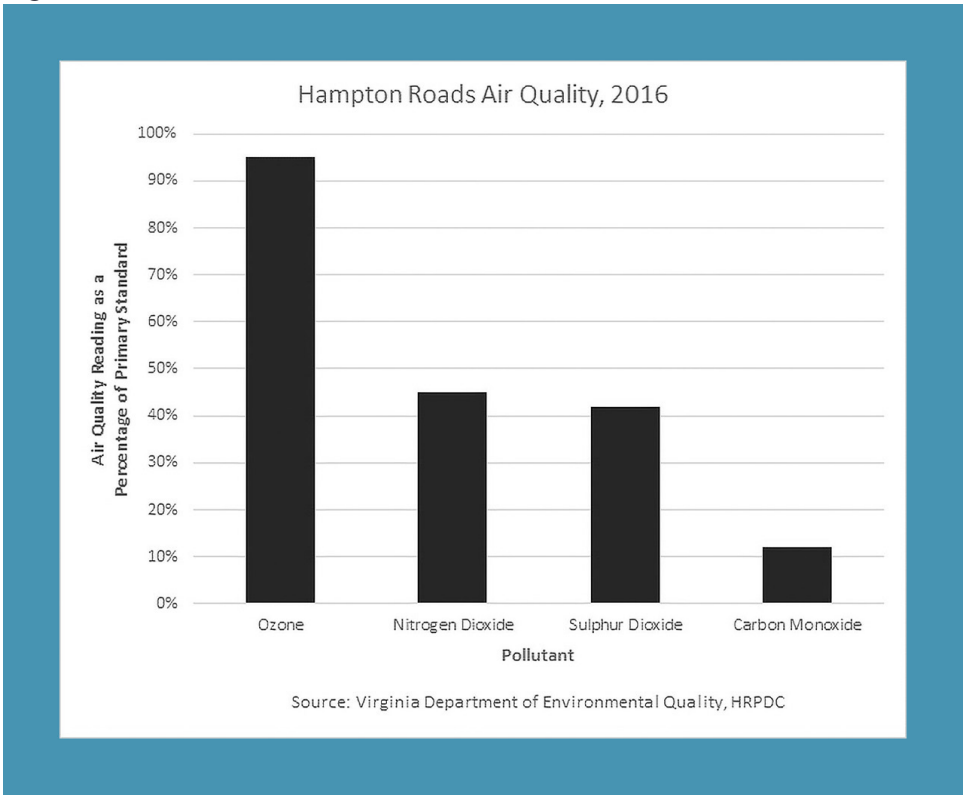
- Carbon monoxide;
- Lead;
- Nitrogen oxides;
- Ozone (formed by volatile organic compounds);
- Particulate matter; and
- Sulfur dioxide.

For each criteria pollutant, the EPA established National Ambient Air Quality Standards (NAAQS), which define the maximum allowed concentration. If the NAAQS for a pollutant is exceeded, it may adversely affect human health. The EPA and state agencies monitor air quality to assess compliance.

Air flow is not limited to political boundaries, so much of the available data for air quality is provided at a regional level. Automobile and industry emissions from Richmond to Virginia Beach heavily influence the air quality in James City County. The EPA and the DEQ monitor air quality to protect the health and welfare of the public. Hampton Roads is in compliance with all four of the air pollutants tracked by the DEQ (Figure ENV-1). The only area where Hampton Roads had problems meeting the standard is with ozone, where the summer's weather pattern can significantly impact its formation.

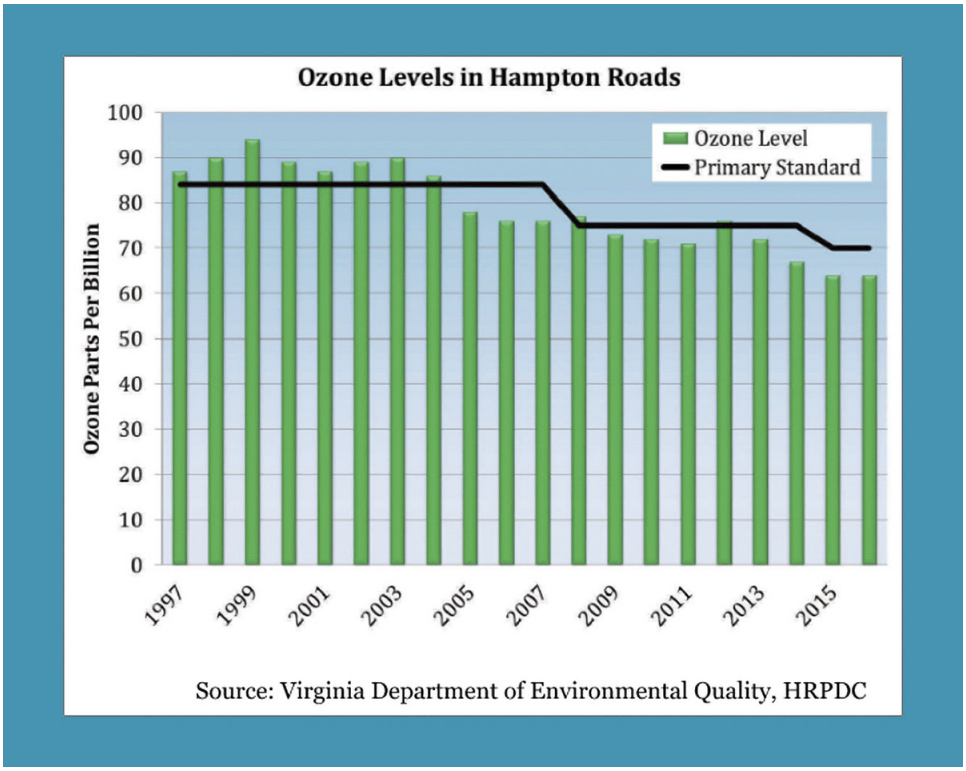
Planning for sea level rise, in the form of land use and other policy decision-making, should use estimates of sea level rise that are based on observational data and a range of scenarios for future conditions.

Figure ENV-1.



According to the National Institute of Environmental Health Sciences, short-term exposure to ambient ozone can have serious health implications. The EPA tightened the air quality standard for ozone, lowering the acceptable level to 75ppb in 2008, and down to 70 ppb in 2015. These stricter standards moved Hampton Roads just slightly out of compliance in 2008 and again in 2012. Ozone levels in the region have realized a steady decline since 2012. (Figure ENV-2)

Figure ENV-2.



Open Space Preservation - Environmental Aspects

The Land use Chapter describes the County's Open Space preservation goals and approaches, including the concept that proceeding in a way that integrates different categories of resources, as well as integrates different possible programs and stakeholders, will likely lead to the best results for the County.

As described throughout the preceding sections, categories of resources that are central to this chapter that are, and will continue to be, facets of the County's Open Space preservation approach include:

- **Wetland Protection and Environmental Planning** (including RPA, wetlands, steep slopes, waterways, watershed planning, floodplains, natural habitat, and ecosystem diversity)
- **Agricultural and Forestal Lands**
- **Green Infrastructure and Greenways** (including trails, buffers and wildlife corridors)

An integrated approach that includes the resources above will be one important tool in achieving environmental goals.



Community Guidance

Public Engagement

Through multiple rounds of community engagement, there continued to be consistent public support to prioritize the protection of natural lands and open spaces in the County. This was the most highly ranked and supported objective across all three rounds of engagement. Respondents supported measures including new development restrictions and public land acquisition to limit development impacts on natural lands and to address impacts of climate change and sea level rise, with a strong focus on protecting water resources.

Among respondents to the 2019 Citizen Survey, 95% ranked it "very important" or "somewhat important" to protect and improve the natural environment including water quality, air quality, and environmentally sensitive areas. 80% of residents were satisfied with existing efforts to protect and improve the natural environment, a 15% satisfaction gap between ranked importance and satisfaction. Additionally, 76% ranked it "very important" or "somewhat important" to provide public access to waterways for swimming and boating, 80% ranked it "very important" or "somewhat important" to limit irrigation with public water to conserve the County's water supply, and 58% of respondents indicated a preference to have more homes on smaller lots and to set aside areas for open space in order to permanently preserve land and maintain the character of the community.

During the Listening/Envisioning first round of community engagement, more than 97% of respondents indicated that it was "very important" or "somewhat important" for the County to do more to improve our efforts to protect and preserve the natural environment in the County. More than 36% chose protecting and preserving the natural environment as the most important vision for the County to improve, making it the highest ranked choice.

The Exploring/Testing second round of community engagement included the Establishing Our Goals Questionnaire and the Alternative Future Survey. The Establishing Our Goals Questionnaire asked respondents to compare the Environment goal from the 2035 Comprehensive Plan with the Environment Engage 2045 Public Input Priority. About 79% of respondents indicated that the goal should remain the same as the 2035 Comprehensive Plan goal while about 21% stated it should be changed. Suggested recommendations included strengthening the language to emphasize protecting against sea level rise and flooding associated with climate change; promoting resilience to mitigate the flooding effects of sea level rise; protecting sensitive land and waterways; protecting the County's water supply; increasing physical connections to nature; and limiting development in order to protect lands and waterways. These comments track very closely to the Public Input Priority.

For the Alternative Future Survey, respondents indicated that Scenario B (Alternative) had fewer environmental impacts than Scenario A (Current Trend). Additionally, transportation testing results showed that the impacts of traffic in Scenario B (Alternative) allowed for fewer overall miles traveled, less delay for car trips, and less carbon dioxide emissions than Scenario A (Trend).

The Deciding/Affirming third round of community engagement solicited input on policy directions the County should pursue and actions it should take to enable citizens' vision for the future of our community to be realized. Responses to the Policies and Actions Questionnaire indicated consistent public support for prioritizing the protection of natural lands and open spaces in the County.

This was the most highly ranked and supported objective across all three rounds of engagement. Respondents supported new development restrictions and public land acquisition to limit development impacts on natural lands and to address impacts of climate change and sea-level rise, with a strong focus on protecting water resources. Respondents also had strong support for protecting a wide variety of natural lands.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to environmental issues:

- Create more mixed-use and neighborhood areas that include connected open spaces and natural areas to support natural ecosystems within urban environments and provide residents with greater access to nature;

- Pursue a more compact development pattern within the Primary Services Area (PSA) and reduce the need to develop on rural and environmentally sensitive lands outside the PSA;

- Protect rural lands, open spaces, and natural areas from being converted to development through the use of multiple federal, state, and local programs and funding sources; and

- Undertake sustainable development and infrastructure construction best practices to ensure the long-term sustainability of natural functions of the County's natural environment and waterways and to create a more resilient built environment that can withstand increasing impacts from severe weather events.

Spotlight on Implementation

Clean water, clean air, functioning wetlands and arable soils sustain life. Beyond providing basic life supporting needs, James City County's natural assets are an inextricable part of what defines the community. In many ways, a healthy environment is the cornerstone to building success stories in other areas of the community related to our quality of life: parks and recreation, community character, public facilities, and economic vitality. With this interdependence in mind, James City County continually works to maintain and improve the high level of environmental quality in the County in order to protect and conserve sensitive lands and waterways.

As federal and state regulations have become more stringent, reflecting the rising demand for resources such as potable water in the face of limited supplies, James City County has endeavored to remain in compliance with current regulations and employ innovative solutions to protect these crucial assets. In the area of water quality, required submittals to the State Water Control Board and the Virginia DEQ are progressing as scheduled, as are local implementation efforts for the Virginia Stormwater Management Program.

The County has continued its support for the successful Clean Water Heritage program, which was established to equip citizens with the knowledge to make better decisions about actions that affect water quality. This program provides information on BMP maintenance to the public and to private owners of stormwater management facilities, and also administers grants to help communities take on improvement and enhancement projects to stormwater infrastructure. In addition, a successful partnership with the Colonial Soil and Water Conservation District (CSWCD) and continued outreach methods have increased agricultural compliance with the County's Chesapeake Bay Preservation Area program. The CSWCD administers cost-share incentives to assist with installing agricultural BMPs on active farmlands. Through educational programing and a variety of outreach efforts, the CSWCD also works closely with owners of agricultural parcels to assist in the implementation of methods to mitigate impacts of agricultural activities on water quality. These efforts have helped to involve the public in the County's environmental initiatives and conserve sensitive lands.

The James Terrace Water Quality Improvement Project was awarded the Best Retrofit - Best Urban BMP in the Bay Award in 2017 from the Chesapeake Stormwater Network. Winning retrofit projects include those that solved difficult design challenges, are cost-effective, enhance habitat or green space, and improve neighborhoods. This project addressed chronic uncontrolled storm runoff affecting property throughout a fully built-out neighborhood by installing an innovative system of water quality treatment facilities that reduce nutrient and bacteria loads in the Chesapeake Bay and College Creek and reduce instances of crawl space and driveway flooding.



James City County has received back-to-back James River Water Quality Improvement Grants from the Virginia Environmental Endowment in 2018 and 2019. In 2018, the County was awarded a $781,900 grant for the Chickahominy Riverfront Park Shoreline Stabilization Project and in 2019 received a grant award of $396,000 in support of the Grices Run Stream Restoration project. The James River Water Quality Improvement Program was created in 2018 to accelerate and advance significant water quality improvements throughout the James River watershed.

The Cooley Road Stream Restoration project, completed in 2018, was awarded the 2019 American Public Works Association Project of the Year Award for the Mid-Atlantic Chapter for the category of Environment Less than $5 million. This project included restoration of two sections of stream channel to reduce stream erosion, protect adjacent infrastructure, improve downstream water quality, and improve stream function.

In September 2017, the Board of Supervisors adopted two resolutions which authorized the County to participate in VDOT's 2019 and 2020 Revenue Sharing Program for projects which aimed to address both stormwater and transportation deficiencies. This program provides localities an additional funding option to construct, reconstruct, improve or maintain the highway system and has been an instrumental way for the County to provide funding for small projects, immediately-needed improvements, or to supplement existing funding on projects. The Commonwealth Transportation Board approved allocations in June 2018 for both of James City County's submitted projects identified as Grove Roadway Improvements ($1,173,700 total cost - $545,000 VDOT; $628,700 County) and Richmond Road Construction of Pedestrian and Bicycle Accommodations, Safety Improvements and Storm Drain System Improvements ($1,665,594 total cost - $715,894 VDOT; $949,700 County).

In the areas of energy savings and air quality, the County has actively tracked energy use at County facilities, completing many programs and projects to increase energy efficiency and achieve significant energy reductions. In addition, the County has made progress on planning for alternative modes in transportation projects and using miles-per-gallon in decision-making for new vehicle purchases. Together, these and other actions have helped the County mitigate and adapt to the effects of a changing climate.

As James City County looks to 2045, these types of successful initiatives and others will be instrumental in ensuring that James City County meets its goal of maintaining a high level of environmental quality for current and future generations.

Goals, Strategies, & Actions

Goals

ENV - Continue to improve the high level of environmental quality in James City County and protect rural and sensitive lands and waterways that support the resiliency of our natural systems for the benefit of current and future generations.

Strategies and Actions

ENV 1 - Protect and improve the quality of water in County watersheds, wetlands, and waterways including water bodies that discharge into the Chesapeake Bay.

ENV 1.1 - Using adopted plans and regulations for guidance, pursue development and land use decisions, redevelopment approaches, and reduction of pollution sources that protect and improve the function of wetlands and the quality of water bodies.

ENV 1.2 - Promote the use of Better Site Design, Low Impact Development (LID), and effective Best Management Practices (BMPs) by:

ENV 1.2.1 - Providing stormwater facility maintenance guidelines and assistance directly to BMP owners through training sessions and other tools.

ENV 1.2.2 - Promoting public awareness on the benefits of and necessity for BMPs, erosion and sedimentation control, watershed management, and other land disturbance regulations.

ENV 1.2.3 - Partnering with local, state, and federal agencies, and the Hampton Roads Planning District Commission (HRPDC).

ENV 1.2.4 - Continuing to develop and enforce new and existing regulations that require soils identification and the consideration of the limitations of these soils for development and agricultural and forestal activities.

ENV 1.2.5 - Requiring submission of environmental inventories in order to protect environmentally sensitive lands; to save or most efficiently use permeable soils; and to limit impervious cover.

ENV 1.2.6 - Continuing and expanding support for the Clean Water Heritage program in order to provide information on BMP maintenance and assistance to the public and to owners of stormwater management facilities.

ENV 1.2.7 - Re-examining provisions in the Zoning Ordinance and other regulations to strengthen tree-protection measures.

Goals, Strategies, & Actions

ENV 1.3 - Through the County's Chesapeake Bay Preservation Ordinance, continue to enforce Resource Protection Areas (RPAs) protecting all tidal wetlands, tidal shores, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow, perennial streams, a 100-foot-wide buffer adjacent to and landward of other RPA components, and drinking water reservoirs.

ENV 1.4 - Utilize bathymetric, flushing rate, and other available data when locating and providing new public shoreline and water access opportunities.

ENV 1.5 - Implement comprehensive coastal resource management guidance, consistent with the policy that living shorelines are the preferred alternative for stabilizing eroding shorelines prior to consideration of structural stabilization methods.

ENV 1.5.1 - Refer to the guidance presented in the locality's Comprehensive Coastal Resource Management Portal (CCRMP) prepared by the Virginia Institute of Marine Science (VIMS) to guide regulation and policy decisions regarding shoreline erosion control: www.vims.edu/ccrm/ccrmp/portals/james_city/index.php

ENV 1.5.2 - Utilize established VIMS "decision trees" for onsite review and CCRM Shoreline Best Management Practices for subsequent selection of appropriate erosion control/shoreline BMPs: www.ccrm.vims.edu/decisiontree/index.html

ENV 1.5.3 - Consider a policy where the above Shoreline Best Management Practices become the recommended adaptation strategy for erosion control, and where a departure from these recommendations by an applicant wishing to alter the shoreline must be justified at a hearing of the County Wetlands Board.

ENV 1.5.4 - Seek public outreach opportunities, including interpretive signage, to educate citizens and stakeholders on new shoreline management strategies including living shorelines.

ENV 1.5.5 - Follow the development of integrated shoreline guidance under development by Virginia Marine Resource Commission (VMRC).

ENV 1.5.6 - Promote the preservation of open space in areas adjacent to marsh lands to allow for inland retreat of vegetation and additional water containment areas as sea level rises.

ENV 1.5.7 - Evaluate and consider opportunities for grants, cost sharing partnerships between public entities and private property owners, and other funding sources for construction of living shorelines.

ENV 1.5.8 - In conjunction with the County Wetlands Board, evaluate the feasibility of adopting a coastal Dunes and Beach Ordinance, pursuant to the Virginia Coastal Primary Sand Dune and Beach Act (currently VMRC handles local applications).

Goals, Strategies, & Actions

ENV 1.6 - Ensure that water dependent activities such as marinas and docks are located and conducted in an environmentally sensitive manner and include adequate marine sanitation facilities.

ENV 1.7 - Identify the specific existing and potential uses of County streams and rivers and identify standards necessary to support these uses. Protect the quality and quantity of these surface waters so they will continue to support these uses. Give consideration to protecting existing and potential water resource uses when reviewing land development applications.

ENV 1.8 - Continue to work with the Virginia Department of Environmental Quality (DEQ), Department of Conservation and Recreation (DCR), and Virginia Department of Health (VDH) to identify existing or potential sources of surface and groundwater pollution and take action to prevent or control the effect of the sources. Continue to enforce all existing regulations to protect all water resources and adopt additional protective measures as necessary.

ENV 1.9 - Develop Total Maximum Daily Load (TMDL) Program Action Plans to address water quality impairments within James City County and the Chesapeake Bay, including proposed actions and implementation.

ENV 1.10 - Continue to protect water resources from on-site sewage disposal system failure by:

- ENV 1.10.1 - Continuing to require Health Department approval for all subdivisions making use of on-site sewage disposal systems.
- ENV 1.10.2 - Continuing to maintain minimum lot sizes for any property containing an on-site sewage disposal system.
- ENV 1.10.3 - Continuing to require primary and reserve drain fields for subdivisions with applicable on-site sewage disposal systems.
- ENV 1.10.4 - Continuing to require the pump out of on-site sewage disposal tanks every five years.
- ENV 1.10.5 - Continuing to monitor non-traditional on-site sewage disposal trends.

ENV 1.11 - Continue to implement the Chesapeake Bay Preservation Ordinance in order to protect water quality in all drinking water reservoirs within the County.

ENV 1.12 - Investigate actions needed to implement groundwater protection using suggestions from the Potential Groundwater Management Alternatives section.

ENV 1.13 - Continue to use sound science to update and create the requirements, standards, and specifications used to design, approve, and build BMP facilities in James City County.

Goals, Strategies, & Actions

ENV 1.14 - Continue to minimize post-construction stormwater impacts through implementation of BMPs to reduce pollutants entering the stormwater system and County waterways by:

ENV 1.14.1 - Utilizing available resources, including enforcement of maintenance agreements and covenants.

ENV 1.14.2 - Provide assistance as funding permits to identify failing neighborhood stormwater and drainage facilities and to implement repairs on a prioritized basis.

ENV 1.14.3 - Maintain and assess new programmatic fees collected to fund BMP construction inspections and private stormwater facility assessments.

ENV 1.15 - Ensure that the County's Municipal Separate Storm Sewer System (MS4) Permit is fully implemented in accordance with the annual program plan and General Permit Number VAR040037.

ENV 1.15.1 - Continue to implement public education and outreach programs on the impacts of stormwater, including actions citizens can take to reduce stormwater pollution and the hazards associated with illegal discharges and improper disposal of wastes.

ENV 1.15.2 - Continue to provide public participation opportunities, including providing feedback on the County's program plan, and participation in the Stormwater Program Advisory Committee.

ENV 1.15.3 - Continue to detect and eliminate illegal discharges to the storm sewer system through maintenance of accurate system mapping, annual screening activities and enforcement of County Codes prohibiting illegal discharges.

ENV 1.15.4 - Continue to implement programs and ordinances to limit pollution from construction sites through plan approvals, regular inspections and other methodologies.

ENV 1.15.5 - Continue to minimize post-construction stormwater impacts through implementation of BMPs to reduce pollutants entering the stormwater system and County waterways.

ENV 1.15.6 - Continue to implement pollution prevention and good housekeeping efforts within the County's MS4 service area in order to minimize pollutants from County activities.

ENV 1.16 - Develop funding and implementation mechanisms for the watershed protection and restoration goals and priorities from watershed management plans adopted by the Board of Supervisors.

ENV 1.17 - Continue to develop watershed management plans for the remaining County watersheds, and to update existing watershed management plans that identify environmentally sensitive areas and specific protection, restoration, and retrofit recommendations. Include in those studies an evaluation of the impact of the change in precipitation events in the watershed.

ENV 1.18 - Continue to develop regional, cumulative impact-focused hydraulic studies for County waterways vulnerable to flooding and develop strategies to fix identified problems.

ENV 1.19 - Continue to follow the progress of the Lower Chickahominy Watershed Study and incorporate final recommendations into local policies and Ordinances.

ENV 1.20 - Explore Zoning Ordinance amendments that would incorporate recommendations of the Colonial Soil and Water Conservation District as it pertains to equine and other animal stocking rates.

ENV 1.21 - In a joint endeavor by the Stormwater & Resource Protection Division and Stormwater Program Advisory Committee prepare a multi-year, prioritized list of stormwater-related projects, including stream restoration, health, safety, and water quality that includes estimated costs for design and implementation.

ENV 1.22 - Conduct an analysis of the impacts of sea-level rise, tidal flooding, and non-tidal flooding in the areas around Chickahominy Haven, Powhatan Shores, and other impacted areas based on the work of Virginia Institute of Marine Science, the Commonwealth Center for Recurrent Flooding Resiliency at Old Dominion University, and other relevant agencies.

ENV 2 - Continue to promote public knowledge of and involvement in County environmental programs and initiatives.

ENV 2.1 - Continue to educate the public about voluntary techniques to preserve and protect environmentally sensitive lands; wildlife habitats; water quality; and watersheds, agricultural, forestal, and other open space lands through County programs, including but not limited to, the Clean Water Heritage program.

ENV 2.2 - Utilize the Clean County Commission to coordinate citizen efforts in participating in the County recycling program, the Adopt-A-Spot program supported by the Virginia DEQ, Division of Environmental Enhancement, and shoreline clean-up days sponsored by a variety of organizations.

ENV 2.3 - Promote recycling by developing a post-consumer waste office paper purchasing policy in accordance with the Virginia Public Procurement Act for all County facilities, expanding County facility reduce/reuse/recycling programs, and by increasing private sector and public awareness of recycling opportunities through the County's curbside recycling programs, Recollect website, and Recyclopedia tool.

ENV 3 - Protect and conserve environmentally sensitive areas, and work to maintain or promote the ecosystem services provided by all natural areas.

ENV 3.1 - Maintain and promote biological and habitat diversity, ecosystem services, and habitat connectivity by protecting wildlife and riparian corridors between watersheds, sub-watersheds, catchments, and tidal and nontidal wetlands, and by developing and implementing a green infrastructure plan.

ENV 3.2 - Develop specific recommendations for voluntary and regulatory means to protect resources identified in studies, such as the Regional Natural Areas Inventory, and watershed management plans for County watersheds.

ENV 3.3 - Continue to update mandatory tree protection standards and examine tree canopy protection standards.

ENV 3.4 - Continue to develop and enforce zoning regulations and other County Ordinances that preserve to the maximum extent practicable rare, threatened, and endangered species; wetlands; flood plains; shorelines; wildlife habitats; natural areas; perennial streams; groundwater resources; and other environmentally sensitive areas.

ENV 3.5 - Continue to gather and gain technical knowledge on data that is available to help the County identify and map its natural and cultural assets, and, where appropriate, use such data as an information tool to help guide decisions during the creation of regulations and policies to provide guidance to property owners and development proposal applicants on lands best suited for development, and to inform open space preservation efforts.

ENV 3.6 - Ensure that site development projects, including those initiated by the County, are consistent with the protection of environmentally sensitive areas so that development projects do not exacerbate flooding in flood prone areas.

ENV 3.7 - Seek to maintain and protect forested land and recognize the benefits it provides by sequestering carbon dioxide.

ENV 3.7.1 - Investigate changes to the Zoning Ordinance including renaming the A-1, General Agricultural District and re-examining lot sizes and clustering provisions to acknowledge and encourage preservation of forested land.

ENV 3.7.2 - Assemble a local flood resilience plan to address the County's flood resilience needs using existing plans where available and supplementing with additional documentation where necessary. Incorporate resiliency plan items from other chapters including Transportation, Land Use, and others.

ENV 4 - Work with the private sector and other governmental entities such as HRPDC and the State through both regulation and non-regulatory techniques to mitigate and adapt to the effects of climate change.

ENV 4.1 - Continue to implement reduction strategies by reducing building energy and transportation fuel consumption.

ENV 4.2 - Continue utilizing the County's Interdepartmental Energy Team to conduct energy audits, make recommendations on efficiency measures and implement energy management practices.

ENV 4.3 - Promote alternative modes of transportation and a reduction in auto dependency and trip distances through measures in the Zoning Ordinance such as encouraging enhanced pedestrian accommodations and reductions in required parking with approval of a mass or alternative transportation plan, or appropriate similar provisions.

Goals, Strategies, & Actions

ENV 4.4 - Continue to evaluate and update Ordinances and policies to promote the construction of homes, businesses, and public facilities that conserve energy and achieve other green building standards. As one component of this, re-examine the existing Green Building Incentives adopted by the Board on September 11, 2012. Use U.S. Green Building Council's LEED program, Earthcraft, Envision, STAR Communities, WELL Building Standard, the Sustainable Development Code, and other sustainable building programs as guides in this effort.

ENV 4.5 - Investigate amending County Ordinances to allow or encourage appropriate energy production and conservation technologies in residential areas.

ENV 4.6 - Investigate ways to amend the County Ordinances to address alternative energy production, and to amend ordinances or include special use permit conditions that protect and enhance natural resources on alternative energy production sites.

ENV 4.6.1 - In Ordinances or as development approval conditions, include provisions to minimize clearing of forested land.

ENV 4.6.2 - In Ordinances or as development approval conditions, implement best practice documents on the inclusion of native pollinator plants.

ENV 4.7 - Continue the current programs that have installed building management control systems in many County facilities which assist in reducing energy consumption. Continue to evaluate renewable energy technologies and energy efficiency improvements during capital maintenance activities.

ENV 4.8 - Continue to manage the County vehicle fleet to improve energy efficiency and reduce emissions by replacing fuel inefficient vehicles, assessing new technologies, and developing an anti-idling policy.

ENV 4.9 - Proactively work with private, local, regional, state and federal organizations to implement innovative solutions to improve air quality, including through the protection and enhancement of natural resources such as forest ecosystems.

ENV 4.10 - Use resources from the HRPDC or other applicable organizations to periodically monitor sea level rise at the local and/or regional level.

ENV 4.11 - Evaluate adjustments to watersheds, floodplains, and resource protection areas with changes to the VRMC mean high water line.

ENV 4.11.1 - Use predicted shoreline protection needs to inform shoreline protection strategies and to re-examine relevant County master plans.

ENV 4.11.2 - Notify landowners of likelihood of shoreline impacts based on shoreline protection needs.

ENV 4.12 - Continuing James City County's partnership with VIMS and the HRPDC to more fully identify specific issues with respect to riverine flooding, storm surge, sea level rise, and other conditions affecting coastal flooding in James City County.

COMMUNITY CHARACTER

Introduction

James City County's community character is often described as "historic," "rural," and "small town." Key components include the natural topography; large wooded areas of tall deciduous forests; open vistas across ravines, wetlands, and water bodies; relatively low traffic volumes; scenic roads; and small scale, low-intensity development. Places such as Norge, Toano, Grove, Five Forks, and Jamestown bring to mind separate, identifiable areas of the County. However, this small town feel and sense of place has been challenged by the growth of the past 20 years, including an evolution to more urban and suburban landscapes. The guidance that this chapter offers is intended to maintain the small town feel and sense of place even as the County changes over the years.

As this growth occurs, it can change the County's character in a positive or negative way. Factors such as architectural style and massing, streetscape, buffers, scale, and accessibility can influence whether designs are distinctive and build the community's character, or lack authenticity and are indistinguishable from those found anywhere else in the United States. Through its policies and Ordinances, the County continues to encourage new growth to locate inside the Primary Service Area (PSA), rather than outside the PSA in more rural areas. This important tool, along with other Ordinances, policies, and the new Character Design Guidelines, work to ensure that development is in keeping with the existing community and preserves the elements of the County's unique community character.

The character of James City County is important to its citizens and business community members alike, and has contributed to the County's attractiveness and growth through the years. As noted in the *2019 James City County Comprehensive Plan Survey* (2019 Citizen Survey), preserving the nature of the area and its quality of life remains a high priority. Additionally, placemaking and economic development go hand in hand. According to research by the Virginia Office of Intermodal Planning and Investment, investing in placemaking not only creates livable, multimodal communities that are attractive to a broad range of residents - these elements also attract businesses and economic growth. Recent trends show that business site selection is data-driven, with companies looking for communities that can attract and retain a viable workforce.

CHAPTER GOAL

"The County will be a good steward of the land by preserving and enhancing the scenic, cultural, rural, farm, forestal, natural, architectural, and historic qualities that are essential to the County's distinctive character, economic vitality, and overall health and quality of life of its residents."

The Community Character Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language as written in the 2035 Comprehensive Plan has been updated, with several changes to acknowledge the current character of the County by adding "architectural" to the qualities to be preserved and enhanced, "the overall health of its residents" and by noting the County's "distinctive character" as a replacement for "rural and small town." The Goal now states: "The County will be a good steward of the land by preserving and enhancing the scenic, cultural, rural, farm, forestal, natural, architectural, and historic qualities that are essential to the County's distinctive character, economic vitality, and overall health and quality of life of its residents."

In recognition of the importance and value of community character, the County has taken many positive steps over the years toward shaping future development, which are detailed in part in the Spotlight on Implementation section, and continues to be sensitive to the many characteristics that already exist. The methods that the County has at its disposal influence not only the appearance of the community, but also the way the community functions and the experiences of visitors, citizens, and those who do business in the County. Further action through the revised and updated Strategies and Actions will continue these efforts into the future.

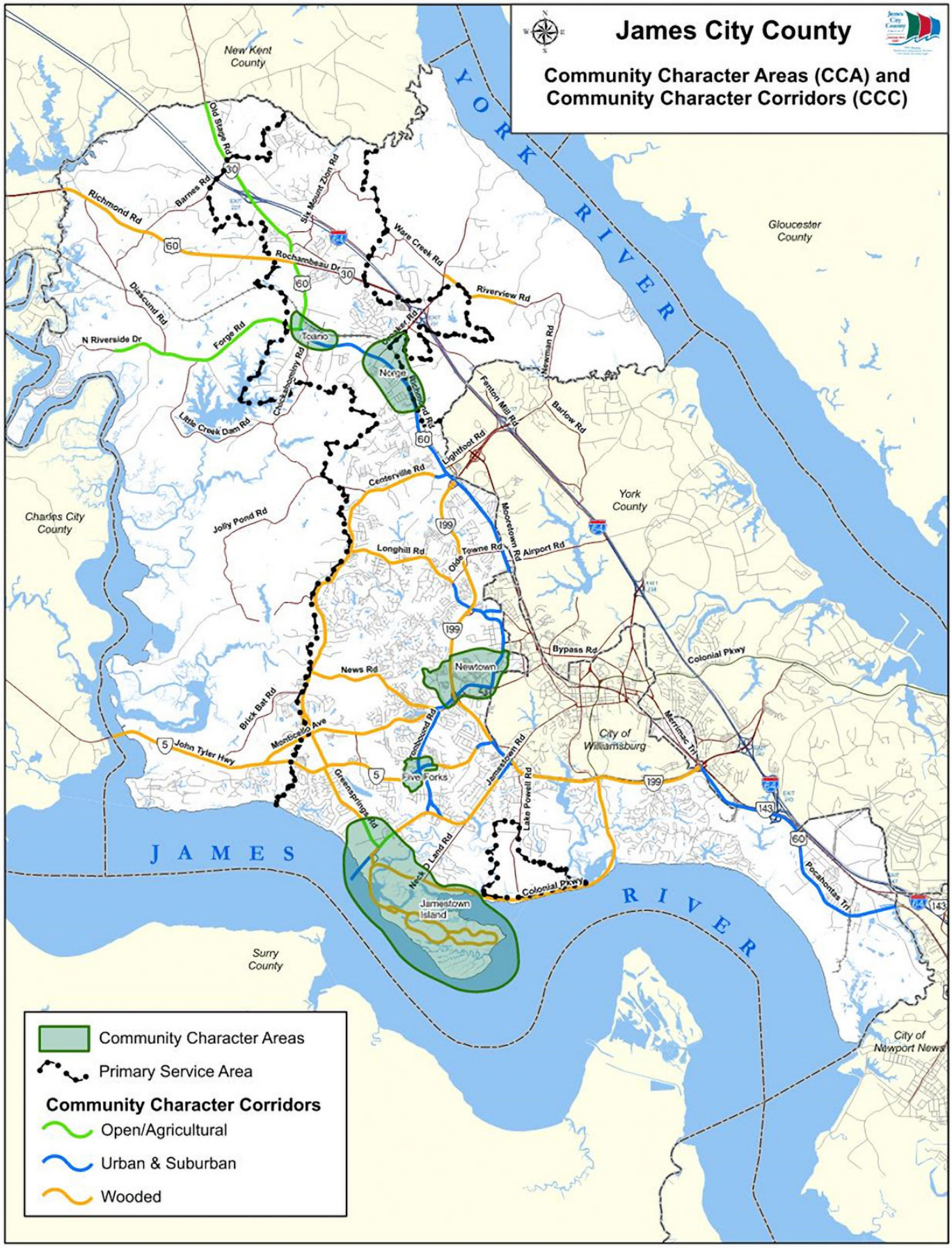
Key Planning Influences

Important Places of Character

Recognizing the value and importance of the natural and historical resources of the County, the Comprehensive Plan has since 1997 designated certain roads and areas in the County as Community Character Corridors (CCCs) and Community Character Areas (CCAs). Other areas in the County such as the Grove and Croaker communities and Forge Road, although not designated as Community Characters, are still important places of character in the County. Map CC-1 shows the designated Community Character Corridors and Areas in the County.



Map CC-1. Community Character Areas and Community Character Corridors



Community Character Corridors

Community Character Corridors (CCCs) are roads in the County that were previously designated as greenbelt roads, described in the 1991 Comprehensive Plan as entrance corridors and roads which promoted the rural, natural, or historic character of the County. In 1997 they were adopted as CCCs and have played an instrumental role in helping to preserve the original character of these roads. More attention has been given to the roads which are considered to be entrance corridors, or gateways, because they set the important first impression that many visitors have of the area.

Since the 1997 Comprehensive Plan, each plan has identified the following three types of CCCs and their corresponding goals: Open/Agricultural, Wooded, and Urban/Suburban. Some roads have more than one designation depending on the location within the County.

Table CC-1. County CCC Designations

Road	Open/ Agricultural	Wooded	Urban/ Suburban
Centerville Road		X	X
Colonial Parkway		X	
DePue Road			X
Forge Road	X		
Greensprings Road	X	X	
Humelsine Parkway (Route 199)		X	X
Ironbound Road from Jamestown Road to News Road			X
Ironbound Road from Strawberry Plains Road to City of Williamsburg border			X
Jamestown Road		X	X
John Tyler Highway		X	X
Longhill Road		X	X
Monticello Avenue		X	X
News Road		X	
Old Stage Road and Barhamsville Road from Anderson's Corner (intersection of Routes 30 and 60) to New Kent County border	X		
Pocahontas Trail south of Humelsine Parkway to Newport News border			X
Richmond Road from Anderson's Corner to City of Williamsburg border	X		X
Riverview Road from Croaker Road to the entrance of York River State Park		X	
Sandy Bay Road from Ironbound Road to Jamestown Road			X

The County has created standards and guidelines for how CCC buffers are to be treated during development and how to preserve the unique community character along these key corridors throughout the County. To give better guidance regarding landscape treatments along the different Community Character Corridors, in January 2011, the Board of Supervisors adopted buffer treatment guidelines and a map showing the location of the corridors and their buffer type designations.

For the most effective corridor buffers, existing plant material should be maintained and supplemented with a mix of small trees and shrubs that are both evergreen and deciduous and preferably native. Planting should occur in a staggered pattern, with the smaller understory plant material defining the edges of the existing groupings of material. New buffers can also be successfully planted in a more natural design, especially when the buffer might be very wide and the developer wants to reduce maintenance costs associated with a manicured area.

In addition to the treatment guidelines adopted by the Board, the Landscape Ordinance specifies when CCC buffer treatments are required for development plans. Generally, roads designated as CCCs require a 50-foot average buffer along the right-of-way, but in some instances the Ordinance allows for a buffer width reduction if it best complements the surrounding area. For example, parcels located in a Community Character Area with design guidelines recommending a more urban design with shallower setbacks may be eligible for a reduced CCC landscape buffer width in order to better align with the neighboring streetscape. A buffer reduction may be conditioned upon superior site design, such as enhanced landscaping and architectural features, and should not be viewed as a method for reducing landscaping requirements. Additionally, consideration should be paid to the context of the right-of-way itself. For example, the design of any complementary facilities should be in keeping with state and regional guidelines, such as the Virginia Department of Rail and Public Transportation (DRPT) Multimodal System Design Guidelines.

Highlights from the adopted policy describing the three types of buffer treatments and their corresponding goals are provided below.

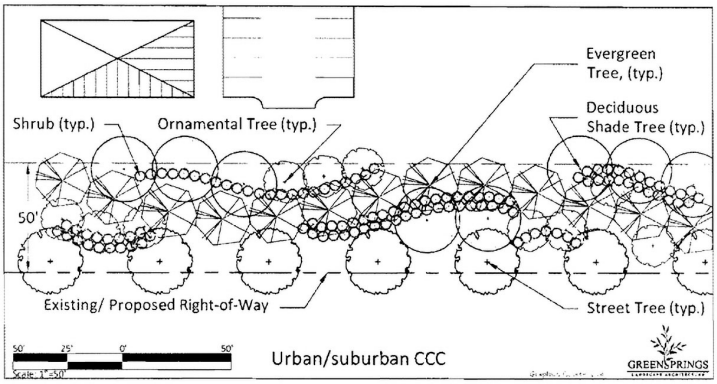
Urban/Suburban Community Character Corridors

- Characterized as having high to moderate traffic, commercial uses, and some residential uses.
- Predominant visual character should be the built environment and natural landscape.
- Buffer treatments should incorporate existing and new vegetation, berms, and other desirable design features to complement and enhance the visual quality of the corridor.
- Vehicle-related activities such as parking lots, deliveries, and outdoor operations should be screened.

Image CC-1. Richmond Road along Williamsburg Premium Outlets



Figure CC-1. Urban/Suburban CCC Treatment Exhibit



Wooded Community Character Corridors

- Characterized as having natural wooded areas along the road, with light to moderate traffic, and minimal commercial development.
- Existing vegetation should be preserved or supplemented to create a wooded buffer that preserves open space and wildlife habitat.
- The buffer should visually screen the development from the road to maintain the natural character of the County.

Image CC-2. Western Monticello Avenue

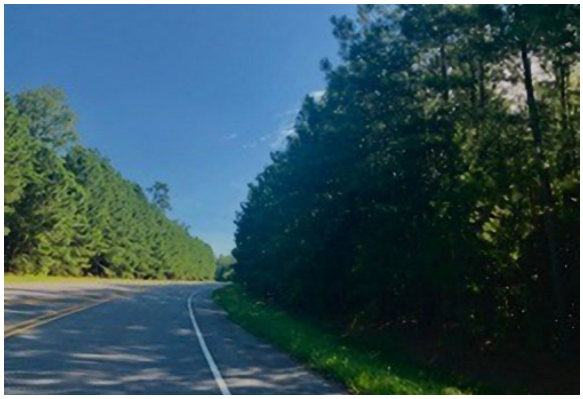
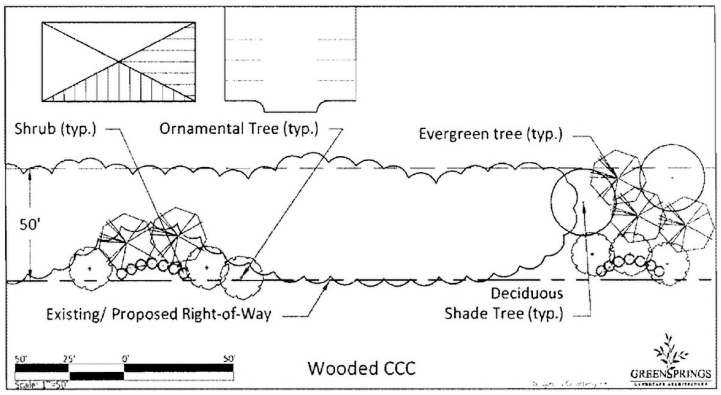


Figure CC-2. Wooded CCC Treatment Exhibit



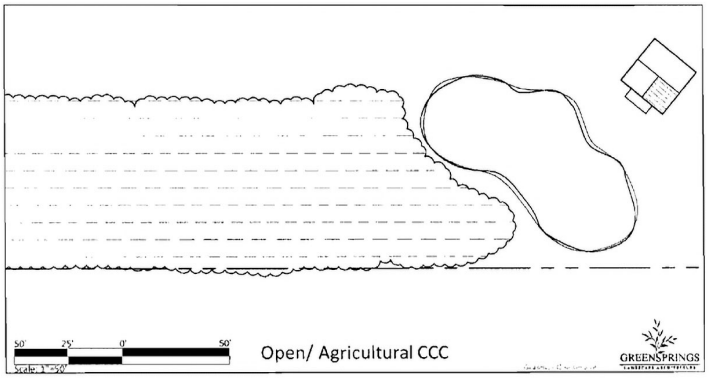
Open/Agricultural Community Character Corridors

- Characterized as a corridor located primarily in rural lands where farming and forestry activities are predominant.
- The viewshed and integrity of farm fields and natural open spaces should be preserved so they remain the dominant visual features.

Image CC-3. Forge Road



Figure CC-3. Open/Agricultural CCC Treatment Exhibit



Rural Roads

A number of secondary roads both inside and outside the PSA have a distinct rural character. These roads are characterized by pavement widths typically less than 20 feet, limited sight distances, narrow shoulders, and in many instances, tree canopies that extend over the pavement. Such roads play a major role in preserving the rural character of the County. Some need safety improvements while others are impacted by traffic volumes greater than their intended capabilities. The County works with the Virginia Department of Transportation (VDOT) to make needed improvements through the Secondary Six-Year Improvement Program (SSYIP) in a manner that retains the rural character of these roads.

Community Character Areas

Existing Community Character Areas

During the 1997 Comprehensive Plan process, certain areas of James City County were confirmed as important places during the public participation process. The following areas are identified as Community Character Areas (CCAs):

- Toano
- Norge
- Jamestown Island - Jamestown Settlement - Greensprings Road
- New Town
- Five Forks

Design guidelines for future development have been developed for these areas. Both Toano and the Five Forks CCAs have standalone design guidelines with specific design standards adopted by the Board of Supervisors. The New Town CCA has guidelines developed as part of the rezoning and master planning of the New Town Mixed Use development. Unlike these three CCAs, Norge and Jamestown Island do not have standalone design guidelines, and therefore, design standards for these areas are listed within the text below.

The boundaries of CCAs, as represented on the Land Use Map, are not intended to be parcel-specific. Instead, they are meant to be used as a guide to areas that citizens have identified as possessing unique characteristics and maintaining a relatively defined sense of place. The specific design characteristics outlined for each area are used at the discretion of the Board of Supervisors when considering new large-scale developments at the rezoning and Special Use Permit (SUP) stage and are not necessarily intended to be applied to individual homeowners in existing neighborhoods. Most CCAs have a central core area, where stricter adherence to the area's description is seen as very important in order for the area to maintain the desired character. Application of the design characteristics may be more relaxed for parcels towards the perimeter of the CCA, but may still involve an evaluation of the parcel's impact on other adjacent parcels within the CCA, specifically as they pertain to the viewshed, parcel connections, and walkability.

Toano

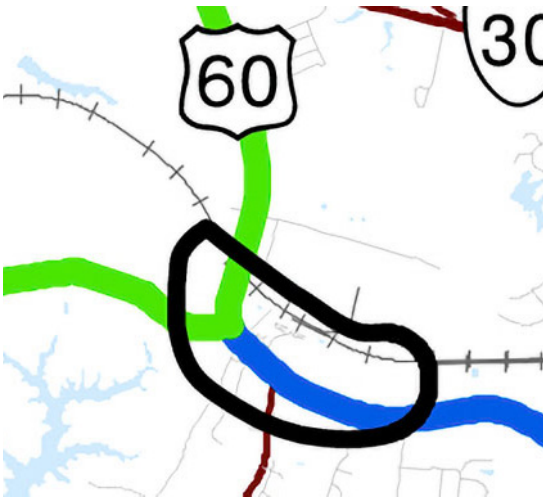


Figure CC-4. Toano CCA



Image CC-4. Toano Farmers Market

Toano, derived from a western U.S. Native American word meaning "high ground," has been a center of modern commerce and trade since the colonial era. Prior to English colonization, this area was part of the Powhatan Confederacy. Beginning in the 1700s, the area was home to "ordinaries," or inns providing lodging and meals to travelers on the road from Williamsburg to Richmond. The area became known as "Burnt Ordinary" following a Revolutionary War-era fire, and retained this name until the 1880s, when it was renamed to Toano by out-of-town developers of the C&O Railway for a new station on a new rail line.

The addition of the railroad allowed commerce to grow, and by the early 20th century downtown Toano included the C&O depot, a variety of retail shops and trades services, banks, inns, and a school. The area became known as a "Village of Stores" and solidified itself as an important commercial hub for upper James City County.

Toano still retains much of the "village" character that led to its designation as a Community Character Area. Although some new development has occurred, the character is still dominated by buildings constructed at the beginning of the 20th century. These buildings have shallow setbacks and many are two-story, creating a more pedestrian-oriented storefront environment than any other area in the County. Toano has also retained a fairly clear visual separation from more recent development along Richmond Road, with visitors enjoying a distinct sense of arrival from both the east and the west.

In September 2005, the Board of Supervisors created the Toano Community Character Area Study Committee in order to listen to the views of County citizens, particularly those who live and work in Toano. The Committee's purpose was to recommend principles and guidelines that highlight and honor Toano's history, encourage growth that enhances the area's character, and improve streetscapes and a pedestrian-friendly town center. The guidelines created by the study were adopted by the Board of Supervisors in February 2006.

The design guidelines highlight improvements and plans for the Toano area and give guidance for all future developments inside the CCA. For parcels fronting on Richmond Road on the northwest side of its intersection with Forge Road, the design guidelines encourage a mix of commercial and residential uses, but predominantly neighborhood commercial on the Richmond Road frontage. Speed limits should be lowered in transitional zones entering Historic Toano, and pedestrian/bicycle access should be promoted throughout the corridor with safe, improved sidewalks, crosswalks, bike lanes, and sidewalk buffers.

Since the design guidelines were adopted, improvements have been made to median landscaping, sidewalks, and signage, and additional drainage and roadway infrastructure improvements are currently being planned. An example of beautification improvements include the installation of "Welcome to Toano" signs in 2006, featuring a design inspired by demi-lune windows, a type of window frequently featured in early 20th century architecture around the village.

In addition to these efforts, in 2019 the Toano Commercial Historic District was added to the National Register of Historic Places, and in 2020 Toano was accepted as a Commercial District Affiliate of the Virginia Main Street Program. An affiliate is an introductory tier of the Main Street Program that allows communities to access the national network of strategies and resources for preserving and revitalizing community character.



Norge

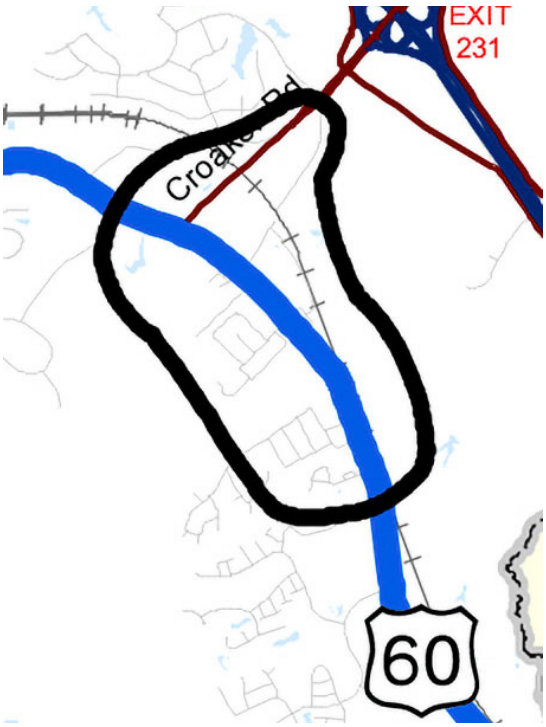




Figure CC-5. Norge CCA

Prior to the 1890s, the area now encompassing Norge was sparsely populated. Settlers of Scandinavian origin located in the Midwestern United States, who were unhappy with the farming conditions of the Midwest, were persuaded to move to the upper Peninsula through the efforts of Carl M. Bergh, a Norwegian immigrant who worked as a C&O Railway land agent. Having bought property in James City County himself, he soon encouraged other Norwegians to join him. The first Norwegian resettlers arrived in the late 1890s and situated themselves in the area now known as Norge.

In contrast to Toano, Norge has been more impacted by recent commercial development along Richmond Road and has not been the subject of a subarea study. While Norge continues to have a unique and identifiable residential component located off Richmond Road, along with some pedestrian-oriented storefronts, the early 20th century "village" character of its business and residential areas along Richmond Road has been visually impacted by automobile-oriented development.

Many original buildings from the early 1900s were demolished for the widening of Richmond Road in the 1960s. Further, newer development from the east has substantially blurred the distinction between Norge and neighboring Lightfoot. A subarea study with guidelines similar to Toano may be beneficial in providing a more comprehensive evaluation of how to minimize impacts to the historic village character of Norge.

Outlined below are specific design standards intended to guide future development and redevelopment in Norge:

- The architecture, scale, materials, spacing, and color of buildings should complement the historic character of the area.
- Building setbacks should be consistent with nearby historic buildings and structures.
- Where possible, parking should be located to the rear of buildings. Parking should be screened from roadway and adjacent properties.
- Shared access and parking should be pursued before constructing new access breaks and parking facilities.
- Existing specimen trees and shrubs should be preserved to the extent possible.
- New landscaping should be of a type, size, and scale to complement and enhance the building and site design. Native plant and tree species are encouraged.
- Signage should be of a scale, size, color, and materials to complement the historic character of the area.
- Pedestrian and bicycle access and circulation should be promoted through the provision of sidewalks, bike racks, benches, crosswalks, street trees, and other design features which help accomplish this goal.
- Mixed use development which provides residential, commercial, and office uses in close proximity is encouraged.
- Efforts to maintain and reinforce the boundaries of Norge and Toano through open space and site design measures are strongly encouraged.

Community character considerations are important for development within areas of the CCA that are designated Economic Opportunity (EO) areas but present some unique considerations. Acknowledging that most EO land is at the perimeter of the Norge CCA, protecting the viewshed around the central core of the CCA and along the railroad should be a primary consideration. Outlined below are specific design standards intended to guide future development and redevelopment in the Norge EO:

- Building setbacks similar to those in central Norge should be more flexible based on the types of uses that are master planned within the CCA. For compatible uses with low impacts, smaller setbacks should be encouraged to integrate the areas. For larger, less compatible uses, attention should be paid to larger setbacks and buffering to minimize impacts.
- Building scale may be larger, but height and massing should gradually increase as development moves away from the core of Norge and closer to the perimeter of the CCA.
- Architectural features consistent with the Norge area should be included in designs for those buildings that are contained within or are clearly visible from the CCA.
- Signage facing into the CCA should also be minimized or designed in a manner consistent with the Norge character.
- Pedestrian and bicycle connections over the railroad tracks should also be promoted through the use of elevated or signalized crossings, sidewalks along roads on either side of the tracks, and bike racks to further integrate EO land with the Norge CCA.

Jamestown Island - Jamestown Settlement - Greensprings Road



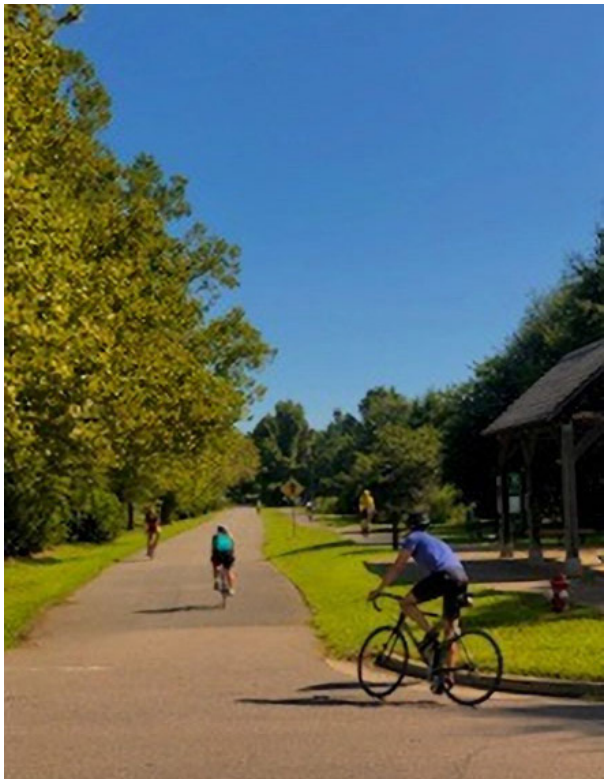


Figure CC-6. Jamestown-Greensprings Road CCA

Since acquiring Jamestown Beach Event Park and the James City County Marina in 2006 as greenspace purchases, the County has invested in shaping the long-term preservation and revitalization of this important corridor. With its waterfront access and close proximity to both Jamestown Settlement and Colonial National Historical Park, this area has unique opportunities for historic and environmental preservation, as well as economic development.

Jamestown Beach and the Marina, along with Chickahominy Riverfront Park on John Tyler Highway, were evaluated in a master planning project called Shaping Our Shores (SOS). Originally adopted by the Board of Supervisors on June 9, 2009, the SOS Master Plan addressed the long-range physical development, use, and stewardship of these sites over the next 20 years. It presented a vision for the physical environment that promoted and supported the values and goals of James City County citizens.

Since acquiring Jamestown Beach Event Park and the James City County Marina in 2006 as greenspace purchases, the County has invested in shaping the long-term preservation and revitalization of this important corridor.

The master plan proposed specific land uses and development which are compatible with specific design standards outlined below:

- The architecture, scale, materials, and color of buildings should be complementary and reflect the historic character of James City County, the City of Williamsburg, and Colonial Williamsburg.
- All development should be well screened from Jamestown Road.
- Parking should be located to the rear of buildings and should be well landscaped with shrubs and street trees.
- All utilities should be placed underground.
- Existing specimen trees and shrubs should be preserved to the extent possible.
- New landscaping should be of a type, size, and scale to complement and enhance the building and site design. Native plant and tree species are encouraged.
- Signage should be of a scale, size, color, and materials to complement the architecture and scale of buildings. Low signs with subdued colors are encouraged.
- Pedestrian and bicycle access and circulation should be promoted through the provision of sidewalks, bike racks, benches, and other design features which help accomplish this goal.
- Natural woodland, open space, and waterfront vistas should be the predominant features.
- Public access to the waterfront should be an integral feature of new development but carefully designed to limit the visual impact on views from the river.

In 2018, a review and update of the 2009 SOS Master Plan was launched by the Parks and Recreation Department to incorporate recently added amenities and adapt to changes in the community's facility needs. The purpose of the review was not to recreate or fix the old plan, but rather to update the plan with these goals:

- Evaluate and confirm where existing park amenities are successfully meeting community needs;
- Identify unmet needs or opportunities and challenges to improve upon existing amenities;
- Evaluate maintenance/conditions and longevity of park features;
- Learn from the community if facilities in the plan are no longer needed, feasible, or should be built in other parks; and
- Create an updated master plan to guide development for the next decade and beyond.

Staff from Parks and Recreation, Economic Development, Planning, General Services, and the James City Service Authority were all involved in the review to ensure the revised master plan complied with local infrastructure and easement requirements and provided enhanced revenue opportunities.

Feedback from the community was also sought through public meetings, online surveys, and paper surveys. Some changes included relocation of buildings, equipment and amenities out of the flood plain, removing high-intensity uses such as condos and retail, and adding facilities such as bathrooms and offices. The SOS Master Plan update was adopted by the James City County Board of Supervisors on July 28, 2020.

New Town

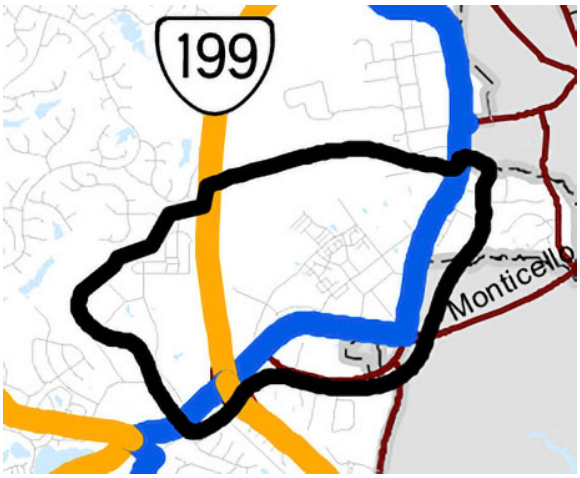




Figure CC-7. New Town CCA

In August 1995, James City County and the C.C. Casey Limited Company sponsored parallel design competitions for a Courthouse and Town Plan, respectively, to be located on approximately 600 acres known as the "Casey" Property. The winning town plan, chosen from among 99 entries worldwide, was submitted by Michel Dionne, Paul Milana, and Christopher Stienon of New York City.

The plan included several civic facilities, 600,000 square feet of regional and community retail, 400,000 square feet of office space, and 2,000 residential units of varying types. The plan locates a civic green at the southeast corner of the site where it becomes central to the larger Williamsburg region and a gateway to the town. A retail square is the focus of the mixed use town center with research and development corporations along Discovery Boulevard.

The neighborhoods are composed of a simple street and block pattern that accommodates alleys and permits a variety of lot sizes and housing types. The public spaces of the plan connect to the regional system of public open space so that the new town becomes an urban extension and center for the region. Using the winning town plan as a launching pad, on December 22, 1997, the Board of Supervisors approved rezoning applications that set forth the New Town binding Master Plan and Design Review Guidelines.

Since then, the Board has amended the guidelines several times as new sections have been developed. The design guidelines were prepared by Cooper, Robertson & Partners, and the New Town Design Review Board was created to review all development plans within the New Town Master Plan area for compliance with the guidelines. Both the guidelines and master plan established standards for different areas of New Town. As development continues many of the original design features are now taking shape, and the New Town Design Review Board has been instrumental in adhering to the design guidelines, thus ensuring that the original concept is realized.

The area designated as the New Town CCA is mostly the same area shown on the adopted master plan for New Town; however, some parcels located within the CCA are not part of the master plan or subject to the same proffers. For the parcels that are located within the New Town Master Plan area and which were rezoned, development must follow the standards provided by the adopted design guidelines. For the parcels that are in the New Town Master Plan area and referenced in the design guidelines but were not rezoned or bound by proffers, development is strongly encouraged to follow the design guidelines. For parcels located outside the New Town Master Plan area, development is encouraged to follow New Town's architectural and design features in order to maintain a unifying look and feel to the area.

Five Forks





Figure CC-8. Five Forks CCA

Five Forks is an area that retains elements of a village character, including two original buildings dating to the early 1900s: the original Five Forks School and the neighboring teachers' residence, located near the corner of Ironbound and Ingram Roads. Both are good surviving examples of American four square construction and have influenced the design of newer buildings directly adjacent, which were designed to share a vernacular appearance.

This area has grown and changed, and as a result, the Board of Supervisors created the Five Forks Area Study Committee in June 2004 to listen to the views of County citizens, particularly those who live and work in Five Forks. The Committee's purpose was to recommend principles that preserve and build upon the many positive qualities of Five Forks, including protecting both creek watersheds and safeguarding the village character of the area.

These principles addressed residential growth, commercial development, traffic concerns, and alternative transportation, and called for the creation of the Five Forks Community Character Area to incorporate design standards for future development. The Board of Supervisors adopted the Primary Principles for the Five Forks Area in August 2004.

Five Forks is an area that retains elements of a village character, including two original buildings dating to the early 1900s.

Other Special Places

While not all areas that contribute to the County's character have historic or distinct architecture and definable boundaries that would qualify them as Community Character Areas, they are still special to the community because of historic, aesthetic, natural, and/or cultural elements that exist in these locations. Because of this, additional consideration should be given to enhancing and building the character of these areas. Based upon citizen comments as well as a review of documents from the Historical Commission and the book, *James City County: Keystone of the Commonwealth*, three special places have been identified for their contributions to the greater community: the Grove, Croaker, and Forge Road communities.

Grove

Grove is a community in the southeastern portion of the County, valued for its historic, cultural, and agricultural roots. Bordered by the James River to the west and separated from the Newport News city limits by Skiffes Creek, the area was originally part of the Powhatan Confederacy before being colonized by the English. Historic sites in Grove related to Virginia's colonial past include the archaeological site of Wolstenholme Towne, the administrative center of Martin's Hundred dating to 1618, and Carter's Grove Plantation, built in 1755. The Grove community was probably named for nearby Grove Creek, which drains into the James River about six miles east of Jamestown. It may also have been named after Carter's Grove Plantation.

The southeast portion of Grove was largely agricultural through the 1990s before being developed into industrial parks. While the physical presence of Grove's agricultural roots has decreased, a small amount of agricultural land remains on the Carter's Grove property, which is currently included in the Agricultural and Forestal District program.

Grove's present day development began with African-American settlement by freedmen from Carter's Grove and other plantations following the American Civil War. Its population was fewer than 100 people until after the turn of the 20th century. The African-American population increased during the two World Wars, due in part to attracting hundreds of people displaced by federal land acquisition for military installations, including the Naval Weapons Station, Cheatham Annex, and Camp Peary. Grove eventually became the largest African-American community in the County and was commemorated with a Historical Highway Marker in 2013.

Today, Grove is an active community with increasing amenities and programs, including the Abram Frink, Jr. Community Center, the Community Garden, and Grove Community Playground, which was recently refurbished. Proposed additions by the County include a Lower County Park and a new Convenience Center, both cited in the top five priorities by the Planning Commission in the adopted 2021-25 Capital Improvements Program. Additionally, a segment of Pocahontas Trail will be widened and has undergone a VDOT corridor study with public feedback. To help protect and complement the visual character of the community, Pocahontas Trail, the main thoroughfare through Grove, is a designated Community Character Corridor. Any new development along this route must adhere to CCC buffer requirements. As the area grows and industrial development brings jobs and new residents, it will continue to be important to identify and enhance the special character of Grove.

Other Special Places

Croaker

Croaker is a community on the south bank of the York River. The name "Croaker" is believed to have derived from the abundant quantity of Atlantic Croaker, an inshore, bottom-dwelling fish. The community of Croaker was known in its early history as Taskinas Plantation, then Hollywood due to the many holly trees. "Taskinask" was designated by the Tobacco Inspection Act of 1730 as the site of the public tobacco warehouse where local planters stored their crops to be shipped to England. While much of Croaker is now within York River State Park, the remaining area is divided among residential, farming, and woodland areas, which was highlighted as a special place by citizens. The Croaker community includes many historic resources. Croaker Landing, an archaeological site listed on the National Register of Historic Places (NRHP) since 1987, contains evidence of Native American habitation throughout the Woodland Period (c. 1000 B.C. - A.D. 1600). Riverview Plantation, a historic Federal and Greek Revival home dating to the 1850s with early 20th century additions, is also listed on the NRHP. The grounds of Riverview also include contributing structures dating to the 1940s.

Riverview Road from Croaker Road to York River State Park has been designated as an open/agricultural CCC, which enhances the County's ability to preserve the special character of this area. Valued for its history as an agricultural community, the farming and natural character of the area is notable as one of the few agricultural communities left in the County. Since the opening of York River State Park much of the scenic beauty of the areas has been preserved for generations to come, but special attention should be given to acknowledging and protecting the remaining agricultural character of the area.

Forge Road

As colonists moved inland from Jamestown along the waterways, the land bound by the Chickahominy River and Diascund Creek was rapidly settled. By the mid-18th century a number of large farms were established in the area that would become the Forge Road corridor. In this area, troop movement occurred during both the Revolutionary and Civil Wars. The Revolutionary War-era Chickahominy Shipyard, destroyed by the British in 1781 and now included on the National Register of Historic Places, was accessed from Forge Road. Despite the activity that took place in this area during the Revolutionary and Civil Wars, a significant number of 18th and 19th century homes survive today along Forge Road. Architectural remnants which reflect the agrarian heritage of the Forge Road community include the homes of Windsor Castle, Lombardy, and Warrenton.

Today the vistas seen from Forge Road are of larger, pastoral parcels, used primarily for agricultural purposes. The relatively flat terrain along the road has mostly been cleared for residences, crops, or livestock, with denser clusters of trees located at the rear of parcels or around bodies of water. Houses and other structures tend to be set back farther from the road. Much of the land in this area has been recognized for having prime farmland soils and has been an attractive area for horse-related uses. The County has invested in various open space purchases along this corridor.

Forge Road is a two-lane road with a shoulder and is designated as an Open/Agricultural CCC. Additionally, Forge Road at the intersection of Richmond Road is within the Toano CCA. Given the area's historic significance, the agricultural value of the land and the unique and attractive viewshed, the County has been careful regarding road improvements to Forge Road for vehicular traffic. Future development proposals for Forge Road will be encouraged to preserve the agricultural economy that has defined the rural character rooted here for generations.

Factors that Influence Community Character

There are many different factors that can influence community appearance and character. In James City County, factors such as architectural and design elements, the preservation of natural resources, and the area's historic and cultural heritage are important elements that contribute to the overall character of the County.

Neighborhood and Community Appearance

While market conditions greatly determine the type of housing and commercial product offered to citizens, the County can influence the design and appearance of the community to meet the ideals expressed by citizens. Public input shows that many residents value the history and culture of the area, as well as the small-town and friendly atmosphere the County offers. Elements of development can reflect these characteristics that help make James City County a special place for its residents. They are addressed in many ways, from suggestions and requirements for new development to expectations for public plans and improvements.

County Policy and Beautification

The County employs development review and other techniques for beautification. The County has designated funds toward the beautification of high profile corridors, intersections, and public areas in the County, including landscape planting and maintenance. Landscaping has been installed along Humelsine Parkway, Monticello Avenue, Richmond Road, Jamestown Road, Anderson's Corner, and many other areas. County staff also created a sound wall policy and provided feedback regarding landscaping and sound walls to the Virginia Department of Transportation (VDOT) for the I-64 widening project. In addition to landscaping, James City County funded the replacement of standard VDOT signs along Humelsine Parkway and adjacent roads with signs more complementary to the character of the area. Previous efforts include the installation a new wayfinding system in anticipation of the Jamestown 400th Anniversary Commemoration, completed in 2006. This was a regional effort to make the entire Historic Triangle more navigable, with signage that was easier to read and more aesthetically pleasing than the standard VDOT signs.

The County's Sign Ordinance also includes regulations intended to safeguard against inappropriate or excessive signage that may be incompatible with the surrounding character of the area. The Sign Ordinance was amended in 2017 in response to a Supreme Court ruling which stripped localities of the ability to regulate signage based on content, but protections against nuisance signage remained as strong as possible through clarifications to the County's definitions and regulations. Examples include restrictions against off-site signs, illuminated signs, temporary signs, and new billboards, along with specifications for sign dimensions relative to a building façade's surface area. Colors and design of signs are further reviewed for aesthetic compatibility when located on a CCC, within a CCA, or as required by proffers and conditions. Reducing distractions, obstructions, and visual clutter helps protect the historic and natural character of the County, as well as promote traffic and pedestrian safety.

Character Design Guidelines

Historically, the County has been able to review architectural elevations and/or design guidelines when required for legislative cases. The resulting documents typically then become a binding commitment through conditions or proffers. However, design guidelines are specific to the vision of the developer and may have limited consistency in the elements addressed as compared to other development.

The James City County Engage 2045 Comprehensive Plan update is grounded in the idea that County residents should steer the future of their community through clear and open engagement in the planning process. Community engagement opportunities have included a variety of surveys, forums, meetings, and other venues for input on growth, goals, appearance and other topics. Through these engagement opportunities, residents have expressed interests in preserving aspects of James City County's appearance and character that can be shaped by design guidelines.

The James City County Design Guidelines, found in Appendix H, are an important new tool to achieve community character goals. The Guidelines present standards and best practices for lot siting, building placement, building form, access, and landscaping across the County. The Guidelines were developed to support the goals of the James City County Comprehensive Plan and reflect the community's preferences and priorities for the County's continued growth in coming years. The Guidelines ensure that new development is contextual and reflective of James City County's unique natural, historic, and cultural resources, promotes the walkable scale and character the residents appreciate in their neighborhoods, directs new growth to embody sustainable land use practices and landscaping that preserve and protect the County's community character, and contribute to continued distinct character and economic vitality throughout the County.

The Guidelines are divided into chapters covering Site and Street Design; Rural; Small Lot (one unit per lot: single-family and multi-family units); Apartments; Commercial & Industrial; and Mixed Use. The Guidelines focus on guidance for development form and placement, and are intended to complement the guidance on use and development scale/intensity found in the land use designation descriptions in the Land Use Chapter. In addition, the Guidelines are intended to complement, but not supersede, the guidance provided in this chapter for the geographically-specific Community Character Corridors and Community Character Areas. Development proposals will also still need to meet Zoning Ordinance requirements.



The new Comprehensive Plan, with the addition of strong Character Guidelines based on public input, will considerably enhance the County's ability to shape new development so that it is more sensitive to community character and design quality standards.

Preserving Vegetation during Development

Landscape requirements per the Zoning Ordinance, open space requirements per the Chesapeake Bay Preservation Ordinance, and buffer preservation all play a role in retaining existing trees and vegetation during development. Listed below are some of the Zoning Ordinance requirements that help the County preserve vegetation during development.

- *CCCs and Right-of-Way Landscape Requirements.* When development occurs along a right-of-way, landscape buffers directly adjacent to the right-of-way are required to be preserved or installed. CCCs require a 50-foot buffer for commercial projects and a 150-foot buffer for major subdivision projects. All other roads require a 30-foot buffer for commercial projects and a 75-foot buffer for major subdivision projects.
- *Transitional Screening.* When development occurs adjacent to a conflicting land use, such as a commercial development next to a residential district, an enlarged buffer is required between the two uses. The buffer is required to be preserved in its natural and undisturbed state. If the buffer is not vegetated, then screening landscaping is to be installed.
- *Perimeter Buffers.* The side and rear perimeters of parcels located in commercial or industrial districts that are not adjacent to a roadway or require transitional screening must have a 15-foot landscape buffer. These buffers are to be left in their natural undisturbed state, unless supplemental planting is needed.
- *Phased Clearing Plan.* A Phased Clearing Plan is required for any development that disturbs more than 25 acres. This requirement is intended to minimize the size of areas of land to be cleared at once, enabling developers to lessen the visual and environmental impacts that the clearing causes.
- *Outstanding Specimen Tree Designation.* The Zoning Ordinance includes an Outstanding Specimen Tree Designation. This designation allows developers to gain five credits toward fulfilling tree planting requirements. This incentive is intended to make it more economically feasible and practical for developers to preserve large healthy specimen trees.
- *Tree Protection and Criteria for Removal.* The Zoning Ordinance establishes criteria and standards for the protection of existing trees in accordance with specifications contained within the Virginia Erosion and Sediment Control Handbook.

These constitute a comprehensive and extensive set of County regulations to preserve vegetation. By implementing the following procedures to enforce these regulations, the County endeavors to improve the quality of tree preservation efforts and ensure the integrity of buffers:

- Concurrently conduct plan reviews by both Stormwater & Resource Protection Division and Planning Division staff.
- Enforce the language of the tree protection Landscape Ordinance.
- Emphasize tree protection measures during pre-construction meetings.
- Train the County Stormwater & Resource Protection Division inspectors on proper tree protection measures and identification of native plants.
- Strictly enforce tree protection measures during development and follow up on violations found in the field for encroachment into protected areas, as well as for damage associated with improper tree protection techniques.

Historic Preservation

Historic Sites

The character of James City County is closely linked with the numerous known and unknown historic sites within its boundaries. As home to Native American settlements dating to prehistoric times, Jamestown Island, the Battle of Green Spring, and the first free black settlement, just to name a few, the County is known for its diverse wealth of nationally significant historic and archaeological resources. Currently, the County has 18 properties on the National Register of Historic Places and/or the Virginia Landmarks Register, detailed in Table CC-2. The newest addition to these registers is the Toano Commercial Historic District, approved in 2018 at the state level, and 2019 federally.

Table CC-2. Properties Listed on the Virginia Landmarks Register and/or the National Register of Historic Places

Property Name	Property Type	Virginia Landmarks Register	National Register of Historic Places
Amblers House	19th-century dwelling	X	X
Carter's Grove*	18th-century plantation	X	X
Chickahominy Shipyard Archaeological Sites	18th-century shipyard	X	X
Colonial National Historical Park/Colonial Parkway	Collection of noncontiguous 17th-/18th century sites and 20th century scenic parkway		X
Croaker Landing Archaeological Site	Prehistoric archaeological site, middle-late Woodland Period	X	X
Governor's Land Archaeological District	17th-century English settlement sites	X	X
Green Spring Archaeological Site	17th-century plantation	X	X
Hickory Neck Church	18th-century church	X	X
Jamestown National Historic Site	17th-century village	X	X
Kingsmill Plantation Archaeological District	18th-century plantation	X	X
Norge Train Depot	20th-century train depot	X	X

Property Name	Property Type	Virginia Landmarks Register	National Register of Historic Places
Paspahegh Archaeological Site	Prehistoric Native American settlement	X	X
Pinewoods (Warbuton House)	17th-century dwelling	X	X
Powhatan	18th-century dwelling	X	X
Riverview	19th-20th-century dwelling	X	X
Stone House	c. 17th-century structure, unknown origin	X	X
Toano Commercial Historic District	Early 20th-century commercial center	X	X
Tutter's Neck Site	18th-century dwelling	X	
White Hall	19th-century dwelling	X	X
Windsor Castle	18th-century dwelling	X	X

Source: Virginia Department of Historic Resources.
*Also Designated a National Historic Landmark



Archaeological Studies and Policies

The County's Archaeological Policy was adopted by the Board of Supervisors in 1998 and applies to legislative rezoning and SUP cases, ensuring the identification and protection of sites as new development occurs in the County. The policy recommends adding a condition to all appropriate legislative cases requiring archaeological studies within the proposed limits of disturbance.

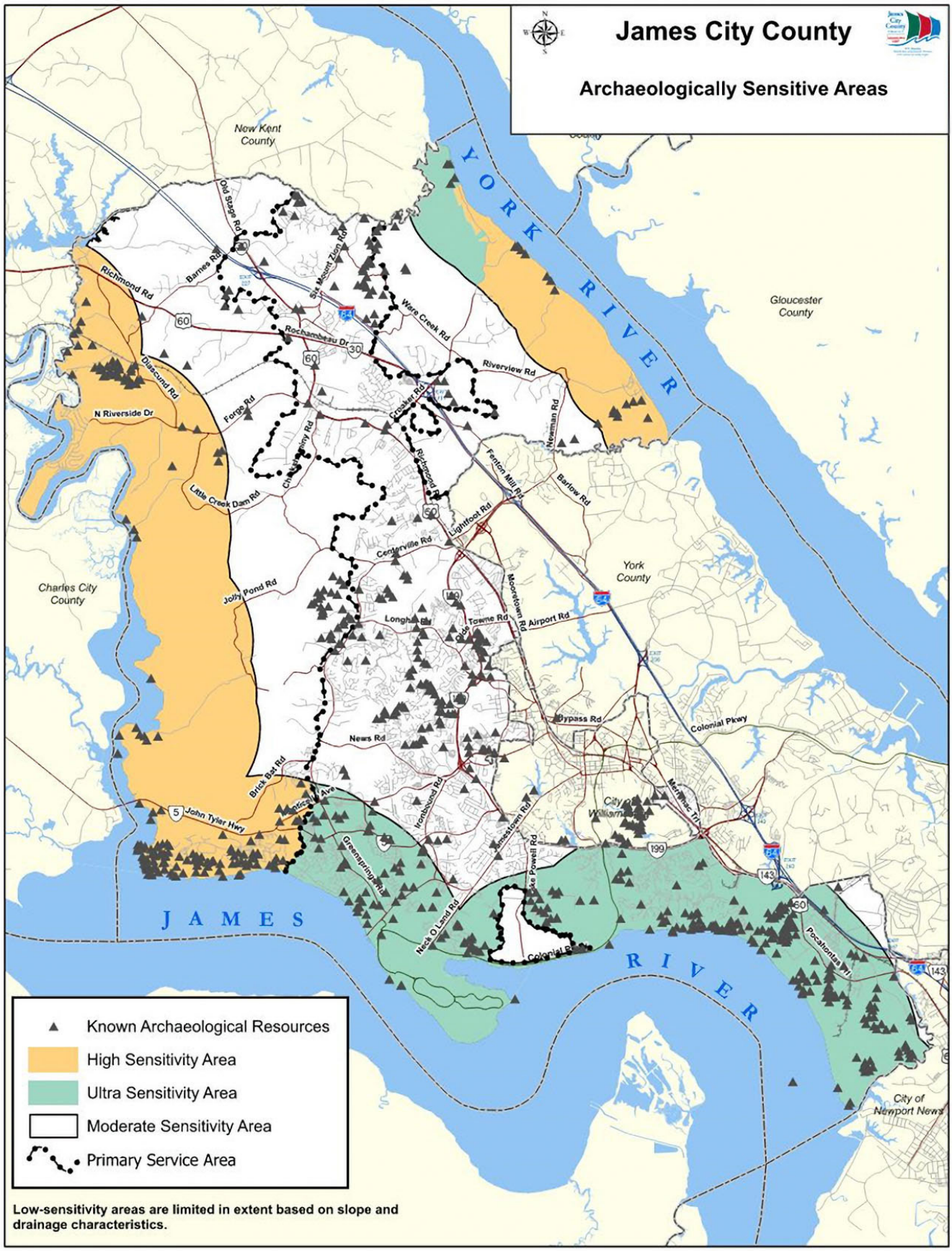
Submitted studies are reviewed by the Virginia Department of Historic Resources (DHR) for conformance with DHR's *Guidelines for Conducting Historic Resources Surveys* in Virginia and the Secretary of the Interior's *Standards for Archaeological Documentation*. Sites that are identified as potentially eligible for the National Register must conduct further studies to either preserve the site in situ or excavate and document the materials found within the site per an approved treatment plan.

In 2018, the policy was converted to an Ordinance requirement for non-legislative development projects that require a site plan. This ensured that by-right projects would be subject to the same archaeological requirements as legislative cases, and provided further assurances that unknown archaeological resources would be preserved or documented within the County.

In addition to development-related requirements, the following studies have been commissioned to identify and evaluate the archaeological and historic resources in the County, and future opportunities for updates to these studies could be explored:

- *Toward a Resource Protection Process* is a cultural resource preservation plan for James City County, York County, Williamsburg, and Poquoson written by the Colonial Williamsburg Foundation in 1986.
- *Toward a Resource Protection Process Update (RP3)* is a 1992 update to the 1986 plan.
- *Preserving Our Hidden Heritage* is an archaeological assessment of historic resources in James City County written by the College of William and Mary Center for Archaeological Research in 1997. Map CC-2 illustrates moderate, high, and ultra-sensitive resource areas in the County as identified by this study. An update to this plan should be considered.
- An architectural survey was begun by the County in 1999 and was expanded in 2006 to include 223 historic properties. The survey establishes historic contexts, which are guides that categorize these properties by period of time, ethnic and cultural background, and how they were influenced by historical events of the times. Each historical context has its own set of historical and architectural themes. The survey has been an important planning tool in negotiations with developers to demonstrate the importance of the structure and why it should be preserved. Some notable successes are the redevelopment in the Five Forks area of the former school building and the renovation of the Power's house on Richmond Road in Toano.

Map CC-2. Archaeologically Sensitive Areas



Historical Commission

In 1985 the Board of Supervisors established the Historical Commission, whose mission is to further the efforts of the County to document, commemorate, preserve, and promote public interest in the history and historic legacy of the County. The Commission meets bimonthly September through May each year, and in cooperation as appropriate with County agencies and other public or private bodies, carries out the following objectives:

- Ensure that historic buildings and archaeological sites are surveyed, identified, and documented within the County;
- Assemble, preserve, and disseminate information respecting such buildings and sites;
- Advise the County government and appropriate private parties on historical considerations relating to the use and development of land, waterways, and other resources within the County; and
- Conduct and encourage educational activities that will stimulate interest in the history and archaeology of the County.

Typical projects for the Historical Commission include funding new historic highway markers through DHR's historic highway marker program, presenting annual Historic Preservation Awards to community members or groups who have made significant local contributions, and commissioning architectural/archaeological studies of important sites.

Utility Lines

Utility lines include electrical, natural gas, petroleum, water and sewer transmission, and communication lines and related facilities. Many utilities are placed underground or are substantially screened for safety reasons. Although all new utilities are required to be placed underground unless granted an exception by the Planning Commission, the visual impact of existing or proposed above-ground utilities can be substantial and can increase as lines are upgraded and expanded. Not only is undergrounding of utilities an important aspect of Community Character, it also helps to improve reliability since underground utilities are less susceptible to damage during storm events and vehicle accidents.

Placing existing utilities underground can be costly and difficult. Often the most efficient way to accomplish the burial of utility lines is in conjunction with transportation projects where the County does not have to bear all the costs. Recent and upcoming examples of burying utility lines concurrently with road projects include the widening of Longhill Road and Croaker Road, and turn lane construction along Olde Towne Road. Past examples include projects along Jamestown Road, John Tyler Highway, and Ironbound Road. Given this efficiency and broader benefits, it will continue to be the policy of the County to evaluate and pursue burial of existing utilities in conjunction with transportation projects.

Communications Facilities

In 1998, the increasing need for new wireless communication facilities (WCF) prompted the County to establish a new division in the Zoning Ordinance to address them, along with the *Performance Standards for Wireless Communication Facilities* policy. Through the use of the new Ordinance and policy, the County sought to accomplish the following:

- Keep the number of WCF sites to a minimum;
- Minimize the impacts of newly approved WCF facilities; and
- Expedite the approval process for new WCF applications.

The Ordinance and performance standards strived to mitigate the impact of WCF on the viewsheds of surrounding areas. This could be achieved by constructing towers below the surrounding tree line or built as a camouflaged structure to blend in with the surrounding natural and man-made environment. The Ordinance also included protections against new towers in certain residential districts.

Amendments to the WCF Ordinance and policy were approved in 2012 and in 2016 to ensure compatibility with new technologies, promote by-right options for hidden antennas, add protections against by-right towers within residential districts, and clarify mechanisms to review certain systems that were not defined at that time.

To capture the scope of these amendments, the language of the Ordinance and policy was broadened to include communication facilities, antennas, towers, and/or support structures (CATS). In addition to meeting the requirements of the Spectrum Act, the 2016 CATS updates included revisions and clarifications regarding height triggers for new towers such as:

- By-right heights for new towers were lowered in certain districts, and in other districts new towers became a specially permitted use or not allowed.
- Camouflaging of towers continued to be encouraged or required wherever possible.
- Protections for residential districts remained.

In 2020, the CATS Ordinance was again revised for compatibility with new State Code changes to support the deployment of 5G technology. These changes affect how localities can process applications for CATS and establish by-right administrative review procedures for certain new structures up to 50 feet in height.

While new state and federal mandates erode local zoning authority to regulate new and modified facilities, the County has stayed firm wherever possible to continue requiring camouflaged towers and other impact-reducing measures to protect local viewsheds.

Open Space Preservation - Community Character Aspects

The Land Use Chapter describes the County's Open Space preservation goals and approaches, including the concept that proceeding in a way that integrates different categories of resources, as well as integrates different possible programs and stakeholders, will likely lead to the best results for the County. As described throughout the preceding sections, categories central to this chapter that are, and will continue to be, facets of the County's Open Space preservation approach include:

- **Historic Preservation and Cultural Heritage Landscapes**
- **Scenic Properties and Scenic Viewsheds**
- **Agricultural and Forestal Lands**
- **Entrance Corridors and Road Buffers, including Community Character Corridors**
- **Open Spaces that complete or enhance the County's Community Character Areas, neighborhoods and other built environments**

An integrated approach that considers the resources above will be one important tool in achieving community character goals.

Community Guidance

Public Engagement

Public input for the Community Character Chapter was received at key points of the Engage 2045 process. The 2019 Citizen Survey was conducted in the spring of 2019 and the results were reported in the summer. Responses related to the Community Character Chapter were generally consistent with the results from the 2014 Citizen Survey. When asked for their opinions regarding the preservation of the County's rural character 69% were satisfied with existing efforts to protect and preserve the County's rural character. Regarding the visual appearance of buildings in the County and preservation of farm land, 84% of respondents ranked the visual appearance of buildings within new developments in the County as very important or somewhat important and 78.5% of respondents strongly agreed or somewhat agreed that is more important to preserve farmland in the County thank it is to have more development.

Open-ended responses from the 2019 Citizen Survey showed that respondents found that was better to have neighborhoods in which there is a mix of housing options and small scale retail and office development.

The first round of community engagement was held in the fall of 2019 during the Summit on the Future event. Ninety percent of respondents indicated that it was somewhat or very important for the County to do more to improve our efforts to protect and preserve our rural character in the County. Forty-six percent supported locating any new development inside the Primary Service Area (PSA) on empty lots in already developed areas as a top choice and 71.3% supported protecting as much rural and environmentally sensitive land as possible Participants were also provided an opportunity to share their "Big Ideas." Responses to this activity indicated support for preserving the "small town" character and encouraging development/redevelopment to locate inside the PSA.

The second round of community engagement was held in the fall of 2020 to evaluate the existing Comprehensive Plan goals and the future land use alternatives. The Establishing our Goals questionnaire asked respondents to compare the goal from the Community Character Chapter in the 2035 Comprehensive Plan to the Engage 2045 Public Input Priority for Community Character and to evaluate if any changes should be made. Of the 131 responses received, 75.6% said that the goal should remain the same and 21.5% said that the goal should be changed.

The third round of community engagement was held in the winter of 2021. This round solicited input on policy directions the County should pursue and actions it should take to enable citizens' vision for the future of our community to be realized. Overall, there was consistent support for enhancing quality of life amenities in James City County with a strong emphasis on walking and biking facilities. Respondents supported prioritizing County resources for enhancing quality of life amenities. They also supported prioritizing walking and biking amenities in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways.

Throughout the planning process, there has been consistent public support to prioritize protection of the County's unique community character, particularly the character of rural lands and communities in the County. In Round 3, there was strong support for styles of development that reduce development intensity supported through the expression of values for natural beauty, agricultural conservation, privacy, walkability, historical architecture, and community.

Round 3 participants' primary community character concern was preserving the existing rural and low-density development patterns in James City County. Participants believed that rural residential development must be planned with farmland preservation in mind, but participant comments revealed disagreements in how to achieve this. Participants generally associated high-density development with increased traffic and a lower quality of life. However, there was evidence that middle density land uses could be supported with County-compatible designs and the incorporation of nature and green spaces. Respondents expressed support for higher densities within mixed use and employment contexts that provided walkability and opportunities for interaction.

The Character Design Guidelines questionnaire inputs were leveraged to update the County's Character Design Guidelines. The findings from this engagement reinforce and reaffirm the direction of design standards and the preexisting standards that the County was following. Resident feedback regarding density, scale, and character in many ways echoed the feedback collected in Rounds 1 and 2, and reflected the County's ongoing efforts to encourage that any new growth be contextually appropriate and contribute to local heritage and character. This feedback also guides priorities and preferences in the Design Guidelines.

Throughout the planning process, there has been consistent public support to prioritize protection of the County's unique community character, particularly the character of rural lands and communities in the County.

Spotlight on Implementation

Retaining and enhancing Community Character in James City County is furthered through the establishment of CCCs and CCAs and the preservation of scenic, cultural, rural, agricultural, forestal, natural, and historic qualities. The County has endeavored to be good stewards of the land by taking actions that support this goal.

Creating clear guidance for development along CCCs and working with developers to create sensitive designs in CCAs, such as the Food Lion/CVS in Norge, the redevelopment of Lightfoot Market Place, and the new fire station in Toano have helped ensure compatibility with neighborhood character and reinforced a sense of place. Adopting new lighting Ordinances with dark sky principles as well as guidelines for sound wall design and landscape treatment have helped to preserve and enhance community appearance. Additionally, several policies including those related to street tree plantings and pedestrian/bicycle accommodations were converted to Zoning Ordinance requirements so that they now apply to all new development, including by-right development, meeting certain criteria. The Pocahontas Trail Corridor Study engaged the community to identify key transportation needs and define a vision for the future of the corridor. These regulations and guidance help ensure that future projects and private development will be mindful of the local context and the opportunities to strengthen the area's aesthetic tapestry.

The County capitalized on the opportunity to bury utilities along Longhill Road concurrently with the Phase 1 widening project, allowing efficient use of resources and promoting community character while also stabilizing utility services for residents. Other improvements planned for the Longhill Road Phase 1 corridor include improved access management strategies at several intersections, a roundabout at one intersection (Longhill Road and Williamsburg Plantation Drive), signal system wireless interconnects, construction of bus pull-off areas, and pedestrian improvements in the form of a multiuse path and crosswalks with pedestrian push buttons.

Funding was also approved for similar improvements along Croaker Road which are in the process of coming to fruition. These include a road widening from two to four lanes with a new two-lane bridge parallel to the existing bridge over the CSX line to accommodate additional travel lanes. There will also be a new multipurpose trail to connect the library, residential areas, and commercial areas, and utilities will be relocated underground.

Through a Revenue Sharing Program with VDOT approved in 2018, the Toano area will also see a variety of improvements along a 0.5-mile section of Richmond Road from Forge Road to the entrance of Toano Middle School. These include improvements to the storm drain system, pedestrian and bicycle accommodations including crosswalks, ADA upgrades, and bike lanes, and other safety improvements such as grass medians to restrict turning movements and improve traffic safety.

As stated previously, many businesses desire to locate in this area because of its unique community character. Upholding this character through careful and deliberate design is essential to attracting and retaining a viable and diverse economic base, which ensures that future generations will want to live, work, and visit the area. Looking to 2045, James City County will continue to promote policies and regulations that further the efforts of preserving community character.

Goals, Strategies, & Actions

Goals

CC - The County will be a good steward of the land by preserving and enhancing the scenic, cultural, rural, farm, forestal, natural, architectural, and historic qualities that are essential to the County's distinctive character, economic vitality, and the overall health and quality of life of its residents.

Strategies and Actions

CC 1 - Preserve and enhance entrance corridors and roads that promote the rural, natural, or historic character of the County.

CC 1.1 - Ensure that development along Community Character Corridors (CCCs) protects the natural views of the area; promotes the historic, rural, or unique character of the area; and establishes entrance corridors that enhance the experience of residents and visitors.

CC 1.2 - Continue to explore opportunities and cost-sharing arrangements to bury overhead utilities in Community Character Corridors and Community Character Areas through transportation initiatives.

CC 1.3 - Monitor the status of billboards throughout the County and pursue action, where possible, to remove billboards using all currently available methods, and explore and pursue any new methods as they become available.

CC 1.4 - Pursue the expenditure of public funds from sources such as the Capital Improvement Program (CIP) to enhance the appearance of highly visible focal points of the County, including, but not limited to, County entrance corridors, median areas, interstate interchanges, and undeveloped parcels fronting on thoroughfares. Entrance corridors and roads in the proximity of historic landmarks should be prioritized for improvements. Improvements include, but are not limited to, placement of existing utilities underground, beautification through sustainable landscaping or buildings changes, and the acquisitions of easements and properties. The County shall continue to coordinate corridor enhancement efforts within the County and surrounding localities to achieve compatible, attractive corridors.

CC 1.5 - Preserve the character of rural roads by identifying roads that should be preserved and work with the Virginia Department of Transportation (VDOT) to maintain their rural character while providing an acceptable level of safety.

CC 1.6 - Carefully monitor development along roads that are important to maintain community character so that the build-out of surrounding areas will not require improvements such as road widening that disrupt the community character of the areas.

CC 2 - Maintain the unique heritage and identity of designated Community Character Areas (CCAs) within the County.

CC 2.1 - Ensure that development in CCAs protects the natural views of the area; promotes the historic, rural, or unique character of the area; and establishes entrance corridors that enhance the experience of residents and visitors.

Goals, Strategies, & Actions

CC 2.2 - Within the CCA boundaries, continue to establish development management and preservation techniques to meet specific historic preservation and community character needs. Encourage development patterns and building designs that maintain and reinforce the visual separation of CCAs.

CC 2.3 - In New Town, continue to support the design review process by working closely with the New Town Design Review Board and supporting the implementation of New Town's design guidelines.

CC 2.3.1 - For areas within the New Town CCA but not subject to the New Town Master Plan and/or proffers, ensure that new development is consistent with existing adjacent development and the New Town design guidelines.

CC 2.4 - In Toano, ensure that developers apply the adopted design guidelines to projects within the Toano CCA.

CC 2.4.1 - Consider updates to the Toano CCA Design guidelines to complement the Toano Commercial Historic District.

CC 2.5 - In Five Forks, ensure that developers apply the adopted Primary Principles to projects within the Five Forks CCA.

CC 2.6 - In Norge, consider development and adoption of formal design guidelines.

CC 2.7 - In the Jamestown/Greensprings area, consider development and adoption of formal design guidelines, and/or guidance on maintaining the historic and rural/wooded character of that area.

CC 3 - Preserve and enhance neighborhood and community appearance.

CC 3.1 - Protect vistas and other scenic resources and encourage building, site, and road designs that enhance the natural landscape and preserve valued vistas. These designs should also minimize any potential negative impacts with regard to noise and light pollution and other quality of life concerns.

CC 3.2 - Require illustrative drawings, including streetscapes, architecture, and perspectives as a binding component for appropriate rezoning and special use permit applications.

CC 3.3 - Continue to improve and protect the character of the County through use of the Character Design Guidelines.

CC 3.3.1 - Further the use of the Character Design Guidelines in legislative review processes and encourage private developers to familiarize themselves with these guidelines as part of educational materials and pre-application meetings.

CC 3.3.2 - Incorporate the Character Design Guidelines in appropriate portions of the Zoning and Subdivision Ordinances, policies, and other regulations.

CC 3.3.3 - Incorporate elements of the Character Design Guidelines in other County policy documents and explore if any of the elements could be converted into regulations within the zoning and subdivision ordinance.

CC 3.3.4 - Continue to evaluate the Character Design Guidelines and update, revise, and enhance the Guidelines regularly.

CC 3.3.5 - Consider developing Character Design Guidelines for rural areas in the County.

CC 3.3.6 - Consider incorporating elements of the Character Design Guidelines into the future land use guidelines in the Land Use chapter to ensure consistency between the Community Character and Land Use guidelines.

CC 4 - Integrate community character considerations in open space planning and programs.

CC 4.1 - Continue to gather and gain technical knowledge on data that is available to help the County identify and map its archaeological, historic, and cultural assets, and, where appropriate, use such data as an information tool to help guide decisions during the creation of regulations and policies, to provide guidance to property owners and development proposal applicants on lands best suited for development, and to inform open space preservation efforts.

CC 4.2 - Devote resources to and operate programs to preserve or enhance components of the County that significantly contribute to community character, including historic properties and cultural heritage landscapes, scenic properties and viewsheds, agricultural and forestal lands, and entrance corridors, community character corridors, community character areas, and other special places. Integrate these considerations with others found in the Parks and Recreation, Environment and Land Use chapters. In addition, collaborate with other entities, the private sector, and landowners in these efforts.

CC 5 - Preserve existing vegetation as possible and appropriate during development.

CC 5.1 - Use County Ordinances and/or policies as enabled by the Code of Virginia to require a more detailed phased clearing plan that minimizes the removal of existing trees and ensures tree preservation requirements are implemented during the site plan review and pre-construction phase of development. Consider developing requirements for County staff to inspect projects pre-and-post construction specifically to ensure compliance with the tree protection requirement of the Zoning Ordinance.

CC 5.2 - Promote the Optional Specimen Tree Designation to enable more developers to preserve specimen trees that are not within required tree save areas.

CC 5.3 - Continue to enforce existing methods/requirements the County uses during planning, pre-construction, construction, and post-construction phases to make sure tree preservation measures are properly performed, resulting in healthier trees, buffers, and proper maintenance.

CC 5.4 - Evaluate the appropriateness of street trees along narrow streets or located in neighborhoods with reduced setbacks and update the Streetscape Policy Guidelines accordingly.

Goals, Strategies, & Actions

CC 6 - Identify and protect archaeological and historic sites.

CC 6.1 - Require that archaeological studies for development proposals are conducted and require their recommendations to be implemented.

CC 6.2 - Update the document Preserving Our Hidden Heritage, an assessment of the archaeological resources in James City County. Review the document prior to each Comprehensive Plan revision and perform a complete revision every 10 years to include new site surveys.

CC 6.3 - Pursue the preservation of historic and archaeological sites of the County by:

CC 6.3.1 - Enlisting the assistance of the County's Historical Commission in updating the County's inventory of historic places.

CC 6.3.2 - Promoting voluntary techniques for preservation of these properties.

CC 6.3.3 - Considering designating areas of the County as historic districts or historic corridors with architectural review.

CC 6.3.4 - Discouraging the demolition or inappropriate use of cultural and historic resources through regulatory and voluntary techniques.

CC 6.3.5 - Integrating the results of the architectural survey into the planning process.

CC 6.3.6 - Exploring opportunities to preserve and enhance Community Character Areas such as those found in Five Forks, Norge and Toano through use of partnerships, pattern books, and design guidelines.

CC 7 - Keep pace with the changes in wireless communication technology to better enable providers to preserve existing community character while providing quality service.

CC 7.1 - Update the Communications Facilities section of the Zoning Ordinance as necessary to accommodate the use of new and emerging wireless communication services while preserving community character.

PARKS AND RECREATION

Introduction

Parks and recreation programs and facilities are integral parts of James City County's public service system. The outlook on parks and recreation has dramatically changed from the 1970s when the County contributed funding to the City of Williamsburg in order to secure access to recreational services for County residents. A pilot summer playground program in 1980 led to the creation of the James City County Parks & Recreation Office in 1981. In 1982, the Board of Supervisors adopted a parks and recreation system master plan that resulted in the development of Upper County Park, Veterans Park (formerly Mid County Park), and the James City County Recreation Center in the 1980s. The plan also laid the groundwork for construction of the Abram Frink Jr. Community Center, which opened in 1994 in the same building as the James River Elementary School, and for the purchase of Chickahominy Riverfront Park in 2001.

A revised master plan was adopted in 1993. Community input to the plan confirmed that well-planned parks, offering a variety of recreational opportunities and quality programs for all ages and incomes, are essential for maintaining the high quality of life enjoyed by County residents. The 1993 plan set forth an ambitious proposal for property acquisition and development to augment the County's 147 acres of existing parks. Subsequent major developments included the 1995 purchase of the land that became Freedom Park, the 1996 expansion of the James City County Recreation Center, and the opening of the Warhill Sports Complex in 1999. The 1993 plan also emphasized the importance of water access and the need to develop trails, bikeways, and greenways. These objectives took longer to implement - the Greensprings Interpretive Trail was completed in 2001 and the Powhatan Creek Trail opened in 2012. In 2006, the County acquired the properties now known as Jamestown Beach Event Park and the James City County Marina. Both of these popular waterfront County parks continue to be improved, along with Chickahominy Riverfront Park; the Shaping Our Shores Master Plan, which was adopted in 2009 and updated in 2020, guides their development.



An update to the County's 1993 Parks & Recreation system master plan was adopted by the Board of Supervisors in 2009. By that time, the County owned nearly 1,500 acres of park land, 29 miles of trails, two recreation centers, and many athletic fields and sports courts. In addition to operating these facilities, Parks & Recreation staff offered thousands of programs annually, yet struggled to meet the increasing demand for recreation services caused by spikes in population growth during the 1990s and 2000s.

CHAPTER GOAL

"Provide a range of recreational facilities and activities desired by the community that are affordable, accessible, and adequate in number, size, type and geographic dispersion to accommodate the needs of all County residents and that promote personal growth, social development and healthy lifestyles."

The 2009 system master plan recommended a shift in focus, emphasizing the importance of partnerships, contractual agreements and leases, and redefining Parks & Recreation's role from direct service provider to program facilitator. The County subsequently arranged for contractors to operate Little Creek Reservoir Park and the James City County Marina. Go Ape USA built a zip-line course at Freedom Park, with a revenue-sharing arrangement, and additional land was leased to the Williamsburg Indoor Sports Complex to allow them to build an indoor pool. Parks & Recreation streamlined its youth sports offerings, focusing on introductory sports classes, and encouraged community sports leagues to use County facilities such as the Warhill Sports Complex for specialized sports instruction.

The most recent system master plan, adopted in 2017, found that trails and water access continued to be County residents' most frequently requested recreational amenities. The plan also noted a lack of recreational facilities in the lower portion of the County, which prompted the 2018 Grove Community Recreation Analysis. In response to community input received during both processes, Parks & Recreation proposed the future construction of a park in southeastern James City County, to include a pool and walking trail, which is tentatively scheduled to be constructed in 2024. A smaller project requested by many residents during the master plan process, a primitive camping area for youth groups, was created at Upper County Park in 2018.

The Parks and Recreation Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language as written in the 2035 Comprehensive Plan has been re-affirmed and is much the same, with some additional emphasis on the geographic dispersion of recreational facilities and activities throughout the community. The Goal now states: *"Provide a range of recreational facilities and activities desired by the community that are affordable, accessible, and adequate in number, size, type and geographic dispersion to accommodate the needs of all County residents and that promote personal growth, social development and healthy lifestyles."*

Many important Parks and Recreation Chapter implementation activities have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the revised and updated Strategies and Actions will be needed. The establishment of parks and recreational opportunities is vital to the creation of a sustainable and healthy community. The availability of parks and recreation programs spurs economic growth, enhances the social fabric, preserves connections to nature, protects environmental resources, and creates a sense of ownership and belonging for residents.

Key Planning Influences

Parks and Recreation Facilities Inventory

Today, the Parks & Recreation Department administers an annual budget of approximately $6.6 million. A staff of 54 full-time employees oversees the department's functions with the assistance of up to 235 part-time and seasonal employees, depending on the time of year. In 2019, volunteers contributed 9,572 hours to Parks & Recreation's programs, events, and parks. The Facilities and Grounds Division of the General Services' Department assists Parks & Recreation in providing the extensive maintenance necessary to keep parks, playing fields, and open areas maintained.

The County now operates 17 parks spanning 1,711 acres. These parks contain two recreation centers, 41 miles of trails, a sports complex featuring a synthetic turf stadium, and numerous opportunities for water access for fishing, boating, and swimming. During Fiscal Year 2019, these parks and recreation centers were visited more than 4,428,000 times. Map PR-1 shows the public recreation facilities in James City County.

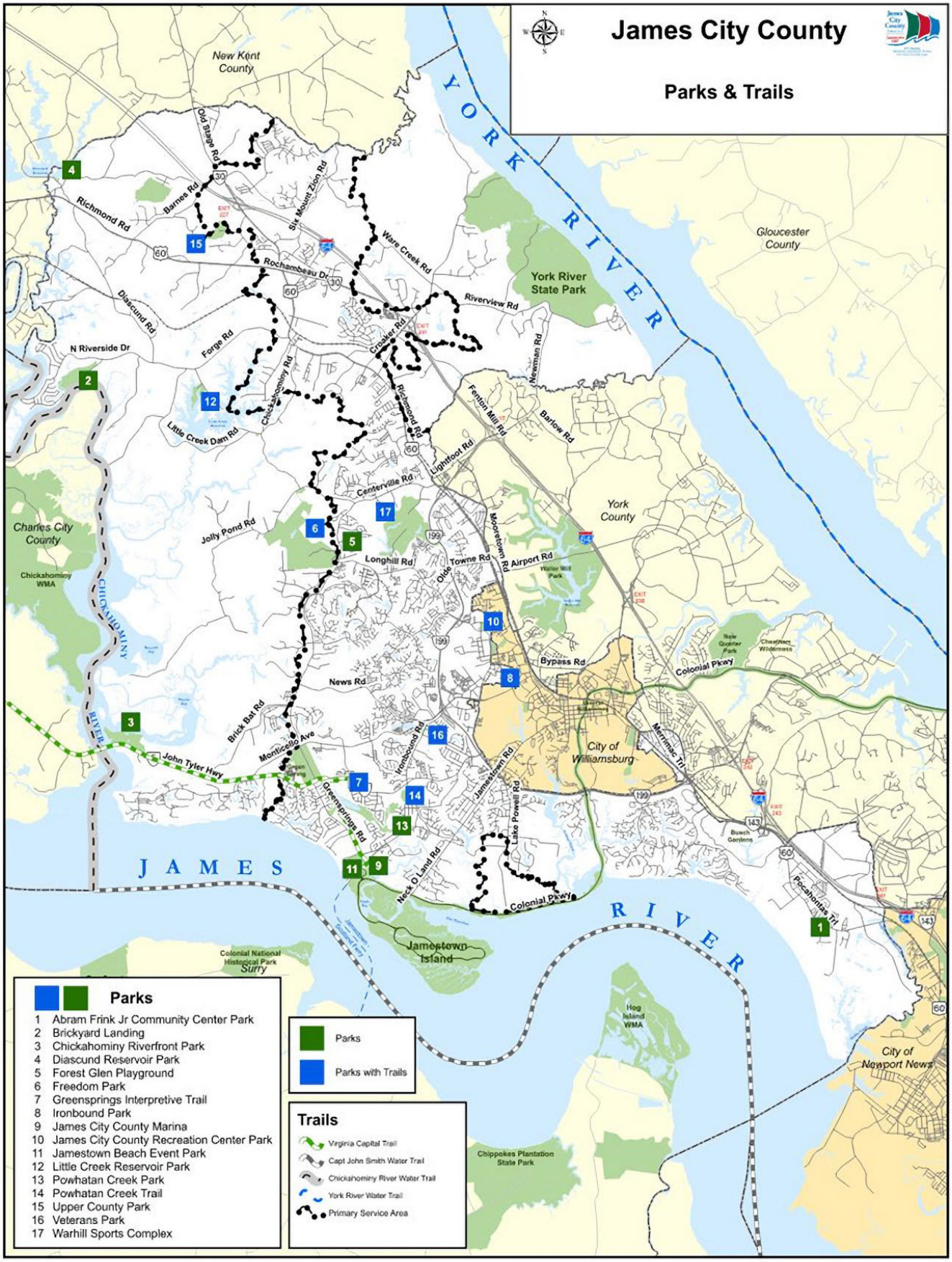


County park amenities include 10 playgrounds, nine basketball courts, eight pickleball courts, four volleyball courts, five baseball fields, two softball fields, four tee-ball fields, 11 multipurpose grass rectangular fields, and seven synthetic multipurpose rectangular fields. Williamsburg-James City County (WJCC) School properties also provide outdoor recreation/athletic areas to the public. The Schools have 26 playgrounds, 13 basketball courts, 18 tennis courts (six of the tennis courts are also lined for pickleball), eight volleyball courts, nine baseball fields, eight softball fields, 23 multipurpose rectangular fields and three running tracks. Parks & Recreation and WJCC Schools maintain a joint facility use agreement to promote effective sharing of both outdoor and indoor space. To foster the safety of children in the County, licensed playground inspectors on Parks & Recreation's staff regularly inspect both park and school playgrounds.

In addition to its public facilities, James City County contains a wealth of private recreation facilities, including tennis courts, golf courses, trails, and swimming pools within many of its neighborhoods. The development of these amenities is designed to and does in fact relieve some pressure for County provision of public facilities. It is important to acknowledge the positive contribution these facilities make to overall community quality of life and how they help make amenities accessible to individuals, reducing vehicle miles traveled. While these facilities provide invaluable services and should be promoted, the goal of the County is to provide a quality park system with facilities available to all citizens.

James City County is a part of a regional effort to encourage the development of a comprehensive system of bikeways primarily as a mode of transportation but also for increased recreational opportunities. The original plan was adopted in 1993, and the Board of Supervisors approved the most recent update in 2013. The Regional Bikeways Map provides a framework to identify bikeway connections and joint bicycle/pedestrian facility opportunities, and bicycle parking needs. Logical corridors were identified that could be used by cyclists of all ability levels for both recreational and commuting purposes. These bikeway amenities not only can enhance the area's appeal, but also improve the health and fitness of its residents.

Map PR-1. James City County Parks and Recreation Facilities



County residents also have access to many recreational opportunities in the adjacent localities of the City of Williamsburg, the City of Newport News, and York County. Several nearby state and federally operated park facilities also offer excellent recreational facilities, including boating, bicycling, hiking, passive recreation, and sightseeing. These include York River State Park, the Captain John Smith Chesapeake National Historic Trail (blueway), and portions of the Colonial National Historical Park, which includes Historic Jamestowne.

Programming

The Parks & Recreation Department currently offers more than 2,000 programs annually with active and passive recreation opportunities for all ages, interests and abilities. Parks & Recreation's 12 core program areas are Aquatics, Club 55+, Health & Wellness, Inclusion/Therapeutic Recreation, Neighborhood Outreach, Outdoor, Special Events, Special Interest, Sports & Athletics, Teens, Volunteer Services, and Youth. The Department continually seeks creative partnerships with public, private and nonprofit providers, and coordinates with adjacent localities to avoid duplication of services and maximize opportunities for citizens.



To assist residents in accessing recreation opportunities and improving health and wellness, Parks & Recreation offers a Discount Assistance Program to residents of both James City County and the City of Williamsburg. Discounts are offered to qualifying household on many programs including passes to the County's recreation centers and Parks & Recreation's before and after school programs. Discounts can also be used at Williamsburg's Quarterpath Park facility.

As the County's population changes, the types of programs that are in demand and barriers to serving the youth, senior, and lower-income populations change as well. As noted in the Population Needs section, it continues to be important for the Parks & Recreation Department to regularly assess residents' needs and be flexible and creative in developing programs that meet the changing needs of the population.

Teens On Point (TOP) is a prime example of a recent programming adjustment that staff undertook to address changing family needs. Parks & Recreation has offered state-licensed before and after school care under the name REC Connect for more than 30 years. REC Connect is offered on site at WJCC Schools, a convenient arrangement for many parents. Over time, enrollment in REC Connect at the middle schools declined, due to many middle-school students having other after-school commitments such as sports or club activities. To avoid inefficient allocation of staff, in 2020 Parks & Recreation introduced TOP, a centralized after school program for middle-school students that includes transportation from the four WJCC middle schools to the James City County Recreation Center. REC Connect continues to operate in all nine WJCC elementary schools.

In accordance with the County's Strategic Plan, Parks & Recreation embraces modern technology as a means to offer new opportunities and expand programming to new audiences. Recent innovations include classes taught via Zoom, online gaming tournaments, on demand fitness videos and virtual trivia nights. A new twist on an old favorite that has proven very popular is scavenger hunts in which participants track their progress at finding objects hidden in parks by using their phones to scan QR codes.

Greenways

According to the Sports and Fitness Industry Association, the most popular recreational activities for adults in the United States are fitness walking, treadmill use, and running/jogging. The 2017 Virginia Outdoors Demand Survey found that residents of the Hampton Roads Recreational Planning Region, which includes James City County and 21 other municipalities, believe the region's most-needed outdoor recreation opportunities are parks, natural areas, water access, trails, and historic areas. Respondents' top outdoor recreation activities are visiting natural areas, walking for pleasure, driving for pleasure, visiting parks, swimming, and sunbathing. Planning for greenways can help accommodate these preferences.



Greenways are linear open spaces that are managed for conservation, recreation and/or alternative trans-portation uses. Most are networks of natural open space corridors that connect neighborhoods, parks and schools to areas of natural, cultural, recreational, scenic and historical significance.

Recognizing the importance of greenways, the Board of Supervisors adopted the Greenway Master Plan in 2002. The Greenway Master Plan establishes a framework for a County-wide system of interconnected greenways and trails with the goal of balancing environmental protection with the need for recreational amenities. Elements included in the plan are greenway planning and design, maintenance and management, and implementation and funding strategies. The plan is intended to be part of a new, broader green infrastructure plan, which would identify a network of parks or conservation areas connected by linear greenway corridors. Green infrastructure planning is often seen as a way to protect environmentally sensitive areas and wildlife corridors, but can also contribute significant opportunities for outdoor recreation. This is especially true in our area, where many facilities are open to users living in other jurisdictions; sidewalk, bikeway, and greenway connections across locality borders would facilitate access to these facilities.

The Greenway Master Plan establishes a framework for a County-wide system of interconnected greenways and trails with the goal of balancing environmental protection with the need for recreational amenities.

Blueways and Shoreline Recreation

Forty-three percent of Hampton Roads residents consider water access a most-needed recreation opportunity, according to the 2017 Virginia Outdoors Demand Survey. Three of respondents' top 10 outdoor activities require water access (sunbathing on a beach, viewing the water, and swimming in open water). Not only does water access provide for excellent recreational opportunities, but also residents' personal interactions with local rivers that feed into the Chesapeake Bay can help them become aware of the connection between the value of the Bay and their interests in protecting it.

James City County recently took advantage of an opportunity to enhance Brickyard Landing, a 0.33-acre boat launch site on the Chickahominy River that has been operated by the County since 1999. With the assistance of a $687,500 grant from the Virginia Department of Conservation and Recreation, the County purchased 119 acres adjacent to the boat ramp in 2020. This will allow for future expansion of Brickyard Landing's very small parking lot to support citizen access to the river. Use of the parcel is limited to recreation by the terms of the grant.

Two capital improvement projects currently underway address erosion at the County's waterfront parks. Both the Chickahominy Riverfront Park and the James City County Marina have experienced significant erosion and require shoreline stabilization. Living shorelines will be installed, and boat ramps will be repaired. Chickahominy Riverfront Park's fishing pier and the Marina's boat slips will also be replaced. Longer-term plans call for the replacement of buildings in both parks. Both sites generate significant revenue and have the potential to be more profitable after aging infrastructure and deferred maintenance issues are addressed. A grant of $781,900 from the Virginia Environmental Endowment will cover approximately half of the cost of the Chickahominy Riverfront Park shoreline stabilization project.



Several phases of improvements at Jamestown Beach Event Park have transformed a private waterfront with significant environmental and infrastructure need into a popular beach venue that attracts nearly 300,000 people annually. The most recent improvements include construction of restrooms and showers in 2015, relocation of the park entrance to reduce congestion near the ferry in 2016, walkway construction in 2017 and 2018, and regular sand replenishment.

Parks & Recreation employees working at waterfront parks seek to follow best practices to preserve fragile ecosystems. In 2017, the James City County Marina was designated a Virginia Clean Marina by the Virginia Institute of Marine Science. The program recognizes marinas that meet all legal and regulatory standards, and voluntarily adopt measures to prevent or reduce pollution in Virginia waterways. Marina staff continue to work with the Marina Technical and Environmental Advisory Committee, which conducts annual reviews of Clean Marinas and offers educational workshops.

There are currently 10 private and 10 public water access facilities. More detail is available in Tables PR-1 and PR-2 and Map PR-2. Numerous private developments also allow property owners to maintain docks and piers on their lots.

Table PR-1. Private Water Access Areas

	Water Body	Parking	Boat Launch Ramp	Wet Slips	Dockside Pumpout Station	Restrooms	Private Resident Docks
Kingsmill Marina	James River	X	X	X	X	X	X
The Marina at Two Rivers (Governor's Land)	James River	X	X	X		X	
Chickahominy Haven Marina	Chickahominy River	X	X	X		X	
Chickahominy Haven Boat Ramp	Chickahominy River	X	X				X
Riverview Plantation	York River	X	X				X
First Colony	James River	X	X	X			X
Jamestown 4-H Educational Center	James River	X	X			X	
Powhatan Shores	Powhatan Creek	X	X				X
Kingspoint	Powhatan Creek	X	X				
Jamestown Marina	Powhatan Creek	X	X	X		X	

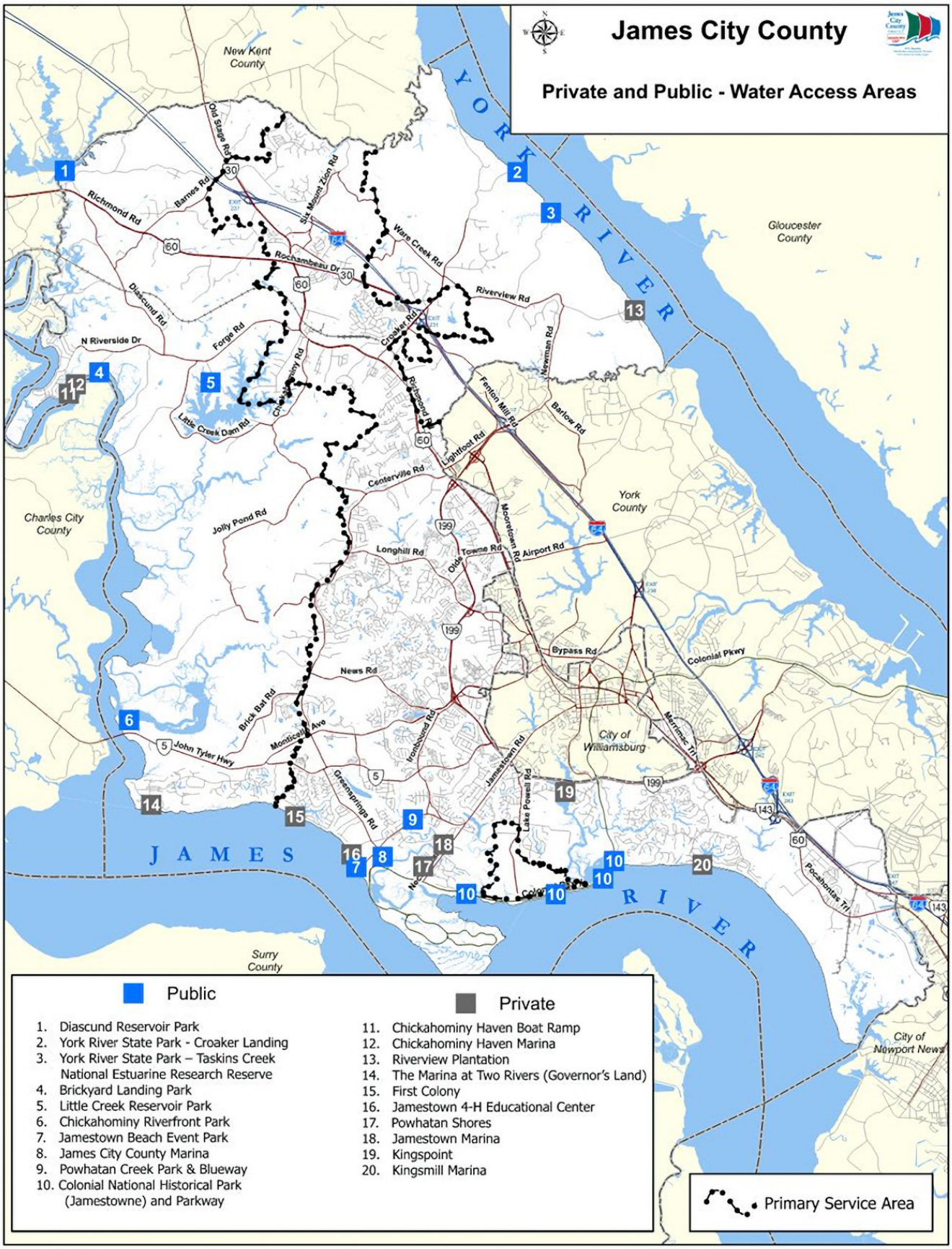
Sources: James City County Comprehensive Plan Shoreline and Ground Water Element, James City County Parks and Recreation, James City County Geographic Information System, 2019 aerial photography, and site visits.

Table PR-2: Public Water Access Areas

	Water Body	Day Use	Seasonal Use	Fee or Permit to Launch	Parking	Boat Launch Ramp	Wet Slips	Dockside Pump-out Station	Fishing	Swimming Beach	Hiking	Camping	Picnicking	Restrooms	ADA Accessible	Cultural Resources
Brickyard Landing Park	Chickahominy River	X			X	X			X							
Chickahominy Riverfront Park	Chickahominy River	X		X	X	X			X			X	X	X	X	
Colonial National Historical Park (Jamestowne Island) and Parkway	James River	X			X				X##	X#	X		X	X		X
Diascund Reservoir Park	Diascund Reservoir	X			X	X**			X				X		X	
James City County Marina	James River	X		X	X	X	X	X					X	X	X	X
Jamestown Beach Event Park	James River	X			X				X	X			X	X	X	X
Little Creek Reservoir Park	Little Creek Reservoir	X		X	X	X**			X		X		X	X	X	
Powhatan Creek Park & Blueway	Powhatan Creek	X			X	X*			X		X		X	X	X	X
York River State Park - Croaker Landing	York River	X		X	X	X			X		X				X***	
York River State Park – Taskinas Creek National Estuarine Research Reserve	York River/ Taskinas Creek	X			X	X*					X		X	X	X***	

Swimming is permitted at College Creek and Archer's Hope; however, it is strongly discouraged due to dangerous currents (Mike Litterst, National Park Service)
Permitted along Parkway, restrictions on Jamestowne Island
* Launch restricted to non-motorized boats
** Launch restricted to non-motorized boats and electric trolling motors (no gas motors)
*** Portions of park are handicap accessible: https://www.dcr.virginia.gov/state-parks/york-river#other_info.
Sources: The Chesapeake Bay Program, James City County Comprehensive Plan Shoreline and Ground Water Element, Stormwater and Resource Protection Division, Parks & Recreation Department, and the Virginia Department of Wildlife Resources, National Park Service

Map PR-2. Public and Private Water Access Area



Recreation Needs

Several techniques are used to identify the County's recreation needs, including inventorying existing public facilities, analyzing population trends, benchmarking against other jurisdictions, and collecting public input. The Parks & Recreation Department reviews recreation needs as part of its system master plan, as mandated by the Commission for Accreditation of Park and Recreation Agencies. Chapter 4 of the 2017 system master plan contains a community inventory, including school, government, and select nonprofit and private facilities; a level of service analysis for three scenarios, 14 equity maps (discussed below), and a discussion of most-needed amenities.

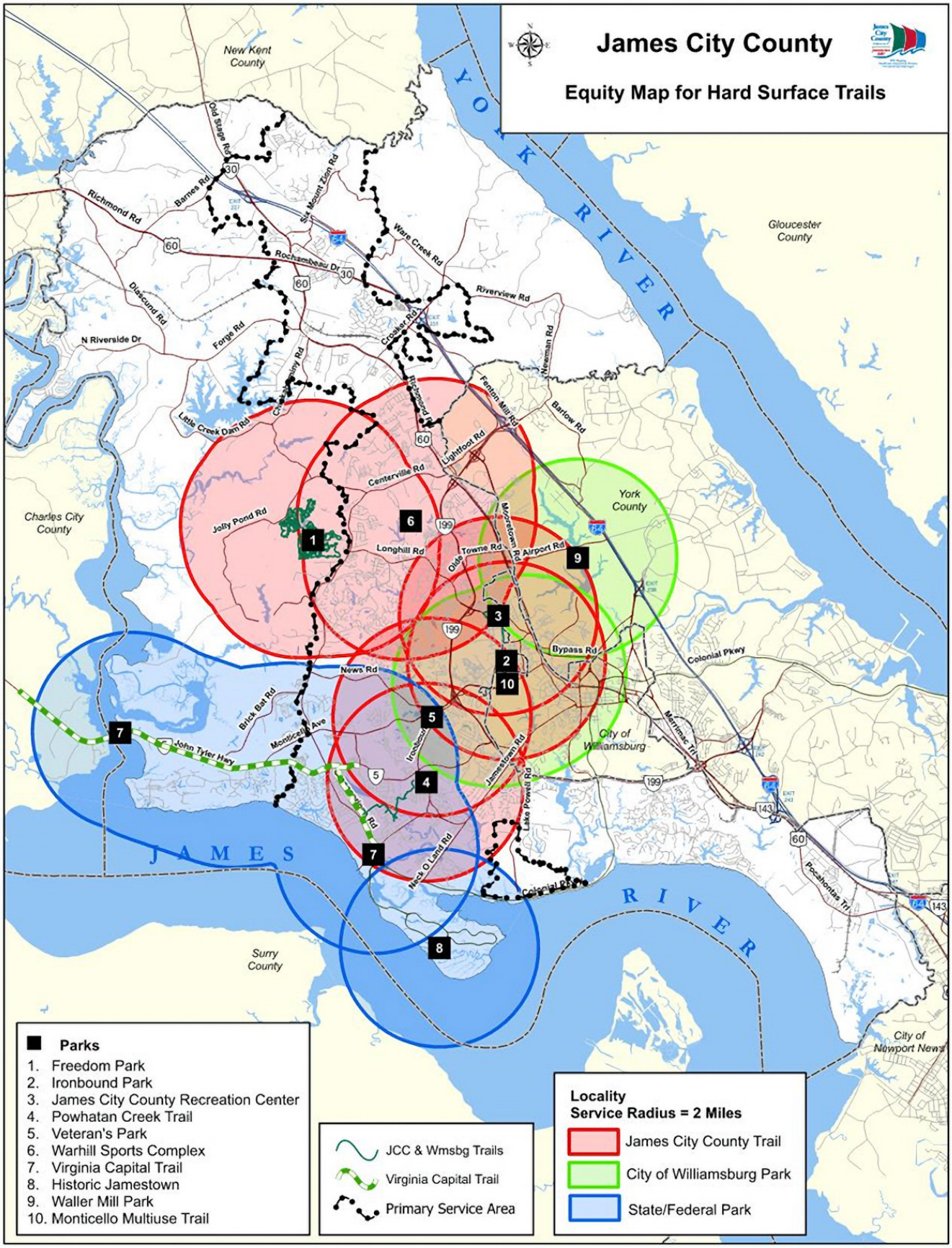
An important component of a recreation needs assessment is level of service (LOS) standards, which are guidelines that define park and facility service areas. LOS standards are typically expressed in terms of a designated travel time or the number of facilities per 1,000 residents. A commonly cited LOS standard in urban areas is the ability for residents of all neighborhoods to access a park by walking 10 minutes or less. Another widespread LOS standard is for a county or other governmental unit to have at least 10 acres of park land per 1,000 residents.

During the 1970s and 80s, the National Recreation and Park Association (NRPA) published LOS standards to guide the development of park and recreation systems. Recognizing that one size does not fit all, NRPA later moved to a benchmarking system and encouraged member agencies to take into account their citizens' unique preferences. During the development of James City County Parks & Recreation's 2009 system master plan, a consultant assisted the Department in creating custom LOS standards. Their analysis concluded that the County fell short in many categories, but it did not take into account the fact that Parks & Recreation is not the only provider of recreation amenities in James City County. The County benefits from several state and federal parks within its borders and recreation facilities are also provided by WJCC Schools, nonprofits, and the private sector. The 2017 system master plan applied the 2009 LOS standards to updated inventory and population numbers, and expanded the analysis to include recreation amenities from other providers. School, nonprofit, and private recreation facilities were counted at 10-50% since their availability for public use may be limited.

At the time of the 2017 system master plan, which used 2015 population counts, James City County's park acreage per 1,000 residents was 21.8, far exceeding both the national average of 9.5 and the consultant's 2009 recommendation of minimum 12 acres/1,000 people. However, trail miles and bike lanes remained short of the recommended LOS standard, as did various other amenities detailed in Figure 20 of the 2017 system master plan. Since then, both the County's population and park acreage have increased, yielding a current figure of 22.4 acres per 1,000 people. If state and federal parks located within the County are included, acreage per 1,000 people swells to 87.3.

While the quantity of parks may exceed standards, the location of parks and recreation amenities also must be considered. Equity maps provide a visual representation of which areas of the County are served by existing recreational facilities, how equitable service delivery is across the County, and where land should be acquired for the construction of new parks or facilities. Equity maps prepared for the 2017 Parks & Recreation system master plan show that many of the County's recreation facilities are clustered in the central portion of James City County; the most underserved areas for several types of facilities are in the north (Stonehouse District) and south (Roberts District). One example is hard surface trails - Map PR-3 depicts the location of paved trails in or near the County, with a two-mile service radius drawn around each trail. The map includes trails provided by James City County, the City of Williamsburg, Virginia Department of Transportation, and Historic Jamestown. Additional maps can be viewed in Chapter 4 of the system master plan.

Map PR-3. Hard Surfaced Trails



Open Space Preservation - Parks and Recreation Aspects

The Land Use Chapter describes the County's Open Space preservation goals and approaches, including the concept that proceeding in a way that integrates different categories of resources, as well as integrates different possible programs and stakeholders, will likely lead to the best results for the County. As described throughout the preceding sections, categories of resources that are central to this chapter that are, and will continue to be, facets of the County's Open Space preservation approach include:

- Park and Recreational Purposes (including recreation fields, passive recreation areas, trails, and ecotourism)
- Green Infrastructure and Greenways (including trails, buffers, and wildlife corridors, see Greenways section above)

An integrated approach that includes the resources above will be one important tool in achieving parks and recreation planning goals.

Action Plan

The adopted Parks & Recreation Master Plan reaffirms the goals, strategies, and actions set forth in the County's Comprehensive Plan and Strategic Plan, and includes a list of future capital improvements. Each year the Parks & Recreation Department develops written action plans for all full-time employees that describe the specific actions staff will take to meet the County's current recreation needs and to prepare for future recreation needs.

In order to offset the cost of the construction and operation of new facilities, the County's Parks & Recreation Department continues to explore revenue-generating programs and facilities and seek additional funding through alternative sources. The adopted Parks & Recreation Master Plan also contains guidelines that are used by the Planning Division, Planning Commission, and Board of Supervisors to address provision of neighborhood recreational facilities when considering Special Use Permit (SUP) and rezoning applications. In addition, the Planning Division works to consider and incorporate the Parks and Recreation Master Plan vision into appropriate transportation projects.

As described above in the Blueways and Shoreline Recreation section, in 2020 Parks & Recreation received a $687,500 grant to purchase waterfront property at Brickyard Landing. Another example of alternative funding is the 2020 expansion of a County-owned playground in Forest Glen; the developer of new affordable homes in Forest Glen provided equipment and labor to improve the existing neighborhood park, and construct a short walking trail to enhance access and safety. Finally, one example of tying the Parks and Recreation Master Plan into transportation projects is the Clara Byrd Baker Safe Routes to School project, which links new sidewalk connectivity to the Powhatan Creek Trail, an existing multi-use trail.

Community Guidance

Public Engagement

One of the public engagement themes identified during this Comprehensive Plan update that most directly relates to this chapter is: "Respondents desire additional quality of life amenities including parks, public water access, expanded recreational facilities, trails for walking and bicycling, transit connections, and other enhancements to existing public facilities." Respondents to the 2019 Citizen Survey generally rated the County's parks and recreation offerings very favorably. Approximately 94% of respondents considered the County's parks and recreation facilities, programs, and services overall to be "very important" or "important." Another item worth noting is that residents inside the PSA were more likely than those outside it to be satisfied with the parks and recreation facilities overall. While respondents enjoy the recreation center, the various parks and open areas, and the access to waterways, they would like to see more trails, boat launches, and space for music and food festivals. Comments from the open ended questions included that the County should encourage community gardens, provide more opportunities for safe biking and improve connectivity between subdivisions with bike and walking trails.

As a follow-up to the survey, the County hosted the Engage 2045 Summit on the Future in the fall of 2019 to engage with citizens to determine their vision for the future of the County. During the preserve/change exercise of the Summit, respondents indicated the following:

- Preserve Chickahominy Riverfront Park as an important place of recreation
- Preserve and enhance Upper County Park
- Keep James City County Marina as a wonderful community asset
- Add public facilities such as multi-use trails and docks for public access

Participants were also provided an opportunity to share their "Big Ideas." These responses included the following:

- More parks to include dog parks
- More bike and walking trails to support connectivity to places where people want to go
- Add a bike share program
- Provide parks and open spaces in order to keep pace with the County's growth

The second round of public engagement included questionnaires on the Goal statements for each chapter, and feedback on alternative futures. The results of the Goals Questionnaire for the Parks and Recreation chapter's goal showed that slightly more than 83% of respondents did not want to change the goal, just under 13% wanted to change the goal, and just under 4% had no opinion. Of those preferring change, 6 commenters emphasized the need to provide more affordable, accessible, equitable and geographically dispersed recreation facilities to accommodate all County residents, 3 respondents suggested concrete objectives be developed, and 4 respondents want more bike and walking trails. It should also be reflected that many respondents to the goals questionnaire for other chapters of the Comprehensive Plan stated the need for more walking and bike paths.

The third round of community engagement was held in the winter of 2021. This round solicited input on policy directions the County should pursue and actions it should take to enable citizens' vision for the future of our community to be realized. Overall, there was consistent support for enhancing quality of life amenities in James City County with a strong emphasis on walking and biking facilities. Respondents supported prioritizing County resources for enhancing quality of life amenities. They also supported prioritizing walking and biking amenities in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to Parks and Recreation:

- Protect sufficient open space and important natural areas that can provide passive public recreation opportunities;
- Support growth into infill and redevelopment sites near existing communities that can improve recreational and transportation connections between neighborhoods and community destinations;
- Maximize access to and use of existing public recreational facilities and programs by locating new development within the PSA;
- Create more mixed-use Complete Communities that integrate within them access to recreation, parks, schools, and other quality of life needs; and
- Foster development of walkable environments that increase the health outcomes of residents, including the mental health benefits of experiencing nature and more opportunities to interact with fellow citizens.



Spotlight on Implementation

James City County Parks & Recreation has long been a member of the National Recreation and Park Association (NRPA), whose three pillars are conservation, health and wellness, and social equity. In 2017, as the culmination of an 18-month department-wide effort, Parks & Recreation achieved national accreditation from NRPA's Commission for Accreditation of Park and Recreation Agencies. The process of becoming accredited gave staff new tools and knowledge that enhances their ability to manage successful programs and facilities and serve our community.

The Parks & Recreation Department has been recognized nationally and statewide for its achievements in programming and facility development. Highlights from Parks & Recreation's substantial portfolio of awards include:



- Project 547: Longest Day of Play, a program offering a packed schedule of free indoor and outdoor classes and events on the solstice, was awarded "Best New Program" by the Virginia Recreation and Park Society in 2019. Project 547 aims to entice participants to try new activities; sessions begin at 5:47 a.m. and continue past sunset.
- Wildflower Beautification Project, a planting of native flowers at Freedom Park and the Warhill Sports Complex, won a Virginia Association of Counties Achievement Award in 2019. The project was led by Keep James City County Beautiful and involved several County departments including Parks & Recreation. The wildflowers reduce soil erosion, provide pollinator habitat, reduce mowing, deter littering, and beautify the County.
- Capital Color Ride, a family-friendly biking event along the Virginia Capital Trail, received "Best New Special Event" from the Virginia Recreation and Park Society in 2018. Riders mark milestones along the trail by being sprayed with colored powder.
- Freedom Park's Multiuse Trail 3 won a Governor's Environmental Excellence Award in 2017. The paved trail connects Freedom Park to two local schools and is ADA accessible. The trail was built with the assistance of a grant from the Virginia Department of Conservation and Recreation and features a recycled 70-foot bridge. Multiuse Trail 3 was also designated a Virginia Treasure by the Commonwealth of Virginia.
- Following extensive renovations, Jamestown Beach Event Park was awarded "Best New Facility" by the Virginia Recreation and Park Society in 2016. The beach has become a popular recreation venue, with the recently expanded parking lot often reaching capacity during the summer months. Concessions, rentals, and other fees generate considerable revenue from Memorial Day through Labor Day.
- RECn' It Out, a neighborhood outreach program, received a National Association of Counties Achievement Award in 2015 and was awarded "Best New Program" by the Virginia Recreation and Park Society in 2014. RECn' It Out promotes resilient, active, healthy, and fun lifestyles, and seeks to break down transportation, financial, and cultural barriers that hinder recreation participation by citizens living in low-income County neighborhoods.

- The Parks & Recreation Department won a Gold Medal Award from the NRPA and the American Academy for Park and Recreation Administration in 2012. The award recognizes the best-managed park and recreation systems in the nation, and honors communities that demonstrate excellence in long-range planning, resource management, volunteerism, environmental stewardship, program development, and professional development.

Attendance statistics attest to the popularity of Parks & Recreation's parks, facilities and programs. Total attendance increased 54% from Fiscal Year (FY) 2014 to FY2019, with 4.69 million visits in FY2019. Breaking down visitation by category:

- County parks were visited 4 million times in FY2019. The Warhill Sports Complex accounted for more than half of park attendance, with 2.15 million visits in FY2019. Chickahominy Riverfront Park, Veterans Park, and James City County Marina each had more than 300,000 visits in FY2019, with Jamestown Beach Event Park just short of 300,000 visits and Freedom Park at 180,000 visits. Park attendance has grown faster than program participation and facility attendance, increasing 64.5% from FY2014 to FY2019.
- The James City County Recreation Center was visited more than 415,000 times in FY2019, up 13.7% from FY2014.
- Attendance at the Abram Frink Jr. Community Center grew 61.8% from 10,200 in FY2014 to 16,500 in FY2019. In response to citizen requests, hours of operation were expanded in July 2020 to include weekends.
- Program participation was 234,900 in FY2019, up 10.5% from FY2014. Program participation includes activities such as before and after-school programs, camps, classes, group fitness, special events, sports, swim lessons, and workshops. As detailed in the introductory section of this chapter, beginning around 2009, Parks & Recreation intentionally shifted its involvement in youth sports from direct instruction to provision of facilities. The Department partners with more than 30 community organizations, mostly youth sports leagues, which pay a small fee to use the County's athletic fields and indoor pool. These community organizations' overall visits to County facilities increased 25.2% from FY2014 to FY2019; their half-million visits in FY2019 are captured within park attendance and Centers attendance.

Meeting a diverse community's recreation needs requires access to safe, well-maintained parks and recreation facilities that offer a variety of amenities and opportunities for neighbors to connect. Five recent projects highlight the County's commitment to residents of varied ages and interests:

- As detailed in the Blueways and Shoreline Recreation section, shoreline stabilization is in progress at Chickahominy Riverfront Park and the James City County Marina. Installation of living shorelines will reduce erosion and sedimentation, improve safety, and enhance water access.

- Following discussions with community leaders and the City of Williamsburg, in 2020 the County demolished aging tennis courts at Veterans Park and replaced them with pickleball courts. Over the past decade, pickleball has become a very popular racquet sport, primarily among seniors. Both the County and City received requests from residents to convert tennis courts to pickleball; since the County's Veterans Park tennis courts were in poor condition, they were switched over; the City's nearby Kiwanis Park will continue to focus on tennis.
- The synthetic turf at the Warhill Sports Complex was replaced in 2019; this $3.1 million update renovated six multipurpose rectangular fields and Wanner Stadium and ensures that the sports complex continues to meet the needs of local athletes as well as remaining a revenue-generating sports tourism destination.
- A wing of the James City County Recreation Center was renovated in 2019, expanding the square footage of the second-floor fitness area. Vacant office space formerly occupied by a medical provider was converted into a cardio room, personal training room, group fitness studio, and stretching area.
- A splash pad was added to the pool and concession area at Chickahominy Riverfront Park in 2018. While the camping-themed spray elements are an entertaining way to cool off for patrons of all ages, the splash pad is especially appreciated by families with young children and non-swimmers.

In order to continue to reap the benefits that parks and recreation have to offer, the County should continue to support both the maintenance of existing facilities and development of new facilities. Significant opportunities, partnerships, and amenities are already provided, but as County demographics change and growth continues, it becomes increasingly important to plan the location for amenities, connections to neighborhoods, and explore alternative funding and partnership strategies.

The following goals, strategies, and actions serve the desire of residents to maintain a high-quality community through the provision of a wide variety of indoor, outdoor, active, and passive recreation opportunities.



Goals, Strategies, & Actions

Goals

PR - Provide a range of recreational facilities and activities desired by the community that are affordable, accessible, and adequate in number, size, type and geographic dispersion to accommodate the needs of all County residents and that promote personal growth, social development and healthy lifestyles.

Strategies and Actions

PR 1 - Ensure that the number and type of facilities and programs meets citizen needs for recreation and open space.

PR 1.1 - Implement the specific strategies and tactics approved in the current James City County Parks & Recreation Master Plan.

PR 1.2 - Prioritize potential property acquisition for parks in underserved areas of the County, as identified in the needs analysis in the current Parks and Recreation Master Plan or the outdoor recreation category of the ConserveVirginia model.

PR 1.3 - Update and develop master plans for County-owned parks to coordinate construction phasing and validate capital improvement requests.

PR 1.4 - Continue to develop County owned parks based upon approved master plans as funds become available.

PR 1.5 - Develop parks and fields in conjunction with new school development whenever possible and continue to collaborate with Williamsburg-James City County Schools during the site design process.

PR 1.6 - Enhance and implement partnerships with Williamsburg-James City County Schools to offer joint programming opportunities and efficiently and fully utilize all athletic fields and gymnasiums to serve both school and community needs.

PR 1.7 - Support programs that promote healthy lifestyles, such as fitness, aerobics, and wellness education.

PR 2 - Continue to develop an integrated network of linear parks, trails, bikeways, sidewalks, and greenways with connections to a regional greenway system that allow foot or bike access to destinations and that preserve the diverse natural, cultural, scenic, and environmental resources of the community that contribute to recreation activities.

PR 2.1 - Continue to coordinate with the Virginia Department of Transportation (VDOT), the Historic Triangle Bicycle Advisory Committee, and local running, hiking and bicycling clubs to develop a bikeway network consistent with the adopted Regional Bikeways Map.

PR 2.2 - Update the Greenway Master Plan and develop a new strategic Action Plan based on the current needs, conditions, objectives and funding resources in order to continue to improve bike and pedestrian connectivity in the community.

PR 2.2.1 - Continue to seek funding in the Capital Improvements Program (CIP) for the acquisition and use of open space areas and greenways to preserve the scenic, natural, and historic character of the area and to promote public access to these sites.

PR 2.2.2 - Collaborate with adjacent localities, developers, and other interested organizations to align and integrate plans so as to increase bike/pedestrian connectivity.

PR 2.3 - Continue to collaborate regionally to improve connectivity of open space, including but not limited to working with Hampton Roads Planning District Commission (HRPDC) and County staff to develop a local level green infrastructure map, which identifies critical natural, cultural and recreational networks, and develop a plan for implementation.

PR 2.4 - Work with the National Park Service to realize the recreational and cultural potential of national park sites within James City County.

PR 3 - Research and pursue available funding sources for parks and recreation programs and facilities programs that create offsetting expenditures and creating positive cash flows, including through private sector partnerships, the establishment of a park foundation, the use of citizen volunteers, grants and revenue producing facilities.

PR 3.1 - Coordinate outdoor recreation, greenway, Purchase of Development Rights, greenspace, community character and environmental protection programs in order to maximize utility of shared resources and funding.

PR 3.2 - Submit grant applications to secure funds for new parks and recreation programs, services, facilities, and related transportation services.

PR 3.3 - Support the public provision of bicycle facilities by seeking County funding whenever feasible and by seeking non-County funding sources.

PR 3.4 - Emphasize the maintenance of existing facilities as a way to make efficient use of limited financial and physical resources.

PR 4 - Continue to provide access to major water bodies for expansion of water recreation opportunities.

PR 4.1 - Seek additional waterfront access on the James, York, and Chickahominy Rivers to improve and expand water access and blueway trail development, especially in areas currently lacking water access, such as the lower James River.

PR 4.2 - Develop recreational components of Jamestown Beach Event Park, James City County Marina, Chickahominy Riverfront Park, and Brickyard Landing in accordance with approved master plans.

PR 4.3 - Collaborate with the National Park Service to continue to provide trail information at designated Chesapeake Bay Gateways and for the Captain John Smith Water Trail.

PR 4.4 - Provide more public access to waterways for recreation and as part of a collaborative ecotourism/ agritourism strategy.

PR 5 - Maintain up-to-date regulations and policies for new development that address neighborhood park facilities, sidewalks, bikeways, and trails as outlined in the Parks and Recreation, Greenway, and Pedestrian Accommodations master plans and that protect open space and natural resources.

PR 5.1 - Continue to encourage new development proposals to identify on-site natural resources and design the development layout in a manner that places the natural resources within protected open space parcels.

PR 5.2 - Encourage new developments to dedicate right-of-way and to construct sidewalks, bikeways, and greenway trails for transportation and recreation purposes, and to construct such facilities concurrent with road improvements and other public projects in accordance with the Pedestrian Accommodation Master Plan, the Regional Bikeways Map, and the Greenway Master Plan.

PR 5.3 - Encourage new developments requiring legislative review to provide public recreation facilities consistent with standards in the Parks and Recreation Master Plan. New developments should have neighborhood parks with trails, bikeways, playgrounds, practice fields, sports courts, and open spaces.

PR 5.4 - Amend Zoning Ordinance regulations to facilitate development of recreational facilities, including but not limited to neighborhood parks, playgrounds, sport courts, fields, and trails within by-right residential developments in accordance with design standards as enabled by the Code of Virginia.

PR 5.5 - Maintain a comprehensive inventory of privately-owned recreation facilities within the County and apply a percentage of these facilities towards meeting the overall Parks and Recreation Facility and Service Standards.

PR 6 - Incorporate the particular needs of the County's diverse population, including but not limited to teens, at-risk youth, seniors, and persons with disabilities when planning for recreational facilities, programs, and greenways.

PR 6.1 - Include input from teens, at-risk youth, seniors and persons with disabilities in all master plans for new parks.

PR 6.2 - Re-evaluate the types of programs offered based on changing County demographics and citizen desires.

PR 6.3 - Continue to offer Inclusion services and conduct assessments with persons with disabilities to ensure necessary accessibility for participation in recreation programs.

PR 6.4 - Establish and maintain program performance measures (including goals, objectives, and essential eligibility guidelines) to incorporate consistent standards in program design.

PR 6.5 - Incorporate leadership and volunteerism in teen programs in an effort to increase skill building and employability within the County.

PR 6.6 - Include programs and services that build resiliency in at-risk youth and their families.

PR 6.7 - Continue to maintain the certification of a Nationally Accredited Agency through the Commission for Accreditation of Park and Recreation Agencies.

PR 7 - Address issues of affordability and accessibility in planning recreation programs.

PR 7.1 - Work with Williamsburg Area Transit Authority to improve the public transportation service to County parks and facilities.

PR 7.2 - Plan for multiple points of access for vehicles, pedestrians and bicyclists to improve connectivity between Parks and Recreation Department facilities and surrounding neighborhoods.

PR 7.3 - Continue to evaluate and provide financial assistance to qualifying families and individuals, and continue to offer free access to youth at the Abram Frink Jr. Community Center.

PR 7.4 - Conduct a comparative market analysis to review fees biennially to ensure that programs are offered at fair market value.

PR 7.5 - Identify potential partnerships with neighborhoods to develop neighborhood programming.

PR 7.6 - Work collaboratively with lower-income neighborhoods to facilitate improvements to neighborhood parks and recreation facilities.

PR 7.7 - Plan for better access to recreation programs and facilities for all through equitable geographic dispersion of facilities.

PR 8 - Continue to promote awareness of the recreational opportunities available to County residents and visitors.

PR 8.1 - Continue to distribute brochures and ensure timely, accurate information on the County's website and social media platforms to inform residents and visitors about parks, facilities and recreational opportunities in accordance with approved public information plans.

PR 8.2 - Provide information at community events regarding Parks and Recreation Department programs and services.

PR 9 - Sponsor educational opportunities that emphasize the connections between parks and recreation and economic development, as well as environmental, conservation, and historical preservation.

PR 9.1 - Enhance existing facilities and marketing efforts to fully promote an ecotourism program that promotes passive recreational opportunities within natural open spaces and special environmental and historical areas, and identify and designate public lands in support of this purpose.

PR 9.2 - Continue to promote interpretive signage and programs that provide educational opportunities in cultural and natural resources.

PR 10 - Design, construct, and operate facilities in a sustainable manner.

PR 10.1 - Develop sustainable strategies similar to LEED (Leadership in Energy and Environmental Design) for the design and location of parks and incorporate the strategies into park development guidelines, where feasible.

PUBLIC FACILITIES

Introduction

Public facilities are required to support the services and functions provided by James City County and its associated public and private agencies. These facilities support the development of the community and help to ensure quality of life for its citizens. James City County currently provides high quality facilities and services, and it is the County's intention to maintain and improve them. Public facilities are divided into five major categories: public education, public safety, public health, general County government, and public utilities. A sixth category, parks and recreation, is discussed in the Parks and Recreation section of the Comprehensive Plan, while a seventh category, public transit, is included in the Transportation section of the Comprehensive Plan.

The Public Facilities Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language as written in the 2035 Comprehensive Plan has been substantially revised, to specifically note and recognize school facilities, and to give direction that facilities and services should be provided in a manner that is balanced with fiscal impacts. The Goal now states "Provide high quality public facilities, including schools, and public services in a manner that balances demand for facilities and services with fiscal impacts." Many important Public Facilities Chapter implementation activities have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the revised and updated Strategies and Actions will be needed.



CHAPTER GOAL

"Provide high quality public facilities, including schools, and public services in a manner that balances demand for facilities and services with fiscal impacts."

Key Planning Influences

The existing public facilities owned by James City County are a source of pride for citizens and County staff members alike. New and renovated facilities should continue this tradition and be held to high standards of cost-effectiveness, functional and operational efficiency, energy efficiency, green building design, durability, and where applicable, aesthetic appeal, so that they complement existing facilities and serve the long-term needs of the County.

Since the last update of the Comprehensive Plan, the County's Board of Supervisors has adopted a Strategic Plan. The Strategic Plan is the County's guidebook for future investment, provision of public services and facilities, and the County's work plans for the next 20 years. The Strategic Plan sets out priorities to be incorporated into future County budgets and Capital Improvements Programs (CIPs) based on the long-range planning guidance set out in the County's adopted Comprehensive Plan and other long-range planning documents.

Two of the priorities of the Strategic Plan are to modernize the County's infrastructure, facilities, and technology system and to provide exceptional public services. By modernizing infrastructure, community facilities, public education, and technology, the County improves the quality of life for County residents and addresses the changing needs of the population. The County provides exceptional public services by improving services to its aging population, enhancing parks and recreational offerings, and improving the County's communication systems.



The Strategic Plan acts as an inventory of projects for the responsible departments to use to generate CIP requests, and the requests are then evaluated for and prioritized by consistency with the Strategic Plan, Comprehensive Plan, and current capital needs. Each year the County Administrator proposes a capital projects budget and five-year CIP based on this evaluation and prioritization process for the Board to review and approve based on available funding.

The existing public facilities owned by James City County are a source of pride for citizens and County staff members alike.

Assessing Capital and Service Needs

The County's divisions and departments are continually assessing the facility and service needs of the community based on anticipated demographic and growth trends. As guides in this process, departments use the level of service guidelines within this chapter, as well as separate studies and analyses, to determine future needs for public facilities. A facility space needs analysis completed in 2020 found that staff growth, which has already occurred as a result of past population increases, as well as the increasing complexity and sophistication of the County's government, have created space shortages and inefficiencies in numerous County facilities. Efforts are underway to accommodate the space needs of the growing departments and agencies, and the space needs analysis will help to guide the development of future facilities.

In addition to the facility space needs analysis completed in 2020, a broader analysis conducted during this Comprehensive Plan update examined facility needs in 2045 and fiscal impact to the County based upon the land use pattern shown on the Future Land Use Map recommended by the Planning Commission Working Group in April 2021. This information is shown in Appendix I. The results are shown for both the County overall and for four Fiscal Analysis Zones (FAZ): North, Central, South and Outside the PSA. The results cover Streets, Parks and Recreation, Fire and Emergency Services, Police, Library, General Government, General Services, Courts, and Schools. The fiscal model developed during this Comprehensive Plan will continue to be used to analyze fiscal, facility and land use considerations on an on-going basis.

The guidelines below in the Facilities and Services Standards by Category section are intended to be used to help direct the development and operation of public facilities both now and into the future. They provide thresholds for measuring the impacts of growth with respect to creating new facilities; maintaining, and improving the quality of service delivery to the public; and providing a practical way for citizens to balance performance against fiscal limitations. Ultimately, facility and service guidelines are a statement of the expectations residents have for their government services.

James City County endeavors to operate its public facilities as outlined in these guidelines to achieve the following goals:

- The provision of public facilities will reflect what citizens need, desire, and are willing to financially support.
- The quantity and quality of facilities will be correlated with the size and demographic characteristics of the population, as well as demand.
- Public facilities will be located in close proximity to the greatest possible number of people and are provided proportionally to the number of people served.
- The development of public facilities and provision of public services will be focused within the Primary Service Area (PSA) as defined on the Comprehensive Plan Land Use Map.
- New facilities or facility expansions will be located where most needed or required.
- Local community objectives and activities will be supported by encouraging the full utilization of all public facilities, including the development of joint and multi-use facilities for use by different County agencies, the development of shared facilities, and the development of public/private partnerships.

The public facility and service guidelines are derived from a combination of sources. Many of the guidelines were established after reviewing standards set by federal, state, and other local plans. Some reflect the limits established by other independent agencies and boards such as the State Library Board. Each individual County department and public agency directly affected by these standards was consulted regarding the relevance and effectiveness of the existing service guidelines. These community guidelines are unique to James City County and are a product of research and analysis by the department heads, Planning Division staff, and administration.

Facilities and Services by Category

Public Education

This category of facilities includes public schools, adult education, career and technical education, and library services. The locations of the major public education facilities are shown on Map PF-1. Partnerships within the public education category include joint operation of the school system with the City of Williamsburg, joint operation of the New Horizons Regional Education Center with the school divisions of Gloucester County, York County, City of Hampton, City of Newport News, and the City of Poquoson, and operation of the libraries by contract between the County, City of Williamsburg, and York County. Thomas Nelson Community College is operated by the Virginia Community College System. Facility and service standards for public education are listed below.

Education Facilities and the Adequate Public School Facilities Test Policy

In 1998, the Board of Supervisors adopted a policy creating an adequate public schools facilities test. The policy applies to new residential developments requiring a special use permit and/or rezoning application. These applications will considered to have passed the test if the schools which would serve the future development currently have adequate design capacity (not to exceed 100% of the design captivity) to accommodate the existing student population plus the additional schoolchildren generated by the development.

Education Facilities and Service Standards: Public Schools

WJCC Schools' consultant, FutureThink, produces several 10-year projections for planning purposes. Low, moderate, and high enrollment projections are developed using the cohort survival method. This method uses previous live birth data and historical student enrollments to "age" a known population. A ratio is then developed to track how this population grew or reduce in number as they move through the grade levels. Patterns emerge and these are folded into the projections. WJCC uses the "moderate" projection. Below are the enrollment numbers for each school by type:



Table PF-1. Current and Projected Enrollment

Schools - High Schools	Effective Capacity	Current Enrollment	Projected Enrollment 2021-2022	Projected Enrollment 2025-2026	Projected Enrollment 2030-2031
Lafayette	1,314	1,123	1,131	1,120	1,120
Jamestown	1,208	1,257	1,266	1,253	1,253
Warhill	1,441	1,340	1,349	1,336	1,336
Total	3,963	3,720	3,746	3,709	3,709

Schools - Middle Schools	Effective Capacity	Current Enrollment	Projected Enrollment 2021-2022	Projected Enrollment 2025-2026	Projected Enrollment 2030-2031
Berkeley	779	599	587	583	646
Toano	790	628	617	612	677
James Blair	608	533	523	519	575
Hornsby	952	795	781	774	858
Total	3,129	2,555	2,508	2,488	2,756

Schools - Elementary Schools	Effective Capacity	Current Enrollment	Projected Enrollment 2021-2022	Projected Enrollment 2025-2026	Projected Enrollment 2030-2031
Clara Byrd Baker*	599	519	527	557	564
Laurel Lane*	574	506	515	543	570
DJ Montague*	578	494	504	534	561
Norge*	725	660	671	707	742
Matthew Whaley	449	429	438	466	493
James River	528	428	438	464	491
Stonehouse	747	718	732	780	824
Matoaka	747	674	687	732	774
Blayton*	609	550	558	588	636
Total	5,556	4,978	5,070	5,371	5,655

(Source: FutureThink Report Enrollment Projections Update dated October 27, 2020)
*Indicates Pre-K site, includes assumption that Pre-K enrollment will remain constant at 395.

The facility and service standards for schools are listed below. When developing and implementing these standards, the following factors are taken into consideration:

- For all measures of performance, the effective capacity rather than the design capacity of each specific school should be used.
- For new school sites, factors such as close proximity to neighborhoods, location within the existing PSA, ability to minimize transportation costs, availability of land, cost of improvements, and accommodation of multiple users (school, recreation, and community) may translate into smaller urban/neighborhood sites or larger suburban sites as needs dictate. The acreage recommendations for schools listed below may not be appropriate for urban/neighborhood sites as available and developable potential school sites are fewer and smaller. A tradeoff for the neighborhood school design is the availability of sports fields. Availability of off-site or shared sporting locations should be taken into account for any future school sites. The design of new/revitalized schools should be a public process where the needs of students, parents, school administration, and taxpayers are realized. Efficiencies may be realized by reducing the school's footprint by building multiple stories on smaller building pads.
- When designing new educational facilities, the square feet per student standard for elementary, middle, and high schools should be considered to ensure efficient and appropriate use and size of design space during planning.
- The following standards were used in constructing the most recent County school sites and include space allowances for recreation (both school and community needs including sports fields) and other community activities. They may be adjusted as needed to take into account the factors listed above. Multi-story structures, shared parking, and regional stormwater facilities may help reduce the amount of developable acres ultimately needed.

Elementary School Facilities and Service Standards:

- At least 27 developable acres* for a school with a 500-700 student design capacity;
- Optimally located within a two-mile radius of least 80% of the students.

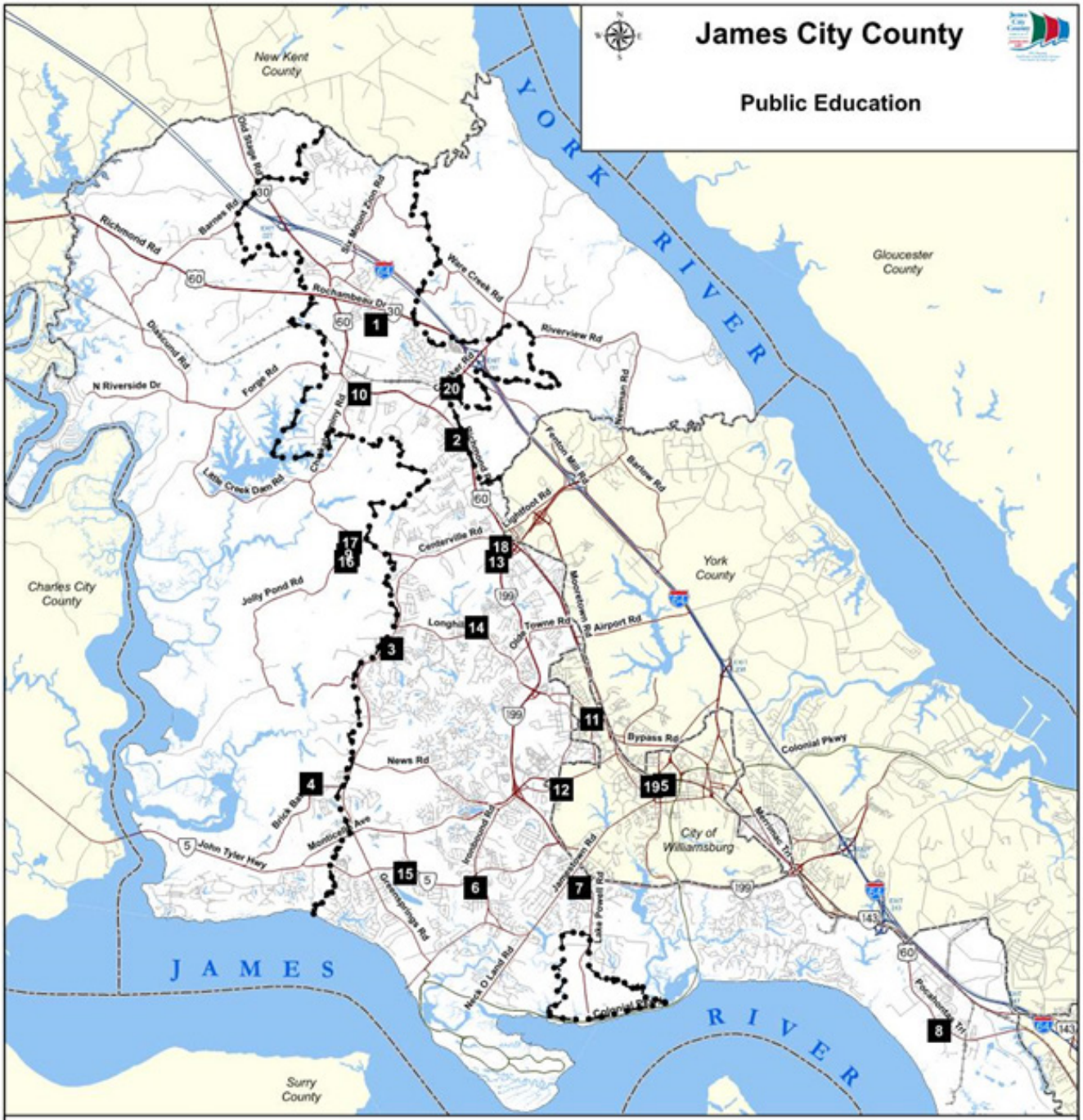
Middle School Facilities and Service Standards:

- At least 38 developable acres* for a school with a 700-900 student design capacity;
- Optimally located within an eight-mile radius of at least 80% of the students.

High School Facilities and Service Standards:

- At least 52 developable acres* for a school with a 1,200-1,400 student design capacity;
- Optimally located within a 10-mile radius of at least 80% of the students.

Map PF-1. Public Education



Education Facilities and Service Standards: Adult and Vocational Education

To help ensure the County has a well-educated workforce, the County in conjunction with WJCC Schools is committed to providing vocational and adult education services. For example, the County regularly provides funding to the Peninsula Workforce Development Center and the Thomas Nelson Workforce Center. The County also provided funding for the Thomas Nelson Community College Historic Triangle Campus.

Education Facilities and Service Standards: Library Services

Libraries serve as community hubs where residents can come and learn on their own or in collaboration. The Williamsburg Regional Library consists of the Williamsburg Library, the James City County Library, the Stryker Center in the City of Williamsburg, and the mobile library service vehicles. Listed below are the facility and service standards:

- No more than 15-minute drive time to a library location;
- Five books per capita;
- 1.0 square feet of library space per capita.

Though digital media resources are becoming more prevalent, book circulation in the buildings is holding steady, even increasing in some areas. DVD and CD circulation has been steadily decreasing with the introduction of streaming and on-demand TV services.

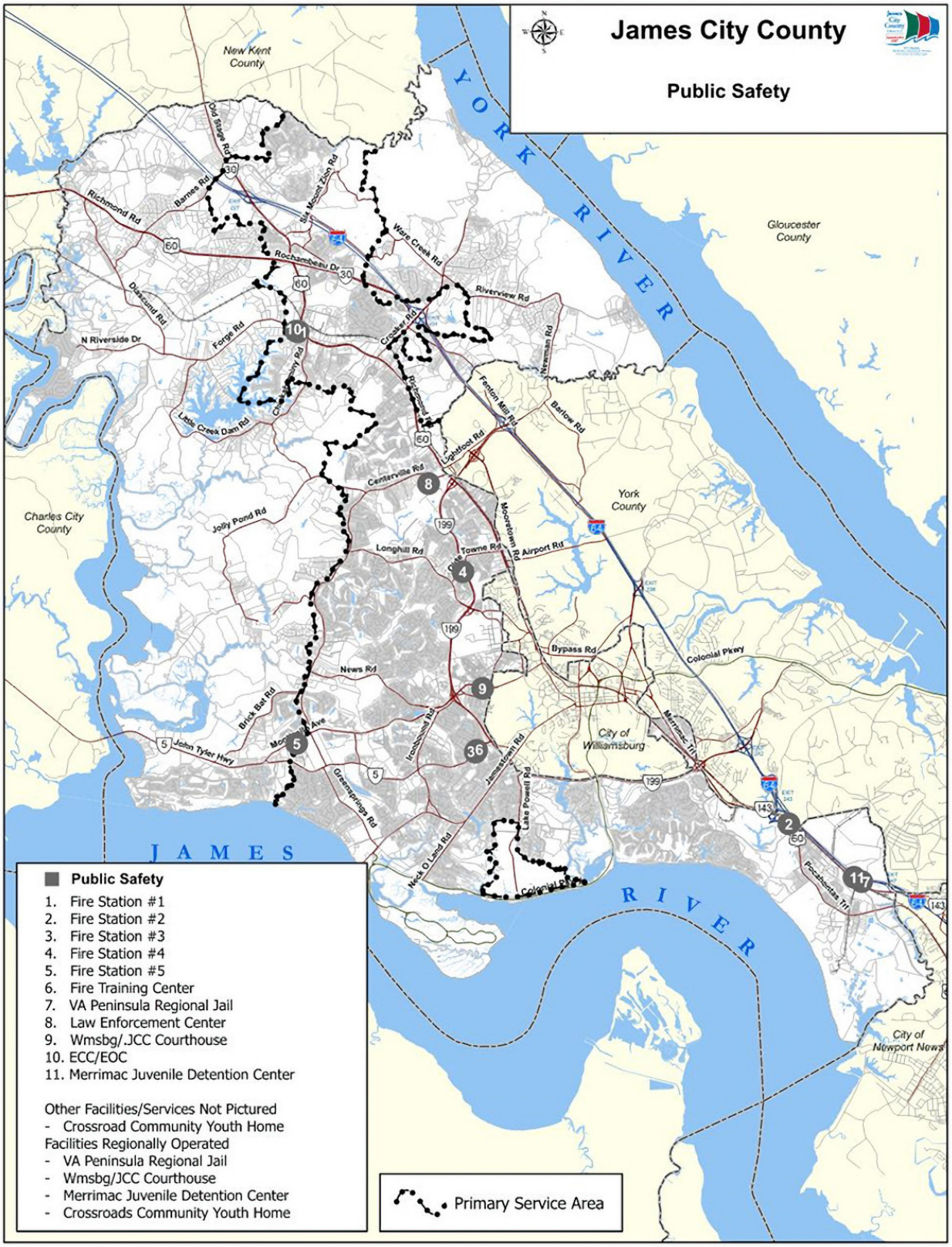
Public Safety

This category of facilities includes fire protection and emergency medical services, law enforcement, and corrections. The locations of the major public safety facilities are shown on Map PF-2. Partnerships within the public safety category include the Fire Department partnership with the James City-Bruton Volunteer Fire Department; regional operation of the jail and juvenile detention center, and joint operation of the Courthouse between the County and the City of Williamsburg. Facility and service standards for public safety are listed below.

Public Safety Facilities and Service Standards: Fire Protection and Emergency Medical Services

- Provide response times of six minutes or less within service areas that generate 365 or more emergency incidents per year.
- Provide a fire station for areas that generate 365 or more emergency incidents per year in order to provide six minute or less response time in areas not currently meeting the response time standard.
- Provide an additional response unit for any existing unit that is not available for more than five hours per day (on an annual average).

Map PF-2. Public Safety



The recently completed Space Needs Analysis found that the current square footage of existing Fire Protection and Emergency Medical Services facilities totals 88,275 square feet. By 2040, the total space needs for Fire Protection and Emergency Medical Services are expected to total 144,353 square feet.

Public Safety Facilities and Service Standards: Law Enforcement

- Provide a police field office in all future fire stations. Field offices should be at least 250 square feet.
- Maintain an average response time of seven minutes for high priority calls.
- Maintain a clearance rate for crimes that exceeds national averages for similar localities.

The recently completed Space Needs Analysis found that the current square footage of existing Law Enforcement facilities totals 49,925 square feet. By 2040, the space needs for Law Enforcement are expected to total 52,480 square feet.

Public Safety Facilities and Service Standards: Corrections

- Juvenile Detention Facilities - 14 bed spaces per 70,000 population and 28,000 square feet per 70,000 population.
- Regional Jails - operated per Board of Corrections standards.

The Merrimac Juvenile Detention Center, located in James City County, is operated by the Middle Peninsula Juvenile Detention Commission and serves the 9th and 15th General District Court Services Units. Each unit consists of 11 different localities.

The Virginia Peninsula Regional Jail, also located in James City County, services four localities: the cities of Williamsburg and Poquoson, and the counties of York and James City.

Public Health

This category of facilities includes refuse collection and disposal, mental and physical health services, and animal care facilities. The locations of the major public health facilities are shown on Map PF-3. Partnerships within the public health category include public/private partnerships for the Olde Towne Medical and Dental Center and the Heritage Humane Society Animal Shelter, and regional funding of the Peninsula Health Department and Colonial Behavioral Health.

For refuse collection and disposal, the County has a transfer station and three convenience centers, but does not maintain any waste disposal facilities. Refuse collection is handled through private companies. The waste is ultimately disposed in two landfills located in Charles City County and the City of Hampton.

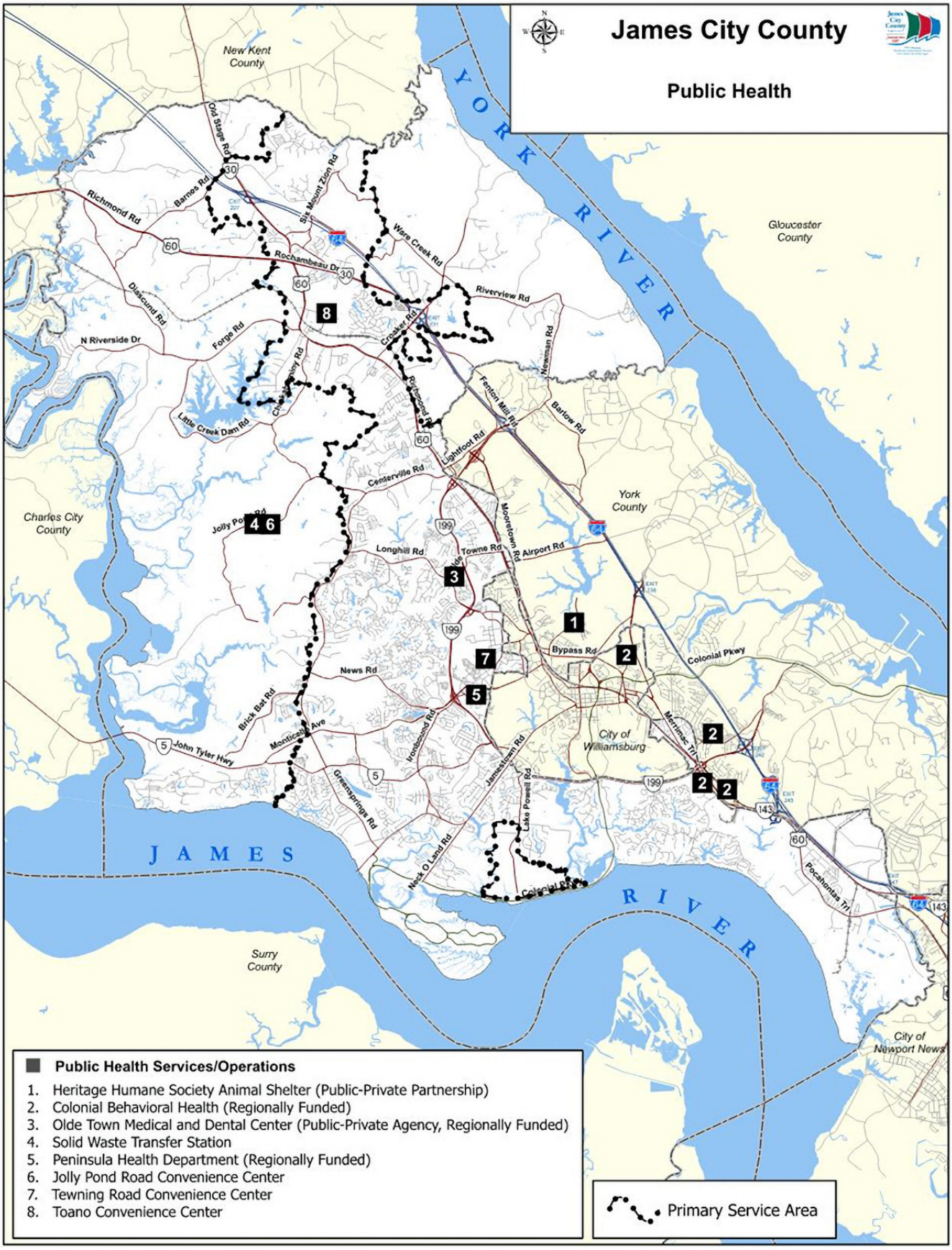
The County provides residential curbside recycling services to residents and transitioned to a fee-based program in July 2019. The goal was to continue to provide curbside recycling, create a program that was both affordable and based on user fees instead of tax revenue, and verify that the materials collected were indeed being recycled. Recycling increases the useful life of landfills, such as two where County residents' waste is disposed. Recycling decreases litter, pollution, water contamination, impacts to wildlife, energy consumption, water usage, and the need for mining raw materials. Currently, there are 15,000 households recycling in James City County.

Public Health Facilities and Service Standards: Refuse Collection and Disposal

- All County facilities should be equipped with appropriate recycling receptacles and mechanisms to reduce the solid waste stream produced in day-to-day operations.
- Provide residential curbside recycling at a reasonable cost.

The recently completed Space Needs Analysis found that the current square footage of existing Solid Waste and Recycling facilities totals 1,440 square feet. By 2040, the space needs for Solid Waste and Recycling are expected to total 1,924 square feet.

Map PF-3. Public Health



General County Government

This category of facilities primarily consists of the office and maintenance buildings housing the County's departments. The locations of the major general County government facilities are shown on Map PF-4. Facility and service standards for general County government are listed below.

General County Government Facilities and Service Standards

- 90% of residents will live within 10 miles of a County office for paying taxes, tags, licenses, etc.

The County sponsored a Facility Space Needs Analysis in 2019-2020, which included County Administration, the WJCC School Board and Central Office, and the WJCC Courthouse functions. Identified in the Strategic Plan as a Board Initiative (Goal No. 2 - Operational Initiative), the analysis examined the facility needs of the County's various administrative functions and established specific planning and design criteria in the form of detailed space requirements. Specifically, the study developed metrics to determine the amount of space needed by job function, evaluated utilization of existing space, identified efficiencies, and applied metrics and best practices to achieve a baseline assessment of space needs. The analysis can be used in the future to develop a comprehensive facility master planning study as well as facility master planning study to examine alternative concepts of renovation, expansions, and/or new construction to meet the County's needs for space.

The analysis projected five-year, 10-year, and 20-year planning horizons to identify the current, 2025, 2030, and 2040 personnel and support space needs for each department within the County. Population growth projections for the County, based on Hampton Roads Planning District Commission (HRPDC) data, along with the corresponding departmental personnel to serve citizens were taken into account. A benchmarking analysis of two similarly sized Virginia localities, at the County's milestone 20-year population projection, was completed to confirm that the personnel and facility goals established today align with those the County strives to reach in the future.

The recently completed Space Needs Analysis found that the current square footage of existing General County Government facilities totals 143,763 square feet. By 2040, the space needs for General County Government are expected to total 280,338 square feet.

The Facility Space Needs Analysis examined the facility needs of the County's various administrative functions and established specific planning and design criteria in the form of detailed space requirements.

Public Utilities

This category of facilities includes water and sewer facilities. Examples of water and sewer facilities include well facilities, water treatment plants, water transmission lines, wastewater treatment plants, and wastewater collection lines. The locations of the major public utilities are shown on Maps PF-5 and PF-6. The James City Service Authority (JCSA) manages the County's public water system except for the areas served by Newport News Waterworks in the southern part of the County. The source of all water provided by the JCSA comes from the aquifers. JCSA also manages the public sewer system, and the sewage is treated at the Hampton Roads Sanitation District (HRSD) Williamsburg Wastewater Treatment Plant. As of April 2020, the JCSA served 23,064 water customers, 24,812 sewer customers, and managed over 860 miles of service lines.

One component of the central water system for the JCSA is the Five Forks Water Treatment Facility which consists of five on-site wells drawing brackish groundwater from the Middle and Lower Potomac Aquifers. A reverse osmosis treatment process is used to extract salts and other minerals to make the water potable. Five million gallons of water of potable water are produced daily using this method.

JCSA, like any other public water supplier, must obtain a permit from the Virginia Department of Environmental Quality (DEQ) to withdraw 300,000 gallons or more per month of groundwater from the aquifers. In 2012, JCSA requested a renewed groundwater withdrawal permit for 8.4 million gallons per day. In 2014, DEQ informed JCSA that it intended to renew its groundwater permit at the rate of 3.8-4.0 million gallons per day, well below current demand, due to concerns about the long-term viability of the aquifers. In 2017, DEQ ultimately renewed the permit for 6.0 million gallons per day, with the ability to increase it up to 8.4 million gallons per day. The purpose of this permit was to allow additional time to find an alternative water source. DEQ emphasized, however, that it was still its intent to reduce the amount available to withdraw to 3.8-4.0 million gallons per day in 2027, when the permit expires. In 2020, the average daily demand for water was 4.5 million gallons per day, with a peak day demand of 9.0 gallons per day.

The JCSA has evaluated a number of options for a long-term water supply, and three remain under consideration. The first is to purchase water from Newport News Waterworks (NNWW). In 2008, the JCSA Board of Directors approved a Project Development Agreement with NNWW. Under the terms of the existing agreement, JCSA pays a fee for the right to purchase only two million gallons per day from NNWW. The JCSA has not purchased any water from NNWW since the agreement was executed. JCSA and NNWW are currently in discussions about renegotiating the 2008 agreement, or simply negotiating a new agreement, to allow for JCSA to purchase water from NNWW.

Another option for JCSA is to construct a surface water treatment plant. A feasibility study was conducted on the three rivers that surround James City County: the James River, Chickahominy River, and York River. The JCSA ultimately decided to submit a Joint Permit Application for an 8 million gallon per day water treatment plant on the Chickahominy River, due to better water quality and the fact that the County already owns land on the Chickahominy that is suitable for a water treatment plant. The JCSA has received most of the permits needed to construct this plant, including a DEQ permit to withdraw up to 16.95 million gallons per day from the Chickahominy River, but still needs to obtain a permit from the Corps of Engineers. When considering the distribution system improvements that would accompany the construction of a water treatment plant, this is an expensive option.

The third option is to continue to rely on groundwater. The Hampton Roads Sanitation District is currently implementing a project known as the Sustainable Water Initiative for Tomorrow (SWIFT). In this initiative, wastewater is treated to drinking water quality standards, and instead of discharging into the area's waterways, the treated wastewater is injected into the aquifers. If successful, this project would reduce land subsidence and saltwater intrusion, and would make more groundwater available for withdrawal. However, DEQ would still need to approve JCSA's withdrawal of additional groundwater. While this could be a viable and cost effective option, its viability and regulatory approval are uncertain at this time. Recent reports from DEQ indicate that conservation efforts associated with recent withdrawal permit renewals in the Eastern Virginia Groundwater Management Area have resulted in improvements in the aquifer levels in the region. However, DEQ has stated that they will need more data before amending any reductions to the groundwater permit.

In addition to identifying viable long-term water supplies for the County, JCSA must look for ways to reduce the County's demand for water. JCSA promotes conservation through its water usage fee structure for single-family residential customers, initiatives such as water conservation guidelines (often proffered or conditioned for legislative cases), rebate programs, conservation education, and restrictions on outdoor watering.

Facility and service standards for public utilities are listed below.

Public Utilities Facilities and Service Standards: Water and Sewer

- The provision of all water and sewer system facilities should be consistent with the following:

    1. JCSA's Regulations Governing Utility Service Regulations. (https://www.jamescitycountyva.gov/1375/Regulations-Governing-Utility-Service)
    2. Design and Acceptance Criteria for Water and Sanitary Sewer Systems. (https://en.calameo.com/read/00452964275e12ac3995d?page=1)
    3. Standards and Specifications for Pump Stations, (available hard copy only.
    4. Hampton Roads Planning District Commission Regional Construction Standards. (https://www.hrrcs.com/)

The recently completed Space Needs Analysis found that the current square footage of existing JCSA facilities totals 30,603 square feet. By 2040, the space needs for JCSA are expected to total 42,780 square feet.

In addition to identifying viable long-term water supplies for the County, JCSA must look for ways to reduce the County's demand for water.

Communication Infrastructure

The Commonwealth of Virginia encourages localities to consider opportunities to provide broadband (high-speed internet) access that can meet the current and future needs of its residents and businesses. The need for this access was highlighted during the COVID-19 pandemic. Children in households with broadband access have more opportunities educationally and in obtaining career success. This access is also important to the local economy. Full broadband service is important to explore with the understanding that there are challenges, financially and logistically.

Some indications of the coverage of broadband service in the County can be determined based on data from the 2018 American Community Survey (ACS), and the Center for Innovative Technology (CIT). The ACS data indicates the following:

- 93.7% of households in the County had a computer, and 85.9% had a broadband internet subscription.
- Among all households, 61% had a cellular data plan; 79.9% had a broadband subscription such as cable, fiber optic, or DSL; 3.7% had a satellite internet subscription; 0.3% had dial-up alone; and less than 1% had some other service alone.

The CIT has a toolkit, which includes mapping of broadband coverage, based on best available data, in Virginia localities. The maps from the CIT toolkit appear to show broad coverage, with some gap areas, primarily in the rural west and northern portions of the County.

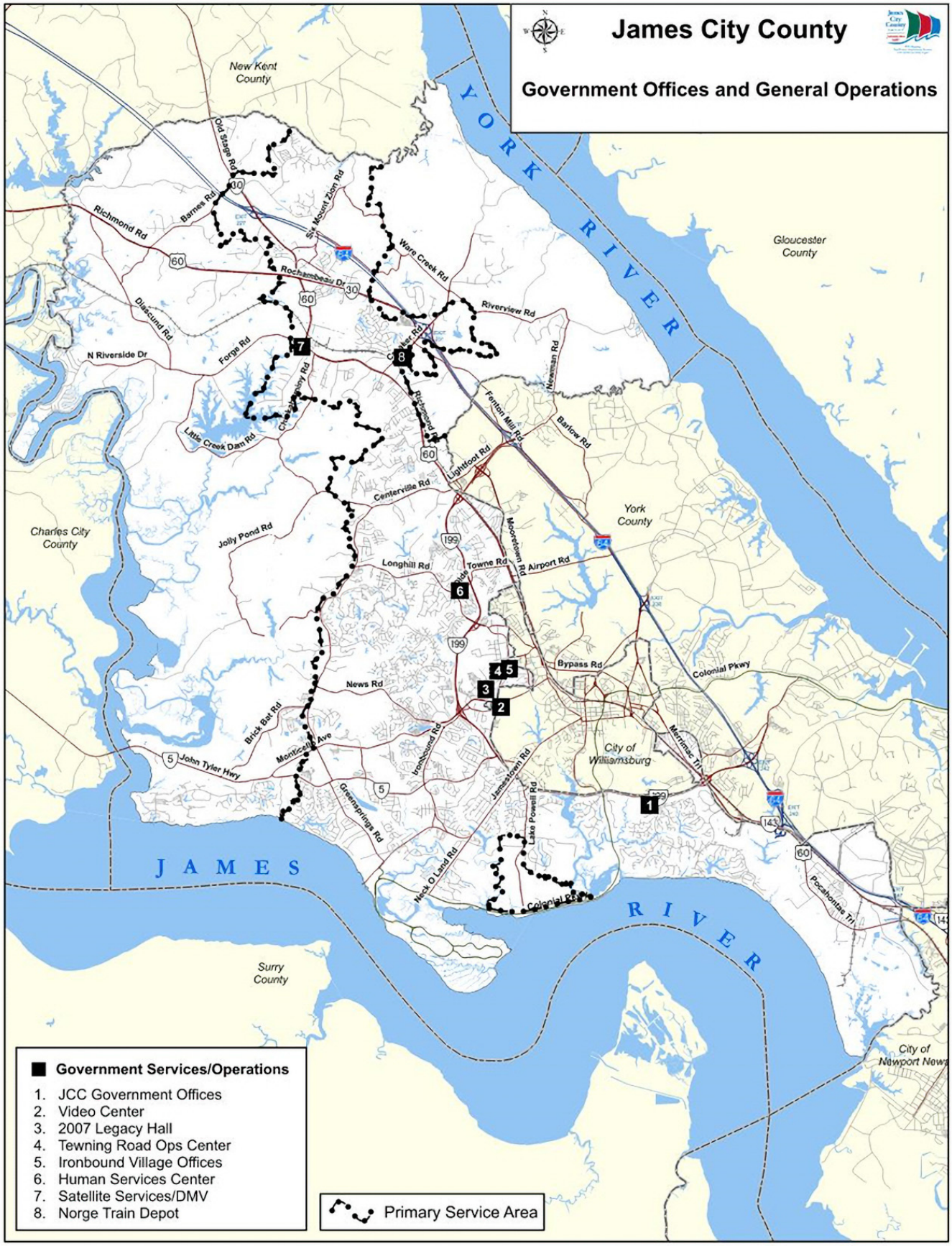
Most broadband service is provided by private companies rather than by the public sector. However, local governments can play indirect or direct roles in encouraging broadband service through actions such as the following:

- In discussions of cable franchise agreements, encourage private providers to extend service, or improve terms of service, to areas lacking service.
- Pursue grant funds to partner with a private company to fund installation of infrastructure, with the company then providing the ongoing service.
- Monitor new technologies and update regulations pertaining to wireless communication facilities in the Zoning Ordinance as appropriate.

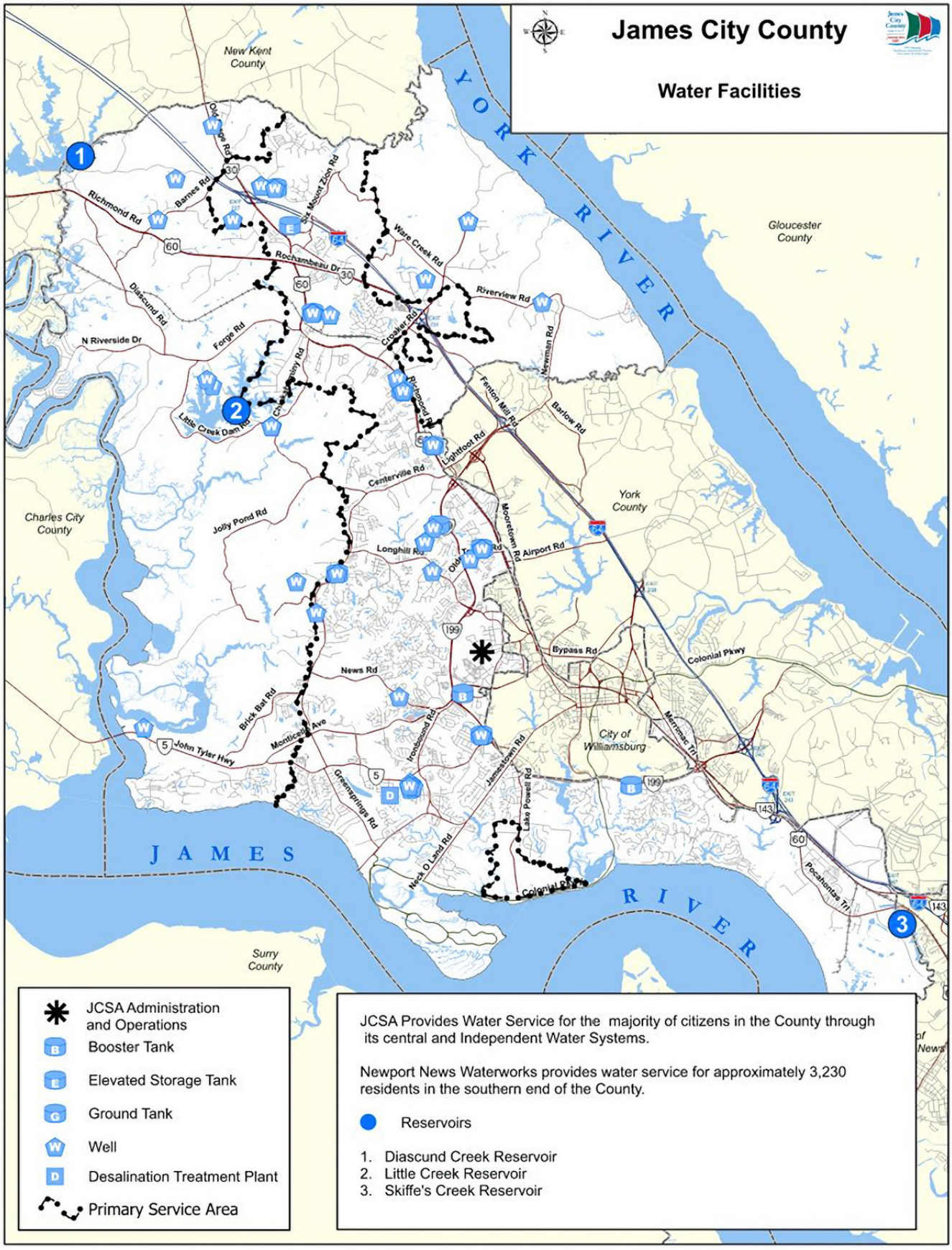
The County also has a role to play in ensuring broadband service to critical public infrastructure. The County already has in place a looped fiber optic cable system and is now in the process of expanding fiber optic cabling in support of County and School operations. This expansion will replace currently leased fiber connections, provide redundant fiber paths to improve reliability and availability and allow County and School technology groups to move to the next level of high-speed communication in support of citizens. Barring any funding constraints, this project should be completed by 2024.

The need for broadband access was highlighted during the COVID-19 pandemic. Children in households with broadband access have more opportunities educationally and in obtaining career success.

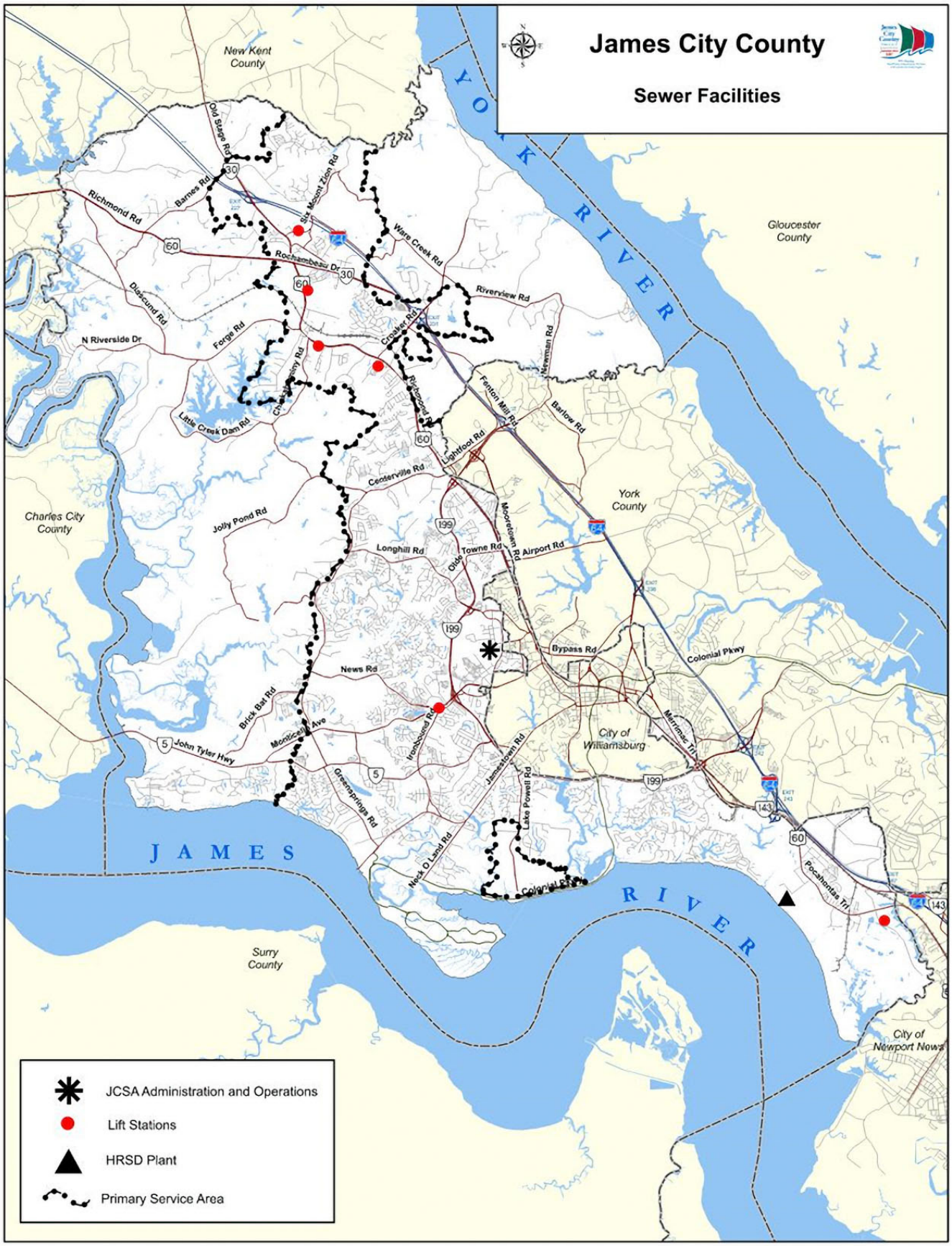
Map PF-4. Government Offices and General Operations



Map PF-5. Water Facilities



Map PF-6. Sewer Facilities



Community Guidance

Public Engagement

One of the public engagement themes identified during this Comprehensive Plan update that most directly relates to this chapter is "Respondents desire additional quality of life amenities including parks, public water access, expanded recreational facilities, trails for walking and bicycling, transit connections, and other enhancements to existing public facilities." Respondents to the 2019 Citizen Survey generally rated the County's public facilities very favorably. Approximately 85% of respondents rated the County's public schools facilities as "excellent" or "good", and 94% of respondents ranked the Williamsburg Regional Library as "excellent" or "good". The Public Safety portion of the survey found that 99% of respondents stated they feel "very safe" or somewhat safe" during daylight hours, with 90% of respondents feeling "very safe" or somewhat safe" after dark. In response to taxation, most citizens thought the level of taxation was "about right" (71%), with an equal amount indicating that the level of services in relation to the taxes paid was either "excellent" or "good".

Comments from the open-ended questions included the following:

- Preserve the small town feel with great schools, parks, trails and libraries;
- Continue to improve waterfront amenities;
- While the County provides great amenities, such as parks, trails and libraries, there is always room for improvement;
- Pursue opportunities for sports facilities and school facilities that can be utilized for sporting events/tournaments/travel programs that could bring in additional revenue to the County; and
- Provide more opportunities for safe biking.

As a follow-up to the survey, the County hosted the Engage 2045 Summit on the Future in the fall of 2019 to engage with citizens to determine their vision for the future of the County. During the polling portion of the Summit and online polling that continued weeks after, respondents were asked to indicate their biggest concern for the County's future, and 11.5% answered that the future water supply of the County was their biggest concern. While "managing growth" was the most frequent response to a separate question of what is most important to accomplish, ensuring the County can manage the quality of public services was the second.

Participants were also provided an opportunity to share their "Big Ideas." Open-ended responses included the County should secure its own affordable water sources, libraries should continue to expand with branches where people reside, the County should meet the technology needs for the 21st century, and the County must plan for schools that accommodate a growing population.

The second round of public engagement included questionnaires on the Goal statements for each chapter, and feedback on alternative futures. The results of the Goals Questionnaire for the Public Facilities chapter's goal showed that slightly more than 80% of respondents did not want to change the goal, 12.5% wanted to change the goal. Of those preferring change:

- Five comments focused on addressing water supply, solar power initiatives and the need to include school needs as an important component of the Comprehensive Plan;
- Four commenters said the goal needed more specificity to clarify the intention; and
- Two commenters added that funding for public facilities should be reduced or replaced by services provided by private business.

The third round of community engagement was held in the winter of 2021. This round solicited input on policy directions the County should pursue and actions it should take to enable citizens' vision for the future of our community to be realized. Overall, there was consistent support for enhancing quality of life amenities in James City County with a strong emphasis on walking and biking facilities. Respondents supported prioritizing County resources for enhancing quality of life amenities. They also supported prioritizing walking and biking amenities in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to Public Facilities:

- Reduce public costs by locating new development within the PSA;
- Support infill redevelopment and adaptive reuse development efforts that maximize use of existing public infrastructure;
- Create more mixed-use areas that include and provide greater access to recreation, parks, schools, and other public facilities;
- Foster development of walkable environments potentially provided as part of new private developments that increase recreational opportunities in a cost-efficient manner; and
- Locate new growth closer to existing population centers to reduce sprawl and provide greater efficiency of access to existing and planned public facilities.

Respondents to the 2019 Citizen Survey generally rated the County's public facilities very favorably.

Spotlight on Implementation

James City County's commitment to providing a high level and quality of public facilities and services has been challenged over the past five years by both a growing population and the difficult economic climate, with particular challenges during the 2020-2021 pandemic. The County's capital focus over the past five years has been on improvements in the areas of education, public safety, and maintenance.

In June 2015, WJCC Schools completed a comprehensive facility condition and educational adequacy assessment of the 15 schools and the Operations Building within the division. The objectives were to:

1. Identify and document the present condition and risks at each school.
2. Identify the risk of deficiencies and consequences of not correcting them.
3. Recommend corrections for all deficiencies.
4. Provide cost estimates for the needed corrective actions.
5. Calculate the Facilities Condition Needs Index (FCNI) to illustrate the relative condition of each facility.

Using this information, WJCC reconfigured and redesigned the entrances to all of its schools to provide better security.

Many County facilities have undergone renovations/expansions or opened since 2009. Such facilities include the renovations of James Blair Middle School into administrative offices, the County's Administration building (Building D), and the Fire Administration building, the completion of Lois S. Hornsby Middle School, which can accommodate approximately 900 students, J. Blaine Blayton Elementary School, which can accommodate approximately 500 students, and the new Law Enforcement Center. Another accomplishment in the last five years is the installation of JCC Alert, which is a new way to communicate with County residents about emergencies by notifications and updates via text message, voice message, and email.

In light of the County's projected growth and changing demographics through 2045, future public facilities and services will need to be efficiently designed, located, and utilized, as well as adequately funded and paced with growth. By minimizing impacts and investing in high quality, secure facilities, the County can ensure that they will add value to the community for years to come.

In light of the County's projected growth and changing demographics through 2045, future public facilities and services will need to be efficiently designed, located, and utilized, as well as adequately funded and paced with growth.

Goals, Strategies, & Actions

Goals

PF - Provide high quality public facilities, including schools, and public services in a manner that balances demand for facilities and services with fiscal impacts.

Strategies and Actions

PF 1 - Design, locate, and utilize public facilities and services more efficiently.

PF 1.1 - Encourage full utilization of all public facilities, including joint use by different County agencies, to support local community objectives and activities.

PF 1.2 - Acquire land for, efficiently locate and design, and construct new public facilities in a manner that facilitates future expansion and promotes the maximum utility of resources to meet future capacity needs.

PF 1.3 - Design facilities and services for efficient and cost-effective operations over their expected lives.

PF 1.4 - Develop public facilities as components of regional programs where feasible.

PF 1.5 - Construct and maintain new facilities consistent with anticipated needs and County fiscal constraints by:

PF 1.5.1 - Review and update the long-term maintenance program that has been developed which utilizes strategies that result in an overall reduction of energy costs. The goal is to ensure adequate maintenance of existing and proposed facilities.

PF 1.5.2 - Acquire public facility sites that will be required by future growth and development.

PF 1.5.3 - Research and use best practices for public facility and service plans in Virginia.

PF 1.5.4 - Pursuant to the strategic planning process that began in Fiscal Year (FY) 2015-16, and in accordance with the Space Needs Assessment that was completed in 2020, develop a service and facility master plan to strengthen the linkage between the Comprehensive Plan, the Capital Improvements Program (CIP) and operating budgets.

PF 1.5.5 - Design and construct County facilities consistent with the Space Needs Assessment for County Administration, Williamsburg-James City County (WJCC) Courts, and WJCC School Administration for 5-year, 10-year, and 20-year (2040) population growth projections.

PF 1.6 - Apply appropriate zoning, land use, and other adopted County criteria when evaluating public facility sites and uses.

PF 1.7 - Assist with public education and promotion of existing public services, including career and technical education opportunities. Explore locating technical education and other programs within James City County.

PF 1.8 - Explore ways to integrate the various data resources, programs, and systems of the County such that data may be more readily shared and accessed between departments and divisions. Develop minimum standards for data storage that ensure that data is produced and securely stored in compatible formats.

PF 1.9 - Encourage the provision and location of preschool programs and classrooms throughout the County utilizing government sponsored programs, public schools, private schools, private businesses, churches, nonprofits, and where appropriate, home-based preschools.

PF 1.10 - Include public transit stops at new public facility sites.

PF 1.11 - Continue to use technology, including broadband service, to improve the delivery of public services to the County.

PF 1.12 - Locate new public facilities and the provision of public services near existing and planned population centers, within the existing Primary Service Area (PSA), as defined on the Comprehensive Plan Future Land Use Map so as to provide convenient service to the greatest number of County residents or service consumers.

PF 1.13 - Encourage and support ways for private companies to expand broadband service. Broadband service initiatives could include but are not limited to updating the Zoning Ordinance when changes occur to wireless communication facilities standards, pursuing grant funds when available, and encouraging broader service areas when cable franchise agreements are negotiated.

PF 1.14 - Collaborate with WJCC Schools to develop a long-range facilities plan.

PF 1.15 - Support initiatives to collaborate with WJCC Schools to implement the WJCC Strategic Plan.

PF 1.16 - Develop a long-range plan for future land needs for future schools and other public facilities.

PF 2 - Seek to adequately fund or finance public facilities and efficiently utilize available funding resources.

PF 2.1 - Review annually the adequacy of existing public and private resources to finance needed qualifying public facilities through the County's CIP and annual budget process.

PF 2.2 - Identify specific public/private partnership opportunities to provide funding for new and existing public facilities.

PF 2.3 - Evaluate methods for private development to help defray the costs of public infrastructure investments.

PF 2.4 - Maintain and use the fiscal impact model to inform development reviews and facility planning in the County.

PF 2.5 - Strive to maintain the AAA bond rating for James City County and the James City Service Authority from all three major rating agencies.

PF 2.6 - Utilize tools such as life-cycle costing and value engineering (as applicable) to develop the most cost-effective facilities.

PF 2.7 - Evaluate the possible use of impact fees to help defray the capital costs of public facilities related to residential development.

PF 3 - Locate and provide public facilities in a manner consistent with County wide growth management policies.

PF 3.1 - Evaluate the accessibility, capacity and adequacy of new facilities to absorb new development and ensure that development recommendations take this information into account.

PF 3.2 - Continue to use the Adequate Public Schools Facilities Test Policy consistent with the WJCC Schools capacity projection methodology. Consider revising the Policy to incorporate the new leave-behind models.

PF 3.3 - Maintain and construct facilities in accordance with service standards and fiscal limitations.

PF 3.4 - Apply public facility standards to define facility requirements associated with level of need, appropriate quantity, size, and relationship to population and growth areas.

PF 3.5 - Develop policies that support the conservation of water through education and awareness, higher water rates for greater usage, restricting irrigation, and, when financially feasible, rebate programs that reward conservation efforts.

PF 3.6 - Support alternative water supply and conservation projects, such as collection and use of stormwater, reuse of gray water, and reclamation of wastewater, where practical and financially feasible. Identify projects that might benefit from such applications, such as golf course irrigation or new residential, commercial, or industrial uses.

PF 3.7 - Explore opportunities to develop regional reclamation and reuse technologies and infrastructure in conjunction with neighboring jurisdictions and the Hampton Roads Sanitation District (HRSD).

PF 3.8 - Continue to explore alternative sources of a long-term water supply in accordance with the adopted Strategic Plan.

PF 3.9 - Support initiatives to refine the fiscal impact model to assess development impacts on fiscal health.

Goals, Strategies, & Actions

PF 4 - Design, construct, and operate public facilities in an efficient and environmentally sustainable manner and complementary of local community character.

PF 4.1 - Utilize energy efficient heating, cooling, ventilation, lighting, and similar systems and designs for newly constructed County facilities, and where feasible, for renovations of existing County facilities. Innovation and technology (such as that found in geothermal heating and cooling systems, green roofs, and solar panels) should similarly be employed where feasible, and where life cycle considerations of cost savings, efficiency, and durability can be clearly expected or demonstrated.

PF 4.1.1 - Continue to utilize and update as necessary the building automation system that tracks and monitors the indoor environment of most County facilities.

PF. 4.1.2 - Develop a comprehensive long-range technology plan to keep pace with the building automation industry.

PF 4.2 - Review and update as necessary the County's Sustainable Building Policy in accordance with the County's Strategic Plan goals.

PF 4.2.1 - Construct new County facilities in accordance with the County's Sustainable Building Policy.

PF 4.3 - Utilize Low-Impact Development (LID) designs for newly constructed facilities, and where practical, for renovations of existing County facilities.

PF 4.4 - Utilize energy efficient vehicles and equipment when they are available and when not otherwise limited by fiscal or functionality considerations.

PF 4.5 - Evaluate all proposed public facilities for potential impacts and provide buffering and mitigation equal to, or greater than (when practical), that required under County Ordinances.

PF 4.6 - Incorporate architectural design features in buildings and structures erected by the County, which support quality design and appearance that enhances local community character.

PF 4.7 - Consider adopting and using the Virginia C-PACE (Commercial Property Assessed Clean Energy) program to pursue energy retrofit projects for public buildings. Consider setting up the program for use by private property owners as well.

PF 4.8 - Identify public facilities (including trails and recreational amenities) that would be impacted by sea level rise, flooding, or other natural hazards, and consider mitigation strategies for these facilities.

PF 4.9 - Consider mitigation strategies for impacts due to sea level rise, flooding and other natural hazards when locating and designing new facilities.

PF 5 - Ensure the safety and security of public facilities and buildings.

PF 5.1 - Evaluate the security of public schools and other County facilities from internal and external threats to better ensure the safety of citizens, visitors, and County staff, and to better protect County assets, sensitive data and data systems, the public water supply, and property.

PF 5.2 - During renovation or new construction, structurally improve public facilities and buildings to better withstand physical perils (such as high wind, explosion, flooding, etc.) and to enable them to serve as shelters or otherwise continue operating in times of crisis, emergency, or severe weather.

PF 5.3 - Locate and design new public facilities with consideration of Crime Prevention Through Environmental Design (CPTED) principles to protect both County facilities and the people utilizing them. Use CPTED principles when renovating facilities wherever applicable and practical.

PF 5.4 - Strive to complete fire and emergency service accreditation through the Center for Public Safety Excellence.

PF 5.5 - Prepare and maintain detailed emergency preparedness plans to protect the County's citizens, facilities, and infrastructure.

PF 5.5.1 - Implement measures in County facilities to ensure safe working environments for County staff and citizens such as barriers, physical distancing, personal protective equipment (PPE) provision, and ionization and filtration for air purification in accordance with Center for Disease Control (CDC) and Virginia Department of Health (VDH) guidelines and recommendations during a pandemic.

TRANSPORTATION

Introduction

Transportation provides individual mobility and shapes activity patterns. It affects the sense of community, the environment, the economic base, and the manner in which visitors perceive the community. The County's transportation facilities include interstate highways; state primary and secondary roads; private neighborhood streets; public transportation services; intra- and inter-regional facilities such as air, rail, bus, and trucking services; as well as sidewalk, bicycle, and greenway facilities. Efforts are made to improve and enhance these facilities through the County's policies and Ordinances, Comprehensive Plan, Six-Year Improvement Program (SYIP), sidewalk and bikeway programs, and cooperation with neighboring localities, the state and the Hampton Roads Transportation Planning Organization (HRTPO).

The Transportation Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language as written in the 2035 Comprehensive Plan has been substantially re-affirmed as written, with added language to encourage the use of non-automotive forms of transportation. The Goal now states: "Provide citizens, businesses, and visitors of James City County with an efficient, safe, attractive, and resilient multimodal transportation system that encourages use of non-automotive forms of transportation and reinforces or is consistent with the goals and land use patterns of the Comprehensive Plan." Many important Transportation Chapter implementation activities have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the revised and updated Strategies and Actions will be needed.



CHAPTER GOAL

"Provide citizens, businesses, and visitors of James City County with an efficient, safe, attractive, and resilient multimodal transportation system that encourages use of non-automotive forms of transportation and reinforces or is consistent with the goals and land use patterns of the Comprehensive Plan."

Key Planning Influences

Consideration of Transportation Issues

Transportation issues focus largely on roads. While important, a well-functioning transportation system requires incorporation of other elements. The most significant include making other modes viable through supportive land use patterns, increased safety for pedestrians and cyclists, and increased transit options. Specifically, when incorporated into transportation planning, the following elements can also help improve efficiency by dispersing vehicle traffic across the local and regional road networks and reducing travel distances to make walking or biking more viable: centralizing rather than spreading out commercial development along roads and managing access thereto; increasing interconnectivity; and increasing affordable housing in proximity to job opportunities to reduce in and out commuting and congestion on major regional roadways such as Interstate 64, Route 143, and Route 60.

Policy developed in this Comprehensive Plan emphasizes the need to establish and maintain an efficient transportation network that reinforces the overall goals of the Comprehensive Plan, including consideration and development of all transportation modes available in the County. Emphasis is placed on coordinating land use development with transportation capacity. Recognition is given to aligning the infrastructure and facilities for the various transportation modes with affordable, accessible housing and community services to meet the needs of all residents and to allow seniors, youth, and persons with disabilities to participate more fully in the community. Future roadway improvements are based upon projected traffic volumes and road capacities, anticipated development, and the County's vision for specific roadways. Recommendations seek to preserve roadway mobility, capacity, and the overall character of the County.

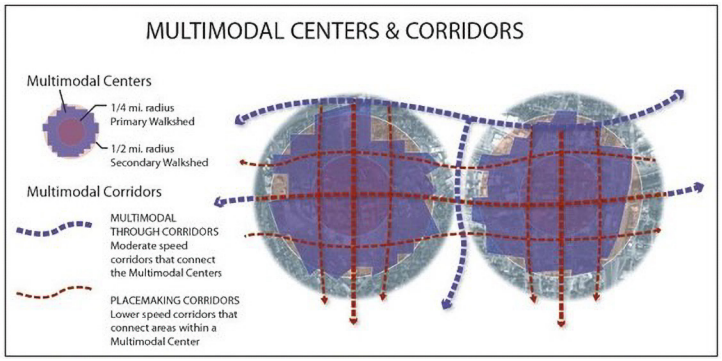
Multimodal Transportation

For decades, roads were designed solely for use by motor vehicles with little consideration for the needs of other types of users. National, regional, and local transportation decisions are typically focused on accommodating motor vehicles and efficient traffic flow, measured as Level of Service (LOS). Essentially, the thinking was that the only way to solve congestion was to build our way out of it through continual road widening and new roads. Roadway improvements are still necessary to improve safety and address congestion, but an exclusive focus on moving automobiles rather than moving people with multimodal travel options carries with it significant financial, environmental, and social costs that need to be considered. Accommodating and planning for automobiles is still essential and vehicles will continue to remain a primary mode of transportation for most; however, transportation planning in the 21st century must also focus on providing additional transportation choices. More specifically, transportation decisions will need to be made on the basis of improved mobility and accessibility for all users, including the youth, the elderly, the disabled, those who cannot afford to own and maintain an automobile, or those who simply choose not to do so.

Since 2004, it has been the Virginia Department of Transportation's (VDOT) policy that bicycle and pedestrian accommodations be integrated into the development of any roadway project. In many instances, receiving state and federal funds is dependent upon providing bicycle and pedestrian accommodations as part of the overall plan. In conjunction with VDOT's expectations, this Comprehensive Plan encourages the development of new or retrofitted "complete streets," which are roadways designed to accommodate all users, drivers, pedestrians, bicyclists, motorists, transit, and the disabled in safety and comfort.

To meet this need, VDOT has incorporated the Department of Rail and Public Transportation's (DRPT) Multimodal Design Guidelines into their Road Design Manual. These design guidelines encourage bicycle, pedestrian, and transit modes.

Figure T-1. Multimodal Centers and Corridors



Courtesy of DRPT, this diagram distinguishes Placemaking Corridors from Multimodal Through Corridors - the two general categories of multimodal corridors that together comprise a true multimodal transportation system in a region.

There are a number of techniques used to design complete streets, many of which have the following characteristics:

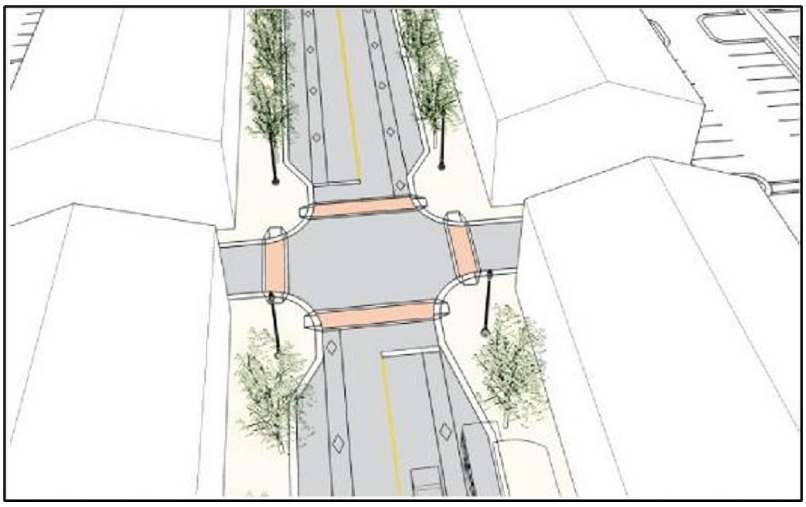
- Reduced lane widths;
- Sidewalks and multiuse paths;
- Consolidated driveways;
- Raised medians with pedestrian refuges;
- Enhanced pedestrian crossings with continental-style crosswalk markings and countdown timers;
- On-street parking;
- Intersections with small turning radii (to reduce vehicle speeds); and
- Bike lanes separated from travel lanes by physical barriers or striping.

In addition to increased attractiveness, this type of design encourages pedestrian and bicycle use, increases safety, and can ease congestion. Complete streets can also be great public places that encourage people to linger on foot, meet with neighbors, and engage in public life. They can yield a positive return on investment by creating a sense of place that attracts development and encourages local economic activity. They can improve public health by encouraging physical activity, reducing crashes through safety improvements, and reducing air pollution.

Figures T-2 and T-3 are examples of complete streets for new developments. Figure T-4 is an example of a suburban arterial complete street retrofit. Discovery Park Boulevard in New Town is an example of a new complete street in James City County, and the Ironbound Road widening project completed in 2013 is an example of a complete street retrofit.

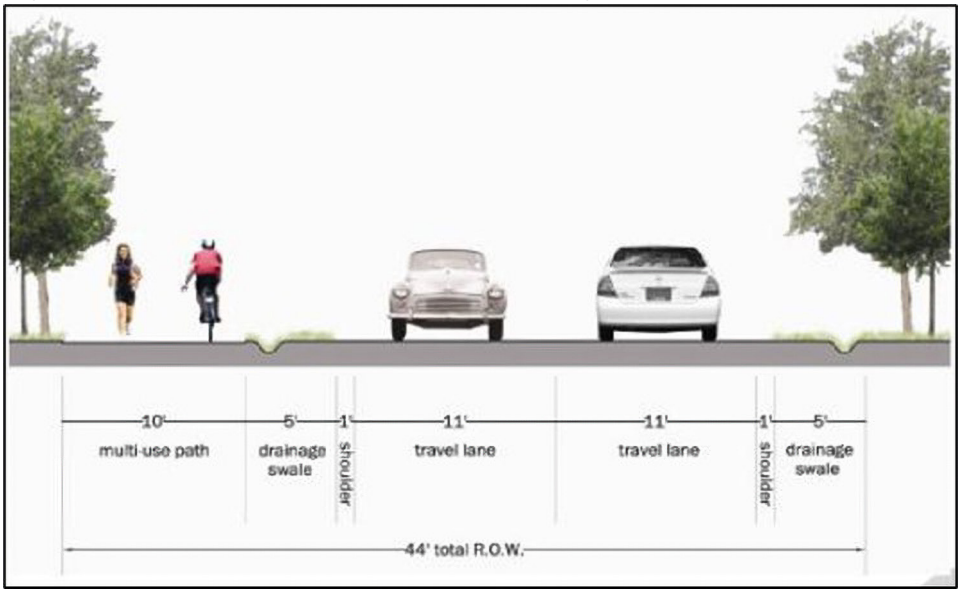
Planned projects such as the Pocahontas Trail multimodal project from Fire Station 2 to James River Elementary School and the widening of Longhill Road from Humelsine Parkway to Centerville Road are consistent with the concept of a complete street retrofit.

Figure T-2. Urban Complete Street Intersection Design



Courtesy of Renaissance Planning Group

Figure T-3. Subdivision Complete Street Design



Courtesy of Renaissance Planning Group

Figure T-4. Before and After of a Suburban-Style Complete Street Retrofit



Courtesy of Renanissance Planning Group

Connectivity

Connectivity is a term used to describe interconnection between developments. This interconnection can refer to the streets within a single development, streets within separate developments, or access for pedestrians and cyclists to neighboring properties. Connectivity is an essential part of comprehensive transportation planning because it provides roadway users with more options to get to a destination and often reduces travel distances. Connectivity does not only apply to vehicles. It is important to a multimodal network that provides safe options for residents to get to and from their destinations. VDOT utilizes the Multimodal System Plan described in the Multimodal Design Guidelines. This plan ensures that there is connectivity within a modal network and between travel modes.

VDOT has adopted Secondary Street Acceptance Requirements (SSARs), which are the minimum standards for new streets to be accepted for state maintenance. The 2011 SSARs, which were last updated in December 2018, usually require interconnectivity between new developments. For connectivity to be an effective tool to mitigate congestion and shorten trip distances, the County and VDOT must work together to ensure newly developed properties offer logical connections between neighboring properties.

Multimodal improvements should also be used to connect between existing developments. Many areas of the County were developed prior to bicycle, pedestrian, and transit requirements. Additional projects should be pursued to connect citizens living in existing developments with multimodal options, including biking, walking and transit to parks, schools, and other existing neighborhoods.

New Town is a local example of connectivity within a development, and provides connectivity opportunities to nearby neighborhoods, shopping, and recreational resources for motorists, pedestrians, and bicyclists. Individual sections of New Town are linked by streets, sidewalks, and trail systems, providing multiple ways to navigate between residential and commercial areas. Exterior access points from New Town to Ironbound Road tie into a multiuse path suitable for bicyclists and pedestrians, linking to the James City County Recreation Center and residential neighborhoods along the way. Along Monticello Avenue, a system of sidewalks, multiuse paths, and bike lanes connect New Town's entrances to the corridor ranging from the Williamsburg-James Center County Courthouse to Monticello Marketplace and Veteran's Park. New Town is also served by Williamsburg Area Transit Authority (WATA) Routes 4, 5, and 14.

Access Management

Access management is the planning, design, and implementation of land use and transportation strategies to maintain a safe flow of traffic while accommodating the access needs of adjacent development. Good access management accomplishes the following:

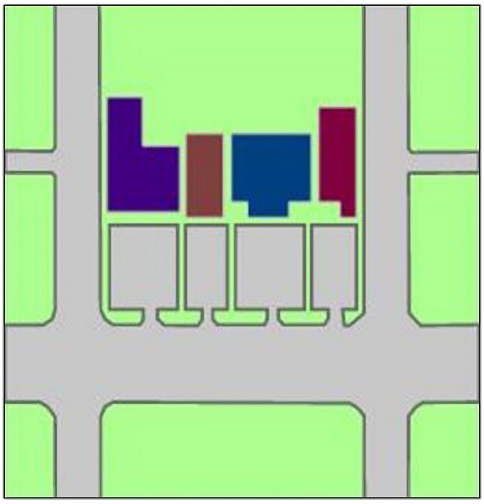
- Reduces the number of crashes, injuries, and fatalities;
- Provides greater mobility that enhances the economic vitality of an area;
- Reduces the need for additional road capacity; and
- Increases the traffic carrying capacity of existing roads.

Access management works by regulating the amount and location of intersections, particularly those for commercial development.

Figure T-5 represents a typical arterial street with four businesses, each with its own parking lot. Note that ingress and egress into the center is done from the principal arterial. This design reduces the capacity of the roadway and increases the likelihood of vehicular collisions. However, Figure T-6 represents what happens if access to the development is managed. In this case, access would no longer be from the principal arterial and parking is shared with multiple businesses. Also, note that the storefronts are closer to the street. This increases store visibility, improves access for pedestrians, and helps promote a sense of place.

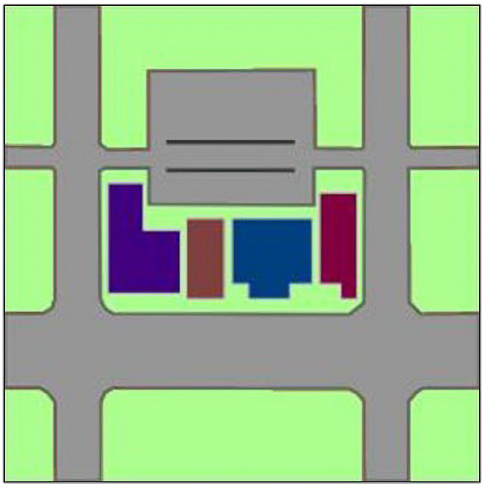
New Town is a local example of connectivity within a development, and provides connectivity opportunities to nearby neighborhoods, shopping, and recreational resources for motorists, pedestrians, and bicyclists.

Figure T-5. Unregulated Access Management



Courtesy of Renaissance Planning Group

Figure T-6. Regulated Access Management



Courtesy of Renaissance Planning Group

The vast majority of roads in the County are state-maintained. Property access from a state-maintained road is guaranteed, but must also be in accordance with VDOT's Access Management Design Standards. Through these standards, VDOT regulates the number of entrances a new development may have and where they may be placed. VDOT can also require new developments to seek access through a neighboring development's curb cut. Additionally, the County has the ability to pursue access management goals through proffers and Special Use Permit (SUP) conditions in cases requiring legislative approval.

One example of access management is the 7-Eleven at the intersection of Longhill and Centerville Roads. Barriers at the entrance to the 7-Eleven restrict certain turning movements, resulting in improved safety and traffic flow at the adjacent intersection. An example of access management on a development-wide scale is New Town, which contains only a few controlled connections off Monticello Avenue and Ironbound Road, thereby increasing mobility and the carrying capacity of the road.

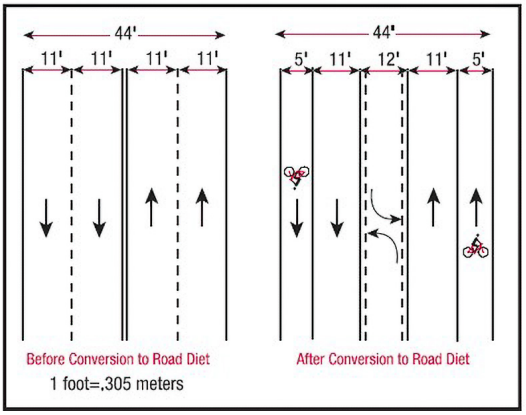
If new developments adhere to complete street, connectivity, and access management principles, these strategies can help mitigate the development's contribution to traffic congestion on major arterials and increase the viability of traveling by bicycle or foot.

Access management works by regulating the amount and location of intersections, particularly those for commercial development.

Road Diets

A road diet, as defined by VDOT, is a specific type of roadway configuration generally described as removing one or more travel lanes from a roadway and utilizing the space for other uses or travel modes. For example, a road diet can be applied to a road that has excess capacity for vehicular traffic to reduce the number of travel lanes and repurpose that space for on-street parking, bike lanes, or multiuse paths. Road diets are typically a low cost solution, and the cost can potentially be lowered further if implemented during a maintenance repaving project.

Figure T-7. Road Diet Design



Courtesy of Federal Highway Administration

In July 2018, HRTPO released the study *Candidate Segments for Road Diets in Hampton Roads* to help localities identify areas for a possible road diet reconfiguration. As part of this study, HRTPO staff determined criteria defining situations in which road diets may be desirable, and then prepared a database of roadways in Hampton Roads that met the criteria:

- Road segments having a four-lane, undivided cross-section;
- Road segments having less than 15,000 vehicles per day; and
- Segments with a high crash rate; or
- Areas in need of bicycle, bus transit, and walking accommodations; or
- Road segments along street-oriented land uses (e.g. townhomes, apartments, and shops on street).

Based on these criteria, two roadway segments in James City County were identified for a possible road diet approach. Further analysis of these roadway segments could examine the feasibility of a road diet in more detail.

- Merrimac Trail, from York/James City County Corporate Limit to James City County/Newport News Corporate Limit (entire segment goes to I-64 Exit 247).
- Pocahontas Trail, from the Fort Magruder Hotel to Route 199.

Merrimac Trail

This segment of Merrimac Trail from the York/James City County Corporate Limit to I-64 Exit 247 was identified by the study as an eligible segment for a road diet, with the James City County portion ending at the Newport News Corporate Limit. The study shows this segment as having a low crash rate, no bike/pedestrian facilities, and no existing bus route. Potential factors against a road diet reconfiguration for this segment include few alternative transportation commuters living nearby and low potential for street-oriented land use. The Skiffes Creek Connector between Route 60 and Merrimac Trail may potentially add more truck traffic to Merrimac Trail, which could also be considered a factor against it.

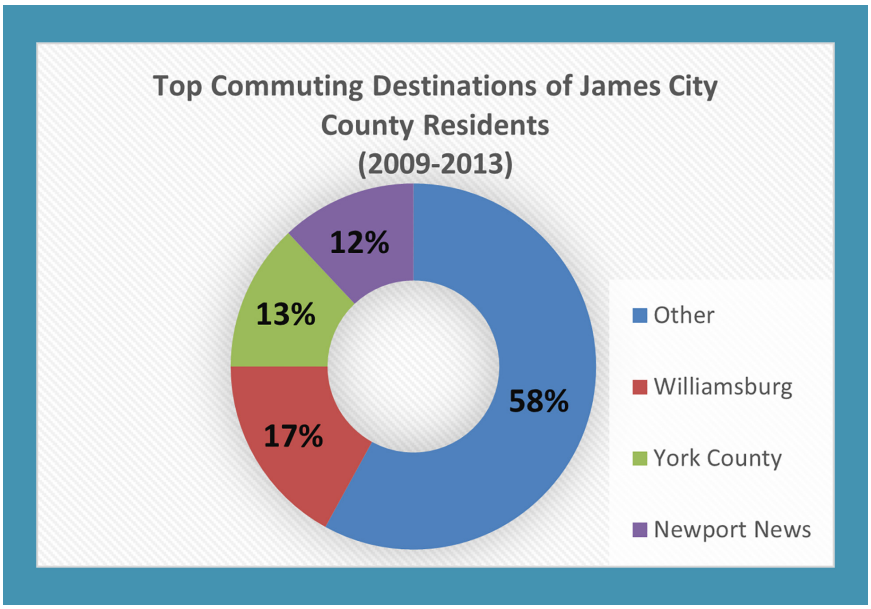
Pocahontas Trail

Pocahontas Trail from the Fort Magruder Hotel to Route 199 was also identified by the study as an eligible segment for a road diet. This segment of Pocahontas Trail has a low crash rate, some bike/pedestrian facilities, few alternative transportation commuters living nearby, is along an existing bus route, and has the potential for street-oriented land use. Changes to this segment may impact access to interstate ramps and other state maintained facilities.

Commuting Patterns

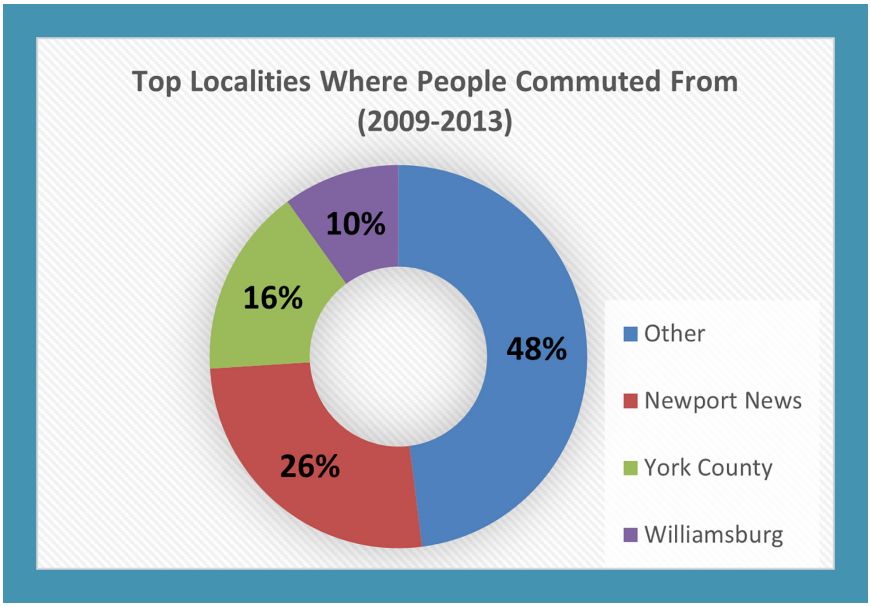
James City County's roadways are part of a larger interconnected system, with many journeys within the County originating elsewhere. As traffic increases or decreases in surrounding localities, it can impact roadways within the County. *The Historic Triangle Comprehensive Transportation Study* provides data illustrating commuting patterns between localities in the period between 2009 and 2013. In James City County, 30,100 residents commuted to work, and nearly 57% of these residents commuted to work outside of the County borders.

Figure T-8. Commuting Destinations



Courtesy of Historic Triangle Comprehensive Transportation Study

Figure T-9. Commuting Destinations



Courtesy of Historic Triangle Comprehensive Transportation Study

In the same timeframe, 26,212 people commuted to work within the County and nearly 51% of them came from outside of the County.

Commuting to and from James City County for work will likely continue as there is a lack of affordable housing in the County to support service sector employees and employees with seasonal work at places like Busch Gardens and Colonial Williamsburg. Development patterns should provide a balance of jobs and housing to reduce commuting patterns.

Different programs such as TRAFFIX reward citizens who carpool, ride transit, bike or walk, or telework as an alternative to commuting. TRAFFIX was established in 1995 and is a Transportation Demand Management program that looks to reduce congestion caused by commuting in all of Hampton Roads in partnership with WATA, Hampton Roads Transit, and Suffolk Transit. This program helps employees find carpools and park and ride lots, and rewards those that find alternative ways to commute to work or telework with discounts from local area businesses.

Transportation Funding

In James City County, the state has overall responsibility for the construction, operation, and maintenance of public streets and highways. Funding for road improvement projects has been increasingly limited over recent years as federal and state transportation resources continue to decline and VDOT shifts its focus to maintenance of existing roads and emergency response needs. Federal and state program dollars often need to be matched with local resources in order to fund projects. Constant review of transportation funding programs is vital as programs change and new programs are introduced with different administrations at the state and federal level.

Therefore, it is important for the County, along with input from residents, to establish clear prioritization of road improvements that ensure the most important projects receive funding and that funding is concentrated where it is most needed and desired. Emphasis should be placed on roads within the Primary Service Area (PSA), with efforts outside the PSA focused on safety projects rather than on projects that add capacity. The County should strategically pursue any funding opportunities available for transportation projects. As funds for new roads and widening are limited, less expensive projects, such as bike lanes, multiuse trails, and sidewalks, could help alleviate congestion on road segments where money for widening is unavailable. This will help ensure that the future transportation network is both efficient and effective without negatively impacting the County's character and development patterns.

When prioritizing projects, the County should base their priority list on the following criteria:

- Demonstration of need
- Filling in gaps in the existing network
- Funding
  - How well will the project fit funding program criteria?
  - Are there multiple funding sources available to complete the project that can be leveraged?
- Location
  - Inside PSA
  - Within a half mile of a school
  - Within a Community Character Corridor (CCC) or within a Community Character Area (CCA) or Urban Development Area (UDA)

Although it is important for the County to continue to pursue funding to address roadway needs, the impact of any new corridor improvement should be carefully studied to ensure that the new improvements will solve the transportation issue without inducing new demand for the roadway that will undermine the congestion relief benefit of the improvement. Travel demand modeling should be conducted for any major improvement proposal to understand the potential impacts of travel patterns shifting based on the improvement. Innovative roadway and intersection designs, such as roundabouts or Restricted Crossing U-Turns (RCUTS) that have been shown to reduce congestion and improve safety with comparatively lower costs, can sometimes be used in place of adding lanes or a signal or more lanes to a corridor.

Table T-1. Transportation Funding Sources

Project Type	Project Cost Amounts*	Funding Source*
Large Size Projects	Greater than $10 Million	Federal Funding: RSTP, CMAQ State Funding: SMART SCALE
Medium Size Road Projects	$1-10 Million	Federal Funding: RSTP, CMAQ State Funding: SMART SCALE + Revenue Sharing/Local
Small Size Projects	$1 Million or Less	Federal Funding: RSTP, CMAQ State Funding: Revenue Sharing/Local
Medium Size Bicycle and Pedestrian Improvements	$1-5 Million	Federal Funding: CMAQ State Funding: SMART SCALE, Revenue Sharing/Local
Small Size Bicycle and Pedestrian Improvements	$1 Million or Less	Federal Funding: Transportation Alternatives State Funding: Local
Intersection Improvements, including signalization	$1-2 Million	Federal Funding: RSTP and CMAQ State Funding: Revenue Sharing/Local
Safety Improvements	$1 Million or Less	Federal Funding: HSIP
*Projects can be funded using multiple funding sources to create a more competitive application.		

Federal Funding

The Hampton Roads Transportation Planning Organization (HRTPO) is a transportation policy-making body comprised of representatives from local governments and transportation agencies in the Hampton Roads region. The HRTPO acts as the metropolitan planning organization (MPO) for the region, ensuring that existing and future federal expenditures for transportation projects and programs are based on a continuing, cooperative, and comprehensive planning process. All federal funding for transportation projects and programs is channeled through the HRTPO and funneled to priority projects first identified in the Long Range Transportation Plan and then in the Transportation Improvement Program. To help with these decisions, HRTPO uses a scoring system to sort the projects submitted by Hampton Roads localities into those with the highest need and greatest benefit.

CMAQ/RSTP (Congestion Mitigation and Air Quality/Regional Surface Transportation Program)

CMAQ funds must be allocated to transportation projects and programs that help improve air quality and reduce traffic congestion. This funding is intended for areas not meeting the National Ambient Air Quality Standards (NAAQS), referred to as nonattainment areas, and for areas that previously did not meet the standards, but now do, referred to as maintenance areas. The Fixing America's Surface Transportation (FAST) Act, signed into law on December 4, 2016, and made CMAQ funding available for maintaining standards in attainment areas. Hampton Roads has been designated as an attainment area for the current ozone standard.

The FAST Act converted the long-standing Surface Transportation Program (STP) into the Surface Transportation Block Grant Program (STBGP). The STBGP promotes flexibility in state and local transportation decisions and provides flexible funding to best address State and local transportation needs. Regional Surface Transportation Program (RSTP) funds are STBGP funds that are apportioned to specific regions within the State.

TA Set-Aside

Within the STBGP, funding is a set-aside amount called the Transportation Alternatives or "TA" Set-Aside, as set forth in 23 U.S.C. 133(h). These set-aside encompass a variety of smaller-scale, non-traditional transportation projects. Projects funded under TA Set-Aside must comply with all applicable federal requirements.

TA Set-Aside eligible activities include on- and off-road pedestrian and bicycle facilities; infrastructure projects for improving non-driver access to public transportation and enhanced mobility; community improvement activities, such as historic preservation and vegetation management; environmental mitigation related to stormwater and habitat connectivity; recreational trail projects; safe routes to school projects; and projects for planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former divided highways.

Highway Safety Improvement Program (HSIP)

The HSIP is a federal-aid program that focuses on reducing fatalities and injuries on all public roads. VDOT identifies intersections and highway segments with above average total and injury crashes for existing traffic. Once identified, the crash trends and existing conditions are analyzed to determine proposed safety needs. There is a 10% local match for safety projects. Engineering improvements should be partnered with local agencies to reduce crashes through education, enforcement, and emergency response.

State Funding

The Virginia Commonwealth Transportation Board (CTB), appointed by the Governor, oversees transportation projects and initiatives for the Commonwealth of Virginia. This includes deciding on state transportation priorities in the Virginia Surface Transportation Plan (VSTP) and allocating funds for state projects through the Statewide Transportation Improvement Program (STIP) and the Six-Year Improvement Plan (SYIP). Much of the state funding is through competitive grant programs designed to measure which projects will produce the greatest benefit using the least amount of state funding. Projects include improvements to the interstate, primary, secondary and urban highway systems, public transit, ports and airports, and other programs.

In 2013, Virginia enacted a new transportation funding bill that changed the way it pays for and allocates funding for new transportation projects. The Hampton Roads Transportation Accountability Commission (HRTAC) was created in 2014 to manage the Hampton Roads Transportation Fund (HRTF) revenues for the Hampton Roads Region. Comprised primarily of state and locally elected officials, HRTAC set its focus toward funding regionally significant mega-projects to include new construction on new or existing roads, bridges, and tunnels in the localities comprising Planning District 23. Examples include widening Interstate 64 on the Peninsula and the Hampton Roads Bridge Tunnel expansion. The HRTAC gives priority to those projects that are expected to provide the greatest impact on reducing congestion and ensures that the funding is used for construction projects in all Planning District 23 localities.

SMART SCALE

Virginia House Bill 2 (HB2), signed into law in 2014, directed the Commonwealth Transportation Board (CTB) to develop and use a prioritization process to select transportation projects. The legislation was intended to improve the transparency and accountability of project selection, as well as improve stability in the SYIP. The new process scores projects based on an objective analysis across five evaluation factors and provides guidance to the CTB for project selection and funding. The CTB approved the Smart Scale prioritization process on June 17, 2015. Smart Scale is currently in its third round of funding projects statewide. Prior experience in earlier Smart Scale rounds has shown that a wide variety of projects have been funded including bike, pedestrian, transit, and trail projects in addition to roadway improvements. Localities such as James City County and regional agencies such as HRTPO are eligible to nominate projects for consideration under Smart Scale but the number of projects that can be submitted in any two-year funding cycle is limited. Projects must be included in one of three geographies to be eligible for Smart Scale: Regional Networks, Corridors of Statewide Significance or Urban Development Areas. While the first two are determined by the State, the third (UDAs) are locally designated. The transportation needs of a UDA are also determined by the locality.

Revenue Sharing

VDOT administers this program, in cooperation with participating localities, under the authority of Section 33.2-357 of the Code of Virginia. The Revenue Sharing Program provides additional funding for use by a county, city, or town to construct or improve the highway systems within such locality, with statutory limitations on the amount of state funds authorized per locality. Funds can also be requested for eligible additions in certain counties of the Commonwealth. Locality funds are matched with state funds for qualifying projects. An annual allocation of funds for this program is designated by the CTB. Application for program funding must be made online by accessing the CTB's Smart Portal, where localities may make requests for VDOT funding programs electronically. Additional supporting documentation, including a resolution in support of the application for the Revenue Sharing funding by the locality's governing body, as outlined in the Revenue Sharing guidelines, will be required. Towns not maintaining their own streets must have their requests included in their county's application. Project administration may be done by VDOT or by the locality under an agreement with the Department.

VTrans

The Commonwealth of Virginia has a statewide long-range multimodal transportation plan called VTrans. The plan is prepared by Virginia's Office of Intermodal Planning and Investment in cooperation with a variety of stakeholders to identify overarching vision and goals for transportation in the state. VTrans focuses on three transportation needs:

1. Interregional travel through Corridors of Statewide Significance (e.g., I-64)
2. Intraregional travel through Regional Networks (e.g., Hampton Roads Network)
3. Travel in local activity centers through UDAs (e.g., New Town)

Legislation passed by the General Assembly mandated that the transportation section of each locality's comprehensive plan must be consistent with VTrans. Each comprehensive plan must include corridors of statewide significance and UDAs and be reviewed by VDOT.

Roadway Components of the County's Transportation System: Inventory and Planning

Roads

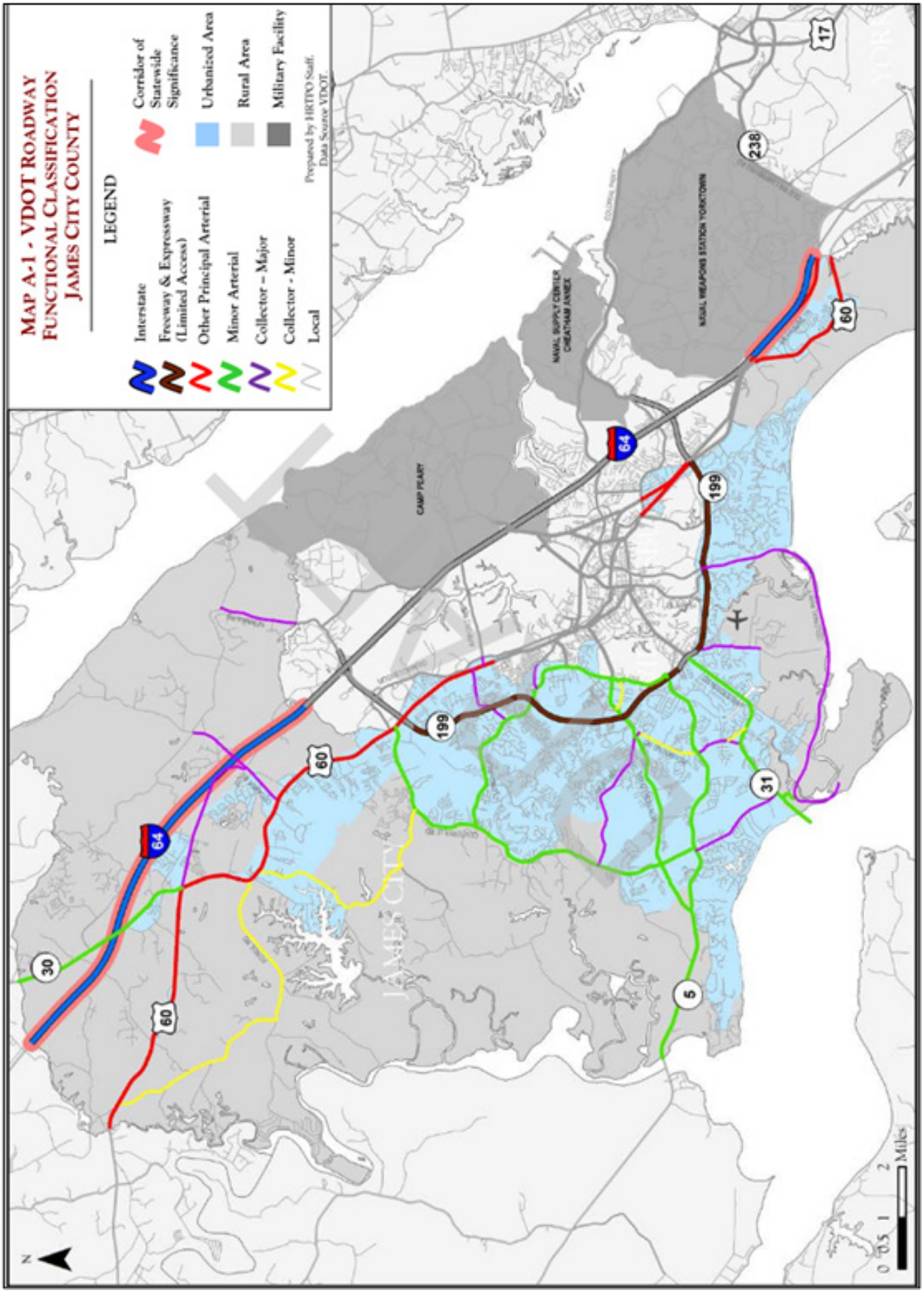
James City County has 406.88 miles of public roads maintained by VDOT, of which 11.04 are interstate, 67.37 miles are primary roads, and 328.47 are secondary roads. These roads are organized into a hierarchy based on their function. Arterial roadways (which include interstates, freeways and expressways, other principal arterials and minor arterials) provide the highest level of mobility, or the lowest time required for traffic to pass through a defined area within a set time. Local roadways provide more accessibility, which is measured in the roadway's capacity to provide access to and between land uses within a defined area. Collector roadways offer a mix of mobility and accessibility. Map T-1 below shows the VDOT functional classifications for roadways in James City County. The Historic Triangle Comprehensive Transportation Study (Appendix J) includes maps for all three localities.

New roads are constructed by either VDOT or private developers. Roads are added to the state system only if a developer constructs them to VDOT standards and the County petitions the state for their acceptance in the maintenance system. Private roads exist in a number of areas throughout the County where permitted by Ordinances and where private agreements are in place to ensure their continued maintenance.





Map T-1. VDOT Roadway Functional Classification



Road Capacity and Level of Service

Two terms which are often used to describe the performance of roads and intersections are "capacity" and "level of service (LOS)." Road capacity is the rate at which vehicles can reasonably be expected to traverse a section of roadway under ideal conditions. Ideal conditions include adequate roadway geometric design and the free flow of traffic. For arterial roadways, the ideal capacity is usually set at 1,900 vehicles per lane per hour. It is adjusted downward at intersections, where conflicts occur, and where roadway geometry reduces the speed at which vehicles can move safely. While capacity is a static metric independent of volumes, LOS indicates the deterioration of the vehicle flow rates as increasing volumes approach the capacity of the roadway. With increasing volumes and decreasing maneuvering space, the ability of motorists to maintain free flow speeds is compromised, average vehicle speeds decline, and the flow rate along the arterial roadway decreases. LOS is represented by a letter from A to F with LOS "A" being the highest flow and LOS "F" being the lowest flow. In the Historic Triangle Comprehensive Transportation Study, the LOS levels have been grouped into low, moderate, and severe levels.

Table T-2. Congestion Levels

Congestion Level		LOS Comparison
Low	LOW	A-C
Moderate	MOD	D
Severe	SEV	E-F

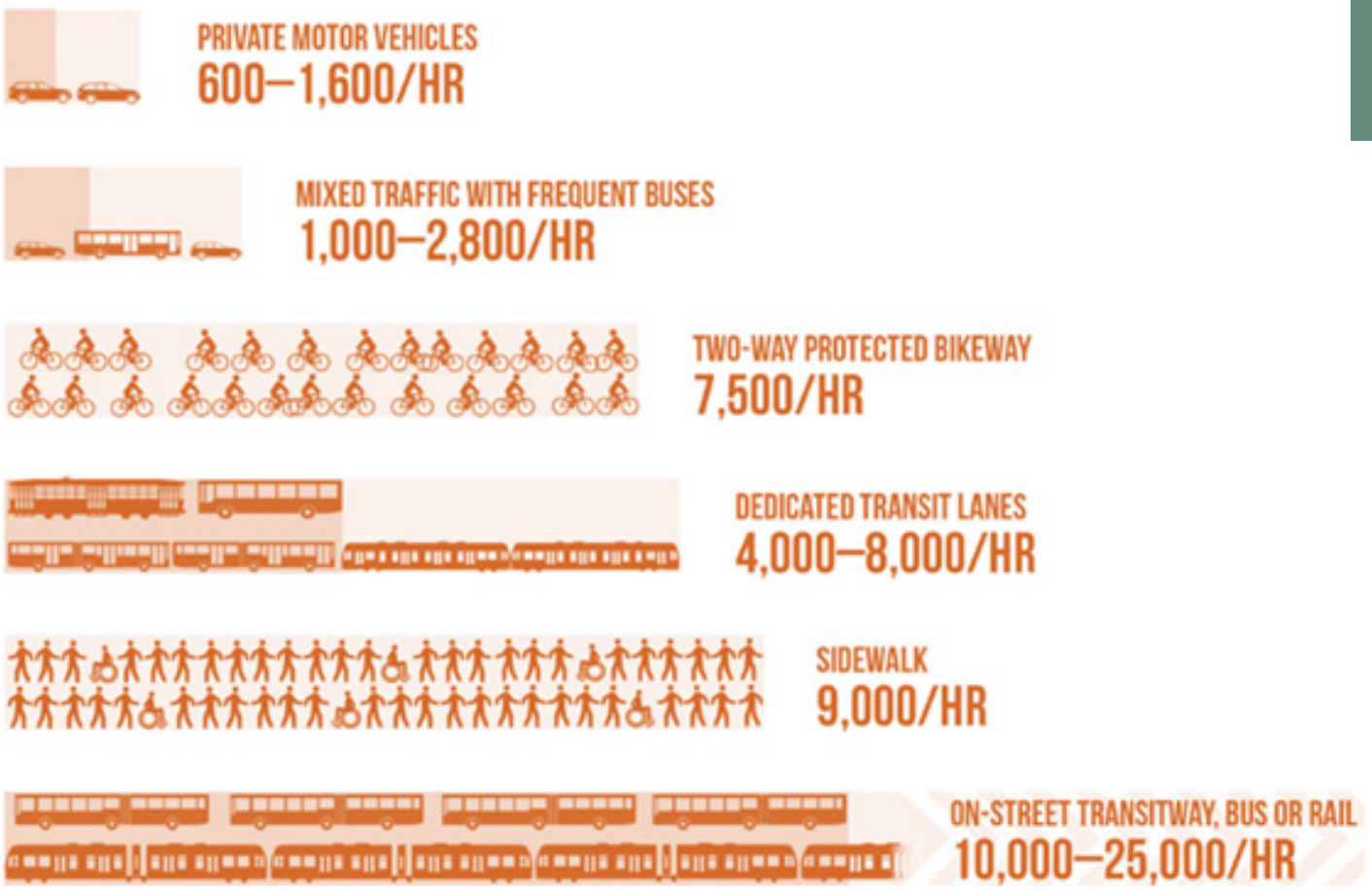
Courtesy of Historic Triangle Comprehensive Transportation Study

As an operational measurement, LOS is determined by the amount of delay at an intersection or by the density of vehicles on a road segment. An LOS can be determined at both a micro and macro level from individual turning movements to intersections and roadways. LOS can also be affected by traffic conditions at different times of day.

James City County uses both capacity and LOS measurements during transportation planning and development review. For instance, per Ordinance requirements and policy guidelines, if a development proposal is projected to generate 100 or more weekday peak hour vehicular trips, or has an exit or entrance on a roadway with a LOS "D" or lower (Moderate/Severe) as determined by the Institute of Transportation Engineers standards, the applicant must submit a Traffic Impact Analysis (TIA) per the Traffic Impact Analysis Submittal Requirements Policy, demonstrating the effect of the development proposal on the road network and any recommended improvements. During consideration of a rezoning or SUP application, the Board of Supervisors considers the results of the TIA as one factor in its decision-making process. When weighing previous development proposals, the County has generally been supportive of projects that do not degrade surrounding streets and intersections below a LOS "C." In practical terms, this means that a signalized intersection providing access to the development cannot cause more than 35 seconds of delay and development-generated traffic does not destabilize the traffic flow on the surrounding streets.

As discussed in the beginning of this chapter, streets are increasingly being considered as more than just "pipelines to move cars." They are being redesigned as multimodal corridors that carry people in a variety of travel modes, including cars, trucks, buses, bicycles, and pedestrians. Multimodal streets ultimately have a capacity to move more people than streets that only serve cars. Figure T-7 shows how repurposing some street space for additional travel modes can increase the total street capacity while reducing sole dependence on personal motorized vehicles. A multimodal street network allows people to tailor their trip by their preferred mode of travel. Multimodal streets can also provide better accessibility to locations within the countywide transit and cycling networks, which can enhance the quality of life. Increasing the person throughput of a corridor can sometimes be done within the existing right-of-way and increase the multimodal capacity. By planning for a multimodal corridor, all transportation modes become more reliable to all users instead of focusing on a single travel mode. This can help invite new businesses and services and improve overall health by providing more active transportation options.

Figure T-10. Designing to Move People



Courtesy of Transit Street Design Guide, National Association of City Transportation Officials

Future Planning

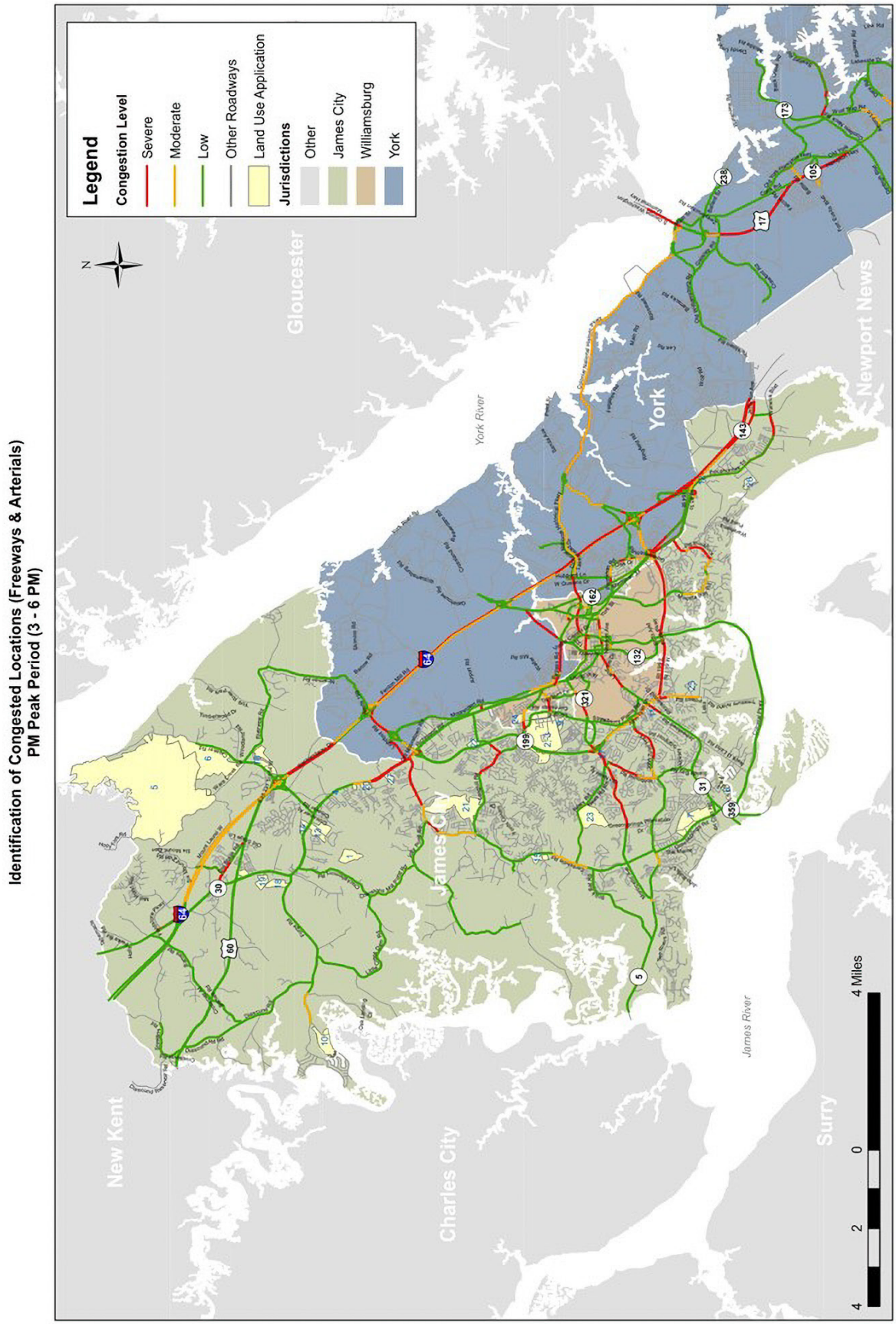
To monitor the ability of state-maintained roads to continue meeting the needs of residents, businesses, and visitors, VDOT regularly counts traffic on many arterial and collector streets. These counts are closely monitored to evaluate growth trends and to see if and where capacity improvements may be needed in the future.

Beyond the immediate timeframe, HRTPO produces long-range transportation planning information for James City County. Using a computerized modeling tool (travel model), the HRTPO assigns projected future traffic to the regional transportation network and determines what transportation infrastructure will be needed to handle the future traffic. Currently HRTPO has published traffic projections for James City County for 2040, which have been adopted by the HRTPO in the 2040 Long-Range Transportation Plan (LRTP). The County uses the HRTPO results to plan for large-scale improvements that may take many years to finance and construct. Preparations are now underway for the 2045 traffic projections and updated LRTP.

The travel model serves to estimate changes in traffic volumes and transit usage according to various assumptions connected to the Comprehensive Plan, primarily the intensity and location of land use development. The travel model is also sensitive to changes in the roadway system, such as the addition of capacity through the widening of existing roadways or the addition of roadways. The travel model used in the Comprehensive Plan update is a refined version of the HRTPO travel model. These refinements focused on improving the description of roadways serving James City County and surrounding jurisdictions, and enabling the model to better account for travel patterns within, to, and from James City County.

The future traffic forecasting process used in the development of the Comprehensive Plan benefited from a scenario planning approach to determine the intensity and location of land use development. The alternative scenarios that were developed and examined during the process presented potential future growth with respect to the location, density, and type of development. Each alternative land use scenario was tested with the travel model to understand the impacts to economic, transportation and other performance measures. At the end of the process, the travel model was run using data that reflected the land use pattern shown on the Future Land Use Map as recommended by the Planning Commission Working Group in April 2021. The results are shown in Map T-2 and Table T-3. The travel model developed during this Comprehensive Plan will continue to be used to analyze transportation and land use considerations on an on-going basis.

Map T-2. Future Roadway Congested Levels



Courtesy of Michael Baker International

Table T-3. Future Roadway Congested Levels

Facility	Segment From	Segment To	2017 Weekday Volume	2045 Weekday Volume	2017 PM Peak Period LOS	2045 PM Peak Period LOS
Barhamsville Rd	I-64	US 60 - Richmond Rd	19,004	32,280	Low	Low
Centerville Rd	SR 5 - John Tyler Hwy	Rte 5000 - Monticello Ave	2,645	4,782	Low	Low
Centerville Rd	Rte 5000 - Monticello Ave	Rte 613 - News Road	2,745	4,962	Low	Low
Centerville Rd	Rte 613 - News Road	Rte 612 - Longhill Rd	2,701	5,530	Low	Low
Centerville Rd	Rte 612 - Longhill Rd	US 60 - Richmond Rd	7,881	14,374	Low	Moderate
Colonial Pkwy	Jamestown Visitor Center	Williamsburg CL	1,804	7,268	Low	Low
Croaker Rd	US 60 - Richmond Rd	Rte 760 - Maxton Ln	7,134	15,768	Low	Low
Croaker Rd	Rte 760 - Maxton Ln	I-64	9,455	20,161	Low	Low
Croaker Rd	I-64	Rte 602 - Fenton Mill Rd	6,004	15,783	Low	Low
Croaker Rd	Rte 602 - Fenton Mill Rd	Rte 606 - Riverview Rd	3,616	8,400	Low	Low
DePue Dr	Rte 615 - Ironbound Rd	Rte 612 - Longhill Rd	12,225	21,884	Low	Low
I-64 EB	New Kent CL	SR 30 - Old Stage Rd	25,141	41,343	Low	Low
I-64 WB	New Kent CL	SR 30 - Old Stage Rd	25,140	41,342	Low	Low
I-64 EB	SR 30 - Old Stage Rd	Rte 607 - Croaker Rd	29,586	44,888	Low	Moderate
I-64 WB	SR 30 - Old Stage Rd	Rte 607 - Croaker Rd	30,828	45,416	Low	Moderate
I-64 EB	Rte 607 - Croaker Rd	York CL	32,266	53,965	Low	Severe
I-64 WB	Rte 607 - Croaker Rd	York CL	33,555	54,836	Low	Severe
I-64 EB	York CL	SR 143 Merrimac Trail/ NN CL	49,147	76,975	Severe	Severe
I-64 WB	York CL	SR 143 Merrimac Trail/ NN CL	51,163	78,962	Severe	Severe
Ironbound Rd/ Sandy Bay Rd	SR 31 - Jamestown Rd	SR 5 - John Tyler Hwy	1,819	4,664	Low	Low

Table T-3. Future Roadway Congested Levels

Facility	Segment From	Segment To	2017 Weekday Volume	2045 Weekday Volume	2017 PM Peak Period LOS	2045 PM Peak Period LOS
Ironbound Rd/ News Rd	SR 5 - John Tyler Hwy	SR 321 - Monticello Ave	13,737	18,436	Low	Severe
Ironbound Rd	Rte 616 - Strawberry Plains Rd	SR 321 - Monticello Ave	1,571	2,314	Low	Low
Ironbound Rd	SR 321 - Monticello Ave	Williamsburg CL	5,526	2,721	Low	Low
Jamestown Rd	Jamestown Ferry	Rte 614 - Greensprings Rd	1,725	3,686	Low	Low
Jamestown Rd	Rte 614 - Greensprings Rd	Rte 681 - Sandy Bay Rd	5,040	7,495	Low	Low
Jamestown Rd	Rte 681 - Sandy Bay Rd	Rte 682 - Neck-O-Land Rd	5,124	7,532	Low	Low
Jamestown Rd	Rte 682 - Neck-O-Land Rd	CL	6,751	11,466	Low	Low
John Tyler Memorial Hwy	Charles City CL	Rte 5000 - Monticello Ave	4,894	5,186	Low	Low
John Tyler Memorial Hwy	Rte 5000 - Monticello Ave	Rte 614 - Centerville Rd	2,793	4,183	Low	Low
John Tyler Memorial Hwy	Rte 614 - Centerville Rd	Rte 615 - Ironbound Rd	6,023	8,744	Low	Low
John Tyler Memorial Hwy	Rte 615 - Ironbound Rd	Rte 652 - Stanley Dr	13,802	16,511	Low	Severe
John Tyler Memorial Hwy	Rte 652 - Stanley Dr	SR 199	22,814	27,627	Low	Low
Longhill Rd	Rte 614 - Centerville Rd	Rte 658 - Olde Towne Rd	5,634	8,736	Low	Low
Longhill Rd	Rte 658 - Olde Towne Rd	SR 199	14,115	21,362	Low	Low
Longhill Rd	SR 199	R e 615 - DePue Dr	17,314	28,489	Low	Moderate
Merrimac Trail	Newport News CL	York CL (South of Busch Gardens)	31,306	39,734	Severe	Severe
Merrimac Trail	SR 199/York CL	Rte 641 - Penniman Rd/York CL	14,338	25,434	Low	Moderate
Monticello Ave	SR 5 - John Tyler Hwy	Rte 614 - Centerville Rd	3,838	2,645	Low	Low
Monticello Ave	Rte 614 - Centerville Rd	Rte 613 - News Road	7,044	8,548	Low	Severe

Table T-3. Future Roadway Congested Levels

Facility	Segment From	Segment To	2017 Weekday Volume	2045 Weekday Volume	2017 PM Peak Period LOS	2045 PM Peak Period LOS
Monticello Ave	Rte 613 - News Road	SR 199	21,934	27,881	Severe	Severe
Monticello Ave	SR 199	Rte 615 - Ironbound Rd	21,320	41,257	Low	Severe
Old Stage Hwy	New Kent CL	Rte 601 - Barnes Rd	14,943	19,225	Low	Low
Old Stage Hwy	Rte 601 - Barnes Rd	I-64	8,315	13,680	Low	Low
Olde Towne Rd	Rte 612 - Longhill Rd	US 60 - Richmond Rd	6,222	6,963	Low	Low
Pocahontas Trail	Williamsburg CL	SR 199/York CL	19,402	26,810	Low	Low
Pocahontas Trail	York CL	BASF Rd	12,490	18,934	Moderate	Severe
Pocahontas Trail	BASF Rd	Newport News CL	9,875	18,151	Low	Severe
Richmond Rd	New Kent CL	SR 30 - Barhamsville Rd	7,382	7,597	Low	Low
Richmond Rd	SR 30 - Barhamsville Rd	Rte 607 - Croaker Rd	9,257	22,735	Low	Low
Richmond Rd	Rte 607 - Croaker Rd	Rte 646 - Lightfoot Rd	20,120	40,336	Low	Moderate
Richmond Rd	Rte 646 - Lightfoot Rd	Rte 614 - Centerville Rd	17,544	39,925	Low	Severe
Richmond Rd	Rte 614 - Centerville Rd	SR 199	11,278	22,989	Low	Moderate
Richmond Rd	SR 199	Rte 658 - Olde Towne Rd	14,854	20,627	Low	Low
Richmond Rd	Rte 658 - Olde Towne Rd	Williamsburg CL	17,837	24,044	Low	Low
Rochambeau Dr	US 60 - Richmond Rd	0.7 mi east of Ashington Way	2,845	10,128	Low	Low
Rochambeau Dr	0.7 mi east of Ashington Way	Rte 607 - Croaker Rd	4,353	12,457	Low	Low
SR 199 EB	US 60 - Richmond Rd/ York CL	Rte 612 - Longhill Rd	9,977	16,527	Low	Low
SR 199 WB	US 60 - Richmond Rd/ York CL	Rte 612 - Longhill Rd	10,372	16,175	Low	Low

Table T-3. Future Roadway Congested Levels

Facility	Segment From	Segment To	2017 Weekday Volume	2045 Weekday Volume	2017 PM Peak Period LOS	2045 PM Peak Period LOS
SR 199 EB	Rte 612 - Longhill Rd	SR 321 - Monticello Ave	13,260	16,932	Low	Low
SR 199 WB	Rte 612 - Longhill Rd	SR 321 - Monticello Ave	13,091	16,447	Low	Low
SR 199 EB	SR 321 - Monticello Ave	SR 5 - John Tyler Hwy	18,363	25,244	Low	Moderate
SR 199 WB	SR 321 - Monticello Ave	SR 5 - John Tyler Hwy	16,890	22,812	Low	Low
SR 199	SR 5 - John Tyler Hwy	Williamsburg CL	23,821	30,913	Moderate	Severe
SR 199	SR 132 - Henry St	Mounts Bay Rd	55,762	69,178	Severe	Severe
SR 199	Mounts Bay Rd	US 60 - Pocahontas Tr/ York CL	47,507	71,148	Moderate	Severe
Strawberry Plains Rd	SR 5 - John Tyler Hwy	Rte 615 - Ironbound Rd	2,807	4,331	Low	Low

Courtesy of Michael Baker International

In June 2020, the HRTPO finalized the Historic Triangle Transportation Study for James City County, the City of Williamsburg, and York County. The purpose of the study was to look at key issues related to transportation and to assist the localities with the transportation sections of their respective comprehensive plan updates. The study looks at current and future conditions of the following topics:

- Highways
- Roadway Safety
- Commuting Patterns
- Bridges
- Freight
- Air Travel
- Resiliency/Sea Level Rise
- Rail
- Public Transportation
- Active Transportation

Roadway improvements such as additional through and turn lanes, improved intersections, and traffic signals are potential solutions to managing future congestion. Alternatively, managing the amount of traffic growth is another means of reducing future congestion. This can be accomplished by carefully managing growth and development in the area of the roadway segment. These studies do not presume any particular solution for any specific roadway segments. They merely point out those roadway segments that are likely to incur congested conditions in 2045 under the given assumptions and employment growth.

Another component of future planning is considering the impacts of sea level rise on the road network. In 2019, the Virginia Institute of Marine Science (VIMS) began a study to project flooding inundation due to sea level rise on the existing road network at the years 2050 and 2100. Roads that could be affected by flooding inundation were categorized by the total hours they are projected to be impassible due to recurrent flooding:

- 0-5 hours/year
- 5-100 hours/year
- 100-200 hours/year
- 200+ hours/year

The study also takes into account road accessibility when impacted by 0.5 to 3.0 meters of flooding. By understanding future inundation threats to existing roads, appropriate policies can be developed now to guide land uses and development patterns. For example, if land that is currently developable is located on a road that could be impassible 100 hours/year by 2100, new policies and regulations can deter growth in such an area, thus protecting future property owner investments and reducing direct risks to residents. This also helps direct emergency response infrastructure efficiently and reduces the risk of building new homes in areas that may not be reachable by first responders in a timely manner in the future.

In addition to the VIMS study, the National Oceanic and Atmospheric Administration established a program called Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA) program. This program focuses on the Chesapeake Bay Watershed and the diverse settings of the Mid-Atlantic Region. Since November 2018, the MARISA has released a seasonal outlook for the Chesapeake Bay Watershed. It looks at the past quarter's temperatures and weather, potential risks of severe weather, and upcoming impacts of below or above average temperatures to the region.

The latest Community Climate Outlook for James City County, released in November 2020, showed that the County has experienced a one-foot sea level rise since 1950. By 2070, the County can experience another two to six feet of sea level rise. The report also looks at precipitation as another impact to the County's watershed and roadways. Per the report, heavy downpours have increased in frequency and intensity, resulting in property damage, sewage backups, and negative impacts to roadways and watersheds leading into the Chesapeake Bay. Heavy rainfalls are defined as ≥2 inches per rainfall event. By 2070, James City County can expect up to 35% more days of heavy rainfalls.

As roadways become more vulnerable to flooding, roadway, and bridge designs should continue to adapt. Per the report titled Review of Recent Research on Climate Projections for the *Chesapeake Bay Watershed* released in October 2020 by David Wood, of the Chesapeake Stormwater Network, VDOT has revised its Bridge Design Manual accordingly. The changes took into account climate change, increased the amount of expected annual rainfall by 20%, and a 25% increase in the bridge drainage design. Jamestown Road is a primary road that will see much of the future effects of sea level rise and increased rainfall, but further analysis should be done to identify additional secondary and rural roads that will be affected to mitigate future impacts.

Corridor Visions

The following is a summary of major roadways in the County and improvement recommendations that will help ensure these roads remain functional and attractive in future years. In addition to the corridor visions below, the Community Character section of the Comprehensive Plan should be considered during the development of any proposed transportation improvement projects. Together, this information will help the County and VDOT to work collaboratively to ensure that improvements to roadways are in keeping with the community's vision. Table T-4 below and Map T-3 below provide a complete list of all programmed County projects based upon their listing in VDOT's current SYIP.

Projects included in the SYIP are based upon goals and priorities established in VTrans2040. The state is in the process of updating the VTrans2040 plan with the VTrans2045 plan to be adopted in 2021. VTrans2040 represents Virginia's multimodal transportation plan for highways, transit, rail, air, pedestrian, port, and bicycle facilities. Specific recommendations from the plans for James City County include the following:

- **Corridors of Statewide Significance** - Identifies the East-West Corridor, which runs along I-64 and the CSX rail line, as one of 11 Corridors of Statewide Significance. Recommendations focus on highway and rail capacity improvements as well as implementation of various strategies pertaining to transit, park-and-ride lots, intelligent transportation systems (ITS), freight, and access to airport facilities.
- **Public Transportation** - Recommends ITS investments in transit operations, customer amenities, service planning, security, and maintenance/management for Williamsburg Area Transport.
- **Highway** - Recommends expansion of I-64 in two segments through York/James City County/ Newport News:
    - o New Kent County Line to Route 199 - 6 lanes
    - o Route 199 to Jefferson Avenue - 8 lanes

Urban Development Areas

UDAs are areas designated by localities that are appropriate for higher density due to their proximity to transportation facilities, the availability of a public or community water and sewer system, or a developed area. Some areas may incorporate redevelopment or infill development if feasible.

James City County has 11 UDAs with various characteristics. Each UDA has a VTrans2040 Transportation Needs Assessment that identifies location, socioeconomic characteristics, the current and planned place type, and gaps in the transportation system.

James City County should actively continue to submit SMART SCALE applications during each funding cycle to compete for transportation funding opportunities. These applications will need to address needs identified by VTrans for Corridors of Statewide Significance, regional networks, and UDAs.

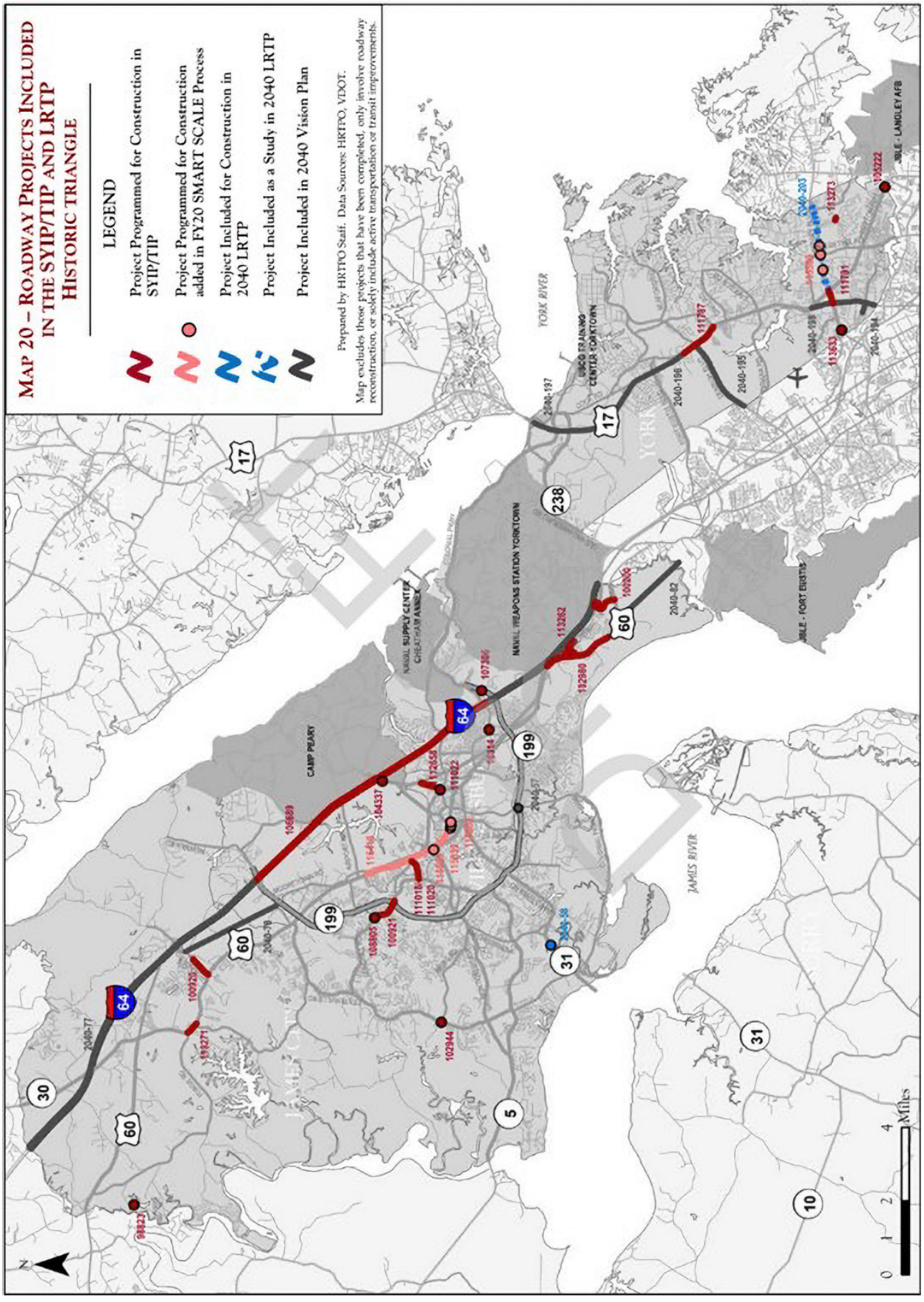
Table T-4. Recently Completed, Current and Future Projects

UPC/ Candidate Project ID	Project Name	Project Construction Start	Funding Source	Project Cost
100920	Croaker Road (Rt 607) - Widening to 4 lanes between Route 60 and James City County Library	2023	CMAQ	$20,039,195
113262	Grove Subdivision Streets - Reconstruction	2020	Revenue Sharing	$1,895,300
100921	Longhill Road (Rt 612) - Widening to 4 lanes between Olde Towne Road (Rt 658) and Rt 199	2019	Secondary; RSTP	$19,795,300
108805	Longhill Road (Rt 612) at Olde Towne Road (Rt 658) - Turn Lane Improvements	2021	Revenue Sharing	$635,500
102980	Pocahontas Trail (US Rt 60) - Multi-modal Improvements	2026	RSTP; CMAQ; Smart Scale	$30,681,000
113271	Richmond Road (US Rt 60) in Toano - Reconstruction	2021	Revenue Sharing	$1,665,600
17633	Richmond Road (US Rt 60) in Toano – Bicycle and Pedestrian Improvements	Active	Revenue Sharing	$2,700,000
100200	Skiffes Creek Connector - New Facility	Active	RSTP; Smart Scale	$50,503,700
113534	Clara Byrd Baker Sidewalk Improvements	Active	TA - SRTS	$480,113
98823	Bridge Replacement - Route 601 (Hicks Island Road) over Diascund Creek	Active	Bridge Funds	$1,672,631
2045-160	I-64 Peninsula Widening Segment 4	TBD	N/A	N/A
2045-161	Longhill Road - Phase II	LRTP Candidate Project	TBD	$54,900,000
N/A	Mooretown Road Extension	TBD	Private	N/A
2045-725	Bike Lanes on Centerville Road	LRTP Candidate Project	TBD	$100,000
2045-704	Birthplace of America Trail (Portions)	LRTP Candidate Project	TBD	$25,000,000
106195	Jamestown Road Over Powhatan Creek Bridge Replacement	LRTP Candidate Project	Bridge Funds	$2,260,000
N/A	Lightfoot Road/Richmond Road - Intersection Improvements	LRTP Candidate Project	N/A	N/A
2040-57	Rt 199 at Colonial Parkway - Bridge Replacement	LRTP Candidate Project	N/A	$14,000,000
N/A	Rt 199/Mounts Bay Road - Intersection Improvements	LRTP Candidate Project	N/A	N/A

Table T-4. Recently Completed, Current and Future Projects

UPC/ Candidate Project ID	Project Name	Project Construction Start	Funding Source	Project Cost
2040-82	Green Mount Parkway Extension from Pocahontas Trail to Newport News CL	LRTP Candidate Project	N/A	$59,000,000
2045-113	Rt 199 from Richmond Road to Pocahontas Trail – Congestion Relief	LRTP Candidate Project	N/A	TBD
99571	Longhill Road Bike/Pedestrian Improvements Over Rt 199	Active	Smart Scale	$4,400,000
112111	Peach Street Rural Rustic Improvements	Active	Unpaved Road Funding Prgm.	$165,000
Completed Projects				
82961	Intersection Improvements - Monticello Avenue at News Road	Complete	Secondary; Primary	$3,814,517
102948	Intersection Improvements - Rt 199 (Humelsine Pkwy) and Brookwood Road	Complete	CMAQ	$275,000
102947	Intersection Improvements - Rt 199 (Humelsine Pkwy) Ramp at Richmond Road	Complete	CMAQ; Secondary	$729,915
105781	Roadway Reconstruction - Neighbors Drive	Complete	Revenue Sharing	$930,000
104327	Trail Access - Virginia Capital Trail at Monticello Avenue/John Tyler Hwy	Active	Revenue Sharing	$33,000
67134	Racefield Drive Paving	Complete	Rural Rustic; Secondary	$156,694
97214	James River Safe Routes to School	Complete	SRTS	$167,664
104356	Roadway reconstruction - Williamsburg West Subdivision	Complete	Revenue Sharing	$573,000
102944	Centerville Road (Rt 614) at News Road (Rt 613) - Intersection Improvements	Complete	CMAQ; Secondary	$4,071,500
101871	Airport Access Road to the Williamsburg-Jamestown Airport	Completed	Access	$987,000

Map T-3. Roadway Projects Included in the SYIP/TIP and LRTP



Interstate Roads

Interstate 64 (I-64)

For some time, traffic volumes have warranted the expansion of Interstate 64 from Newport News to Richmond from four to six lanes. The region's plan has been to widen I-64 with one additional travel lane in each direction in phases over time.

- The first phase of the widening, from Jefferson Avenue (Exit 255) to Lee Hall/Yorktown (Exit 247), was completed in December 2017 with a budget of $122 million.
- The second phase, from Exit 247 to Humelsine Parkway East of Williamsburg (Exit 242) was completed in April 2019 with a budget of $176 million.
- The third phase, started in August 2018, will widen the roadway from Exit 242 to Humelsine Parkway West of Williamsburg (Exit 234) and has an expected completion date in late 2021 or early 2022 with a budget of $178.3 million.
- As part of the 2045 Long Range Transportation Plan, a fourth phase of widening, from Humelsine Parkway West of Williamsburg (Exit 234) to the James City/New Kent County Line is a candidate project.

Federal and state funding opportunities will be pursued for this project. The need to widen I-64 is reflected in Map T-3 of the VTrans2045 Mid-term Needs Report for the Hampton Roads District, which calls for congestion mitigation along these segments in the Williamsburg region.

As the interstate serves as the primary gateway to the Historic Triangle, the state needs to take great care to ensure the design of any expansion guarantees the highway will maintain its aesthetic character. The expansion should be built around the idea of corridor preservation and landscaping as the core design issue. It is recommended in that in weighing various design proposals, VDOT explore opportunities to implement future widening projects in a way that preserves the natural topography and existing vegetation along the right-of-way before any final plans are adopted.

Primary Roads

Humelsine Parkway (Route 199)

Humelsine Parkway will remain a very heavily traveled roadway and congestion is projected to worsen over the next 20 years. Another travel lane in each direction from John Tyler Highway to Jamestown Road/ Williamsburg City Line may eventually be needed due to population growth, but other options may delay or reduce the need for this improvement. Given the projected traffic volumes, the County should watch conditions along the corridor and avoid the addition of any curb cuts or intersections. Additionally, the County should pay particular attention to development along Jamestown Road, as the westbound left-turn lane from the Parkway onto Jamestown Road is often near capacity and cannot be addressed cost effectively. Finally, the County should evaluate and implement appropriate congestion management strategies suggested by the HRTPO Congestion Management Process report, such as modifications to turn lanes.

The segment of Humelsine Parkway from Jamestown Road/Williamsburg City Line to the Route 60/143/199 interchange is also projected to be severely congested by 2040 due to approved development in this multi-jurisdictional corridor. The recently completed intersection improvements at the intersection of Humelsine Parkway and Brookwood Drive have increased mobility and decreased congestion. Median modifications on Route 199 and drainage improvements were also added. Volumes and conditions will need to be watched over time to assess the need for additional improvements.

As with I-64, Humelsine Parkway is one of the gateways to the Historic Triangle, and therefore should continue to be well maintained and landscaped. Corridor preservation and landscaping for any future widening projects should be the core design issue. It is recommended that in weighing various design proposals, VDOT explore the tradeoffs between widening the roadway within the median versus widening along the edge of the right-of-way to preserve the natural topography and trees before any final plans are adopted. Bicycles and pedestrians are prohibited on Humelsine Parkway (from Interstate 64 at Lightfoot to John Tyler Highway) or discouraged from sharing the road (from John Tyler Highway to Merrimac Trail) due to the high speed limit and volumes; therefore, consideration needs to be given to increasing safety through signage and/or parallel multiuse facilities. Sidewalks, pedestrian/bicycle infrastructure, and other complete streets improvements are specified in the VTrans2045 Mid-term Needs Report.

John Tyler Highway (Route 5)

Monticello Avenue has supplemented capacity in the John Tyler Highway corridor; however, volumes on John Tyler Highway between Greensprings Road and Humelsine Parkway need to be monitored. To avoid four-laning, which has been and continues to be strongly discouraged for this roadway, additional turn lanes along with minor intersection and pavement improvements may be needed. Such improvements should be consistent with the CCC and Scenic Byway designations. Taking into consideration the individual uses on the Land Use map and the public's desire to preserve the historic and natural character of the corridor, careful attention should be paid to impacts to the view shed when evaluating legislative applications for development in this area. Uses that generate high volumes of traffic that have not been accounted for, uses that cannot mitigate their traffic impacts through turn lane and intersection improvements or where such improvements would greatly impact the visual character of the road, and those that would lower the through traffic level of service should be strongly discouraged. Multiuse paths are encouraged for new development along the highway.

In 2021, safety improvements were made to the intersection of Centerville Road and John Tyler Highway. These improvements include making Centerville Road a right turn only and access from John Tyler Highway is a right in only. This intersection will be monitored to study the improvements and determine future needs of the intersection.

Jamestown Road (Route 31)

Projected traffic volumes would normally justify the widening of this road to a four-lane facility between Humelsine Parkway/City of Williamsburg and Ironbound Road and from the Colonial Parkway to Sandy Bay Road. Four-laning and other such improvements to this corridor would alter its visual character and be disruptive to adjacent land uses and homeowners. Keeping consistent with past Comprehensive Plans, Jamestown Road is recommended to be maintained as a two-lane facility with additional turn lanes and access controls. Considering individual uses on the Land Use map, in evaluating legislative applications for development along this corridor, careful attention should be paid to impacts. Uses that generate high volumes of traffic that have not been accounted for, uses that cannot mitigate their traffic impacts through turn lane and intersection improvements or where such improvements would greatly impact the visual character of the road, and those that would lower the through traffic level of service should be discouraged.

Jamestown Road is currently experiencing flooding and this flooding is expected to increase in the next few decades. Two areas of Jamestown Road are expected to have vulnerability to flooding by 2045: the western end where it meets the James River, and where it intersects with Powhatan Creek. HRTPO and HRPDC's 2016 Resiliency and Sea Level Rise Study concluded that there is an increased likelihood of a 2.0 feet sea level rise at some point between 2043 and 2045 with a 25-year storm surge (Scenario 2) or a 50-year storm surge (Scenario 3) in the region. Further, initial findings of the VIMS road flooding assessment predict Jamestown Road to be inundated 200+ hours per year where it meets both the James River and Powhatan Creek.

Monticello Avenue (Route 321)

Currently, access is strictly limited onto this roadway. Given very limited funding, strong efforts should be taken to avoid widening Monticello Avenue to four lanes in any additional locations west of News Road through coordinated development and continued access management. For the segment from News Road to Humelsine Parkway, efforts should be made to maximize capacity through geometric improvements, signal coordination, and other strategies offered in the HRTPO Congestion Management Process report. The addition of new traffic signals is discouraged. The Monticello Avenue intersection improvement project, completed in May 2016, aimed to improve traffic flow at News Road and Ironbound Road with geometric improvements such as the addition of turn lanes, signal coordination, and pedestrian accommodations. Future development proposals should be carefully reviewed for potential traffic impacts, and bike, pedestrian, and transit projects should be pursued to reduce congestion impacts.

Pocahontas Trail (Route 60 East)

To aid with congestion and safety, the County has aggressively pursued transportation improvements along Pocahontas Trail. In 2017 and 2018, the County worked with RK&K Engineering to develop the Pocahontas Trail Corridor Study. As part of the study, a Steering Committee and Technical Committee were formed to help facilitate public engagement and to review the proposed improvement recommendations. The study analyzed the existing data and looked at the future conditions of the corridor to develop three alternative solutions. The three alternatives ranged from three lanes including a center turn lane to five lanes with a center turn lane. Each alternative included improved bicycle and pedestrian facilities and added lighting and landscaping. After engagement with the community and the Steering and Technical Committees, the recommended improvement was a three-lane design with a continuous center turn lane. The recommendation also included an 8-foot multiuse path and a 5-foot sidewalk. Future expansion should be explored to extend the recommended improvements to the Newport News city limits.

Following the Pocahontas Trail Corridor Study, the County is pursuing the Pocahontas Trail Multi-modal Corridor Improvements project. This project will address congestion and safety along a 1.8-mile section of the corridor between James River Elementary School and Fire Station 2. Improvements will include paved shoulders for emergency access, sidewalks, pedestrian lighting, bus pull-offs, and landscaping. Staff is currently pursuing funding by utilizing SMART SCALE and RSTP funds. The project is expected to begin construction in winter of 2025. A separate but related project for intersection upgrades on Pocahontas Trail at James River Elementary School was recently completed and included installation of pedestrian signals and crosswalks.

Another improvement to the corridor is the Skiffes Creek Connector, which will provide a four-lane connection between Pocahontas Trail and Merrimac Trail to the north of the Green Mount Industrial Park. The Skiffes Creek Connector project will span the CSX Railroad, which currently has no crossings between Elmhurst Street near Yorktown Road and the Grove Interchange, a length of 4.5 miles. In addition to creating this additional rail crossing, the Skiffes Creek Connector will provide better access between Route 60 East, Merrimac Trail, I-64, and the Green Mount industrial area, which currently includes distribution centers for Walmart and Haynes Furniture. This would improve truck movement in the area, as well as make this section of James City County more attractive for industrial development. In January 2020, the project received a $24.5 million award from the Commonwealth Transportation Board. Currently, the project is in the design phase and is scheduled to begin construction in the spring of 2021.

A third project for which the County is currently pursuing funding is the Green Mount Parkway Extension to divert traffic from Pocahontas Trail. The proposed extension would not only be expected to relieve congestion along this portion of Pocahontas Trail and northward, but would also promote further commercial and industrial development in the vacant parcels around the Green Mount industrial area. The proposed alignment for the Green Mount Parkway Extension will parallel the existing segment of Pocahontas Trail adjacent to the CSX Railroad and then extend across the Green Mount property and Skiffes Creek and into Newport News, where it will connect to the Route 60 East/Fort Eustis Boulevard interchange.

Improvements along Pocahontas Trail and Green Mount Parkway would address multiple VTrans' needs including capacity preservation, transportation demand management, bicycle access, and pedestrian access.

Richmond Road (Route 60)

Although future traffic volumes indicate the potential need for widening Richmond Road between the City of Williamsburg and Olde Towne Road and between Humelsine Parkway and Lightfoot Road, it is recommended that Richmond Road remain four lanes. Widening in these sections should be avoided or limited due to the physical limitations and negative impacts on existing uses.

Currently, improvements to Richmond Road at the intersection with Airport Road are being looked at to reduce congestion. Improvements include the elimination of traffic signals (the left-turn lane) at the intersection and two U-turns on Richmond Road to allow motorists to access Airport Road using the right-turn lane. This project addresses the VTrans 2045 need for safety improvement, capacity preservation, and transportation demand management. Future projects would need to address the need for bicycle access along the Richmond Road corridor.

Future commercial and residential development proposals along Richmond Road should concentrate in planned areas and will require careful analysis to determine the impacts such development would have on the surrounding road network. Minimizing the number of new signals and entrances and ensuring efficient signal placement and coordination is crucial. The HRTPO developed guidelines for signal placement on Richmond Road as part of its Hampton Roads Access Management Model. These guidelines should be followed by new developments. New developments should be permitted only if it is determined that the cumulative impact of the project and other planned and by-right land uses can be served by the existing road while maintaining an acceptable level of service or if the impacts can be adequately addressed through road and signalization improvements. If public funds are not included in approved state road plans for such improvements, private funding is expected prior to development approval.

Through the villages of Toano and Norge, sidewalks, enhanced landscaping, and on-street parking should be encouraged for new development to preserve a traditional small village feel. This section of the corridor should also have lower speed limits compared to the rest of the Richmond Road. The Toano Area Study should be referenced for additional specific recommendations in Toano. Outside of the villages of Toano and Norge, multiuse paths are recommended to separate pedestrians from heavy traffic flow.

Secondary Roads

Centerville Road

Centerville Road is a boundary line for the PSA. Presently a two-lane road, Centerville Road's future traffic volumes are expected to grow significantly over the next 20 years, approaching levels that may warrant widening the section from Longhill Road to Richmond Road. The County should continue to maximize current capacity of the road by adding turn lanes and discouraging suburban-style residential development on the western side of the road. One recent project improved the intersection of Centerville Road and News Road by adding a right-turn lane on News Road, right- and left-turn lanes on Centerville Road, and installation of a traffic signal. Construction was completed in 2020. Centerville Road's intersection with Jolly Pond Road was evaluated for potential turn lanes and improvements, but the results did not warrant additional intersection improvements.

Croaker Road

The section of Croaker Road extending from Richmond Road to Point O'Woods Road is scheduled to be widened based on future traffic projections. The project proposes widening from two lanes to four lanes and realigning the intersection with Rose Lane. Additionally, the project includes undergrounding utilities and constructing a new two-lane bridge parallel to the existing bridge over the CSX line. This project is to address the expected capacity deficiency as well as anticipated traffic from the Economic Opportunity area. A multiuse trail to connect residential and commercial areas and the Croaker Library will be constructed in tandem with the road widening project. To preserve the rural character of the road, the multiuse trail is proposed on the north side of Croaker Road rather than sidewalks. The project is expected to complete the pre-engineering phase at the end of 2020. Right-of-way acquisition is expected to be completed by 2023 with construction completion by 2025. The widening of Croaker Road would address the VTrans 2045 needs of transportation demand management, bicycle access, roadway capacity, roadway operations, intersection design, and bicycle infrastructure.

Ironbound Road

Ironbound Road between Monticello Avenue and John Tyler Highway is projected to require additional travel lanes in each direction. Any future improvements should occur in a context-sensitive manner, appropriate for the Five Forks CCA. A multiuse trail along the side of the road is encouraged. In May 2019, the County received federal authorization to begin a Safe Routes to School project from Clara Byrd Baker Elementary School to the John Tyler Highway and Ironbound Road intersection. Improvements will include a new sidewalk and crosswalks from John Tyler Highway to Clara Byrd Baker, as well as flashing beacons for safety. The intersection will be reconfigured to be more pedestrian-oriented and to improve safety. Future funding sources should be pursued to increase bicycle and pedestrian connectivity along the corridor.

Longhill Road

Based on current volumes, Longhill Road from Humelsine Parkway to Olde Towne Road is recommended for widening to four lanes. Projected volumes also show the need for widening to Season's Trace and eventually to Centerville Road. In 2014, Kimley-Horn and Associates, Inc. conducted a study to explore the needs along the corridor and context-sensitive transportation solutions. As a result of the analysis of current and projected traffic volumes, safety concerns, multi-modal considerations, and extensive public input, Kimley-Horn created recommended typical sections, an access management plan, and an intersection design plan to act as a guide for future improvements along the roadway. The recommendations were compiled into the Longhill Road Corridor Study Report, which was adopted by the Board as the County's vision for Longhill Road.

The first phase of the project will widen Longhill Road from two to four lanes with a median and multiuse path from Williamsburg West Drive/Humelsine Parkway to just west of Olde Towne Road near New Point Road. Phase I began construction in the fall 2019 and was completed in fall 2020. Adjacent to Phase I, SMART SCALE funding was secured to construct a 10-foot shared use path along a 0.55-mile stretch of Longhill Road from DePue Drive at its eastern terminus, over Route 199, to Lane Place at its western terminus. This will improve connectivity in the bike and pedestrian network by closing existing and projected bike/pedestrian gaps and by improving multimodal safety on this widely traveled road.

Phase II will widen Longhill Road from just west of Williamsburg Plantation Drive to just east of Glenburnie Road. This phase also includes construction of the turn lanes on Olde Towne Road at the intersection. Construction for Phase II began in fall 2020. Phase III will widen and realign Longhill Road from east of Glenburnie Road to Centerville Road and does not currently have an anticipated schedule. Smaller improvements may be done separately as resources are available. Widening of Longhill Road addresses the VTrans 2045 needs of safety improvements, bicycle access, and transportation demand management. Longhill Road should be continued to be monitored to determine if or when congestion levels and traffic volumes reach the threshold for future widening or improvements.



Mooretown Road Extension

The Mooretown Road Corridor Study recommended extending Mooretown Road from its current terminus in York County to Croaker Road or Rochambeau Drive. Development within the vicinity of the proposed Mooretown Road extension should be discouraged until master plans are approved and infrastructure is planned to handle intensive development that does not solely rely on Richmond Road. Private funding is expected to pay for the extension, although public and private efforts may be beneficial in master planning the surrounding land uses. The Corridor Study examined three alternative routes, as well as the associated environmental impacts, utility relocation, and cost estimates. On December 8, 2015, the Board of Supervisors voted to support the three alignments outlined in the study. A final route would be determined once a future development is proposed for the corridor.

News Road

News Road from Centerville Road to Monticello Avenue is a winding road with poor sight distance and sharp curves. At Centerville Road and News Road, an intersection improvement has been completed, which will improves visibility for left turns onto Centerville Road from News Road and add a right-turn lane on News Road as well as right- and left-turn lane on Centerville to access News Road. As development pressure continues along the News Road corridor, coordination with VDOT and future developers is essential to increasing sight distances. Recommended road improvements include shoulder strengthening and the addition of reflectors along the side of the road. Rezoning and SUP applications should take these recommendations and other needed improvements into account to minimize the impacts of additional development. Any shoulder strengthening project should include the addition of a shoulder bike lane.



Rural Roads

Rural roads are outside the PSA and serve areas designated as Rural Lands on the Land Use Map. These facilities are often two lanes, have smaller typical cross sections, and have limited driveways and intersections. Such roadways are not designed for speed or capacity, but rather to provide access and complement the rural character of the area. Besides their scale, these roads are unique because they showcase the County's mature tree canopies and rural landscapes. Capacity improvements and non-rural land uses should be avoided on rural roads. Examples of rural roads include Ware Creek Road, Riverview Road, Newman Road, Forge Road, Jolly Pond Road, and Brick Bat Road.

Non-Roadway Components of the County's Transportation System: Inventory and Planning

James City County looks to improve existing facilities for pedestrian and bicyclist use, create new facilities, and work with regional partners and developers to expand existing networks to promote connectivity and alternative modes of transportation. In numerous studies, the use of non-motor transportation has had environmental, economic, and health benefits in local communities where infrastructure exists to support these modes; furthermore, James City County's historic and Community Character can be enhanced through future investments in pedestrian and bicycle facilities.

The Virginia Capital Trail, running through James City County, is a popular bike and pedestrian trail, and its economic benefits are supported through its use and visitation. During the 2018-2019 fiscal year, the 52-mile Capital Trail from Richmond to Jamestown generated approximately $5.3 million in value-added contributions to the Gross Domestic Product of Virginia. In addition, the trail created 99.2 full-time equivalent jobs, along with $3.6 million in wage and salary income. Properties adjacent to the trail increased in assessed value by about 3.7% more than properties not adjacent to the trail per the Virginia Capital Trail Foundation Economic Impact Analysis.



The County has goals for future non-roadway components and facilities for alternative modes of transport that are consistent with regional goals. These goals include:

- Safe, connected, and accessible networks that provide alternatives to motor transport for a wide variety of ages, lifestyles, and activity levels;
- Inclusion of more connector trails to enhance connections between neighborhoods, schools, recreation, and businesses;
- Use the addition and improvement of facilities to attract new business and increase opportunities for tourism;
- Promote the physical and mental health of residents;
- Decrease dependency on cars to enhance the environmental well-being of the County;
- Enhance the sense of place felt by residents by strengthening residents' relationships with the area's history and community character;
- Guide the location and design of future facilities and additions; and
- Continue to update the Pedestrian Accommodations Master Plan.

Greenways

More specifically discussed in the Parks and Recreation section of the Comprehensive Plan, greenways are defined as linear open spaces that are managed for conservation, recreation, and/or alternative transportation uses. Greenways often follow natural features (ridgelines, stream valleys, and rivers), cultural features (canals, utility corridors, abandoned rail lines, zoning buffers, roadways), or breaks in the land pattern. Although each greenway is unique, most greenways are networks of natural open space corridors that connect neighborhoods, parks, and schools to areas of natural, cultural, recreational, scenic, and historical significance. Blueways are aquatic greenways that provide water access opportunities for small watercraft such as canoes and kayaks. These passageways link people and places to nature for the enjoyment and enhancement of the community. Greenways and blueways provide corridors that bicyclists, pedestrians, and others can use to get from one place to another, free from motor vehicle conflicts.

Two of James City County's most popular trails are the Greensprings Interpretive Trail and the Virginia Capital Trail. The trailhead at Jamestown High School provides convenient parking and access to both trails. The Greensprings Trail is a three-mile soft surface trail that loops through a landscape of ponds, wetlands, and forests adjacent to Mainland Farm, the oldest continuously cultivated farm in the United States. The 52-mile multiuse path for the Virginia Capital Trail links Jamestown and Richmond and was completed in 2015. James City County received Revenue Sharing funds for the addition a path connection near the John Tyler Highway and Monticello Avenue intersection for access to the Capital Trail, which was completed in 2016. Though both the Greensprings Interpretive Trail and the Virginia Capital Trail are maintained by VDOT, the County will work in cooperation with the state and other local agencies to ensure their continued adequacy for their users.

The Powhatan Creek Trail is a 2.05-mile paved trail that connects Clara Byrd Baker Elementary School to the Virginia Capital Trail. This trail provides connections to the Greensprings Interpretive Trail, Historic site known as Church on the Main, and Mainland Farm (considered to be the oldest continuously cultivated farm in America's first English settlement). Future sidewalk expansion through the Clara Byrd Baker Safe Routes to School Project will provide a sidewalk connection to the Powhatan Creek Trail to surrounding neighborhoods around the school.

Current Plans

James City County adopted its Pedestrian Accommodations Master Plan in 2011 and updates to the 1993 Regional Bicycle Facilities Plan in 2013. The Pedestrian Accommodations Master Plan helps meet pedestrian needs generated by current and future growth, while limiting the need for post-development remedial sidewalk projects constructed with public funds. A majority of sidewalks and paths have been constructed by the private sector in conjunction with land development. Since the adoption of the Pedestrian Accommodations Master Plan, a number of studies have been completed and roadway projects initiated that examine the needs and conditions of certain roadways in more detail. Based upon this information, the Pedestrian Accommodations Master Plan shall be continually updated based on citizen input and future studies.

The Regional Bicycle Facilities Plan was originally developed under the direction of the Regional Issues Committee in cooperation with citizens from James City County, York County, and the City of Williamsburg. The Historic Triangle Bikeways Advisory Committee (HTBAC), consisting of citizens and staff from James City County, the City of Williamsburg, York County, and representatives from the National Park Service, the College of William and Mary, and Colonial Williamsburg, is responsible for making recommendations on updates to the plan, monitoring the construction of bike facilities, and ensuring that all new facilities and future plans meet the public's desires and needs. During HTBAC's 2013 update of the Regional Bicycle Facilities Plan, the Committee aspired to design a system that would provide bicycle access to major destinations, eliminate routes with dead ends, be realistic regarding the necessity of the proposed facility type, and be consistent with the Pedestrian Accommodations Master Plan.

The benefits of an integrated bikeway system are energy conservation, reduced pollution, traffic reduction, improved quality of life, and increased appeal as a tourist destination.

Paved multiuse paths complement the range of non-vehicular facilities by providing an option that can serve a wide range of users in one facility. Multiuse paths are typically paved, eight to 10 feet wide, and can be found in rural, suburban, and urban settings. When designing or retrofitting a road to accommodate cyclists and pedestrians, it is important to consider the context before deciding on the type of facility. In historic or more urban and compact settings, on-street bike lanes and sidewalks may be a more appropriate and functional choice.

Along regional trails, the Comprehensive Plan encourages more developments and to include bicycle parking facilities as part of their developments, specifically for restaurants, convenience stores and shops. Bike racks within a development will give citizens the opportunity to have multi-modal access to the site and give riders safer areas to park their bicycles.

The County's Greenway Master Plan establishes a framework for a County-wide system of interconnected greenways and trails with the goal of balancing environmental protection with the need for recreational amenities.

The Pedestrian Accommodations Master Plan, the Regional Bicycle Facilities Plan, and the Greenway Master Plan all promote a shared goal of facilitating transportation choice. As such, shared facilities that combine the benefits of each plan should be developed whenever possible in an effort to unify the effort of providing these types of facilities. Implementation of these plans is strongly encouraged. Tidewater Trails Alliance encourages the adoption of segments of the Birthplace of America Trail (BoAT) plan in the planning session of the Comprehensive Plan and the County's Pedestrian Accommodations Master Plan.

VDOT Pedestrian Safety Action Plan

In 2018, VDOT Traffic Engineering Division completed a report to assist localities on improving pedestrian safety and ultimately reducing fatalities in the Commonwealth. Along with the report, VDOT worked with stakeholders to identify areas across the Commonwealth that has a history of pedestrian crashes. James City County has five corridors (Humelsine Parkway, Richmond Road, Longhill Road, Monticello Avenue, and Pocahontas Trail) identified in the top 1-5% of safety issues for pedestrians. The County should continue to collaborate with VDOT on ways to address these safety issues.

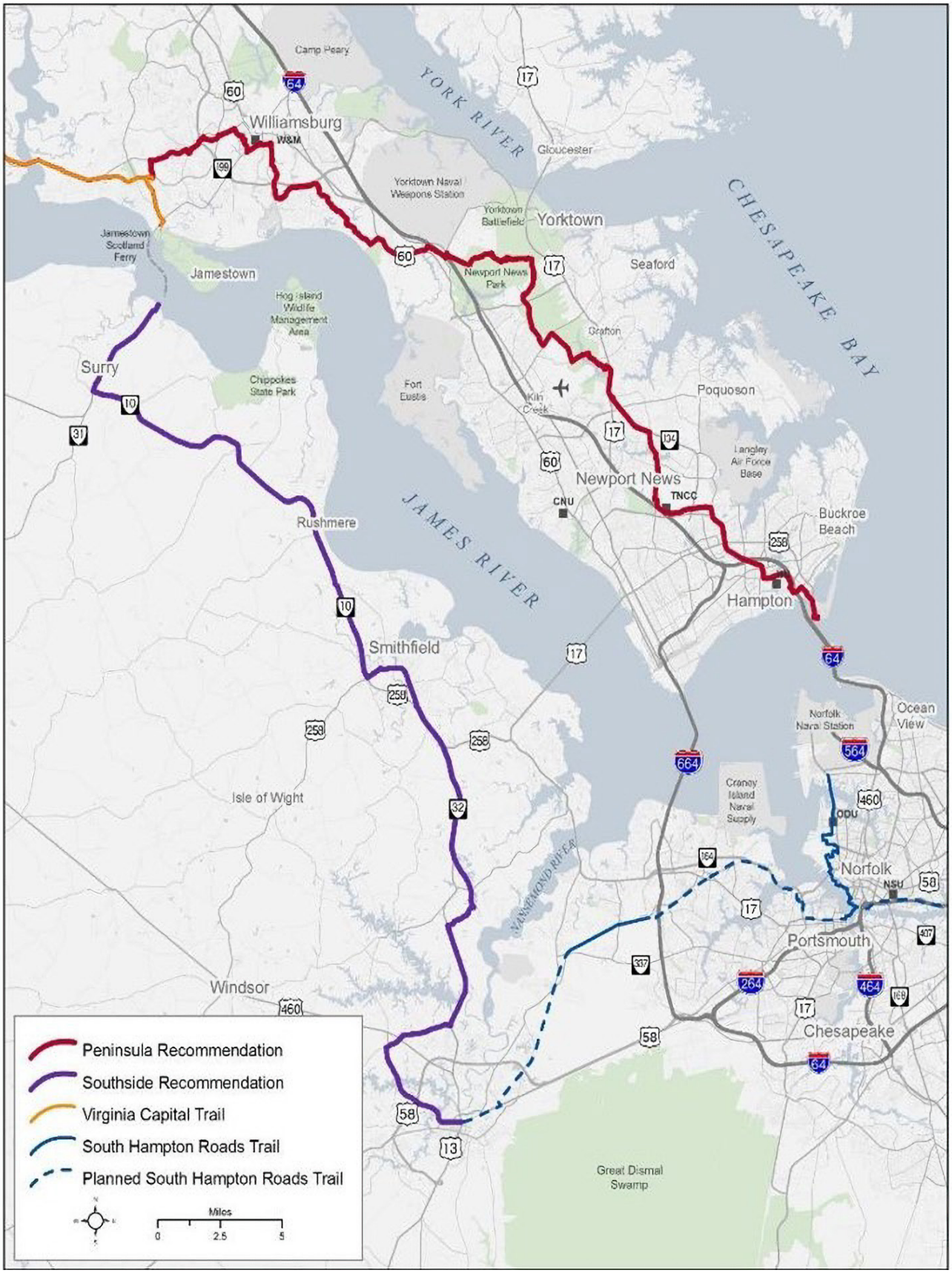
Linking Hampton Roads: a Regional Active Transportation Plan

In the summer of 2017, HRTPO began developing a regional active transportation (bicycle and pedestrian) plan for the Hampton Roads region. The plan recommends that the Virginia Capital Trail be connected to the broader Hampton Roads region, and envisions this implementation through the proposed Birthplace of America Trail (BoAT). BoAT is a proposed multiuse trail of more than 190 miles connecting James City County to greater Hampton Roads via two routes: the Peninsula Route and the Southside Route. The map below shows the adopted map of the two proposed routes. Localities have an opportunity to alter the route should a more desirable location be preferred or if ability to use existing infrastructure is available. On May 9, 2017, the Board of Supervisors passed a Resolution of Support for the proposed trail alignment. This Comprehensive Plan encourages the adoption of more segments of the BoAT.

Utilizing multiple shared-use pathways connecting the County with the entire Historic Triangle and beyond is consistent with the County's goals for non-motor transportation network expansion and with proposed regional plans. The Regional Active Transportation Plan additionally recommends buffered bike lanes throughout the northern portion of the County to increase the County's connectivity.



Map T-4. Birthplace of America Trail, HRTPO



Courtesy of HRTPO

Current and Future Bicycle and Pedestrian Projects

Longhill Road Widening

Longhill Road is currently being widened after the Longhill Corridor Study in 2014 proposed congestion relief improvements and ways to incorporate other modes of transport along the corridor. In addition to widening, a 10-foot-wide, 0.5-mile shared-use path from DePue Drive to Lane Place will be installed along the north side of the roadway. Other improvements will include crosswalks, pedestrian push buttons, and additional widths on outside lanes to accommodate cyclists. The project began in late 2019 and will be complete in three phases with an expected completion date in late 2021/early 2022.

Clara Byrd Baker Sidewalk Improvements

In 2018, James City County received funding for a project from John Tyler Highway to Clara Byrd Baker School, which is expected to start in 2021. Improvements will include a new sidewalk from John Tyler Highway to Clara Byrd Baker and crosswalks as well as flashing beacons for safety.



Croaker Road Widening

The design for a widening project at Croaker Road (Route 607) between Richmond Road (Route 60) and the intersections of Point O'Woods Road and Maxton Lane is currently being developed. This widening project will include a shared used pathway and crosswalks to allow use by pedestrians and cyclists, increasing connectivity to this area, which features new residential housing, Williamsburg-James City County Library, and other commercial areas. The estimated construction start date is Winter 2023/2024.

Centerville Road Bike Lanes

On the 2045 LRTP, the Centerville Road Bike Lanes project was added as a candidate project. The project has an initial funding amount of $100,000. This project will provide a bicycle connection on Centerville Road between John Tyler Highway and Monticello Avenue. Additionally, this project will provide a bike facility where there is currently a gap between the Virginia Capital Trail and existing bike lanes on Centerville Road. No funding source has been determined for the project.

Birthplace of America Trail

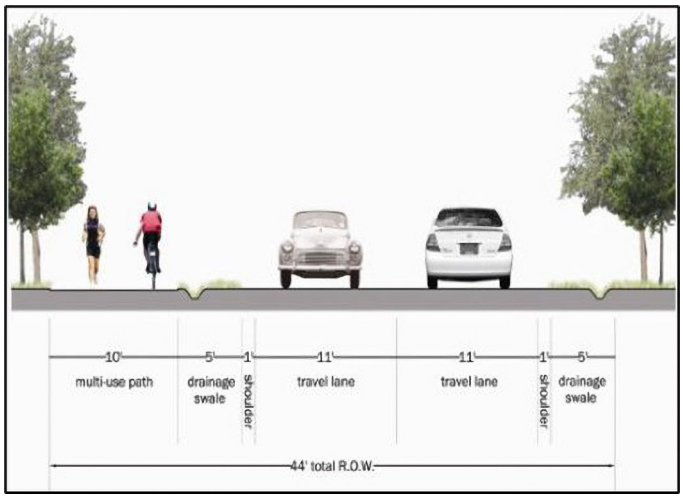
James City County shall continue to explore funding opportunities to fund bicycle and pedestrian project that align with the BoAT. As the trail is development, future projects shall include additional links from existing facilities to the Boat and the Virginia Capital Trail to create a County-wide bicycle and pedestrian transportation network.

Proposed Facility Designs (Cross-Sections)

Paved multiuse paths complement the range of non-vehicular facilities by providing an option that can serve a wide range of users in one facility. The Regional Bicycle Facilities Plan consists of three different types of bicycle facilities.

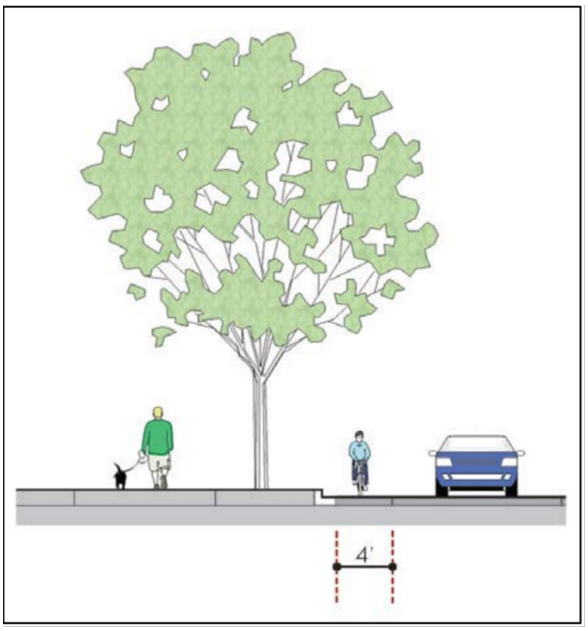
1. *Multiuse Path* - Facilities that are physically separated from the roadway and prohibited for use by motorized traffic.
2. *Bike Lanes* - Roadways that can accommodate bicyclists. These facilities include bike lanes within the roadway that are delineated for bicycle use only. A bike lane can either be adjacent to the curb with no on-street parking or in between on-street parking and vehicle travel lane. Markings and signage for these facilities shall be in accordance with the VDOT Road Design Manual.
3. *Shared Roadway* - Roadways that are signed as a bicycle route, but do not have a portion of the roadway that is either reserved exclusively for bicyclists or can accommodate bicyclists and motorized traffic simultaneously.

Figure T-11. Example of Multiuse Path

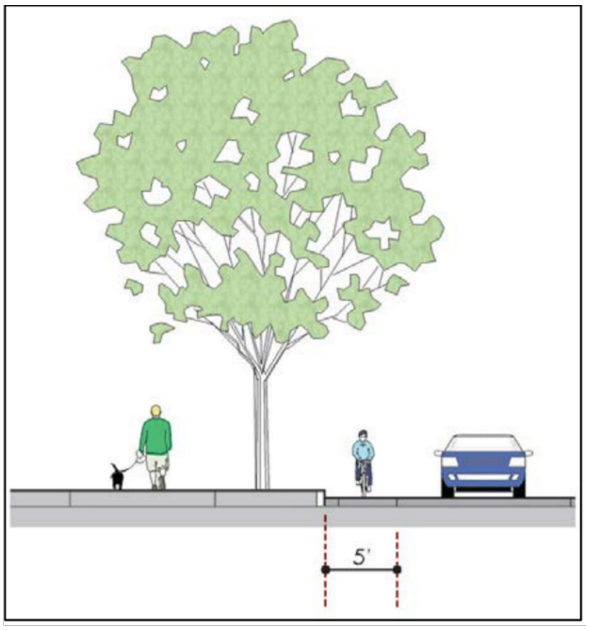


Courtesy of Renaissance Planning Group

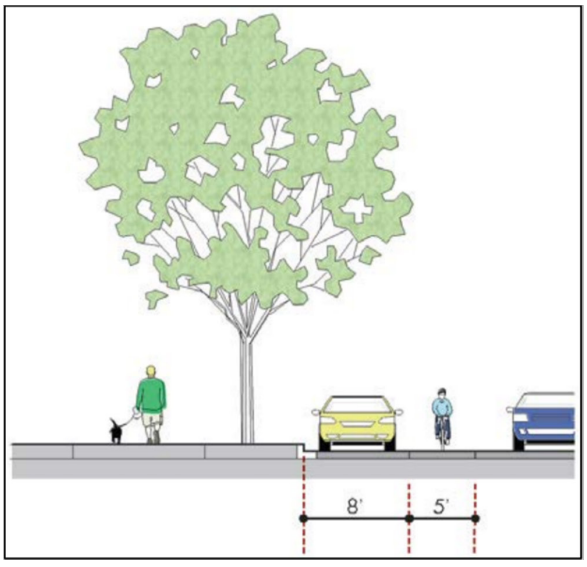
Figure T-10. Example of Shoulder Bike Lane



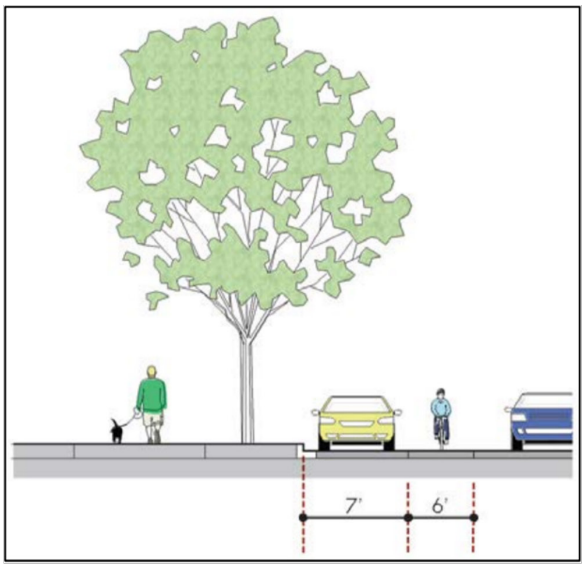
Four-foot-wide bicycle lanes do not include the width of the gutter pan when adjacent to curb and gutter.



A four-foot-wide bicycle lane becomes a five-foot-wide bicycle lane when located adjacent to curb without a gutter pan.



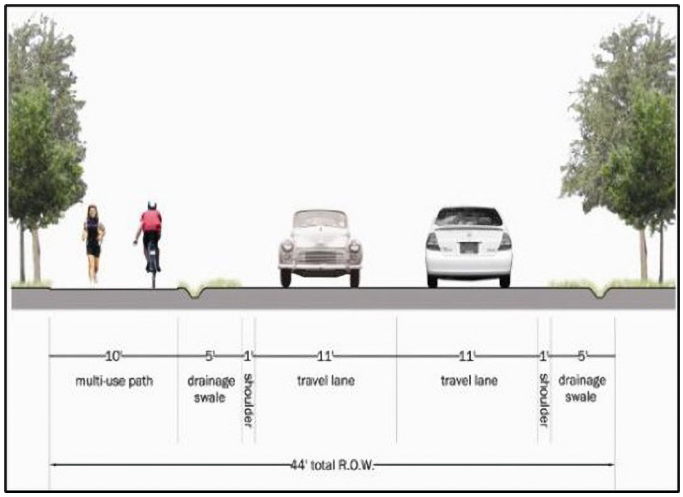
A four-foot-wide bicycle lane becomes a five-foot-wide bicycle lane when paired with an eight-foot-wide parking lane.



A four-foot-wide bicycle lane becomes a six-foot-wide bicycle lane when paired with a seven-foot-wide parking lane.

Courtesy of VDOT Road Design Manual

Figure T-13. Example of Shared Roadway



Courtesy of Renaissance Planning Group

Maintenance of Facilities

James City County will look toward several options for maintaining non-roadway facilities to enhance the historical and community character of these facilities and to keep them accessible to and safe for local users and visitors. Facility maintenance will depend on the location of facilities and ownership of roadways. Any facilities in VDOT's right-of-way will be maintained by VDOT. Facilities outside of VDOT's right-of-way will be maintained privately. It will also be up to the users of facilities to take personal responsibility to take care of their waste and make reports of any issues with facilities, if and when they arise. Per VDOT's Policy of Integrating Bicycle and Pedestrian Accommodations, VDOT will "maintain bicycle and pedestrian accommodations along the Birthplace of America Trail as necessary to keep the accommodations usable and accessible." However, this is dependent on funding available for these efforts, both for VDOT and for localities. The County maintains the Powhatan Creek Trail, while the Virginia Capital Trail and Greensprings Interpretative Trail receive maintenance from VDOT.

Possible Funding Structure and Sources

In order to achieve the Comprehensive Plan's vision of funding future non-roadway projects, the County will need to look toward several combinations of local, state, and federal funding. Existing facilities have been constructed through County efforts using state and federal funding. There are a number of future projects that are currently unfunded and the County will pursue funding applications to make these facilities possible. Potential future funding sources include:

- County Capital Improvements Program
- Grants
- Bond Referendums
- Public-Private Partnerships
- Fundraising Events
- SMART SCALE
- Highway Safety Improvement Plan
- VDOT Revenue Sharing
- Congestion Mitigation Air Quality (CMAQ at federal level)
- Transportation Alternative Projects (federal)
- Other
  - User fees
  - Donations
  - Developer contributions and/or construction

Criteria for Prioritizing Projects

Staff will compare the criteria for prioritizing bike and pedestrian projects from different sources. Staff will evaluate the requirements of the funding source to determine which project will create the most competitive application based on criteria from various funding sources.

In the development of this Comprehensive Plan, a Policies and Actions Questionnaire asked citizens about walking and biking facilities. Citizen feedback indicated a strong emphasis on improving the quality of life through walking and biking facilities. Citizens also prioritize walking and biking amenities in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways. The location and the benefits a new facility would provide in terms of connectivity and access to the surrounding area should be taken into account when applying for new bike and pedestrian projects.

Historic Triangle Bicycle Advisory Committee Project List

The Historic Triangle Bicycle Advisory Committee has developed the following list of projects in need of funding.

1. Longhill Road shoulder bike lanes: Shoulder lanes need to be replaced/expanded.
2. Ironbound Road bike lanes: A widened, marked out, safe bike lane along Ironbound Road from Veterans Park (which is near many neighborhoods and shopping) to connect with the Virginia Capital Trail feeder trail behind Clara Byrd Baker Elementary School.
3. Mooretown Road bike lanes: Along the "two lane" portion of Mooretown Road from Airport Road west to Ashby Park Drive.
4. Richmond Road bike lanes: Eastbound Richmond Road between Carolina Furniture (5425 Richmond Road) and the Williamsburg City line (La Tolteca at 3048 Richmond Road) - would provide connection between Airport Road and the right-turn lanes in the City.
5. Old Country Road multiuse path: Construct multiuse path between the southern terminus of South England Street across the north end of the Kingsmill development to Ron Springs Drive just west of Carter's Grove.
6. Pocahontas Trail (Route 60) bike lanes east of Williamsburg: Add bike lanes between Quarterpath Road at the Williamsburg City line through Grove to James River Elementary School.

Unranked Projects:

- Sweep debris from roadway bike lanes: These areas should be swept once a year in the spring.
- Richmond Road shoulder bike lanes: Between 6601 Richmond Road to Lightfoot Road, eastbound lane.
- John Tyler Highway shoulder widening: Between Hickory Signpost Road and Carolina Boulevard.
- Forge Road bike lanes: Between Little Creek Dam Road and Diascund Road - extend existing bike lanes to Diascund Road.
- John Tyler Highway (Route 5) bike lanes: Add bike lanes to Route 5 between Route 199 and the Virginia Capital Trail connection.
- Centerville Road/Monticello Avenue pavement repairs: add paved shoulder at the base of the traffic light poles at the intersection of Centerville and Monticello Avenues.
- Warhill Sports Complex/James City County Recreation Center connection: Construct multiuse path to connect the two facilities.
- Rochambeau Drive bike lanes: Between Croaker Road and Lightfoot Road.
- Penniman Road bike lane striping: Between the City of Williamsburg boundary eastward to the Marquis Parkway.

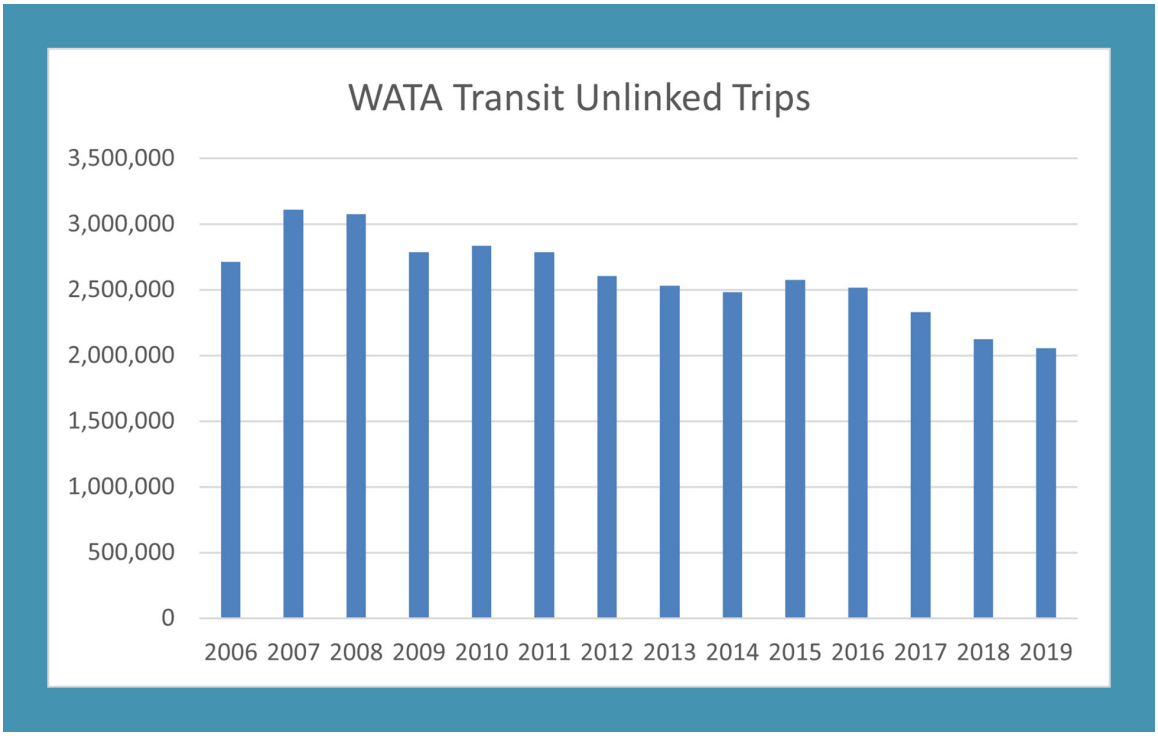
Williamsburg Area Transit Authority

Williamsburg Area Transit Authority (WATA), formerly known as Williamsburg Area Transit, began operation in 1977 to provide a public transportation system to the citizens of James City County, the City of Williamsburg, and the Bruton District of York County. WATA's mission is to provide safe, efficient, and accessible public transit to residents and visitors in the Historic Triangle. WATA's vision is that Williamsburg Area Transit Authority will become the transportation option of choice for people who live, work, and visit the Williamsburg area.

WATA currently operates under a Transit Development Plan that was adopted in 2016. In addition to passenger fares, WATA is funded by federal and state grants and contributions made by James City County, the City of Williamsburg, and York County.

Improvements over the last 10 years include new routes, increased hours, seasonal trolley service between New Town, High Street, and Colonial Williamsburg, Sunday service, and regional connections to Surry County and Newport News. WATA has also established three transportation centers: downtown Williamsburg (serving as a regional hub where taxi, intercity, public transit, and rail connect); the northern area of the County off Rochambeau Drive, and Legacy Hall in New Town.

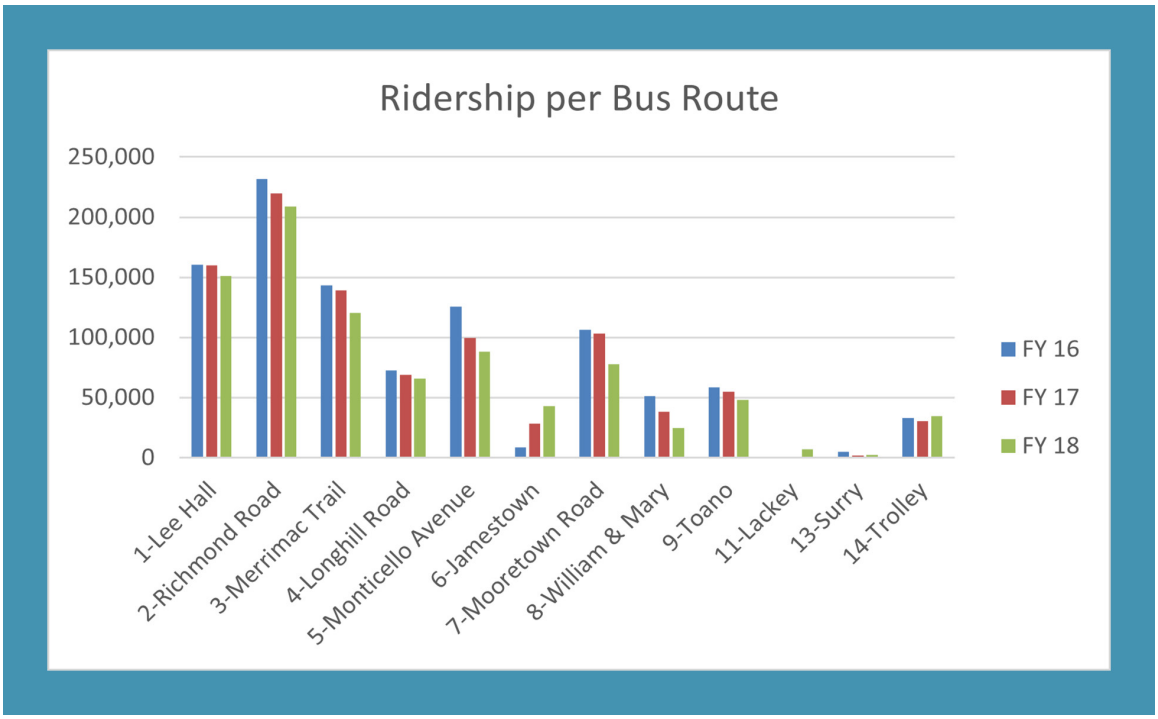
Figure T-14. WATA Transit Unlinked Trips



Source: Historic Triangle Comprehensive Transportation Study.

WATA has 12 routes meeting various community needs such as commuter, recreational, and tourism travel by providing a coordinated system through fixed routes. Accessibility services for customers with disabilities include routes with wheelchair lifts, deviated trip routes, and paratransit service. WATA added the Lackey/Mounts Bay route in 2017, which connects riders from the James City County Government Center/Quarterpath/Riverside Hospital area to Lee Hall in Newport News and Yorktown Square Apartments in York County. Other transit-related services, such as those provided by the Williamsburg-James City County Community Action Agency, Colonial Williamsburg, and private taxi services, offer additional specialized services to area residents.

Figure T-15. WATA Ridership per Bus Route, Historic Triangle Comprehensive Transportation Study



Source: Historic Triangle Comprehensive Transportation Study.

James City County should continue to encourage the expansion of future transit by encouraging compact development inside the PSA that is conducive to transit.

Park and Ride Lots

A number of residents in the study area use carpooling to travel to work. According to the Census Bureau, 5,234 residents in the Historic Triangle carpooled to work on a regular basis in 2013-2017. This percentage (7.3%) is slightly below the regional carpooling average of 7.9%. The TRAFFIX program, which is funded by HRTPO and operated by Hampton Roads Transit, conducts various efforts to increase the use of transportation alternatives such as carpools, rideshares, and public transit throughout the region and study area.

In order to assist with carpooling and ridesharing efforts, VDOT maintains Park and Ride lots throughout the state, including three lots in the study area:

- Lightfoot - This lot is located on East Rochambeau Drive just to the south of the interchange of I-64 and Humelsine Parkway. The unpaved Lightfoot Lot has space available for 51 vehicles. According to VDOT Hampton Roads District data, the 2018 average utilization rate was 33% (17 out of 51 spaces).
- Croaker - The Croaker Lot is located at the corner of Rochambeau Drive and Croaker Road just west of I-64. This partially paved lot has space for 64 vehicles. The facility is lit and has bicycle racks. According to VDOT Hampton Roads District data, the 2018 average utilization rate was 73% (47 out of 64 spaces).
- Jamestown Center - This lot is co-located at the Jamestown Center near the intersection of Jamestown Road at Jamestown Settlement and the Colonial Parkway. This paved lot has 516 general spaces. The facility is lit and has bicycle racks and access to transit services. According to VDOT Hampton Roads District data, the 2018 average utilization rate was 21% (110 out of 516 spaces).

In 2013, VDOT completed the Statewide Park and Ride Lot Inventory and Usage Study. The study updated VDOT's inventory and usage of Park and Ride lots, identified recommendations for new or expanded Park and Ride lots, updated VDOT's website to include an interactive map of official lots, developed VDOT's Park and Ride program policies and goals, and assisted VDOT in coordinating its Park and Ride lot program with other state and local agencies and the public. For James City County, the study's recommendations resulted in one Priority Investment Strategy project - paving and enhancing the Croaker lot. The Park and Ride lot was included as one of the 84 recommended high priority investment projects in Virginia.

In December 2017, VDOT completed Park and Ride Design Guidelines to provide a user-friendly framework for which users to make informed decisions regarding Park and Ride lot layout, services, amenities, and green infrastructure in developing or retrofitting Park and Ride lots throughout the Commonwealth. This Comprehensive Plan supports future growth of Park and Ride facilities in the County to encourage carpooling and ridesharing efforts.

Rail Travel

A main line of the CSX Railroad runs north to south through James City County. This line connects in Richmond with the broader network of the CSX transportation system and connects with the ports of Hampton Roads in Newport News and to the Southside ports in Portsmouth. Rail plays an important role in moving freight and passengers to and from James City County.

Intercity passenger rail service is available in James City County through Amtrak. This service is part of the Northeast Regional route, which operates between Boston, New York, Washington, D.C., and Norfolk. Expanded service to Norfolk began in December 2012 and provides a linkage to the Norfolk Tide light rail system. In the future, James City County has the potential to be served by express bus, commuter rail service, or high speed rail as part of the Southeast High Speed Rail Corridor as outlined in *The Hampton Roads Regional Transit Vision Plan* and summarized for the Historic Triangle area in the James City County/Williamsburg/York County Comprehensive Transportation Study. Successful implementation of expanded rail travel will require an effort to cultivate transit-oriented developments by locating new medium- and high-density development along and in proximity to station locations as well as the development of effective feeder bus, vanpool services, and park-and-ride lots to provide better access to rail transit for those persons not living within proximity of the rail corridor.

Important to the transportation system as well as the economy of the area is freight movement along the CSX lines. Major users of the line in James City County are the Anheuser-Busch InBev brewery, Ball Metal, Luck Stone, Henry S. Branscome, Inc., and several other aggregate companies. The line has a medium-high density classification, which means it carries 10 to 20 million gross tons annually. Industrial rail traffic is important, because it ensures the line against abandonment. James City County can increase the viability of the railroad by encouraging new industries to locate along or near the line.

This Comprehensive Plan recognizes the importance of rail service as a viable transportation mode and supports the continued maintenance of existing and potential industrial rail access to the County's designated industrial sites. Rail activities should be monitored in an effort to determine the impact of potential service or design changes in the County and region. Finally, consideration should be given to improvements, which would increase safety at the seven railroad crossings that exist in the County.

Air Travel

The James City County area is served by three major commercial airports within one hour driving distance: Newport News-Williamsburg International Airport in Newport News (20 minutes), Richmond International Airport (1 hour), and Norfolk International Airport (1 hour). These three airports offer daily commercial passenger flights serving both domestic and international travel. The Williamsburg-Jamestown Airport is a small general aviation facility located within the County, serving as a base for a flight school and small private planes. There is no scheduled commercial passenger service at this airport, and the population served is confined to tourists and business clientele who travel by private plane. The 3,200 feet of runway can handle most turbo-prop aircraft as well as light corporate jets.

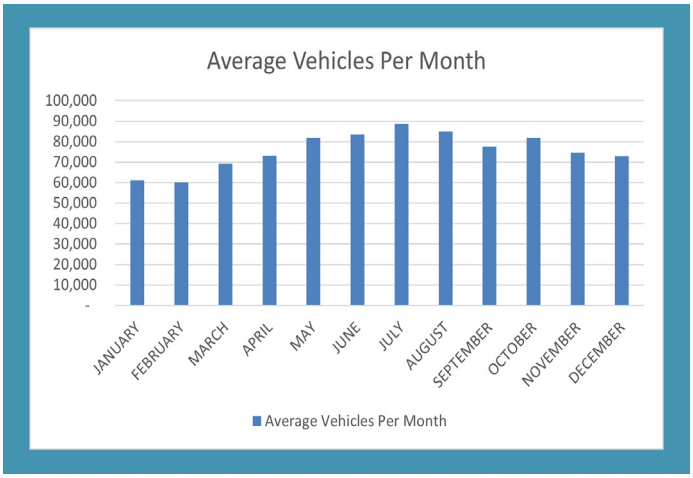
Water Travel

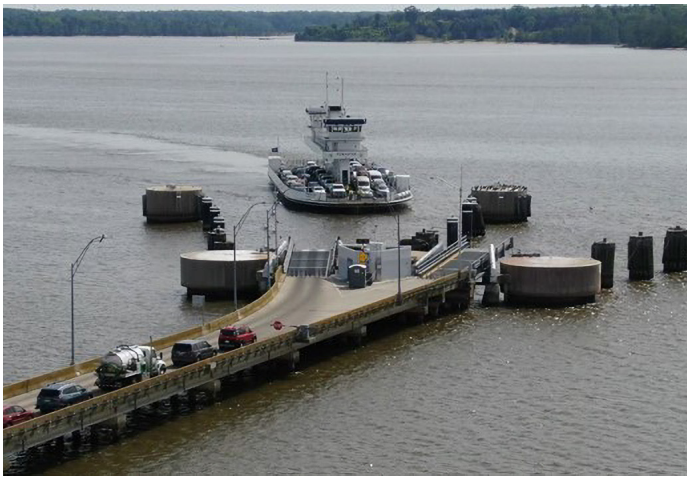
Another important part of the transportation system in James City County is the Jamestown-Scotland Ferry service on the James River. This is a heavily used mode of travel that links Surry County with the James City County/Williamsburg area, transporting roughly 950,000 vehicles per year. Surry County has a large pool of workers who desire employment in the James City County area. The four ferry boats that carry commuters and tourists alike are part of the only 24-hour state-run ferry in operation in Virginia. In July 2020, the Jamestown-Scotland Ferry Facility received $4.9 million through the U.S. Department of Transportation's Federal Transit Administration Passenger Ferry Grant Program to help improve passenger safety and modernize the ferry slips in Surry County and Jamestown. This Comprehensive Plan supports continued 24-hour operation of this critical service.

Table T-5. Vehicle counts for the Jamestown Scotland Ferry

	2014	2015	2016	2017	2018	2019
TOTAL	952,138	940,075	934,213	933,534	888,890	914,525
AVG/DAY	2,609	2,576	2,559	2,551	2,435	2,506

Figure 16. Ferry Average Vehicles per Month





Source: Virginia Department of Transportation.

Community Guidance

Public Engagement

One of the public engagement themes identified during this Comprehensive Plan update that most directly relates to this chapter is: "Respondents desire improved roads, bike, and walking trails, improved congestion, public transportation, and more sidewalks." Respondents to the 2019 Citizen Survey generally rated the County's roads and highways very favorably. Approximately 77% of respondents considered the County's bike lanes and sidewalks to be "very important" or "important". For roads and highways in the County, there is a much greater gap between the importance of the facilities and the satisfaction of those facilities. Roads and highways had a percentage of 97.5%, but the satisfaction was only 73.2% leaving a gap of 24.3%. Comments from the open-ended questions included that the County should encourage more walking and biking paths, increased public transportation and reduce congestion while improving roadways. Public input demonstrates that biking and walking accessibility is important to our community for both recreation and essential transportation needs.

As a follow-up to the survey, the County hosted the Engage 2045 Summit on the Future in the fall of 2019 to engage with citizens to determine their vision for the future of the County. During the preserve/change exercise of the Summit, respondents indicated the following:

- Improve the appearance of Route 60
- Add parallel roadway routes due to traffic congestion
- Add road improvements and a second entrance/exit to Chickahominy Riverfront Park
- Improve Monticello Avenue and make bike path improvements along the corridor

Participants were also provided an opportunity to share their "Big Ideas." These responses included the following:

- More bike and walking trails to support connectivity to places where people want to go
- Connect neighborhoods with new businesses so workers can bike or walk to work
- Focus on increased public transit including new bus lines, rail, and connection to other transportation modes including airports

The second round of public engagement included questionnaires on the Goal statements for each chapter, and feedback on alternative futures. The results of the Goals Questionnaire for the Transportation chapter's goal showed that slightly more than 58% of respondents did not want to change the goal, just under 34% wanted to change the goal, and just under 8% had no opinion. Of those preferring change, 30 commenters requested that the County's transportation system deemphasize automobile use to help reduce traffic congestion and air pollution and focus on walking and biking routes to shopping and other amenities, three respondents suggested increasing public transportation by wanting to grow the system with high-speed or light. Two respondents want to decrease public transportation and wanting to eliminate it due to poor design, inefficiency, and expense. It should also be reflected that many respondents to the goals questionnaire for other chapters of the Comprehensive Plan stated the need for more walking and bike paths.

The third round of community engagement was held in the winter of 2021. This round solicited input on policy directions the County should pursue and actions it should take to enable citizens' vision for the future of our community to be realized. Overall, there was consistent support for enhancing quality of life amenities in James City County with a strong emphasis on walking and biking facilities. Respondents supported prioritizing County resources for enhancing quality of life amenities. They also supported prioritizing walking and biking amenities in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to Transportation:

- Reduce the need to expand roadways in rural areas and protect important rural community character by containing growth within the PSA as much as possible;
- Support greater use of local transit and other alternative modes of travel and reduce greenhouse gas emissions and the impact on the local environment by providing new opportunities for compact mixed-use development and greater opportunities for non-auto modes;
- Reduce overall Countywide travel times and traffic congestion levels by concentrating growth in the PSA;
- Create opportunities for households to have more transportation choices and reduce household transportation costs by locating neighborhoods, employment areas, and commercial developments in close proximity; and
- Foster development of walkable and bikeable environments that increase the health outcomes of residents and provide commuting choices.

Spotlight on Implementation

Having a viable multi-modal transportation network is fundamental to maintaining a strong economy and a high quality of life for the community. It creates important linkages between people, homes, employment centers and recreational areas, and provides citizens, businesses, and visitors a means for the efficient and safe movement of goods and people among activity centers. Accommodating and planning for automobiles will remain paramount as vehicles will remain the primary mode of transportation for most; however, with James City County's population expected to grow for youth, seniors, and the disabled, its transportation planning must also focus on providing additional transportation choice. By building a well-connected system of roads, sidewalks, bikeways, multiuse paths and transit, rail, air, and water service in coordination with surrounding jurisdictions, James City County seeks to address the County's transportation needs of its citizens and economy in a way that improves safety, effectiveness, and efficiency; reduces congestion and emissions; increases accessibility and modal choice; and promotes of a sense of place.

Having a viable multi-modal transportation network is fundamental to maintaining a strong economy and a high quality of life for the community.

The County has worked toward that goal and accomplished a variety of actions from previous Comprehensive Plan's Transportation chapter.

- In terms of ensuring a supportive transportation system, development proposals have been evaluated for potential impacts to the transportation network and for consistency with the County's Corridor Visions. Based on the results of each evaluation, developers have mitigated impacts to the roadway network, such as providing for signal timing studies and/or pedestrian facilities during construction.
- The County has reviewed its transportation priorities annually through VDOT's SYIP and actively pursued funding sources to complete improvement projects.
- Projects such as the News Road/Centerville Road intersection improvements have focused on maximizing the current road capacity by adding turn or travel lanes in a context sensitive manner. Other projects, including the Longhill Road widening, have sought to accommodate current and projected traffic volumes by increasing road capacity. Additional studies have been recently completed or are underway, including the Pocahontas Trail Corridor Study and initial investigations into funding opportunities for safety improvements to the Centerville Road/Greensprings Road intersection at John Tyler Highway.
- To better plan and coordinate transportation improvements within the Historic Triangle and the region, the County participated in joint planning activities, including the Historic Triangle Comprehensive Transportation Study.

Considering that the County's road network is shared by several types of users and also serves as a gateway for visitors into the Historic Triangle area, the County has also pursued improvements to pedestrian facilities and character. In 2011, the Board of Supervisors adopted a new Pedestrian Accommodations Master Plan, which identifies road segments where sidewalks or multiuse paths would provide the largest benefit and helps developers to identify and plan for these facilities in proposals. Implementation of the Pedestrian Accommodations Master Plan was strengthened through amendments to the Zoning Ordinance, which now require by-right development (including expansions) to add or update pedestrian/bicycle accommodations when certain criteria are met. The project to retrofit a 1.8-mile segment of Pocahontas Trail between James River Elementary School and Fire Station 2 has accumulated $24 million to date. The improvements will include paved shoulders, sidewalks, lighting, bus pull-offs, and landscaping.

As James City County looks to 2045, it will need to continue planning for the future transportation needs of the community and seek ways to implement its comprehensive transportation vision. County participation in regular meetings with the HRTPO will be critical to identifying infrastructure needs and deficiencies and making them eligible for federal and state funding. In addition, funding limitations for road improvement projects will require the County to employ creative strategies and regional partnerships to reallocate prior funding and obtain new funding for priority projects and expanded transportation options. It will also be important to reevaluate the County's priorities at regular intervals and factor in differences in the needs of its diverse citizenry and geography to ensure that the County's transportation system meets the needs of its growing population and economy.

Goals, Strategies, & Actions

Goals

T - Provide citizens, businesses, and visitors of James City County with an efficient, safe, attractive, and resilient multimodal transportation system that encourages use of non-automotive forms of transportation and reinforces or is consistent with the goals and land use patterns of the Comprehensive Plan.

Strategies and Actions

T 1 - Foster an efficient safe, effective, and resilient transportation system that supports the County's land use, community character, and high quality of life.

T 1.1 - Ensure that new development supports the Community Character Corridor designations of existing and proposed roads.

T 1.1.1 - Utilize the Travel Demand Leave Behind Model to assess the cumulative impact of new and existing developments.

T 1.2 - Expect new developments to follow recommended densities, intensities, and development patterns that will maintain an acceptable level of service on the surrounding roads and intersections consistent with the land use context (rural, suburban, urban) and the functional classification of the roadway. Ensure that new developments do not compromise planned transportation enhancements.

T 1.2.1 - Limit driveways and other access points and provide shared entrances, side street access, or frontage roads to promote a well-connected and safe road network, consistent with the roadway's functional classification.

T 1.2.2 - Provide a high degree of inter-connectivity within new developments, adjoining new developments, and existing developments, including County facilities, using streets, trails, sidewalks, bikeways, and multi-use trails to improve accessibility and connectivity, and provide alternate routes for emergency access.

T 1.2.3 - Concentrate commercial development in compact nodes or in Mixed Use areas with internal road systems and interconnected parcel access rather than extending development with multiple access points along existing primary and secondary roads.

T 1.2.4 - Pursue active outreach for travel demand management in coordination with Hampton Roads Transportation Planning Organization and TRAFFIX to promote flexible work schedules, off-site work arrangements, and telecommuting. Pursue Zoning Ordinance revisions to require bike racks in more developments throughout the County.

T 1.2.5 - Implement strategies that encourages walking, bicycling, and use of public transit in place of automobile trips.

T 1.2.6 - Facilitate the efficient flow of vehicles and minimize delay through the use of means such as advanced traffic management technology.

T. 1.2.7 - Prepare guiding principles for roads identified in the Comprehensive Plan as needing future improvements. Use these guiding principles during consideration of any plans of development or concurrent with any road improvement project.

T 1.2.8 - Identify ways to improve access management by reducing driveways and turning movements on the adjacent roadway(s) during consideration of plans of development or concurrent with any road improvement project.

T 1.3 - Identify road segments with anticipated moderate to severe road capacity deficiencies and develop a plan to mitigate congestion that may include one or more of the following actions:

T 1.3.1 - Seek funding to add the subject road segments to the Six Year Improvement Program and consider using public-private partnerships among other mechanisms to fund proposed improvements.

T 1.3.2 - Avoid the development of high automobile traffic generating uses in or near the subject road segments, as allowed by the Code of Virginia.

T 1.3.3 - Develop a distributed grid of routes to provide better traffic distribution in developed areas.

T 1.3.4 - Maximize current road capacity by adding turn lanes or travel lanes, where appropriate, in a context sensitive manner.

T 1.3.5 - Design and implement transit, pedestrian, and/or cycling alternatives along the corridor containing the subject road segments, including multi-use paths and paved shoulders.

T 1.3.6 - Develop a Master Transportation Plan that prioritizes future road projects.

T 1.3.7 - Study alternative land uses along congested road segments that will reduce future traffic, with the possibility of redesignating parcels on the future land use map, transferring density or purchasing development rights.

T 1.4 - Create a local ranking system for prioritization of road and bike/pedestrian improvement projects using citizen priorities, with emphasis on directing a majority of capacity investments to areas within the Primary Service Area (PSA), while still providing for the maintenance and safety of the facilities for the entire transportation network.

T 1.5 - Coordinate with the Virginia Department of Transportation (VDOT), adjoining jurisdictions, and prospective developers to implement the most contextually appropriate multimodal improvements for the roadway system.

T 1.6 - Examine safety and configuration improvements compatible with future high speed train service for all at-grade rail crossings in the County.

T 1.7 - Coordinate the County resiliency plan with VDOT to ensure the County road system is resilient to future sea-level rise and recurring tidal and non-tidal flooding by conducting an analysis of roadways and bridges within areas of future high flood risk.

T 2 - Plan and coordinate transportation improvements at the regional and local levels for all modes of travel to ensure efficient transitions from other jurisdictions without congestion or hazard.

T 2.1 - Continue to participate in the Hampton Roads Transportation Planning Organization (HRTPO), which serves as the transportation planning body for the region.

T 2.2 - Continue to participate in the efforts of James City County, the City of Williamsburg, York County, and the Historic Triangle Bicycle Advisory Committee to coordinate and implement a regional bicycle network, including further joint planning and development of regional funding proposals.

T 2.3 - Recognize the importance of rail service as a viable transportation mode by participating in regional planning efforts to improve and expand rail service for people and goods.

T 2.4 - Continue to research the feasibility and impacts of developing rail and bus rapid transit, which would link employers, residents, and tourists.

T 2.5 - Coordinate with Williamsburg Area Transit Authority (WATA) and/or Hampton Roads Transit Authority (HRT) during review of development applications to ensure that proposals are conducive to incorporating the use of transit.

T 2.6 - Pursue funding opportunities for the Birthplace of America Trail (BoAT) and continue joint planning of the trail throughout the region.

T 2.7 - Consider developing more detailed area plans of select Urban Development Areas (UDAs) in advance of private development proposals to ensure that key land use and transportation integration principles are incorporated, and that private development is leveraged to accomplish wider countywide goals consistent with the Comprehensive Plan. In order to accomplish these area plans, consider applying for technical assistance grants if the state issues additional grant opportunities in the future.

T 3 - Continue to develop, maintain, and promote alternative transportation facilities to reduce congestion and improve connectivity, accessibility, environmental well-being, health, safety, and sense of place.

T 3.1 - Seek funding for a regularly updated list of proposed pedestrian and cycling projects in the Six Year Improvement Program.

T 3.2 - Actively pursue additional local, state, federal, and private funding to accelerate the construction of all needed modes of transportation facilities.

Goals, Strategies, & Actions

T 3.3 - Promote increased utilization of public transit through the following actions:

T 3.3.1 - Continue to support transportation services throughout the Greater Williamsburg Area to improve the quality of life for all in the surrounding communities.

T 3.3.2 - Pursue greater interconnection between the local and regional transit systems.

T 3.3.3 - Encourage land use development patterns that provide or are accessible to public transit.

T 3.3.4 - Encourage locating transit-dependent land uses in areas currently served by transit or in areas to be served by transit in the near future.

T 3.3.5 - Require new developments to support bus and transit services at or near the center of mixed use areas, high density multi-family housing communities, and large scale commercial development, and amend the Zoning Ordinance to support this requirement.

T 3.4 - Encourage pedestrian circulation by providing safe, well-lit, and clearly marked crosswalks and unobstructed sidewalks. Encourage the use of accessible design and provision of shade benches, attractive landscaping, and scenic vistas along pedestrian routes.

T 3.5 - Work with VDOT to design new or enhanced complete streets that allow for the safe accommodation of automobiles, public transit, pedestrians, cyclists, and other users. Ensure that new roadway improvements by VDOT conform to the Department of Rail and Public Transportation Multimodal Design Guidelines, which have been adopted by VDOT in their current Road Design Manual.

T 3.6 - Continue to identify and implement changes to the transportation system that improve air quality.

T 3.7 - Develop greenways in a manner that supports their use as one element of an integrated transportation system.

T 3.8 - Develop an inventory of existing bike and pedestrian facilities and continue to update as new facilities are added.

T 3.9 - Implement the adopted James City County Pedestrian Accommodations Master Plan and Regional Bicycle Facilities Plan by planning for bikeways and pedestrian facilities in primary and secondary road plans and projects.

T 3.9.1 - Continue to update the Pedestrian Accommodations Master Plan based on citizen input and future studies.

T 3.10 - Explore and develop new transportation opportunities for citizens through agencies such as Williamsburg Area Transit Authority.

T 3.11 - Continue to partner with Williamsburg-James City County Schools in pursuit of a Safe Routes to School program that identifies primary walking and biking routes to schools and prioritizes improvements to make those routes safe for children.

T 3.12 - Continue to partner with VDOT on promoting park and ride facilities in the County and support the 24-hour operation of the Jamestown-Scotland Ferry.

T 4 - Maintain well-landscaped and attractive transportation facilities.

T 4.1 - Guide new developments in designing roadway and parking areas that reduce the visual impact of auto-related infrastructure, especially in Community Character Areas.

T 4.2 - Utilize planning and design standards for road projects and related improvements which will allow innovation, promote an efficient transportation system, increase public safety, improve visual quality, and expand modal choice for transportation in the County. Require implementation of standards for development proposals and encourage VDOT to incorporate these standards. When improving roads designated as Community Character Corridors, Virginia Byways, or roads outside the PSA, encourage VDOT to be sensitive to the context, including viewsheds, historic sites and structures, and landscaped medians.

T 4.3 - Look for opportunities to incorporate landscaping and aesthetic elements in planned improvements at Park and Ride lots.

LAND USE

Introduction

Land use planning attempts to align the related, yet sometimes competing, needs for population, economic development, public facilities, parks and recreation, environment, housing, transportation, and community character into a single coherent vision for future land development in the community. This vision is expressed in the community's land use policies, translated into its land use map, and supported through its Goals, Strategies, and Actions (GSAs). Together these elements make up the land use plan for the community.

The Land Use Chapter Goal, and the Strategies and Actions, are listed at the end of the chapter. After careful review and public input, the Goal language maintains the emphasis on reinforcing and improving the quality of life for citizens, but has been revised to add language about land use approaches within the Primary Service Area (PSA) and outside the PSA. The linkage from Land Use to the goals in the other eight chapters is maintained. The Goal now states: "Achieve a pattern of land use and development that reinforces and improves the quality of life for citizens by encouraging infill, redevelopment, and adaptive re-use within the PSA; limiting development on rural and natural lands outside the PSA; and achieving the other eight goals of this Comprehensive Plan." Many important Land Use Chapter implementation activities have been achieved in the last five years, as detailed in the Spotlight on Implementation section. However, as the information in this chapter explains, further action through the revised and updated Strategies and Actions will be needed.



CHAPTER GOAL

"Achieve a pattern of land use and development that reinforces and improves the quality of life for citizens by encouraging infill, redevelopment, and adaptive re-use within the PSA; limiting development on rural and natural lands outside the PSA; and achieving the other eight goals of this Comprehensive Plan."

Key Planning Influences

Growth Management

The linchpin of James City County's land use planning is growth management. In simple terms, growth management is a set of tools to address the timing, character, and location of development so that growth occurs in an orderly and efficient manner. It answers the questions of where growth should occur, how it should occur, and when it should occur.

Growth management, however, does not seek to stop growth. Localities inevitably evolve over time, and planning for growth is a proactive way of preparing for these anticipated changes. Equally important, the *Code of Virginia*, as well as court decisions throughout the nation and Virginia, provide guidance requiring municipalities to reasonably plan for and accommodate growth. Caps on building or population are not permitted under Virginia law.

In general, growth management tools fall under the following categories:

- Zoning and other regulatory tools;
- Urban containment (growth boundaries, such as the Primary Service Area);
- Facility planning, adequacy, and timing;
- Promotion of infill and redevelopment;
- Open Space Preservation;
- Rural Lands Protection; and
- Regional planning.

Their implementation is often accomplished through a locality's policies, ordinances, and regulations, which are discussed in the sections that follow.

In simple terms, growth management is a set of tools to address the timing, character, and location of development so that growth occurs in an orderly and efficient manner.

Primary Service Area (PSA)

The Primary Service Area policy is James City County's foundational, longstanding growth management tool having been incorporated in the first James City County Comprehensive Plan adopted by the Board of Supervisors in 1975 and all subsequent updates. As a growth management tool, the PSA uses a combined growth area/service area boundary to direct growth to areas where the land is most suitable to support growth and more intensive development and where public facilities and services exist or are planned. The area outside the PSA has a Rural Lands designation on the County's Future Land Use Map and has its own distinct character and primary uses. As a growth area/service area boundary, the PSA accomplishes the following goals:

- Increase public benefit per dollar spent;
- Encourage efficient utilization of public facilities and services (water and sewer, roadways, schools, fire and police stations, libraries, etc.);
- Help ensure such facilities and services are available where and when needed;
- Promote public health and safety through improved emergency response time;
- Minimize well and septic failures within the PSA; and
- Encourage utilization of Rural Lands for economically beneficial agriculture, forestry, and related uses.

The inclusion of the PSA in the Comprehensive Plan text and Future Land Use Map is consistent with state code guidance that a jurisdiction's comprehensive plan should show the long-range recommendations for development of the locality, thereby directing implementation actions through the zoning and subdivision ordinances and other mechanisms, such as the utility policy and the Capital Improvements Program. As the foundational growth management tool, the PSA also relates to and has implications for all chapters of the Comprehensive Plan, as it affects the appropriate levels of growth as well as the provision of services and facilities in different areas of the County.

On the Land Use Map, the PSA defines areas presently provided with public water and sewer and high levels of other public services, as well as areas expected to receive such services over the next 20 years. It is intended that most residential, commercial, and industrial development will occur within the PSA. Boundary changes to the PSA should only be conditioned upon significant changes in development trends and patterns, significant changes in County policy, and projected community needs. The PSA should provide for adequate economic growth and County housing needs at all levels of affordability.

Primary Service Area - Residential Capacity

The Comprehensive Plan has traditionally assessed the estimated residential development capacity of the area inside the PSA to absorb projected growth during the 20-year cycle of the Future Land Use Map. These estimates can help inform considerations of whether it might be appropriate to evaluate the extent of the PSA, or to consider other approaches to accommodate the community's vision of desired growth (e.g., increase recommended densities, etc.), or to manage the amount, type or pace of future residential growth (particularly in Categories 3 and 4 listed in Table LU-1 below) in a different manner than historical trends.

To estimate the capacity for future development located within the current PSA, County planning staff have used historic development data and current land use guidance to calculate the total residential capacity estimates set out in Table LU-1: Residential Units Based on Planning Division Staff Analysis. Staff has utilized the County's Geographic Information System (GIS), CaseTrak system, and JCC PermitLink system to calculate the current totals for the first two categories in Table LU-1. Staff also used these systems to estimate the amounts for Categories 3 and 4 within this table, as well as broad policy assumptions for the Mixed Use and Economic Opportunity designations, such as the percentage of the site dedicated for residential use and dwelling unit yield per acre. As such, the totals in Categories 3 and 4 are estimates, rather than a precise accounting.

To estimate the projected anticipated growth and related absorption rate, staff has typically used the historic average number of residential Certificates of Occupancy (COs) issued per year. The 15-year average for COs yields a rate of 563 per year, while the average over the last three years is approximately 434.

Finally, to estimate how long it may take for the estimated capacity within the PSA to be absorbed, the estimated capacity can be divided by the projected absorption rates, using a range from the three- and 15-year CO rates. Using these assumptions and estimates, the years to estimated absorption in the PSA are shown in Table LU-1.

Table LU-1. Residential Units Based on Planning Division Staff Analysis[1]

Parcel Status	Estimated Development Potential (Dwelling Units)	Estimated Years to Absorption
1. Master Planned Communities and By-Right Subdivisions with Approved Construction Plans	6,787	13-17
2. Other Vacant Platted Lots	598	
Subtotal	7,385	
3. Undeveloped Parcels Designated Low Density or Moderate Density Residential	2,286	18-24
4. Totals Above, Plus Undeveloped Parcels Designated Mixed Use or Economic Opportunity (portion of designated areas)*	937	
Grand Total	10,608	

** Not all land designated Economic Opportunity is currently within the PSA, but the 2009 Comprehensive Plan made clear that it would all be brought in once master planned.*

[1] This analysis uses data from the residential subdivision build-out data/cumulative impact database, which is the source for the development status report updates included in the Planning Commission annual reports. However, it contains additional classification work for Categories 1 and 2, and as discussed in the text, application of assumptions to "acreage parcels" with certain designations (Categories 3 and 4).

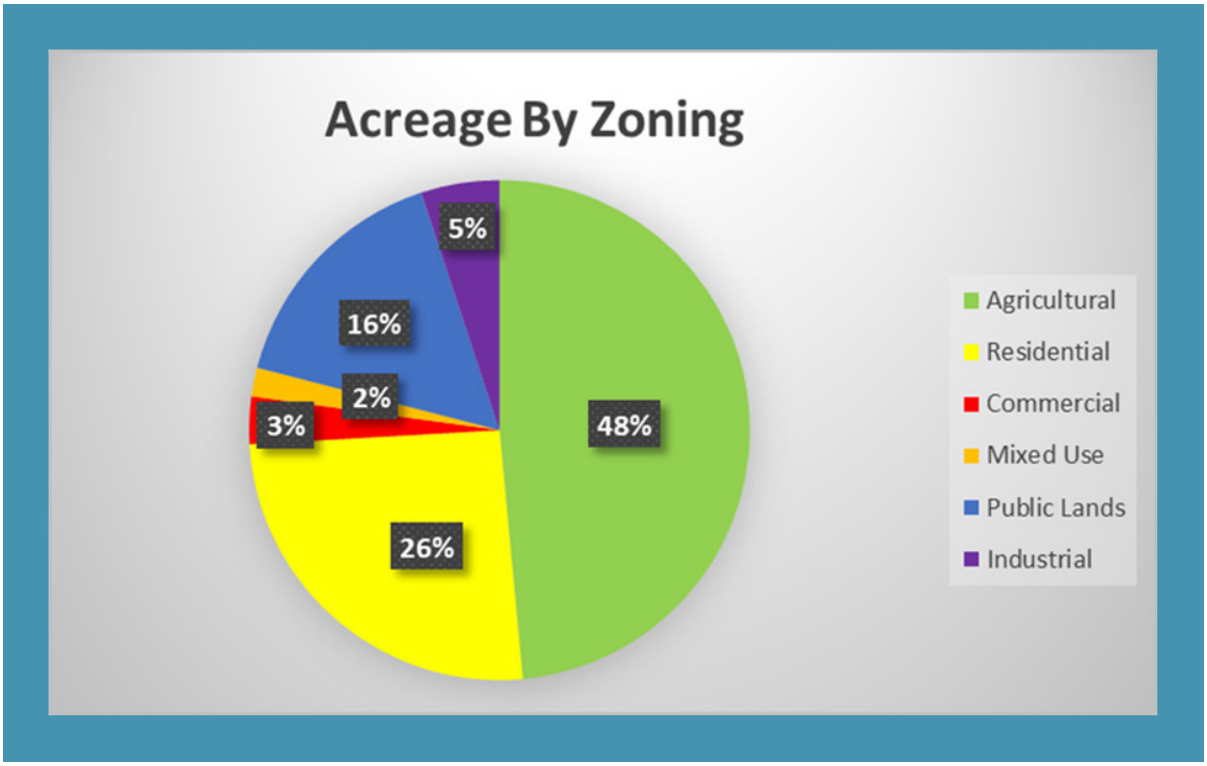
There are several characteristics of Category 1 that provide context regarding the location and type of the potential dwelling units remaining within the PSA. Of the 6,787 units within this category, approximately 80% are located within large master planned communities. Of this 80%, developments that have more than 100 units left in the approved cap are: Colonial Heritage, Ford's Colony, Patriots Colony, New Town, the Settlement at Powhatan Creek, Williamsburg Landing and Stonehouse. These developments are governed by binding master plans, as well as proffers and conditions to mitigate impacts resulting from continued build out. Furthermore, approximately 17% of the units in Category 1 are located within Continuing Care Retirements Communities (CCRCs), such as Williamsburg Landing, Patriot's Colony, and WindsorMeade. These units are intended for a specific, older demographic with unique desires and needs and are not expected to be available to a younger population. As such, development trends within this sector may not correlate with broader market trends for residential development.

It is important to note that the information above pertains to the estimated development potential inside the PSA. Widespread residential uses in the rural areas outside the PSA are discouraged, but can still occur under current regulations, making the development potential of the entire County higher than what is reflected in Table LU-1.

Primary Service Area - Non-Residential Capacity

As can be seen in Figure LU-1 below, the largest zoning category in the County by acreage is Agricultural, which accounts for approximately 48% of land (43,326 acres). The Residential zoning districts account for 26% (22,808 acres) of land in the County, making it the second largest zoning category. The Public Lands zoning district accounts for 16% (14,180 acres). Commercial, Mixed Use, and Industrial zoning districts combined account for 10% (8,904 acres).

Figure LU-1. Acreage by Zoning District



Zoning Districts are classified as follows: Agricultural (A-1, R-8), Residential (R-1, R-2, R-3, R-4, R-5, R-6, PUD-R), Commercial (LB, B-1, PUD-C), Mixed Use (MU), Public Lands (PL), Industrial (M-1, M-2).

In James City County, most commercial and industrial activity occurs in one of six zoning districts: Limited Business (LB), General Business (B-1), Mixed Use (MU), Limited Business/Industrial (M-1), General Industrial (M-2), and Planned Unit Development-Commercial (PUD-C). All of these zoning districts are intended for non-residential development of varying degrees of intensity, and occur inside the PSA. Based on County GIS information as of 2020, approximately 8,904 acres in the County are currently zoned as one of these six districts. Commercial and/or industrial activity can also occur in the Research and Technology (RT) and Economic Opportunity (EO) zoning districts, but there are no parcels currently zoned RT or EO.

In addition, as shown in Table LU-2 below, staff analysis accounted for already-developed land, plus residential portions of Mixed Use areas and other refinements, which resulted in a total estimated undeveloped area of approximately 2,430 acres of land zoned for commercial or industrial. The total land designated for commercial or industrial use on the Future Land Use Map, but not yet zoned is approximately 1,032 acres, for a combined estimated figure of 3,462 acres. Of the land that is designated, but not yet zoned, the largest contiguous area is the Mooretown Road/Hill Pleasant Farm Economic Opportunity area, which was designated in 2009.

Table LU-2. Non-Residential Land Based on Planning Division Staff Analysis

Category	Acres
Zoned, undeveloped	2,317
Zoned, available portion of partially-developed parcels	113
Designated, not yet zoned	1,032
Total	3,462

This zoned and/or designated land contains a mixture of areas where utilities are already in place as well as areas without utilities. For the areas where utilities are not currently in place, utility extensions may increase the absorption rate for the parcels. As a result of the Engage 2045 process, the County will have new modeling tools that will enable the County to more easily track the current amount of non-residential capacity within the PSA.

Another important consideration in analyzing commercial capacity is the efficient use of commercial land through redevelopment, existing structure re-use and increased percent occupancy and infill techniques. Commercial redevelopment is an important goal. Per the input received as part of the Engage 2045 process, residents of the County prefer commercial redevelopment when compared to new commercial development as a way to ensure more compact development and reduce sprawl. Examples of progress on this front in the past decade include new commercial buildings at Candle Factory (CVS and Food Lion), approval of a Special Use Permit (SUP) for the former Williamsburg Outlet Mall property (Lightfoot Marketplace), the construction of the new buildings on the Williamsburg Pottery property, and the development of guidelines for redevelopment in Toano. Opportunities for redevelopment exist throughout the County, from the BASF property and the nearby soil and gravel mining operation in Grove (which operate under SUP conditions designed to ensure future re-use), to the possibility of an eventual change in the development pattern at one or more shopping centers, to additional possible new buildings and infrastructure at the Williamsburg Pottery and in Toano. Together, these and other properties represent hundreds of acres of land that may currently, or in the future, be suitable for redevelopment.

As the County considers future commercial redevelopment, it is paramount that such development maintain or enhance community character. The Engage 2045 community engagement process revealed that citizens are keenly interested in protecting the natural environment, maintaining the integrity of the rural areas outside of the PSA and upholding the established community character within the PSA. The engagement also confirmed the public's support of economic development that results in more businesses with higher paying jobs within the County. These desires create the opportunity for conflict if not managed well, as unplanned commercial growth could detract from community character. As such, commercial redevelopment within the PSA is encouraged, but only when it efficiently redevelops or utilizes land and maintains or enhances the existing community character of the immediate surrounding area through adherence to the Character Design Guidelines and other policies and regulations.

Primary Service Area - Utility Policy

James City County's Utility Policy plays a major role in limiting growth to areas within the PSA. The following outlines the County's pertinent water and sewer requirements, which are explained in more detail in the County's Zoning Ordinance and Subdivision Ordinance, and in the regulations governing utility service provided by the James City Service Authority (JCSA).

Generally speaking, most existing development inside the PSA is connected to public water and sewer, and new development must connect if it is a major residential subdivision or within 55-feet of JCSA infrastructure that is accessible through an applicable and existing right-of-way and/or JCSA water or sanitary sewer easement. Most developments desire to be served by public water and sewer to achieve a higher density and reduce the infrastructure costs. Outside the PSA, subdividers of major subdivisions are required by the Subdivision Ordinance to construct an independent water system, but can use individual onsite sewage disposal systems. Subdividers of minor subdivisions are permitted to use individual well and sewage disposal systems.

An SUP is required for extensions of major water and sewer mains. SUPs for utility extensions within the PSA occur infrequently due to the extensive network of utility lines already in place. The PSA concept strongly discourages extension of utilities outside the PSA. Over past years, there have been certain limited locations that have received SUPs for extension of utilities. Other than two exceptions for neighborhoods (Governors Land on John Tyler Highway and Deer Lake Rural Cluster adjacent to Colonial Heritage), the extensions have been to serve a significant public purpose (school sites), address health and safety situations (Chickahominy Road Community Development Block Grant area, Riverview Plantation, and Greensprings Mobile Home Park), or improve utility service inside the PSA (Cranston's Mill Pond Road and Jolly Pond Road mains, and the JCSA College Creek Pipeline). In keeping with the Utility Policy included as part of the 1997 Comprehensive Plan, all of the SUPs associated with these mains include conditions that place clear limits on connections to directly adjacent properties, a policy that should continue into the future.

Finally, the developer is responsible for paying the cost of providing water and sewer service to and within new subdivisions. JCSA may contribute to the costs to upsize water or sewer lines to serve additional areas. Any decisions about changes to the Utility Policy and the PSA must be carefully examined in conjunction with decisions about Rural Lands policy, which is discussed above.

Facility Planning, Adequacy and Timing

James City County uses other growth management tools to complement the PSA policy, and has implemented a number of strategies to address facility planning, timing, and adequacy. Through utilization of these tools, the County has strived to strike a balance between accommodating additional development and providing services for already-approved development. Examples of policies that may be required of new development include: the provision of pedestrian/bicycle accommodations, adequate public schools facilities analysis, adequate transportation facilities analysis, traffic impact analysis, environmental constraints analysis, fiscal impact analysis, enhanced landscaping, green building incentives, and water conservation guidelines.

New residential development that requires a rezoning or special use permit will be approved only after careful consideration of adequate schools, transportation, water, sewer, recreation, and public safety facilities and services. In the past, the County has strongly encouraged applicants to mitigate the impacts of a proposed development through the combination of physical improvements and timing requirements offered in the form of proffers, as allowed by state code. In terms of adequate facilities, many of the physical improvements are related to keeping traffic at an acceptable level of service (for example, through the construction of new turn lanes or traffic signals), and building recreational facilities as recommended by the Parks and Recreation Master Plan.

Assessing development impacts and creating policies to best address them continues to be an important and very complicated endeavor. Since 2009, the County has made progress in developing the means to track the cumulative impact of development proposals on existing and planned public facilities and services, and in developing guidelines for the content and methodology to be used for various submittal documents, such as traffic studies. Work will continue into the future on refining these systems and documents to best track and mitigate impacts generated by proposals.

Promotion of Infill and Redevelopment

Another key aspect of growth management is promoting infill development and redevelopment. Fostering infill and redevelopment is a viable alternative to the conversion of open space to new development that not only conserves rural and open land but also can save public infrastructure costs that would otherwise be needed to serve more sprawling growth patterns. Infill and redevelopment initiatives are important for residential, commercial, and mixed use developments to help with the creation of complete communities close to existing amenities and activities and to help direct development to appropriate locations within the PSA.

Development of previously undeveloped areas, sometimes called "greenfield" development, often has implicit financial or feasibility advantages for developers over infill development or redevelopment. In order to offset these implicit advantages, the County will need to offer incentives that rebalance the attractiveness of infill and redevelopment for the private sector. Over the years, the County has updated Ordinances and policies to try to encourage infill and redevelopment, including the creation of the R-3, Residential Redevelopment District and a re-examination of the setback requirements in the Mixed Use and other zoning districts. It will be important to continue to re-examine the County's Ordinances going forward to see if they are working to facilitate or incentivize infill and redevelopment. In addition, the County can play a role by participating in public-private partnerships, and making or encouraging targeted investments in infrastructure, amenities or other improvements that work to reduce costs or increase the viability of infill and redevelopment. As this infill and redevelopment is being considered, it is essential that it be sensitive to community character and fit in with surrounding development. These efforts can also be supported by creating plans for particular portions of the County through sub-area or corridor master plans that show specific visions for preferred redevelopment or infill development. These efforts relate to LU 4.

Open Space Preservation

Open space can take many different forms, but in its simplest sense, can be viewed as any undeveloped or minimally developed land. To the casual observer, it may be unknown whether the vacant lot, marsh, or wooded area considered to be open space has public access or is private, is a remnant of development or is a purposeful space, is temporarily or permanently preserved or is entitled to be developed. Nonetheless, the open space may be valued all the same for its scenic quality, enjoyment, or natural resource value. To those involved in land use planning, the concept of open space includes a broad range of possible specialized meanings, values and purposes. Open space may exist for environmental purposes including watershed protection, stormwater management, and carbon sequestration; for economic development purposes including ecotourism and working lands; land banking purposes for future public facilities; for park and recreation purposes in the form of active and passive parks and trails; for transportation purposes including greenways and roadway buffers; for the purpose of maintaining community character values such as historic preservation, cultural heritage landscapes, and scenic viewsheds; or for myriad land use and community design purposes including providing common spaces in neighborhoods, organizing elements in developments, and buffers between varying development patterns. Open space can occur in either the public or private realms, but still provide value to the entire community in terms of ecosystem service delivery, sense of community, and improved human and fiscal health.

James City County citizens' support for open space protection is prevalent in opinions expressed across numerous outreach efforts for the themes of protecting nature, preserving community character, enhancing quality of life, and expanding economic development. As noted in various chapters of this plan, protecting open space includes various types of resource protection efforts such as wetlands and waterways; agricultural and forestal lands; green infrastructure; greenways; historic and archaeological resources; cultural heritage landscapes; scenic properties and scenic viewsheds; entrance corridors and road buffers including Community Character Corridors; open spaces within the County's Community Character Areas, neighborhoods and other built environments; and parks and recreation. Also noted is the role open space can play in shaping the character, direction and timing of community development, especially where the impacts of development will stress County facilities and resources. This is more likely to be a particular need within the PSA where higher development pressures may impact facilities and resources to a greater degree than they would outside the PSA.

Opportunities exist for James City County to facilitate private actions to support the value of open space protection through the development review process; partnerships with land trusts; the development of policies, ordinances and programs that support environmental credit markets; and economic development efforts that promote agri-tourism, heritage and eco-tourism businesses, which relate to actions in LU Strategies 1, 4, and 6. In addition to facilitating private efforts for open space preservation, public actions will be necessary to close the gaps that cannot be effected solely by private actions and conserve resources important to the community. These public actions may range from expanding or initiating special planning efforts, strengthening policies and Ordinances; and reactivating, aligning and funding County open space programs, which relate to actions in LU Strategies 6 and 7. The latter programs should include efforts to acquire open space in an integrated and prioritized manner that maximizes the potential to leverage existing state datasets and state or federal funding sources. As explained in the Environment section, the concept of mapping and planning for a countywide system of "green infrastructure" can offer an organizing structure to these efforts so that James City County can realize its vision more fully, more efficiently and more strategically.

To help property owners and staff members sort through the major open space preservation options to find a tool that matches the property owner's intentions and the property's attributes, staff has created an open space tool decision tree located in Appendix L.

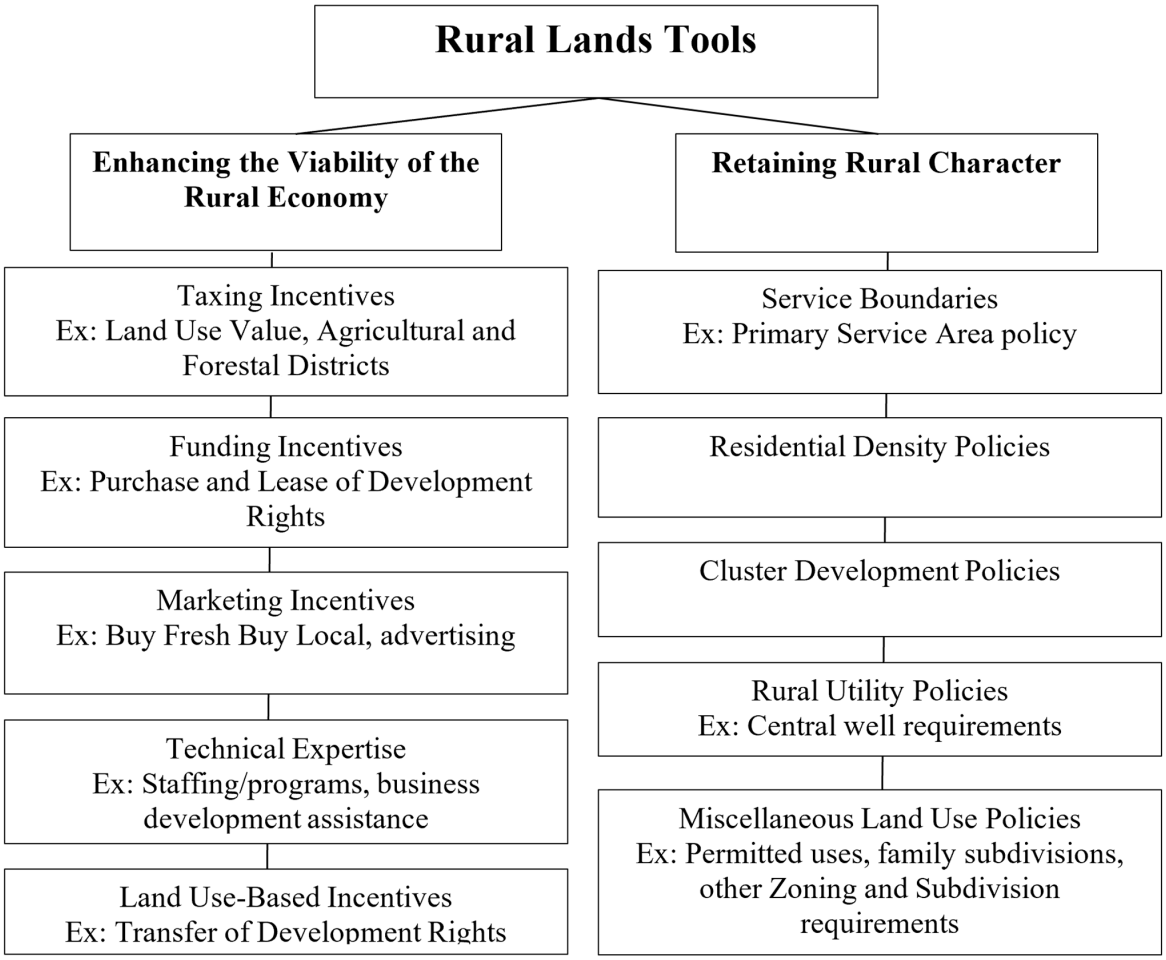
Rural Lands Protection

The areas outside of the PSA are in large part designated as Rural Lands on the Future Land Use Map. While areas with this designation are predominantly known for agricultural and forestal activities, they also contain lands that are vital to the broader environmental health of the County, such as natural areas, extensive Resource Protection Areas (RPAs), aquifer recharge areas, and the headwaters for important watersheds. Land preservation, especially of prime farmland soils, is of utmost importance in this area.

There are a number of tools available to local governments that apply to the protection of the Rural Lands, generally falling into two categories: enhancing the viability of the rural economy and retaining rural character. Figure LU-2 outlines a spectrum of tools and includes information about existing County efforts as well as possible tools that can be used. To be successful, the tools must be tailored to reflect local land use regulations, market forces, community preferences, landowner expectations, property values, and fiscal constraints. It is also important to use tools from both of the categories below to create a balanced approach to the Rural Lands, provide the widest spectrum of opportunities for property owners, and continue to enhance and promote rural character.

James City County citizens' support for open space protection is prevalent in opinions expressed across numerous outreach efforts for the themes of protecting nature, preserving community character, enhancing quality of life, and expanding economic development.

Figure LU-2. Tools for Enhancing the Viability of the Rural Economy and Retaining Rural Character



Existing Rural Lands Tools

As a result of previous comprehensive plans and studies examining the Rural Lands, the County already employs several of the tools referenced in Figure LU-2, including:

1. Land use value taxation;
2. Agricultural and Forestal Districts (AFDs);
3. Greenspace and Purchase of Development Rights (PDR) programs (pending funding);
4. Restrictive utility, zoning, and subdivision requirements and service; and
5. Limited business development assistance.

These programs can offer financial assistance to land owners to offset high land prices in rural areas or provide additional protections for agricultural uses. These existing tools used by the County are important building blocks. However, over the last five years, approximately 284 residential units have been added in the Rural Lands, facilitated in part by the creation of new "by-right" subdivisions and build out of established ones. The market for suburban-rural housing is expected to continue in the future, which could result in the continued "by-right" subdividing and build-out of rural areas within the County. The public road and community water requirements, which had once been major deterrents due to prohibitive costs, have appeared to be less effective in discouraging large-scale rural residential development outside the PSA. While the PSA and the land use designations remain cornerstones of the County's growth management policies, it remains evident that the tools used to effect these policies need to be updated if they are to achieve the stated goals of the Rural Lands designation as discussed in more detail below.

Evaluation of Rural Lands Tools

As discussed previously, there are a number of tools that can be used to help preserve the economy and character in the Rural Lands. The County has conducted preliminary evaluations of some of these tools, both in terms of enhancements to existing tools as well as possible new tools. Using the categories from Figure LU-1 above to organize the discussion, the following provides a brief summary of efforts and investigations that have occurred in the past:

Residential Density Policies, as well as other Categories under the Retaining Rural Character heading

There have been multiple efforts over the years to address development policies in the Rural Lands, particularly residential density policies. In the mid-2000s, citizen committees worked with staff and consultants to research options and best practices. This work led to the development of a draft narrative ordinance with recommendations for amendments to the Zoning Ordinance that would provide incentives for developing large lot and rural cluster subdivisions instead of more conventional small-lot subdivisions. This draft narrative ordinance was not pursued further per new Board direction.

During and following the 2009 Comprehensive Plan update, the County undertook additional research and community engagement efforts. In 2010, as part of the update process, staff worked with a consulting team to research tools used by peer localities in Virginia. In 2013, the County partnered with the Virginia Cooperative Extension to host an educational *Understanding Rural* panel discussion covering state and national trends in rural development best practices and information about farming, forestry, and marketing trends and resources. This partnership also included hosting the *Thinking Rural* discussions with rural landowners and other interested citizens that focused on defining "rural lands" and gathering community thoughts and preferences regarding policies, regulations and programs. Participant comments varied, and on multiple occasions presented opposite perspectives. On the whole, most participants valued the following features and characteristics of rural areas: open/undeveloped areas with low density development, agricultural and forestry productivity and minimal governmental regulations. However, there was wide variation in ideas of what the County could do to help achieve its long-term vision for Rural Lands. No additional work has proceeded on revising the ordinances to influence the residential development potential or pattern of the Rural Lands.

Land Use-Based Incentives, Example: Transfer of Development Rights

A feasibility study for a Transfer of Development Rights (TDR) program was completed by the consulting firm Design, Community and Environment (DC&E) for the County in October 2011. A TDR program essentially allows a developer to purchase development rights (in the form of dwelling units or commercial square footage) from a property in a designated "sending area" and move them to a designated "receiving area" to increase the permitted residential or commercial density. As the assumptions for the feasibility study were being developed, the Board of Supervisors identified the following goals for a potential TDR program in James City County: 1) to preserve rural character; 2) to keep rural landowners "whole" in the event of a downzoning; and 3) to not increase the overall net number of residential units permitted in the County. The study found that a TDR program under the Virginia enabling legislation would be feasible, but was not recommended because of several limitations, including high transfer ratios, an inadequate number and size of receiving areas, inability to hold overall County buildout at a constant level, difficulty with targeting preservation areas with a voluntary program, and difficulties with mitigating the impacts of more intense development in receiving areas.

Marketing Incentives and Technical Expertise

A Strategy for Rural Economic Development was completed in 2014 in conjunction with the Rural Economic Development Committee (REDC) of the Economic Development Authority (EDA) in recognition of the tremendous opportunity to support and grow agriculture- and forestry-based businesses and increase the agricultural sector of the local economy. Enhancing the viability of rural economic uses can also provide alternatives to residential development within the Rural Lands. As shared by Ed McMahon during his presentation titled *Nature, Agriculture, Economy and Community Character*, economic development is strongly linked to the retention of a unique community character, which is a competitive advantage in attracting asset-based businesses and potential employees.

Goals for the Strategy included: assisting existing agriculture- and forestry-based businesses to grow and succeed, identifying and creating opportunities for new business ventures, growing and diversifying the local tax base, and identifying and celebrating the uniqueness of James City County's character. The Strategy includes a list of potential projects in the following three categories: marketing/public relations, business development and facilities/capital projects. The County could play an instrumental role in facilitating projects, establishing groundwork, helping to make connections, and identifying resources for implementation.

Considerations for Implementing Rural Lands Tools

As discussed above, there are many potential land use tools in the "toolkit" for rural protection that could be used, many of which are already being very effectively implemented by the County. However, given the significant public input received in this and prior rounds of Comprehensive Plan updates that the County needs to do more to preserve rural lands, it is important to take a strategic approach and assess which tools and practices are the most effective in meeting this goal of better rural lands protection. As part of the research done for this Comprehensive Plan update, a research paper on "Open Space & Rural Character Preservation Analysis" was developed that summarized some key principles for rural lands protection based on the historically most effective rural land protection programs in other Virginia localities. The four principles listed below stand out as opportunities to add new tools or expand existing ones in James City County.

1. Supportive Zoning

Experience in growing localities like James City County has shown that it is very hard to achieve long-term successful rural protection without supportive agricultural zoning. Rural zoning with minimum lot sizes of 1-10 acres is generally not conducive to the protection of rural character over the long term as it gradually converts the landscape both visually and functionally into a large lot residential character as land is subdivided into lots. In general, the most successful zoning for rural protection has been achieved in the 20-50 acres per dwelling unit range of density, often with sliding scale density program that depend on tract sizes. Minimum lot sizes of at least 20 acres, or cluster development of equivalent gross density, should be considered for implementation as important to both protecting the visual character and maintaining a rurally-focused economic character in the County over the long term.

2. Supportive Utility Policies

Consistent utility policies that do not allow the extension of utilities into rural areas are another feature of localities that have successfully protected their rural lands from extensive development. As part of this, it is important to have a rational basis for utility policies that is consistent with overall growth management policies in the Comprehensive Plan. Currently, the County's independent water systems requirements for major subdivisions in rural lands acts as somewhat of an economic deterrent to large scale conversion of rural lands to residential subdivisions. For major subdivisions with independent water systems, the developer is responsible for constructing the well facility and infrastructure, but this infrastructure is then turned over to JCSA for ownership and maintenance. Operation of these systems currently results in a JCSA fiscal deficit. However, if the independent water system requirements are eliminated, it may be expected that the pace of rural development could increase significantly as the costs of developing large scale three-acre subdivisions in rural areas would be substantially less. If James City County waives the independent water system requirement for Rural Lands, mitigating measures should be proactively put in place in order to avoid the rapid development of the Rural Lands, which would go against the County's long term vision for rural character protection. These measures could include revising lot sizes as discussed in the Supportive Zoning item above or implementing subdivision phasing requirements.

3. Supportive Rural Protection Programs

Rural protection programs also require consistent effort and funding. There are increasing opportunities for leveraging state and federal funding programs and these should be considered to minimize the impacts on local funding sources. In addition, there should be clear and objective standards for selecting properties for these programs, and coordinating with eligibility criteria for state or federal funding programs will allow effective leveraging of other funding sources. See also the Open Space discussion earlier in this chapter.

4. Supportive Rural Economic Development Programs

A consistently funded and robust campaign to foster rural economic development has also been a key feature of successful rural protection in Virginia. A rural economic development staff position could be involved in supporting many different types of compatible rural economic development programs. A position like this could also be a conduit for grant funding, connect property owners and entrepreneurs with supportive programs or available land, and generally be a voice for the protection of a vibrant and economically successful rural culture in a community. This principle complements the discussion of the Strategy for Rural Economic Development in the section above.

The four key principles above relate to the Strategies and Actions found in LU 6 and LU 7 in the Land Use Chapter GSAs. In addition to these items, it will be important to continue to monitor enabling legislation in the state code for other potential tools going forward.

Regional Planning

James City County's growth trends are not the result of activities solely within its borders. The plans of surrounding localities and major institutions influence development within James City County and vice-versa. Therefore, James City County coordinates its planning efforts on a regional level, taking into account the comprehensive plans of other jurisdictions and participating in regional planning opportunities. Many opportunities to plan collaboratively and cooperatively exist in formal groups, such as the Hampton Roads Planning District Commission, while other opportunities are created and taken advantage of daily in normal work activities.

One such example was the coordination effort between James City County, York County, and the City of Williamsburg in the early 2010s. The purpose of this effort was to promote closer collaboration and communication concerning land use, transportation, and other comprehensive plan issues that cross jurisdictional boundaries, and to provide an opportunity for citizens of all three localities to talk about issues of mutual interest. The initial steps for this effort included the preparation of a combined map depicting existing land use across the Historic Triangle and development of a project website and reports on demographics, transportation, and housing. Next, the three localities hosted a series of joint community forums that gave citizens the opportunity to learn about the three comprehensive plans and to share their visions and goals for the future of the Historic Triangle. There was a particular focus on three key geographic areas where jurisdictional boundaries meet (the Riverside/Marquis/Busch focus area, the Lightfoot/Pottery focus area, and the Northeast Triangle and surrounding focus area). Next in the process, the three Planning Commissions held a joint work session to review and discuss the citizen comments of common concern, such as housing affordability, transportation, economic development, and land use compatibility along jurisdictional borders.

Upon the completion of these activities, York County and the City of Williamsburg continued with their comprehensive plan review and update processes with their respective Planning Commissions and governing bodies. The staffs of James City County, York County, and the City of Williamsburg continued to meet on a regular basis to share information about the discussions taking place in their respective jurisdictions. Following adoption of the updated Williamsburg and York County comprehensive plans in January and September 2013, respectively, a summary document was compiled providing regional background information and describing the areas and topics where the localities had similar approaches as well as those areas where the localities' approaches were different. This document is not intended to be included within each of the three localities Comprehensive Plans, but is simply a resource for citizens.

The summary document also included a generalized future land use map that reflects the adopted Future Land Use Map in each locality's comprehensive plans; the map uses a common language and colors so that planners, developers, and citizens can better understand what is planned across borders by each individual locality. The County references this generalized future land use map when performing courtesy reviews for proposed legislative cases within York County and the City of Williamsburg. Overall, the purpose of the summary document is to serve as a foundation for ongoing dialogue and cooperation, which is reflected in this section's GSAs.

Fort Eustis Joint Land Use Study and BASF Site

The most significant example of regional cooperation since the County's previous comprehensive plan update is the Joint Base Langley-Eustis Joint Land Use Study (JLUS). The Joint Base Langley-Eustis (JBLE) is a 7,933-acre facility that is located in both Newport News and James City County and supports a population of 22,000 people, including active duty members, the Army National Guard, Army Reserve, and civilians and family members. JBLE is important to national defense and to the economies of the Commonwealth of Virginia, the Hampton Roads region, and James City County. JBLE is a significantly impactful land use with a unique mission of national defense. As such, the County places a high importance on taking into account how potential development and land use policies in the land adjacent to JBLE might impact or impair its mission.

One such potential development is the BASF site which consists of several contiguous parcels accounting for approximately 678.4 acres, a portion of which directly abuts the JBLE. This site was historically used for chemical manufacturing, though all manufacturing activity on the property ceased in 1994. Since then, the property has been undergoing remediation for contamination, primarily due to zinc. During the previous Comprehensive Plan update in 2015, the County received a request to change the land use designation for the BASF property from General Industry to a Mixed Use designation, which would have been more impactful to the surrounding area. As part of this requested review, the County received correspondence from the Virginia Secretary of Veterans and Defense Affairs, who recommended that no land use designation decision be made until a thorough Joint Land Use Study (JLUS) was conducted. This was due to the potential negative impact that a land use redesignation could have on the Fort Eustis military mission. In light of this recommendation, the proposed land use request was not granted and the site remains designated for General Industry use.

The Joint Base Langley-Eustis JLUS commenced in January 2017. The objective of this study was to identify land uses that are compatible with the mission and use of JBLE, as well as develop growth management guidelines that reduce encroachment on the military site without impairing growth within the surrounding communities.

The County was an active participant in the 15-month collaborative planning process that produced the JLUS. Stakeholders included the U.S. Department of Defense Office of Economic Adjustment, Joint Base Langley-Eustis (Fort Eustis), the City of Newport News, James City County, York County, and community residents and business representatives, including a representative from BASF. The County participated in multiple aspects of this process. Two members of County leadership were members of the Policy Committee for JLUS and steered its overall direction as well as its policy recommendations. Two members of Planning Division staff were members of the Technical Working Group and provided technical expertise on local land use and planning matters relevant to the County. Planning staff also helped facilitate the public involvement process by hosting members of the neighboring communities at community workshops and neighborhood forums within facilities within the County.

The JLUS was published in March of 2018 and adopted by the County's Board of Supervisors in June of that same year. As such, the study is a valuable planning tool that provides a blueprint for the County and the JBLE for further partnership in land use matters. The JLUS recommends that the County and the JBLE establish formal communication procedures to ensure that development proposals and policy changes from either party are communicated clearly and in a timely manner. The JLUS also recommends that the County establish a Military Influence Overlay District (MIOD). The MIOD is a policy tool that would ensure a representative of JBLE would have the opportunity to provide comment and guidance on land use policy decisions and development proposals within the County portion of the JLUS study area. The County intends to continue its partnership with representatives from the JBLE in the future to ensure land use decisions serve County citizens without impeding the mission of the JBLE.

Other Localities

In addition to York County and the City of Williamsburg, the County is directly adjacent to the City of Newport News and New Kent County. The County also neighbors and has important transportation connections with Charles City County and Surry County via the Judith Stewart Dresser Memorial Bridge and the Jamestown-Scotland Ferry, respectively. James City County continues to monitor the comprehensive plans adopted in these localities to keep abreast of regional issues and implications.

Current Development Trends

Residential Trends

James City County has undergone continuous rapid growth since 1970. In the past 50 years, the County's population has more than quadrupled, growing from 17,853 in 1970 to 74,153 as reported in the 2018 American Community Survey. During that time significant changes in land use, particularly within the PSA, have transformed the predominantly rural character of James City County into a more urban and suburban environment. The majority of this development has occurred within the PSA and has largely been concentrated around the City of Williamsburg, though development has also spread to the northern and western areas of the County.

Many of the housing units in the County are located in subdivisions along Richmond Road, John Tyler Highway, Ironbound Road, Greensprings Road, Jamestown Road, Centerville Road, Monticello Avenue, and Longhill Road. Some established neighborhoods, such as Kingsmill, Kingspoint, and First Colony, have reached or are approaching build-out, or their permitted capacities. Other large planned communities such as Colonial Heritage and Stonehouse are expected to contribute new housing from their current inventory of approved units throughout the next several years.

Approximately one-third of the County's existing dwelling units are in large master-planned communities (with 500 or more homes each) and, as of January 2020, approximately 4,821 dwelling units in these communities remain approved but are not yet constructed. More than one-half of this potential output is located in Stonehouse, a master-planned community in the northern end of James City County.

Since the last Comprehensive Plan update in 2015, no new large master-planned communities with more than 500 units have been approved. One existing large master planned community, Stonehouse, was amended in 2019 to remove approximately 1,100 dwelling units from its maximum build-out. In addition, several smaller developments continued their build-out or reached build-out, including the Village at Candle Station, Governors Grove, Walnut Grove, and Powhatan Terrace. The total number of new units approved legislatively since 2015 was approximately 434. There are also several smaller developments that were legislatively approved since 2015 which have yet to commence or make substantial progress toward build-out, such as Forest Heights and Oakland Pointe.

As to geographic distribution, approximately 87% of the County's existing dwelling units are located inside the PSA. Outside of the PSA, the vast majority of remaining dwelling units are located within lands designated as Rural Lands. The heaviest concentrations of these units are located along John Tyler Highway near the Chickahominy River, within the Croaker area, and along Barnes and Richmond Roads. Excluding master-planned communities, the majority of the lots in large rural neighborhoods were subdivided prior to 1990. The 1989 density revision to the A-1, General Agricultural Zoning District and subsequent independent water system requirements initially slowed the trend of rural development considerably. However, in the past two decades, activity in rural areas has increasingly followed broader residential market trends, with demand for new housing units contributing to development pressure on rural areas. As can be seen in Figures LU-2 and LU-3, the total number of units in the County has increased by approximately 5.4% from 2015 to 2019, while the number of units located in land designated for Rural Lands has increased by approximately 7% during that same time, at an average of 57 units annually. The percentage of the County's total dwelling units located in Rural Lands has remained constant during this time at approximately 12%.

Figure LU-3. Total County Dwelling Units

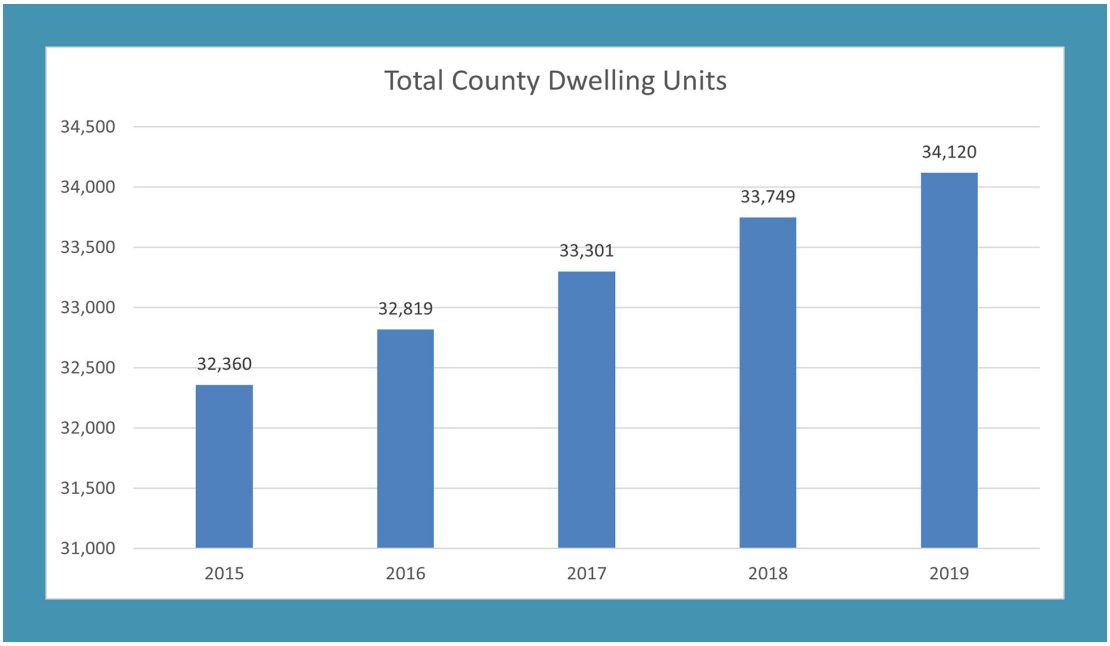
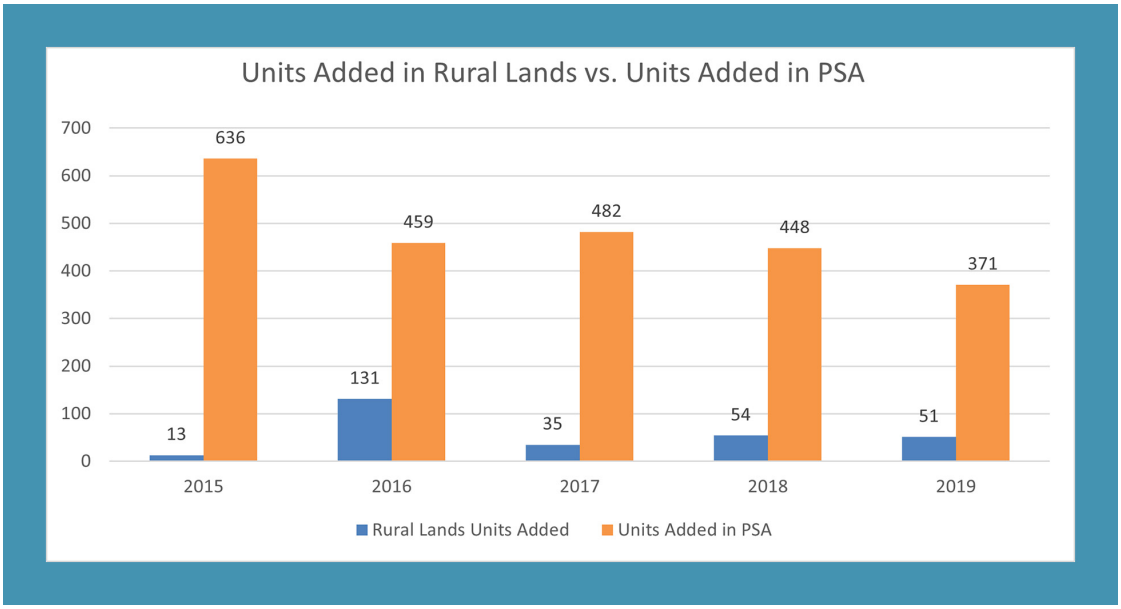


Figure LU-4. Units Added in Rual Lands vs. Units Added in PSA



Commercial and Industrial Trends

Beginning in the 1990s, the County experienced significant diversification in business and industry, a trend that has continued over the past two decades. One of the most prominent developments in James City County since 2000 has been New Town, a mixed use area approved for more than 1,000,000 square feet of commercial space. The primary retail corridor, Main Street, was completed in 2007 and is anchored by New Town Cinemas. New Town also includes the Discovery Office Park, where a substantial amount of the office square footage has been constructed. Since 2010, commercial development in the Settlers Market section of New Town has completed build-out of approximately 400,000 square feet of commercial space, with additional residential units currently under construction in this area as well. Nearby to New Town, complementary commercial development exists within the Courthouse Commons, Courthouse Green, WindsorMeade, Monticello Marketplace, and Monticello Shoppes developments.

The industrial sector also made gains over the last 40 years. Much of the industrial growth occurred in the formerly designated James River Enterprise Zone in the Grove area of the County, both in James River Commerce Park and Green Mount Industrial Park. In the last 10 years, Jacob's Industrial Park (adjacent to Hankins Industrial Park) has been a focus area of activity, adding significant infrastructure and several businesses. The County's industrial base includes three Fortune 500 (or Fortune Global 500) companies: Anheuser-Busch InBev, Ball Metal, and Walmart.

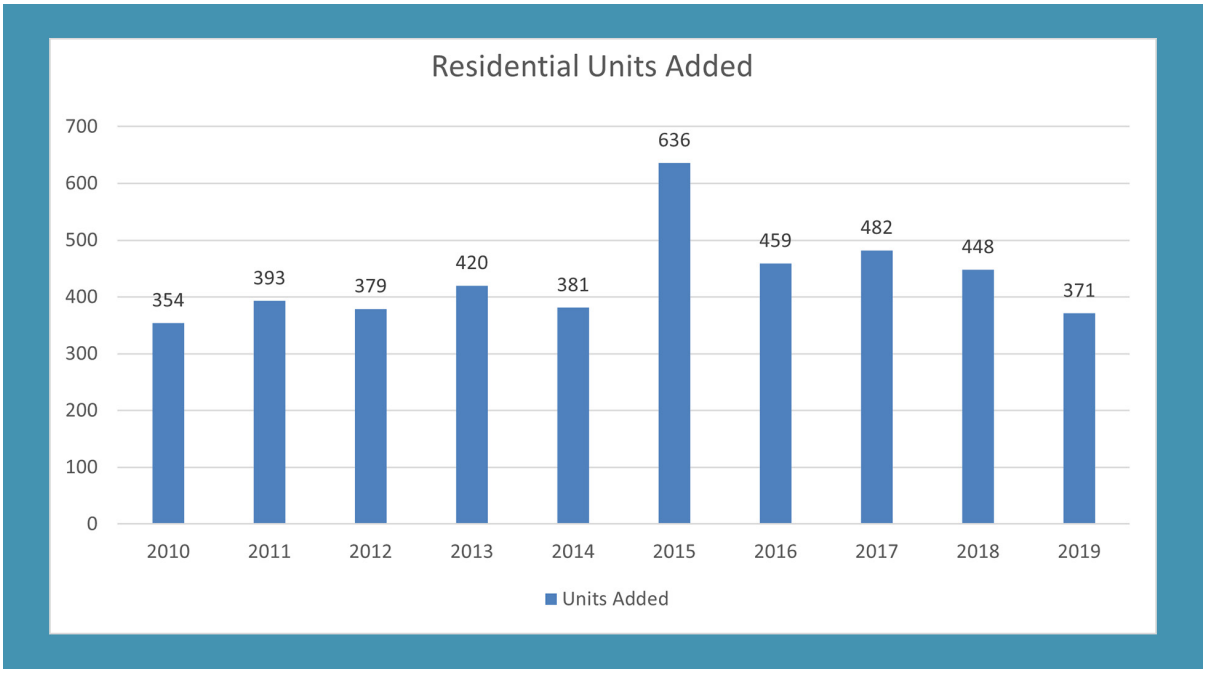
Opportunities for future industrial growth still exist within the County. In 2019, Navien, Inc. Announced its plans to establish a manufacturing and assembly center in an available facility located within the Stonehouse Commerce Park. In addition to Stonehouse Commerce Park, Hankins Industrial Park, James River Commerce Center, and Green Mount Industrial Park have industrial property available for development. In addition to these major industrial parks, land zoned and/or designated for commercial and industrial development or redevelopment is available throughout the County.



General Construction and Service Trends

Certificates of Occupancy (COs), building permits, trends in population, and water and sewer service connections all indicate the rate of growth and assist in the analysis of its total impact on the County. CO issuance confirms that a building is complete and ready for occupancy. Among other uses, CO data is useful in analyzing the number of new homes added to the County's housing stock and determining the amount of population growth. From year to year, both residential building permits and CO numbers tend to be cyclical, echoing fluctuations in the housing market. As can be seen in Figure LU-5, the number of units added in the County over the past decade has risen and fallen with market trends. Between 2010 and 2019, the County added an average of 432 residential units per year, with the average number of units added for 2010-2014 being 385 units per year and the number of units added for 2015-2019 being 480 units per year.

Figure LU-5. Residential Units Added



Another indication of growth and its impact on County services is the growth in public water and sewer. Sewer and water service connections have risen to meet population demands and to respond to health concerns. As can be seen in Figure LU-6 below, the number of water and sewer customers for JCSA has increased steadily on an annual basis over the previous decade, with the water customer base increasing 1.8% annually on average and the sewer customer base increasing 3.0% annually on average. The public water and sewer infrastructure expanded in tandem with this growth in customer base. Per Figure LU-7 below, the total mileage of water facilities increased by 20% and the total mileage of sewer facilities increased by 17%. In comparing the residential annual CO data with the water and sewer customer growth for each year, it is markedly clear that increased residential development positively correlates with increased demand for public water and sewer services.

Figure LU-6. Total Water and Sewer Customers 2010-2019

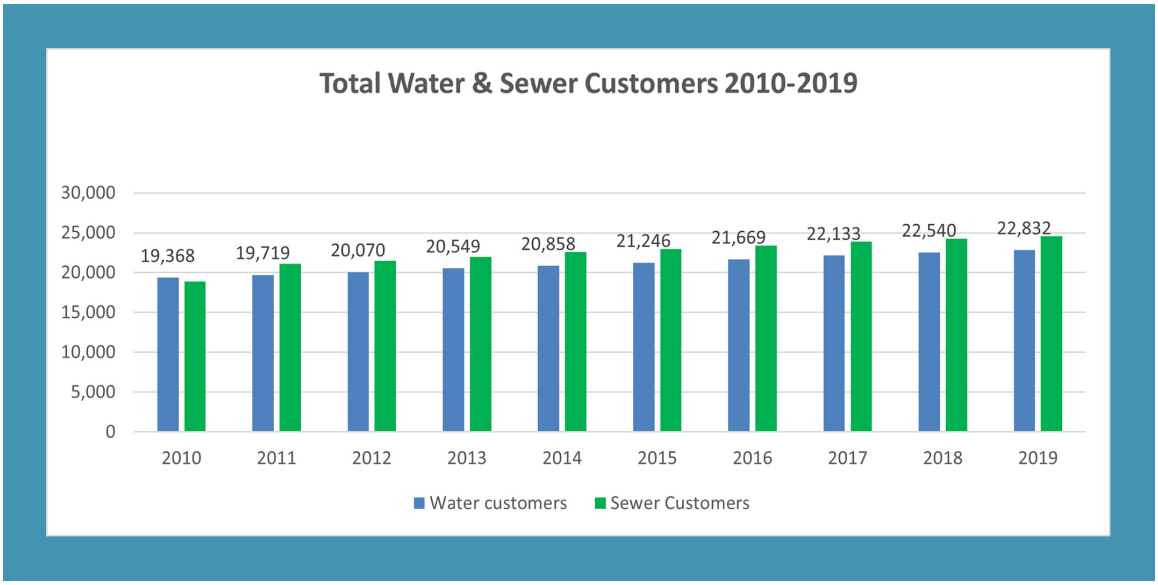
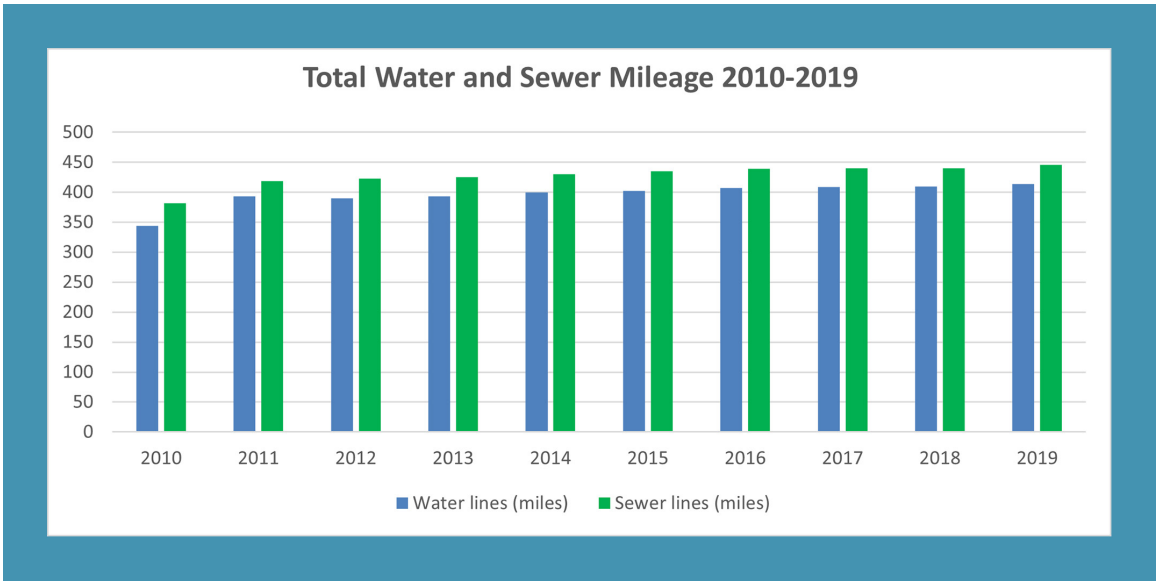


Figure LU-7. Total Water and Sewer Mileage 2010-2019



Agriculture Trends

Agriculture continues to be an important part of a diverse economy and community in James City County. With lands available for both farming and timbering, agriculture not only remains an important area for targeted economic growth in the County, but also serves as a way to uphold the community character. Trends captured by the 2017 Census of Agriculture show that farming in the County did not necessarily mirror statewide trends. The state saw declining numbers of farms with less overall land in farms since 2012, but steady average farm sizes. Since 2002, the number of farms statewide showed a net decrease of approximately 9.2%. Comparatively, County trends showed a decrease in the number of farms since 2012, but with more land in farms overall and a larger average size. Since 2002, the number of farms County-wide showed a net increase of 12.5%. The County consistently uses a higher percentage of farmland as cropland compared to the rest of the state; other uses for farmland can include woodlands or livestock-related uses such as pasturing. (See Table LU-3)

Table LU-3. Summary comparison data from Census of Agriculture 2002-2017

	2017		2012		2007		2002	
	State	County	State	County	State	County	State	County
Total Farms	43,225	72	46,030	83	47,383	74	47,606	64
Land in Farms (acres)	7,797,979	6,630	8,302,444	5,544	8,103,925	5,831	8,624,829	8,962
Avg. Size of Farm (acres)	180	92	180	67	171	79	181	140
Total Cropland (farms)	32,091	46	34,525	57	35,954	47	41,047	60
Total Cropland (acres)	3,084,067	3,591	2,990,561	2,987	3,274,137	2,990	4,194,158	6,342

The greatest number of farms in the County - 26 farms in total - are between 10 and 49 acres. This size range is consistently the most prevalent in the County since 2002, while statewide the most common range is 50 to 179 acres. Census of Agriculture numbers from 2002 to 2017 indicate that there are proportionally more small farms (farms of less than 50 acres) in the County than overall in the state.

Table LU-4 below shows the total size of farms by year since 2002:

Table LU-4. County and state farm size comparison from Census of Agriculture 2002-2017

	2017				2012				2007				2002			
	State		County		State		County		State		County		State		County	
Farms by Size	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
1 to 9 acres	4,595	11%	17	24%	3,343	7%	17	20%	3,530	7%	10	14%	3,027	6%	13	20%
10 to 49 acres	13,631	32%	26	36%	14,425	31%	34	41%	15,177	32%	40	54%	14,082	30%	22	34%
50 to 179 acres	14,800	34%	18	25%	16,850	37%	28	34%	17,589	37%	16	22%	18,315	38%	19	30%
180 to 99 acres	6,732	16%	9	13%	7,864	17%	3	4%	7,777	16%	7	9%	8,613	18%	7	11%
500 to 999 acres	2,127	5%	0	0%	2,173	5%	0	0%	1,985	4%	0	0%	2,183	5%	1	2%
1,000 acres or more	1,340	3%	2	3%	1,375	3%	1	1%	1,325	3%	1	1%	1,386	3%	2	3%

Community Design Policies

Large Retail Establishments

Due to their size and prominence within an area, large retail establishments are expected to impact their surrounding environment. Because these uses present both challenges and opportunities, the following policy statement was developed during the 2003 Comprehensive Plan update to guide their location and design: "a large retail establishment is defined as any combination of retail establishments occupying a single building comprising 40,000 square feet or more of floor space. This building may or may not be situated within a larger shopping center."

The bulk, size, and scale of large retail establishments present many land use concerns for James City County, including but not limited to aesthetic and transportation impacts. Large retail establishments can be detrimental to the vision for James City County and can contribute to a loss of the unique sense of place when they result in massive individual structures that do not integrate into the character and fabric of the area. There are also significant problems involved in the recycling or adaptive re-use of a large retail establishment if it is abandoned, particularly if it was constructed as a stand-alone entity. However, there are advantages to these establishments in terms of convenience and impacts on public finance in the form of sales tax benefits and employment opportunities.

Currently, large retail establishments are regulated through the rezoning process and by a separate commercial SUP requirement for any commercial building or group of buildings which exceeds 10,000 square feet of floor area. The rezoning and SUP processes allow the County to control aesthetics, traffic and other physical impacts through proffers and conditions.

In order to ensure the success of a large retail establishment and to minimize the possible negative impacts on the County, particularly the problems of adaptive re-use, these establishments should be developed consistent with the following policies:

- Be designed as an integral and indivisible component of a larger retail and business enterprise (for example, such as Monticello Marketplace).
- Be sited in locations close to major arterial roads with adequate buffering from existing residential areas and careful integration with new residential areas.
- Be combined when possible with smaller retail merchants and smaller commercial structures in a well-designed and coordinated shopping and business center in a manner that visually reduces their bulk, size, and scale.
- Be designed with a unified theme of design, materials, and shared parking, as well as the utilization of facades that are compatible with local community character and avoid uniform, bland, box-like architecture.
- Be consistent with the design standards for commercial uses in the Character Design Guidelines.

Strip Commercial Development

Commercial developments gain exposure by being located next to each other and along major roadways. Incremental "strip" commercial development is a common suburban development pattern. While this may provide the desired exposure to the roadway, narrow bands of development yield an unbalanced image of a community and do not assist in reducing automobile dependency. Even if the developments are attractively designed, strip development does not allow the public to take advantage of the convenience of centralized commercial activity and may in fact deter shoppers from smaller establishments in smaller developments. Over time, this type of development pattern begins to negatively impact the attractiveness of the commercial area by virtue of its inherent traffic congestion and inconsistent character. County policy will continue to focus on the potentially adverse impacts of strip commercial development, but will also attempt to encourage a more complementary pattern of development into localized centers or nodes, especially at concentrated locations such as intersections of major thoroughfares. This policy is reflected in the different scales of development suggested by the Commercial and Mixed Use designations of the Future Land Use Map the general performance zoning principles in the Zoning Ordinance and the design standards for commercial uses in the Character Design Guidelines.

Continuing Care Retirement Communities (CCRCs)

James City County already has a number of developments and facilities to serve the senior segment of the population, from age-restricted communities like Colonial Heritage, to facilities with a range of care levels (known as Continuing Care Retirement Communities, or CCRCs) such as Williamsburg Landing and Patriots Colony. With the percentages of the senior segment of the population expected to increase, the need for housing and care options will likely increase as well. CCRCs are sometimes called life care communities and many have large campuses that include separate housing for those who live independently, assisted living facilities that offer more support, and nursing homes for those needing skilled nursing care. When all levels of care are included within the same grounds, people who are relatively active, as well as those who have serious physical and intellectual disabilities (like Alzheimer's disease, dementia, etc.) will potentially live in close proximity. Residents then move from one housing choice to a progressively more supportive one as their needs change. CCRCs are a permitted or specially permitted use in the R-3, R-4, R-5, PUD (Planned Unit Development), and MU (Mixed Use) Zoning Districts.

While there has been some variation over the decades in evaluating the impact of CCRCs, the consistent recent practice for these purposes has been to calculate a CCRC's density based on the number of independent living units, with the assisted living rooms and/or skilled nursing beds excluded from this calculation. While assisted living rooms and skilled nursing beds do have an impact on the County, they do not represent the same level of impact as a traditional dwelling unit. Assisted living rooms and skilled nursing beds have been considered to be more along the lines of an institutional land use (like a hospital) than a residential land use, and their impacts should be accounted for differently than with a density measurement. It should also be noted that density is just one of many potential measures of impact for a given project. For most CCRCs, the largest public impacts from the assisted living rooms and skilled nursing beds will likely come from traffic (staff members who support these units traveling to and from the site, delivery of goods and services, etc.), emergency services (Fire and EMS response support for these units), and the environmental impacts associated with locating the building(s) to house these units on the CCRC site. In the past, adequately addressing these types of impacts via the proposal's master plan or proffers has been judged to have met the intent of the Comprehensive Plan and it is the intent of the County to continue to address CCRC impacts using this practice.

Short-Term Rentals

The short-term rental of private residential property facilitated through companies such as Airbnb has emerged as an alternative to traditional short-term rentals such as hotels or timeshares. As of 2020, James City County does not have a specific definition for short-term rentals in the Zoning Ordinance, but historically has permitted "tourist homes" and "rental of rooms" within certain districts, either by-right or with a special use permit. In districts where an SUP is required for short-term rentals, conditions are stipulated that are intended to protect the residential nature of the surrounding area and ensure that updated Certificates of Occupancy are issued within a certain time period.

The Zoning Ordinance currently defines "tourist home" as a dwelling where lodging or lodging and meals are provided for compensation for up to five rooms which are open to transients. Historically, the "tourist home" use has applied to traditional bed and breakfast-style businesses, where a proprietor rents out rooms for short-term stays, and provides services such as meals and basic housekeeping. The current ordinance allows up to five rooms to be rented within a tourist home, and the definition has been interpreted to allow the proprietor to live on- or off-site. "Rental of rooms" is not specifically defined in the Zoning Ordinance, but has typically applied to situations where a homeowner rents a specific number of rooms (usually to a maximum of three) on a short-term basis. Unlike tourist homes, "rental of rooms" does not allow the owner/proprietor to live off-site. The long-term rental of a dwelling or room under a traditional lease does not fall under the short-term rental category.

Many, but not all, residential districts require a special use permit for either tourist homes or rental of rooms, which allows for a legislative review process and conditions to be stipulated which protect the character of the surrounding area. Certain commercial districts allow tourist homes by-right, but rental of rooms is not permitted at all. It is important to note that even if a tourist home or rental of rooms is permitted by-right in a particular location through the Zoning Ordinance, business licensure and an updated Certificate of Occupancy to ensure compliance with commercial fire and building codes would still be required.

Due to the unique impacts that can arise from transient residents in short-term rentals, the County should continue to carefully consider the impacts these uses can have on a community's quality of life. The thriving rural character of James City County continues to offer a variety of agri-tourism opportunities, for which short-term rentals may provide a truly unique opportunity and experience; one that provides economic benefits to rural property owners but does not directly compete with more conventional tourism-based opportunities inside the PSA. If located within a residential context, short-term rentals should serve to complement the residential character of the area rather than altering its nature. Therefore, while every location can be considered uniquely, short-term rentals are most appropriately located subject to the following development standards:

- Be located on lands designated Rural Lands, Neighborhood Commercial, Community Commercial, Mixed Use or Economic Opportunity;
- Be located on the edge or corner of an existing platted subdivision, rather than internal to it;
- Be located on a major road; and
- Be operated in a manner such that the property owner will continue to live and reside on the property during the rental.

Timeshares

In James City County, timeshares have traditionally been considered as appropriate uses in residential zoning districts and Comprehensive Plan future land use designations. When assessing impacts, it is important for projects to provide information on the maximum possible occupancy of units (given features such as lockout units). In the past, lockout features (typically, a unit which has the capability of being divided to create two separate but complete sections) have not been counted toward density, but should be taken into account, if appropriate, in assessing impacts. Timeshare development should be developed consistent with the following policies:

- It should not directly or adversely impact either existing or planned development.
- It should not be developed as a primary use within any non-residentially designated area.
- In Mixed Use areas, timeshares should be a secondary use and should not be located in areas generally reserved for commercial or industrial use.
- It should follow the design standards for residential uses in the Character Design Guidelines.

Community Guidance

Public Engagement

Public input for the Land Use Chapter was received at key points of the Engage 2045 process. All of the public engagement themes identified during this Comprehensive Plan update are related to this chapter. These public engagement themes are the protection of community character, protection of the natural environment, fostering affordable and workforce housing, growing the local economy, and enhancing quality of life. The 2019 Citizen Survey was conducted in the spring of 2019 and the results were reported in the summer. Overall, respondents to the 2019 Citizen Survey revealed a strong desire for the County to continue managing growth in a manner that upholds community character, protects rural lands and allows for enhancement of the community's overall quality of life.

The County hosted the Engage 2045 Summit on the Future in the fall of 2019 to engage with citizens to determine their priorities and preferences for the future. The responses from the Summit continued the themes from the Citizen Survey, revealing the community's strong desire for the County to protect and preserve rural character and the natural environment and specifying that growth should be located within the PSA and not in the Rural Lands.

This vision was more fully explored through the second round of community engagement, which occurred in the fall of 2020. The second round of public engagement included questionnaires on the Goal statements for each chapter, and feedback on alternative options for future growth and preservation. The results of the Goals Questionnaire for the Land Use chapter's goal showed that slightly more than 70% of respondents did not want to change the goal. Of those preferring change, there was an emphasis on the need to maintain the character of the community by discouraging new development and promoting infill and redevelopment of properties. The results from the questionnaire on alternative futures are expressed in the Scenario Planning key principles listed below.

The third round of community engagement was held in the winter of 2021. This round solicited input on policy directions the County should pursue, actions it should take, and design guidelines it should apply to enable citizens' vision for the future of the community to be realized. The recommended policy directions and actions included new development restrictions and public land acquisition to limit development impacts on natural lands, with a strong emphasis on protecting water resources. Regarding development style, there was more support for styles of development that reduce development intensity supported through the expression of values for natural beauty, agricultural conservation, privacy, walkability, historical architecture, and community. Participants generally desired lower-density development, natural surroundings, and colonial inspired architecture. They indicated a preference for commercial areas separate from parking lots where shoppers can walk, with integrated greenspaces and tree cover, as well as a preference for craft cluster and craft core types of commercial/industrial spaces. Participants were generally concerned about preserving farmland and open space, and strongly preferred large lots (20+ acres), passive recreation, and wooded screening. There was also consistent support for enhancing quality of life amenities in James City County with a strong emphasis on walking and biking facilities. Respondents supported prioritizing County resources for enhancing quality of life amenities. They also supported prioritizing walking and biking amenities in locations that increase connectivity between neighborhoods and shopping, schools, employment areas, and greenways.

Scenario Planning - Key Policy Guidance

The results of the Scenario testing phase of community engagement yielded several key community preferences that relate to Land Use:

- Create more mixed-use "complete communities" that include connected open spaces and natural areas, increase walkability and connectedness, and provide new housing and work opportunities, while maintaining the natural green character of the County;
- Provide a more compact development pattern within the Primary Services Area (PSA) and reduce new development in rural lands outside the PSA, as well as potential reductions in the PSA;
- Support efforts to reuse or redevelop existing, older developments and undertake development on infill sites to maximize use of existing services, improve quality of older developed areas, and reduce pressure for development on rural and natural lands;
- Protect natural features and rural areas as critical community character assets that help to attract new businesses and workers, serve as active working lands, and are the foundation for agri-tourism and eco-tourism industries;
- Provide more housing options that increase the ability for workers to live locally and for households entering new lifestyle periods, such as first-time homebuyers and empty nesters, to have options that allow them to continue to live in the County; and
- Ensure high-quality design of new developments and redeveloped areas that focuses on maintaining community character, supporting green building best practices, incorporating of natural areas within the built environment, supporting walkability and multimodal access, and leveraging existing public infrastructure.

Spotlight on Implementation

Building a strong community for the future requires land use planning practices that will preserve natural resources, plan for adequate transportation and housing infrastructure, create a sense of place and community, and maintain an economic base that remains vital during a variety of market climates. In order to achieve a pattern of land use and development that reinforces and improves the quality of life for the community, James City County has identified the following strategic issues:

- Having a range of housing opportunities and choices;
- Having a diverse tax base;
- Achieving cooperation among all neighboring localities to ensure compatibility of land uses;
- Having attractive places with a discernible identity;
- Promoting the use of land in a manner harmonious with other land uses and the environment;
- Mixing land uses to promote the efficient use of land;
- Preserving natural resources such as open space, farmland and environmentally sensitive areas;
- Providing varied and adequate transportation opportunities;
- Directing development into designated growth areas and providing services and facilities that meet the needs of all citizens; and
- Encouraging the development of complete communities, multi-modal transportation options, and compact mixed use centers that are walkable and bikeable.

There have been a number of items accomplished since 2009 that originated in whole or in part from the Land Use section and Goals, Strategies, and Actions (GSAs). In terms of GSAs related to the area that is designated Rural Lands, the County conducted a study of the feasibility of starting a Transfer of Development Rights (TDR) program, continued to examine zoning regulations for this area, including holding several discussion sessions, and was awarded an Agricultural and Forestal Industries Development grant to enhance rural economic development activities.

With regard to engaging in planning efforts related to our regional context, the County partnered with federal officials, adjacent localities, residents, and business owners to complete the planning process portion of the Joint Base Langley-Eustis Joint Land Use Study (JLUS). This 15-month process resulted in the adoption of the study by the County's Board of Supervisors.

The Zoning and Subdivision Ordinances were also updated to address actions across multiple strategies. For example, the Zoning Ordinance was updated to permit places of public assembly used primarily as an event facility subject to certain performance standards, which helped fulfill one of the recommendations of the County's rural economic development strategy. Other examples include the Zoning Ordinance being updated to create a new section that lists standards and specifications for street trees in certain residential developments, to add bicycle improvements to many of the required pedestrian accommodation improvements based on the Historic Triangle Bikeways Master Plan, to allow for electric vehicle charging stations as an accessory use to off-street parking, and to revise submittal requirements for legislative cases.

Finally, in terms of GSAs related to the tracking of impacts of development proposals in a comprehensive and cumulative manner, staff has updated its tracking methods and now creates annual updates so future development can be better projected. A land use modeling effort in collaboration with consultants as part of this Comprehensive Plan update will also provide additional resources for staff's tracking and analysis of development.

As the County looks to 2045, the Land Use section, along with the entire Comprehensive Plan, seeks to address the strategies listed above and provide the framework for the policy decisions and Ordinances that will guide the community both today and into the future.

Future Land Use Map Descriptions and Development Standards

The following Future Land Use Map descriptions define the Land Use Map designations and assist in interpreting the intent of the Comprehensive Plan. These descriptions are to be used in conjunction with the Comprehensive Plan's Land Use Development Standards and Future Land Use Map when considering any development proposal affecting areas within the County. On any given parcel, there may be factors or property features highlighted in other Comprehensive Plan sections (e.g., historic or environmental resources) which may also influence the preferred uses, intensities and general development of the property, or determine its suitability for open space preservation.

In some instances, existing developed areas are not shown on the Future Land Use Map because it would be imprudent to encourage further expansions of those uses at this time. There are also areas where a property's zoning is not consistent with its Comprehensive Plan Land Use Designation. The significant instances of this circumstance are described below.

The Future Land Use Map and Comprehensive Plan will be reviewed on a periodic basis to consider changes in development patterns or County policy which may affect the rationale behind particular Future Land Use Map designations. Because the plan is reviewed on a regular basis, the Future Land Use Map and Comprehensive Plan are intended to be relatively rigid guidelines for development over the next five years.

Land Use designations and zoning districts are both important, but each serve a different function. The Land Use designation, in conjunction with County development guidelines, is a guide for a property's desired use in the future. Zoning is a separate regulatory process and layer, and legally determines current development, such as building and structure dimensions, design, placement, and use on the property.

Primary Service Area (PSA)

The PSA defines areas presently provided with public water, sewer and high levels of other public services, as well as areas expected to receive such services over the next 20 years. Promoting efficiency in the delivery of public facilities and services through land use planning and timing development is an important concept. The PSA concept encourages efficient use of public facilities and services, avoids overburdening such facilities and services, helps ensure facilities and services are available where and when needed, increases public benefit per dollar spent, promotes public health and safety through improved emergency response time, and minimizes well and septic failures within the PSA. Most residential, commercial, and industrial development will occur within the PSA. Development outside of the PSA is strongly discouraged.

Public utility sites, easements, and facilities are not shown on the Future Land Use Map; however, it is the intent of the Comprehensive Plan that any development of these sites, easements, and facilities, inside or outside the PSA, be subject to individualized review under § 15.2-2232 of the Code of Virginia.

Relationship between the Comprehensive Plan Future Land Use Map and Zoning Ordinance District Map for Areas with Residential Designations

The first James City County Zoning Ordinance was approved in 1969, following the first adopted Land Use Plan, which was adopted in 1965, but pre-dating the first Comprehensive Plan, which was adopted in 1975. The Comprehensive Plan Future Land Use map was created with recognition and deliberation of adjacent land uses, traffic conditions, zoning, and a variety of other considerations. The following information provides additional guidance on the zoning-Comprehensive Plan Future Land Use Map relationship.

	Future Land Use Map Residential Designations (Low Density Residential and Moderate Density Residential)
R-8 or A-1 Zoning Districts inside the PSA	**1. For residential uses, it may be appropriate to rezone to a residential zoning district.** **2. For commercial uses, certain uses are permitted by-right in these zoning districts, while others may require a Special Use Permit (SUP). In a limited number of instances, to be evaluated on a case-by-case basis, a rezoning to a limited commercial zoning district may be considered. For either SUP or rezoning legislative actions, careful adherence to the Low Density Residential /Moderate Density Residential development standards, which have more specific guidelines for these limited commercial uses/districts, will be extremely important.**
Residential Zoning Districts (R-1, R-2, R-3)	**1. Residential uses and residential zoning districts are in concert with these Future Land Use Designations.** **2. For residentially-zoned properties where a property owner wishes to pursue a commercial use, a limited number of uses are permitted by-right in these zoning districts, while others may require an SUP. In a limited number of instances, to be carefully evaluated on a case-by-case basis, a rezoning to a limited commercial zoning district may be considered. In these instances, for either SUP or rezoning legislative actions, careful adherence to the Low Density Residential/Moderate Density Residential development standards, which have more specific guidelines for these limited commercial uses/districts, will be extremely important.**

	Future Land Use Map Residential Designations (Low Density Residential and Moderate Density Residential)
Commercial/ Industrial Zoning Districts (LB, B-1, M-1, M-2)	**A number of properties in this scenario reflect the historical discrepancy between the property's original zoning and the Comprehensive Plan Future Land Use Map. In these instances, the future land use designation was deliberately put in place to address a variety of considerations. Examples of this are described below, together with the rationale for the existing designation, and information to help guide future development in these areas. Where this discrepancy occurs, a property owner could choose to pursue a rezoning to a residential district to allow for a residential use, which is typically less intense than what would otherwise be allowed. Similar to the circumstances discussed in the previous categories, if a property owner wishes to pursue a commercial use, certain uses are permitted by-right in these zoning districts, while others may require an SUP. For legislative actions, careful adherence to the language pertaining to a particular area below (where applicable) and to the Low Density Residential /Moderate Density Residential development standards, which have more specific guidelines for these limited commercial uses/zoning districts, will be very important.**

Anderson's Corner Area

There are approximately 87 acres outside the area designated Mixed Use in Anderson's Corner that are zoned General Business (B-1) and designated Low Density Residential. The surrounding property is zoned General Agricultural (A-1) and Limited Residential (R-1).

The County recognizes this property's zoning and Comprehensive Plan land use designations are inconsistent; however, for the reasons outlined below, the County believes that no changes in Land Use Map designation are warranted.

- Changing the Future Land Use Map designation to Mixed Use is not recommended. There is a substantial amount of land designated Mixed Use in and around the Barhamsville Road and the Croaker Road interchanges. There is also a substantial amount of land designated for General Industry just to the south of Anderson's Corner.
- Changing the Future Land Use Map designation to make it consistent with the underlying zoning could lead to other adjacent property owners wishing to re-designate their parcels from Low Density Residential to a more intense land use classification. Further development beyond what could occur based on existing zoning could result in significant increases in traffic volumes on both Route 30 and Richmond Road (Route 60).
- Because these B-1 parcels are adjacent to existing single family homes and property designated Low Density Residential on the Comprehensive Plan, they are not an appropriate location for intense business/ commercial uses. By keeping the Low Density Residential designation in this area, the County is better able to mitigate the impacts of businesses that locate in this area through the SUP process. It is the policy of the County to mitigate these impacts during the development review process.

The County would evaluate development proposals in this area based on how well they measure against the following criteria:

- Protecting adjacent residential areas.
- Limiting curb cuts and minimize negative traffic impacts on the area.
- Discouraging "strip" development and promote a coordinated and comprehensive development plan for the entire area.
- Giving preference to office and limited industrial uses.
- Encouraging pedestrian travel.

Strawberry Plains Road and Route 199 Area

This property is located on the west side of Strawberry Plains Road north of John Tyler Highway (Route 5). The northern portion of this area is zoned Limited Business (LB) and the southern portion is zoned B-1. The northern half of this area has a Moderate Density Residential designation while the balance of the area is designated Low Density Residential. Most of the property designated Moderate Density is already developed with small commercial uses associated with the Midlands townhouse complex. A portion of the property zoned B-1 is owned by the County and has been utilized for Route 199 right-of-way and buffers, and the rest has been developed as the Strawberry Plains Center commercial area.

The County believes that no change in Comprehensive Plan designation is warranted. Given this area's proximity to nearby residential development, including the Strawberry Plains subdivision in the City of Williamsburg, it is ill-suited for further intense business and commercial development. For the B-1 property, the County discourages development or redevelopment of this property in a strip commercial fashion.

Greensprings Road and John Tyler Highway (Route 5)

Several properties located at the southwestern corner of John Tyler Highway (Route 5) and Greensprings Road are zoned LB and designated Low Density Residential. These parcels front on both Greensprings Road and John Tyler Highway (Route 5). They are adjacent to Low Density Residential properties (built subdivisions). Historic Green Spring is located directly across the street. The western parcel has been developed as an office complex. Because of their location, the development of these parcels could have a significant impact on the entry point to Green Spring Road and Historic Green Spring and consequently their historic and natural character.

The County believes that no change in the Future Land Use Map designation is warranted. Development of these parcels should continue to be very low traffic generators that protect the adjacent residential communities and the historic and aesthetic character of Greensprings Road and John Tyler Highway (Route 5). By keeping the Low Density Residential designation in this area, the County is better able to mitigate the impacts of businesses that locate in this area through the SUP process.

Jamestown Road - Sandy Bay/Ironbound Road Area

There are a number of properties in this area that are zoned LB and designated Low Density Residential. Jamestown Road is projected to be approaching or over capacity in the future Widening would have a significant negative impact on the character of the road. Given the traffic concerns and the fact that this area is predominantly residential in character, the Low Density Residential designation is appropriate for this area and should remain unchanged. The most appropriate uses are either residential or the very limited accessory commercial uses referenced in the Low Density Residential designation. The Low Density Residential designation affords more opportunity to guide future uses.

Land Use Designation Descriptions and Development Standards

The information and charts below summarize the preferred development standards for the following future land use designations:

- Economic Opportunity
- Community Character Conservation, Open Space or Recreation
- Williamsburg-Jamestown Airport
- Federal, State or County Land
- Rural Lands
- Low Density Residential
- Moderate Density Residential
- Neighborhood Commercial
- Community Commercial
- Limited Industry
- General Industry
- Mixed Use

The designation descriptions and development standards for these future land use designations describe preferred uses, intensities and general development characteristics for each designation. In addition, the Character Design Guidelines should also be consulted as they describe the preferred design guidelines for different land uses.

Economic Opportunity

Lands designated as Economic Opportunity are intended primarily for economic development, increased non-residential tax base, and the creation of jobs. The lands should be at strategic locations in the County relative to transportation, utilities infrastructure, and adjacent uses, and the lands should only be developed consistent with comprehensive area/corridor master plans.

The principal uses and development form should maximize the economic development potential of the area and encourage development types that have certain attributes, principally that they have a positive fiscal contribution, provide quality jobs, enhance community values, are environmentally friendly and support local economic stability. Master planning is at the core of this designation, and no development should occur unless incorporated into area/corridor master planning efforts which should address environmentally sensitive areas, available infrastructure (roads, water, sewer, transit, etc.), community character and context, public facilities and adjacent land uses to include lands in adjacent jurisdictions. The intent of this designation is to include parcels with this designation in the PSA (where not already included) pending the outcome of the master planning efforts.

These area/corridor master planning efforts should phase development to be in step with, and provide for, adequate amounts or capacities of roads, water, sewer, transit, bicycle and pedestrian facilities, fire stations, police and general government services, parks and recreation facilities, schools, and other facilities and service needs generated by the development. The master plan for the area should also demonstrate appropriate variation in uses, densities/intensities, pattern, and design such that new development is compatible with the existing character of surrounding areas. If an individual landowner in lands designated Economic Opportunity does not wish to participate in the master planning effort, such land shall be recognized and adequate buffers provided in the master plan to protect the current use of that land.

Development should be designed to encourage trips by alternative transportation modes and should be concentrated on portions of the site to avoid sensitive environmental features and respect view-sheds from historic and Community Character areas and corridors.

Economic Opportunity - Mooretown Road/Hill Pleasant Farm Area

For the Mooretown Road/Hill Pleasant Farm Area, the primary suggested uses include industrial, light industrial, and office uses. Primary uses shall follow the recommendations for the general Economic Opportunity designation as described above. Development should refer to the commercial/industrial and residential development standards. Retail commercial uses should be limited in amount and type to support the primary uses. Mixed-cost housing, with a strong emphasis on affordable/workforce needs, may be permitted on up to 15% of developable land area. Housing shall only occur with (a) an area/corridor master plan to balance regional residential distribution, and (b) assurance that the residential units must be built concurrently or after the office/ industrial component. High density residential may be permitted as a secondary use only with commitments to improved transit system infrastructure and programs (light rail, commuter rail, expanded bus transit, etc.); should transit not occur, high density residential uses are strongly discouraged. In addition, any residential density should be highest closest to transit access points, and should decrease as distance increases from those points. A portion of this area is included within the Norge Community Character Area. Additional information can be found in the Norge description in the Community Character section. New development in the northern portion should be of a design, scale and intensity that is complementary to the development standards for the Croaker mixed use area.

Economic Opportunity - Barhamsville Interchange Area

For the I-64 Exit 227 Interchange Area, the primary suggested uses include industrial, light industrial, office, medical/research, and/or tourist attraction uses. Primary uses shall follow the recommendations for the general Economic Opportunity designation described above. Development should refer to the commercial/industrial development standards. Retail commercial uses should be limited in amount and type to support the primary uses. As expressed in the general Economic Opportunity language, the master plan for this area should demonstrate appropriate variation in uses, densities/intensities, pattern and design such that new development is compatible with the existing character of surrounding areas. In particular for this site, buffers, open space, or other similar mechanisms should be used along the southern and western property lines in order to provide a transition to areas designated Rural Lands and Park, Public and Semi-Public Open Space. These parcels constitute a gateway into the County along I-64 and Route 30 which should be reflected in the development's architectural design, landscaping and buffering.

Transportation is a key component of this EO area, with proximity to the interstate interchange as an important driver. The phasing and intensity of future development should safeguard this important element by maintaining adequate levels of service at the interchange and surrounding roadways. The primary access for these EO parcels should be an internal access road that connects to Old Stage Road/Route 30. A secondary access onto Barnes Road could be considered depending on the type of development that is ultimately proposed, as well as a more thorough analysis of the adequacy and safety of Barnes Road to handle traffic both from the north and the south. Any residential uses should be subordinate to and in support of the primary economic development uses and only located on the periphery of the property in areas that are not suitable for economic development uses. In addition, the location and amount of any residential uses should be depicted as an integrated element of the larger master plan for the area, should be limited to the amount or percentage allowed in the Economic Opportunity Zoning District, and should not be developed prior to a significant portion of the primary economic development uses. New development should be of a design, scale and intensity that is complementary to the development standards for the Stonehouse mixed-use area.

Economic Opportunity - Toano/Anderson's Corner Area

For the Toano/Anderson's Corner Area, the recommended uses are industrial, light industrial and office uses. Businesses that take advantage of the unique assets of the property or use agricultural or timber industry inputs are highly encouraged. In order to support Toano as the commercial center of this part of the County, retail commercial is not a recommended use unless accessory to the recommended uses. Any residential uses should be subordinate to and in support of the primary economic development uses. In addition, the location and amount of any residential uses should be depicted as an integrated element of the larger master plan for the area, should be limited to the amount or percentage allowed in the Economic Opportunity Zoning District, and should not be developed prior to a significant portion of the primary economic development uses. As expressed in the general Economic Opportunity language, the master plan for this area should demonstrate appropriate variation in uses, densities/intensities, pattern and design such that new development is compatible with the character of surrounding areas. In particular for this site, buffers, open space, or other similar mechanisms should be used along the southwest and western property lines in order to provide a transition to areas designated Rural Lands, and the site design and architecture should respect the local rural character and nearby historic structures. Maintaining mobility on Route 60 is also a significant consideration, so development should utilize best practices for access management. New development should be of a design, scale and intensity that is complementary to the development standards for the Anderson's Corner mixed-use area.

Community Character Conservation, Open Space or Recreation

The properties that are most appropriate for this designation are those that currently contribute to the rural, historic and scenic character of James City County, whether inside or outside the Primary Service Area, and are used for that purpose. Categories for these properties includes those larger, undeveloped areas within the Primary Service Area (PSA) that are protected by historic or scenic easements, properties of national or local historic significance such as Jamestown Island, Colonial Parkway, Green Springs National Park, Carter's Grove and Mainland Farm, and properties currently used for public recreation such as York River State Park, the Warhill Sports Complex, Chickahominy Riverfront Park and Freedom Park. Other properties that are appropriate for this designation are those that provide buffers to historic sites and environmentally sensitive areas such as reservoirs, natural heritage resources, educational resources, and areas for recreation and enjoyment.

Williamsburg-Jamestown Airport

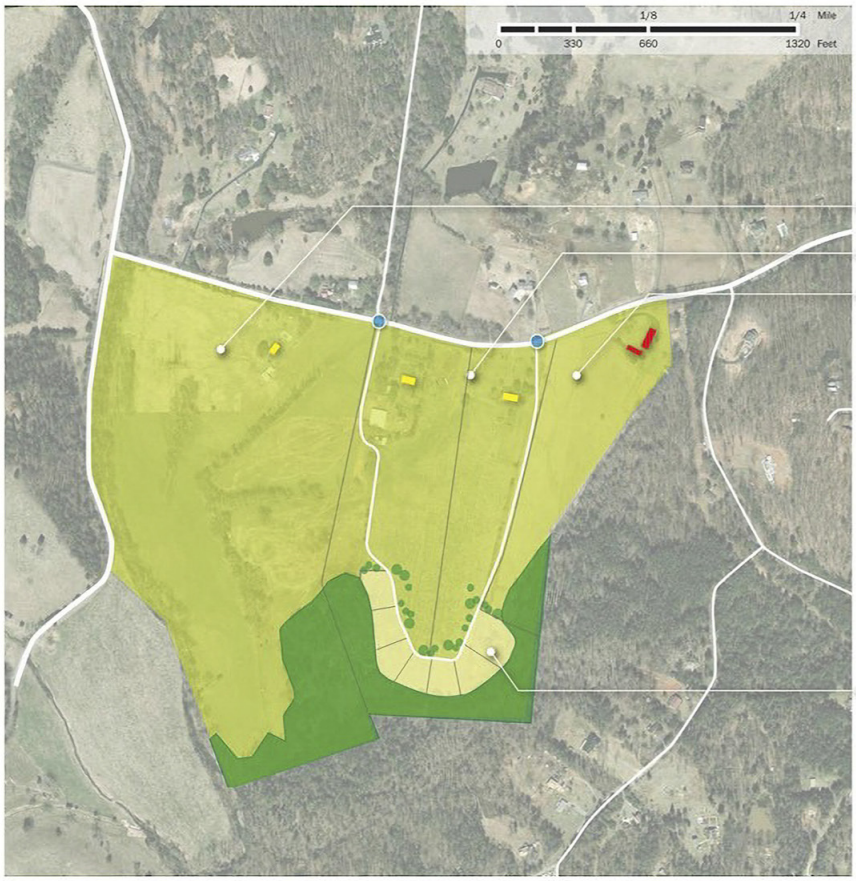
The principal suggested uses for the developable land associated with the airport include aviation, with airport-related commercial and office development as clearly secondary uses. Land which is currently in use as a mulching operation may continue in its current or a similar use, in a limited manner consistent with State and local permits. Changes in the use of this portion of the site to an activity which is similar or less intense than the previous activity may be permitted provided that all local, state, and federal permits are obtained and that the development of these uses is clearly secondary to the existing and future airport operations. Manufacturing, commercial, or industrial activities beyond the scope of what is described above are discouraged and any proposed development is to be considered in light of its impact on neighboring communities and subdivisions. The timing and intensity of development will be conditioned on the sufficient buffering and screening of adjacent property and the maintenance of an acceptable level of service for roads and other public services.

Federal, State, or County Land

Publicly owned lands included in this category are Eastern State Hospital, military installations, County offices and facilities, and larger utility sites such as the Hampton Roads Sanitation District treatment plant. Development in these areas should follow applicable development standards listed in the charts.



Chart 1. Rural Lands Designation Description	
1. Basic Description	Rural Lands are areas containing farms, forests and scattered houses, exclusively outside of the PSA, where a lower level of public service delivery exists or where utilities and urban services do not exist and are not planned for in the future. Rural Lands uses are intended to help protect and enhance the viability of agricultural and forestal resources and compatible rural economic development uses as important components of the local economy.
2. Recommended Uses	Appropriate primary uses include traditional agricultural and forestal activities, but also innovative agriculture, horticulture, silviculture, specialty or niche farming, commercial and non-commercial equine opportunities, agri-tourism, rural-based public or commercial recreation, rural-support businesses and certain public or semi- public and institutional uses that require a spacious site and are compatible with the natural and rural surroundings. Retail and other commercial uses serving Rural Lands are encouraged to be located at planned commercial locations on major thoroughfares inside the PSA. However, appropriately-scaled and located direct agricultural or forestal-support uses (including agri-business and eco-tourism), home-based occupations, or certain uses which require very low intensity settings relative to the site in which it will be located may be considered on the basis of a case-by-case review, provided such uses are compatible with the natural and rural character of the area and are in accordance with the Rural Lands Development Standards. These uses should be located in a manner that minimizes effects on agricultural and forestal activities, and where public services and facilities, especially roads, can adequately accommodate them.
3. Recommended Density	Residential development is not a recommended use and is discouraged outside the Primary Service Area in the Rural Lands. Residences associated with agricultural and forestal activities may be appropriate, but subdivision of lots should occur at a density of no greater than one residence per 20 acres. A very limited amount of residential development could be permitted in the form of rural clusters, provided significant preservation of the natural resources is achieved, such development does not interrupt rural qualities or character, and the development standards for rural clusters listed below are followed.
Rural Lands Development Standards	
4. Use and Character Compatibility	a. Uses in Rural Lands should reflect and enhance the rural character of the County. Particular attention should be given to the following: i. Locating structures and uses outside of sensitive areas; ii. Maintaining existing topography, vegetation, trees, and tree lines to the maximum extent possible, especially along roads and between uses; iii. Discouraging development on farmland, open fields, scenic roadside vistas, and other important agricultural/ forestal soils and resources; iv. Encouraging enhanced landscaping to screen structures located in open fields using a natural appearance or one that resembles traditional hedgerows and windbreaks; v. Locating new driveways or service roads so that they follow existing contours and old roadway corridors whenever feasible; vi. Generally limiting the height of structures to an elevation below the height of surrounding mature trees and scaling buildings to be compatible with the character of the existing community; vii. Minimizing the number of street and driveway intersections along the main road by providing common driveways; and viii. Utilizing lighting only where necessary and in a manner that eliminates glare and brightness. b. Encourage the preservation and reuse of existing agricultural structures such as barns, silos, and houses. c. Site more intensive uses in areas where the existing road network can accommodate the additional vehicle trips without the need for significant upgrades or modifications that would impact the character of the rural road network.
5. Rural Clusters	If built, rural clusters should develop with the following guidelines: a. Densities should be no higher than the maximum permitted density in the underlying zoning district. Lot sizes may be reduced as appropriate to maximize the preservation of rural view-sheds and resources as described in the standards below. b. Minimize the impact of residential development by retaining a substantial amount (at least two-thirds) of the site in large, undivided blocks of land for permanent open space, farming, timbering and/or rural economic uses. c. Appropriate goals for open space and lot layout include preservation of farmland, open fields, scenic vistas, woodland, meadows, wildlife habitats, and vegetation; protection of environmentally sensitive land including wetlands, stream corridors, and steep slopes; important historic and archaeological resources, and roadway buffers. d. The goals of the open space and lot layout should be shown on a conceptual plan, and the design should support these goals. For instance, if preservation of agriculture is one of the main goals of the open space, the open space should encompass that land which is most suitable for farming (topography, soils). Blocks of land large enough to support a farm should be set aside in the open space. In addition, potential conflicts between the uses should be minimized by designing buffers between the farmland and the residential development. Similar design considerations would be expected to support other open space goals as well. e. The open space should be placed in a conservation easement or the equivalent to ensure that the land will remain undeveloped. f. The visibility of the development from the main road should be minimized. It is recommended that lots be placed along an access road rather than along the main route so that the view from the main route still appears rural in nature.



Rural Lands

SAMPLE DEVELOPMENT CONCEPT

This illustration represents one potential way that the policies in the Land Use chapter for this land use could be interpreted. Alternate concepts that follow these policies may also be acceptable. This development concept is only for illustrative purposes and design guidelines, policies and ordinance requirements are a factor, particularly with respect to detailed requirements such as landscaping

Large farm remains in agricultural / forestal use

Medium sized parcel divided into two large lots managed as small farms

Small farm managed as rural economic enterprise with agritourism and winery use





Small rural cluster sited away from roads and screened by trees to preserve rural viewsheds

Legend

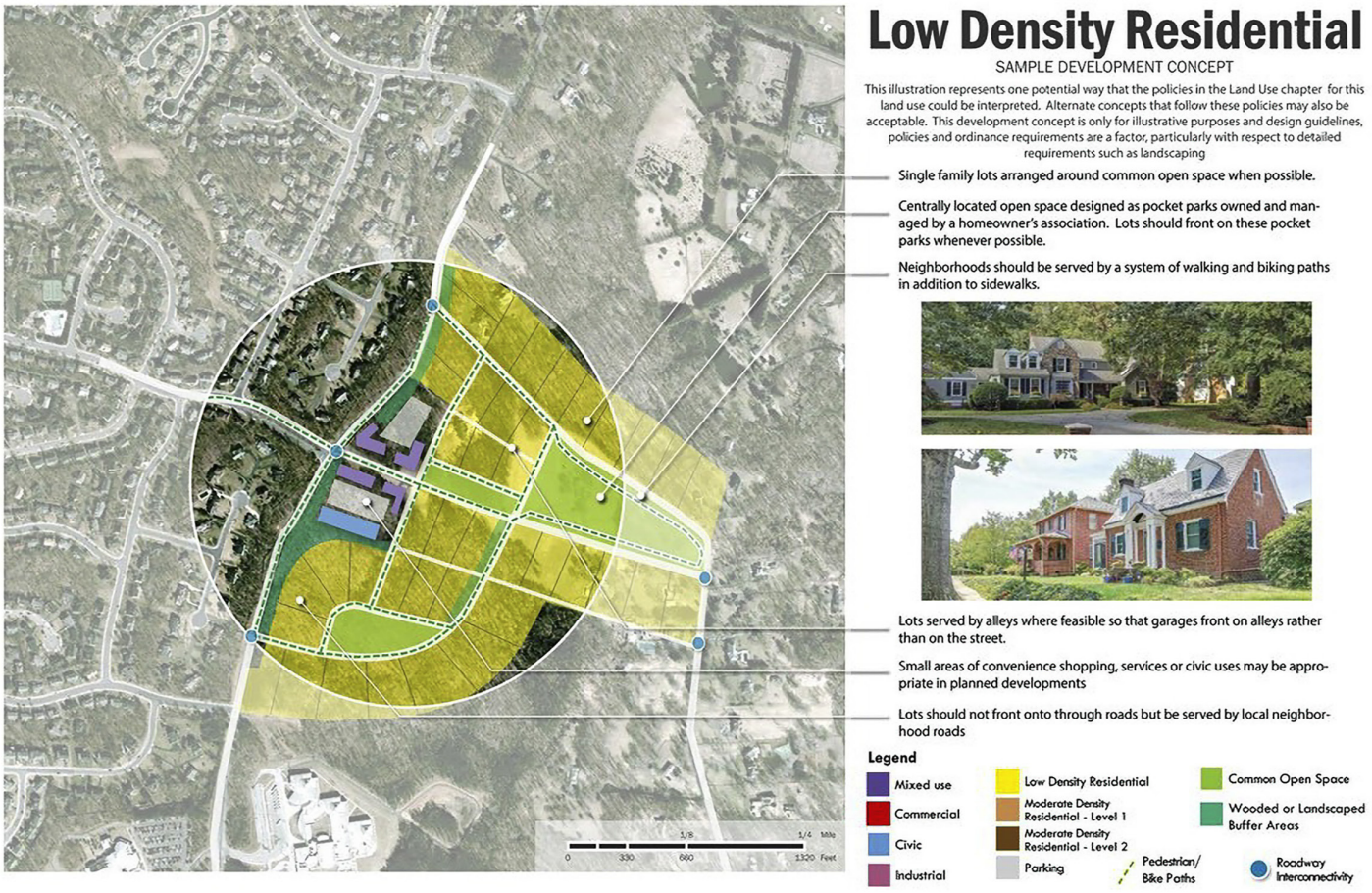
- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Pedestrian/ Bike Paths
- Roadway Interconnectivity



Chart 2. Residential Designation Descriptions			
	Low Density Residential	Moderate Density Residential	
		Level 1	Level 2
1. Basic Description	• Located in the PSA where public services and utilities exist or are expected to be expanded to serve the sites over the next 20 years. • Have natural characteristics such as terrain and soils suitable for residential development.	• Located in the PSA where public services and utilities are available. • Optimally located near the intersections of collector or arterial streets. • Have natural characteristics such as terrain and soils suitable for compact residential redevelopment. • May serve as transitional uses, primarily to general commercial, Neighborhood Commercial, or Mixed Use areas.	• Have the attributes of Level 1, plus: • Optimally located on high capacity roadways, and near the intersections of collector or arterial streets. • May be part of a larger mixed use community as part of higher density uses at the core. • Should be located close to shopping and service uses with good multimodal connections to employment and recreation opportunities.
2. Recommended Density	• Gross density up to one dwelling unit per acre, depending on the character and density of surrounding development, physical attributes of the property, buffers, the number of dwelling units proposed, and the degree to which the development is consistent with the Comprehensive Plan. • Gross density from one unit per acre up to four units per acre, if particular public benefits are provided. Examples of such public benefits include mixed-cost housing, affordable and workforce housing, enhanced environmental protection, or development that adheres to the principles of open space design.	Minimum gross density of four units per acre up to 8 units per acre, depending on the character and density of surrounding development, physical attributes of the property, buffers, and the degree to which the development is consistent with the Comprehensive Plan. Development at the highest density is not recommended unless it offers particular public benefits. Examples of such public benefits include mixed- cost housing, affordable and workforce housing, and enhanced environmental protection.	Minimum gross density of 8 units per acre up to 16 units per acre, depending on the character and density of surrounding development, physical attributes of the property, buffers, the number of dwelling units proposed, and the degree to which the development is consistent with the Comprehensive Plan. Development at the highest density is not recommended unless it offers particular public benefits. Examples of such public benefits include mixed- cost housing, affordable and workforce housing, and enhanced environmental protection.
3. Recommended Uses	Group 1 Single-family and multifamily units, accessory units, cluster or cottage homes on small lots, recreation areas. Group 2 Schools, places of public assembly, very limited commercial, and community-oriented facilities. Group 3 (See also the CCRC and timeshare policies) Timeshares, retirement and care facilities and communities.	Group 1 Multifamily units (single family attached homes, duplexes, townhomes), lower density apartments, recreation areas, manufactured home parks and subdivisions in accordance with location standards. Group 2 Very limited commercial and community-oriented facilities. Group 3 (See also the CCRC and timeshare policies) Timeshares, retirement and care facilities and communities.	Group 1 Multifamily units (single family attached homes, duplexes, townhomes), apartments, recreation areas, in accordance with location standards. Group 2 Limited commercial and community-oriented facilities. Group 3 (See also the CCRC and timeshare policies) Timeshares, retirement and care facilities and communities.

Residential Development Standards	
4. Use and Character Compatibility	a. Permit new development only where such developments are compatible with the character of adjoining uses and where the impacts of such new developments can be adequately addressed. Particular attention should be given to addressing such impacts as incompatible development intensity and design, building height and scale, land uses, smoke, noise, dust, odor, vibration, light, and traffic. b. Locate residential uses immediately adjacent to non-residential uses, major roads, railroads, airports, agricultural and forestal uses, and other conflicting uses only where the conflicts between such uses can be adequately addressed (noise, vibrations, and others). In some cases these conflicts may be addressed by sufficient screening or buffering, or other adequately protective site and building design features. c. For Moderate Density Residential uses generally, sufficient buffering should be provided so that the higher density development is compatible with nearby development and the natural and wooded character of the County. d. Uses in Groups 2 and 3 above should only be approved in these designations when the following standards are met: i. Maintain the residential character of the area; ii. Have traffic, noise, lighting and other impacts similar to surrounding residential uses; iii. Generally be located on collector or arterial roads at intersections; iv. Act as a transitional use between residential and commercial areas or, if located within a residential community, be integrated with the residential character of the area rather than altering its nature; v. Provide adequate screening and buffering to protect the character of nearby residential areas; and vi. Generally intended to support the residential area in which they are located (for Group 2 uses only). e. For uses that are covered in the Community Design Policies section of this chapter, follow the guidance for that use.
5. Public Services, Utilities, and Adequacy of Infrastructure	a. Timing and density of the development of particular sites will depend upon the availability and adequacy of public services, utilities, and facilities, and the maintenance of an acceptable level of service of roads and other public services. b. The need for public services (police, fire, education, recreation, etc.) and facilities (schools, fire stations, libraries, etc.) generated by a development should be met or mitigated by that development.
6. Open Space, Open Space Design	Use open space design and resource protection measures for new developments by: a. Basing design on a use of land reflecting topographic and other physical features and natural boundaries of the site rather than imposing a layout intended solely to satisfy minimum Ordinance requirements; b. Maintaining open fields, farm lands or contiguous forests suitable for timbering; c. Preserving scenic vistas; d. Protecting wildlife habitats, high-ranking Virginia Department of Conservation and Recreation designated Natural Areas and significant natural heritage resources, and other sensitive areas as open space; e. Retaining natural vegetative buffers around water bodies or wetlands; f. Preserving historic and archaeological resources; g. Ensuring that the common land adjoins protected open space on adjacent parcels; h. Maintaining existing trees and vegetation and preserving the character of the development's natural setting; i. Emphasizing the use of natural screening/buffering (using vegetation, topography, etc.) over artificial or planted screening/buffering; j. Creating usable and functional public gathering places and recreational amenities that become focal points of the development and community; k. Designing effective pedestrian circulation to include trail systems (see also Nos. 8 and 9 below); l. Protecting land designated as conservation areas on development plans by perpetual conservation easement; and m. Protecting designated Community Character Corridors.
7. Enhanced Environmental Protection	Provide enhanced environmental protection by designing the site in accordance with the open space design standards in No. 6, plus items such as: a. Adhering to the County's adopted watershed master plans; b. Preserving soils with the highest potential for infiltration; c. Adhering to green building guidelines, such as LEED (Leadership in Energy and Environmental Design) or equivalent; d. Providing for water conservation measures and/or the use of grey or reclaimed water for irrigation; e. Providing for nutrient management plans; and f. Considering siting for solar orientation.

8. Transportation and Mobility	Minimize the impact of development proposals on overall mobility and traffic safety, especially on major roads by: a. Limiting access points and providing internal, on-site collector and local roads, side street access, and joint entrances, and prohibiting direct access to arterial and collector streets from individual single-family detached units and duplex units except in the case of a master planned community; b. Providing new public collector and arterial roads in master planned communities; c. Enhancing the efficiency of the entire street network by providing for vehicular connections to adjacent properties and developments; d. Providing for safe, convenient, and inviting bicycle, pedestrian, and greenway connections to adjacent properties and developments in accordance with the adopted Pedestrian Accommodations Master Plan and Regional Bikeway Map, with a special focus on providing adequate access between residential and nonresidential activity centers and among residential neighborhoods; e. Encouraging use of "complete streets" which integrate sidewalks and bikeways into the design of streets, and provide adequate associated facilities such as bike racks, such that these activities are given equal priority to motor vehicle activity; f. Providing for ultimate future road, bicycle, and pedestrian improvement needs and new road locations through the reservation of adequate right-of-way, and by designing and constructing roads, drainage improvements, and utilities in a manner that accommodates future road, bicycle, and pedestrian improvements; g. Explore bus and transit service need and provide facilities if appropriate; and h. Encouraging adequate off-street parking areas for multi-family residential developments that minimize conflicting turning movements with on-site and off-site traffic circulation.
9. Sense of Place and Streetscapes	Reference the Character Design Guidelines.
10. Affordable and Workforce Housing	a. Affordable and workforce housing should be provided in accordance with guidance or requirements in the Housing Chapter, Zoning Ordinance, and any other adopted policies or regulations. b. Where provided, affordable and workforce housing should be blended with other units of various types and prices throughout a given development. c. Public benefit in this area is most effectively achieved through provision of units or dedication of land.
11. Underground Utilities	Reference the Character Design Guidelines





Moderate Density Residential - Level 1

SAMPLE DEVELOPMENT CONCEPT

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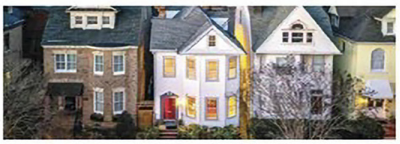
Walking trails to link together residential clusters and create a sense of a unified community

Level 2 Moderate Density Residential located along major intersections to provide mixture of densities





Residential clusters anchored by communal green spaces

Level 1 Moderate Density Residential in the form of townhomes located in small courts or clusters ancored by open space

Small areas of low density residential to provide mixture of densities and housing types

Mixed use with convenience shopping and services within walking distance of homes

Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Pedestrian/ Bike Paths
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity



Moderate Density Residential - Level 2

SAMPLE DEVELOPMENT CONCEPT

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Lower density housing integrated into the communioty to provide a diversity of housing options and a mixed density community

Commercial uses along main highway act as "gateway" to the community

Mixed use buildings to create "main street" character with housing above walkable retail uses





Project designed as a "complete community" with a mixture of uses and housing types organized around a series of communal open spaces and walkable/bikable access to amenities

Ample open space in the community organized as small pocket parks or village greens with buildings fronting on them

Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Pedestrian/ Bike Paths
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity

Chart 3. Commercial/Industrial Designation Descriptions				
	Neighborhood Commercial	**Community Commercial**	**Limited Industry**	**General**
1. Basic Description	• Located in the PSA, serving residents of the surrounding neighborhoods in the immediate area and having only a limited impact on nearby development. • Location criteria for commercial uses are small sites; access to collector or arterial streets, preferably at intersections with local or other collector arterial roads; public water and sewer service; environmental features such as soils and topography suitable for compact development; and adequate buffering by physical features or adjacent uses to protect nearby residential development and preserve the natural and wooded character of the County.	• General business activities located within the PSA and usually having a moderate impact on nearby development are designated Community Commercial. • Location criteria for Community Commercial uses are access to arterial streets, preferably at intersections with collector and arterial streets; moderate to large sized sites; public water and sewer service; environmental features such as soils and topography suitable for compact development; and adequate buffering by physical features or adjacent uses to protect nearby residential development.	• Designated sites within the PSA for warehousing, office, service industries, light manufacturing plants, and public facilities that have moderate impacts on the surrounding area. • Limited Industry ordinarily requires access to arterial roads or major collector streets, public water and sewer, nearby police and fire protection, small to moderate sized sites, environmental features such as soils and topography suitable for intense development, and adequate buffers for nearby residential development.	• Areas located within the PSA that are suitable for industrial uses which, because of their potential for creating dust, noise, odor, and other adverse environmental effects, require buffering from adjoining uses, particularly residential uses. • General Industry uses usually require access to interstate and arterial highways, public water and sewer, adequate supply of electric power and other energy sources, access to a sufficient labor supply, and moderate to large sized sites with natural features such as soils, topography, and buffering suitable for intense development.
2. Recommended Intensity	Recommended FAR range: No minimum-0.2 See Character Design Guidelines for massing information and other guidance.	Recommended FAR range: 0.2-0.4 Lower FARs are acceptable if the site includes open space for future expansion or buffering purposes. See Character Design Guidelines for massing information and other guidance.	Recommended FAR range: 0.2-No limit Lower FARs are acceptable if the site includes open space for future expansion or buffering purposes.	Recommended FAR range: 0.2-No limit Lower FARs are acceptable if the site includes open space for future expansion or buffering purposes.

3. Recommended Uses	**Neighborhood scale commercial, professional and office uses such as individual medical offices, branch banks, small service establishments, day care centers, places of public assembly, convenience stores with limited hours of operation, small restaurants, and smaller public facilities. Examples of uses which are considered unacceptable include fast-food restaurants, 24-hour convenience stores, and gas stations.**	**Community-scale commercial, professional and office uses such as branch banks, places of public assembly, convenience stores, day care centers, general retail stores, grocery stores, indoor recreation facilities, medical offices, office parks, public facilities, service establishments, shopping centers, restaurants, and theaters.**	**See basic description for primary uses.** **Secondary uses in Limited Industry areas may include office uses and a limited amount of commercial development generally intended to support the needs of employees and other persons associated with an industrial development.**	**Primary uses include uses that maximize the industrial opportunities of an area. Typical uses can be found in the M-2, General Industrial, section of the Zoning Ordinance.** **Secondary uses in General Industry areas may include office uses and a limited amount of commercial development generally intended to support the needs of employees and other persons associated with an industrial development.**

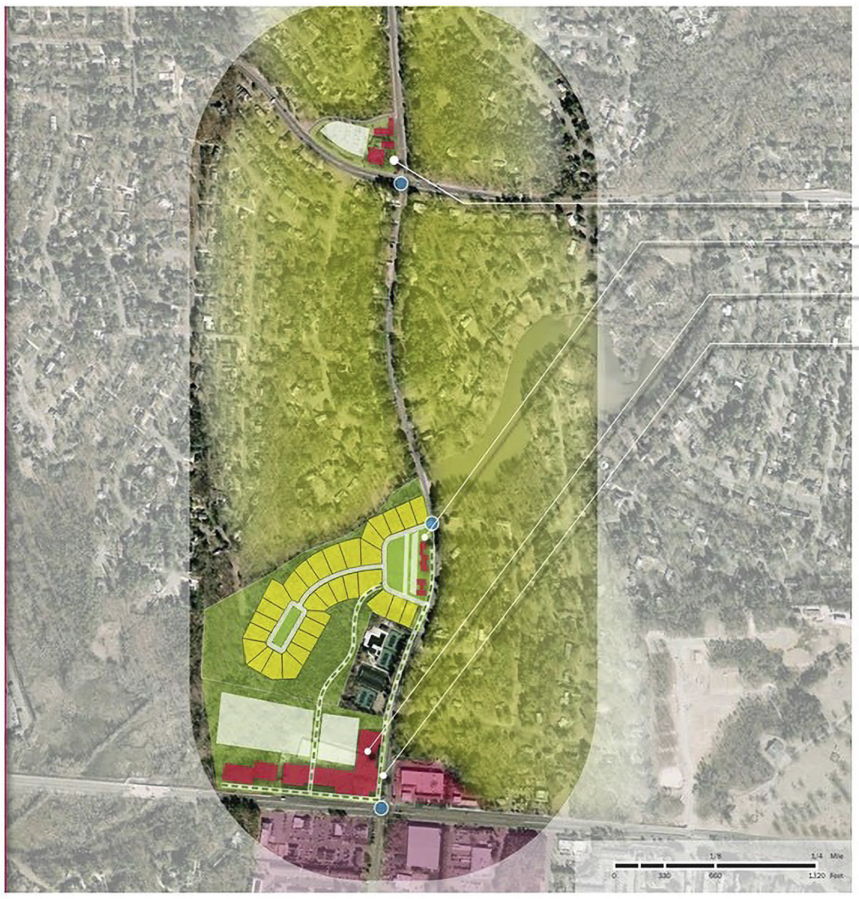
Commercial/Industrial Development Standards	
4. Compatibility	**a. Locate proposed commercial and industrial developments adjacent to compatible uses (public or other similar uses, etc.). Where a commercial or industrial development is proposed at a location near a sensitive area, the site should be designed so that transitional uses such as offices and/or buffers are located between conflicting uses. Emphasis should be placed on ensuring the provision of open space; protection of the environment, historical and archaeological resources; and adjoining land uses; sufficient capacities of public facilities and services; quality and effectiveness of pedestrian circulation systems and facilities; and ability to meet the public needs of the development.** **b. Commercial uses, and particularly Neighborhood Commercial areas, will have a limited impact on adjacent residential areas especially in terms of visible parking areas, lighting, signage, traffic, odor, noise, and hours of operation.** **c. Acceptable Neighborhood Commercial uses should be compatible with surrounding or planned residential development in terms of scale, bulk, size, building design, materials, and color, and should provide safe and convenient multimodal access to nearby residential neighborhoods and adjacent sites.** **d. For uses that are covered in the Community Design Policies section of this chapter, follow the guidance for that use.** **e. For Limited Industry areas, dust, noise, odor, and other adverse environmental effects are primary considerations for determining whether land uses are acceptable in these areas.** **f. Each Community Commercial area should be clearly separated from other Community Commercial areas to retain the small town and rural character of the County, provide a sense of place, and promote transportation mobility.** **g. Be consistent with the Character Design Guidelines.**
5. Public Services, Utilities, and Adequacy of Infrastructure	**a. Permit the location of new uses only where public services, utilities, and facilities are adequate to support such uses. The need for public services (police, fire, education, recreation, etc.) and facilities generated by a development should be met or mitigated by that development.** **b. While a variety of market forces influence commercial and industrial development proposals, the maintenance of an acceptable level of service of roads and other public services and the availability and capacity of public utilities should be primary considerations.**
6. Environmental Protection	**a. Protect environmentally sensitive resources including high-ranking Natural Areas and significant natural heritage resources, watersheds, historic and archaeological resources, designated CCCs and CCAs, and other sensitive resources by locating conflicting uses away from such resources and utilizing design features, including building and site design, buffers, and screening to adequately protect the resource.** **b. Protect land designated as conservation areas on development plans by perpetual conservation easement.**

7. Transportation	**a. Minimize the impact of development proposals on overall mobility, especially on major roads, by limiting access points and providing internal, on-site collector and local roads, side street access, and joint entrances. When developing large master planned communities, provide new public collector and arterial roads that will mitigate traffic impacts on existing public collector and arterial roads. Provide for safe, convenient, and inviting bicycle, pedestrian, and greenway connections to adjacent properties and developments and activity centers. Vehicular connections to adjacent properties and developments should also be provided wherever possible in order to maximize the efficiency of the entire street network. Integrate multimodal facilities into the design of streets so that multimodal movement is safe, comfortable, and convenient. Multimodal activity should be given an equal priority to motor vehicle activity.** **b. Industrial and commercial areas should be planned and located to avoid traffic through residential and agricultural areas except in special circumstances where residential and nonresidential areas are both part of an overall master plan and special measures are taken to ensure that the residential or agricultural uses are adequately protected.** **c. Provide for ultimate future road, bicycle, and pedestrian improvement needs and new road locations through the reservation of adequate right-of-way and by designing and constructing roads, drainage improvements, and utilities in a manner that accommodates future road, bicycle, and pedestrian improvements. Explore bus and transit service need and provide facilities if appropriate.**
8. Streetscapes	**Reference the Character Design Guidelines.**

Specific Commercial Areas

The following Commercial areas and their recommended priorities of land uses can be found in James City County:

Jamestown / Sandy Bay Road Area	**Several parcels located at or near the intersection of Jamestown Road and Sandy Bay Road were re-designated from Low Density Residential to Neighborhood Commercial during the 1997 Comprehensive Plan update. This land use designation sought to recognize existing uses, zoning, and the future development of adjacent parcels while limiting negative impacts on the traffic capacity of Jamestown Road. Additional commercial development beyond the boundaries of the proposed Neighborhood Commercial designation would further impede traffic flow along this road.** **The principal suggested uses for the Jamestown Road Neighborhood Commercial area are very limited commercial uses. Future development is to be of a type and nature that is consistent with the Neighborhood Commercial designation. In addition, future development will consist only of low traffic generating uses due to the limited road capacity on Jamestown Road; the extent of parking will be minimal; uses will provide service to local, nearby neighborhoods, as opposed to the wider community; the site will develop as a pedestrian-oriented environment with a design compatible with nearby residential areas; a master development plan for the full area is encouraged; and driveways will be limited. There is to be full adherence to the County's Community Character Corridor policy along the entire frontage of all properties along Jamestown Road.**
Premium Outlets Area	**The area in and around Premium Outlets was re-designated from Low Density Residential to Community Commercial during the 1997 Comprehensive Plan update.** **Re-designation of this area is in recognition of deliberate decisions of the Board of Supervisors to zone the area as commercial and of subsequent commercial development of the property. The Community Commercial designation of this area is not intended in any way to promote or accommodate an extension of a strip commercial development beyond its boundaries.**



Neighborhood Commercial

SAMPLE DEVELOPMENT CONCEPT

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- Small local shops or services located along collector streets serving a local neighborhood
- Cluster of professional office uses integrated with a new residential neighborhood with communal open space
- Neighborhood center with retail or office uses along arterial or collector roads designed to be compatible with surrounding context
- Community trails and sidewalks allow pedestrian and bicycle connections to nearby homes





Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Pedestrian/ Bike Paths
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity

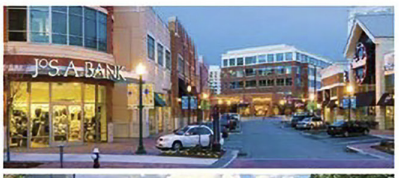


Community Commercial

SAMPLE DEVELOPMENT CONCEPT

This illustration represents one potential way that the policies in the Land Use chapter for this land use could be interpreted. Alternate concepts that follow these policies may also be acceptable. This development concept is only for illustrative purposes and design guidelines, policies and ordinance requirements are a factor, particularly with respect to detailed requirements such as landscaping

- Larger scale commercial and retail uses facing major roadways and intersections with screened parking
- Smaller scale office or retail uses facing roadways to create a "main street" character on walkable boulevards
- Civic uses integrated to create a community focal point
- Central community open spaces connected to each block through a system of sidewalks and trails
- A mixture of housing types and densities integrated with commercial buildings to make a mixed use "complete community"





Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
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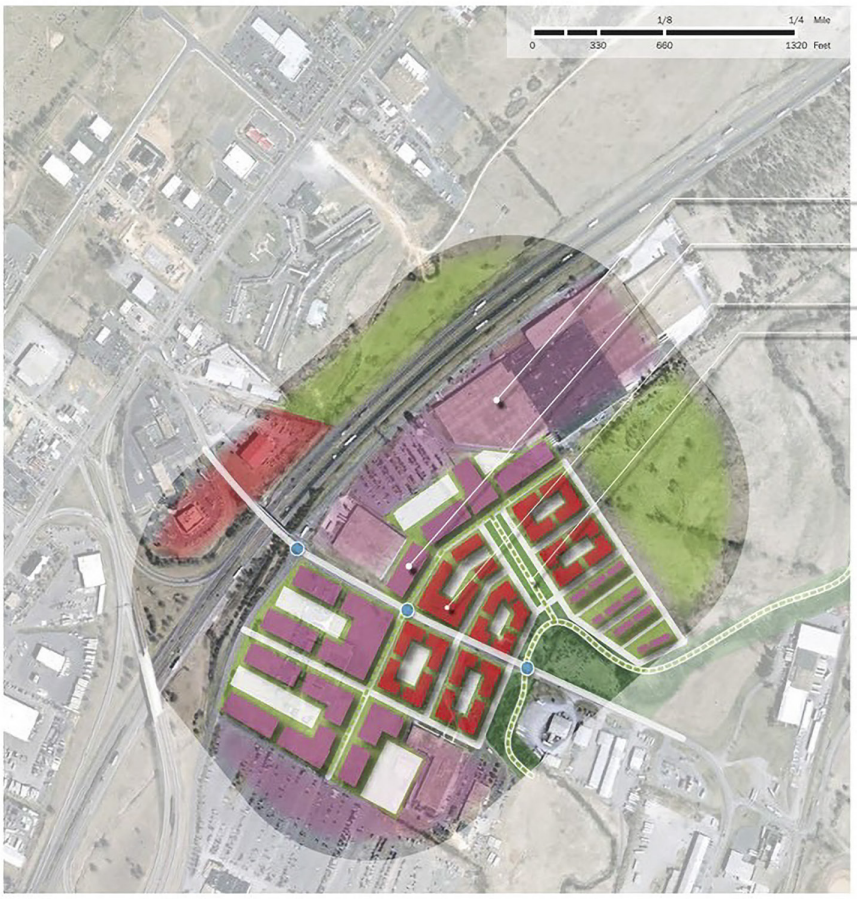
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity



Limited Industry

SAMPLE DEVELOPMENT CONCEPT

This illustration represents one potential way that the policies in the Land Use chapter for this land use could be interpreted. Alternate concepts that follow these policies may also be acceptable. This development concept is only for illustrative purposes and design guidelines, policies and ordinance requirements are a factor, particularly with respect to detailed requirements such as landscaping

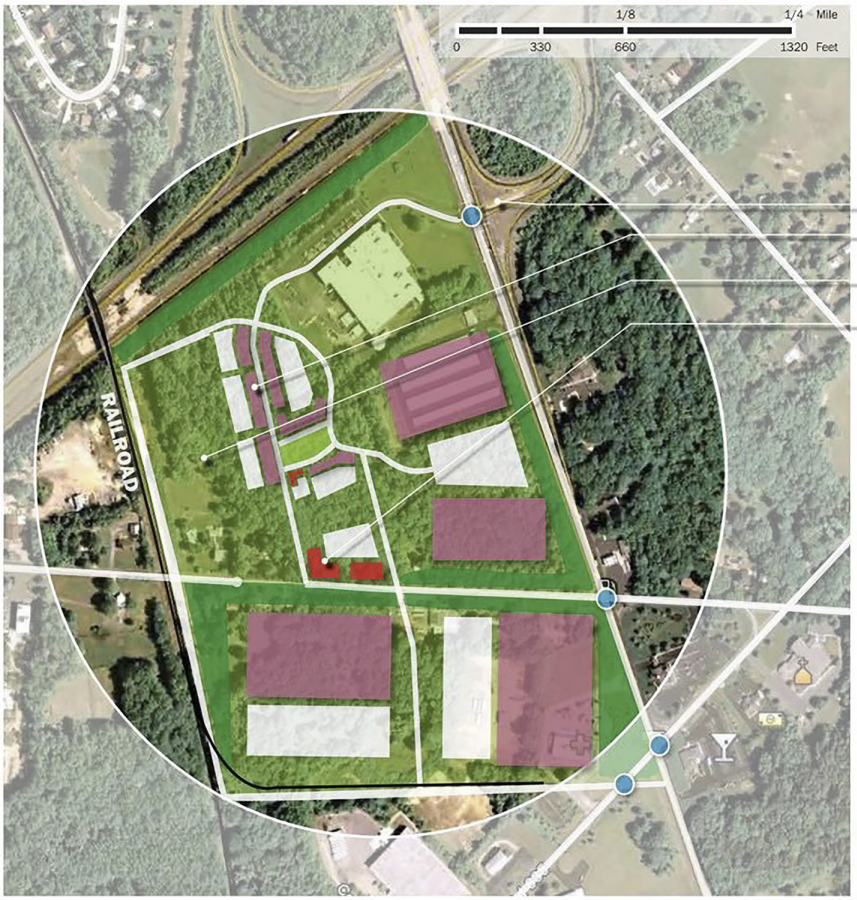
- Located near existing warehousing and light manufacturing as well as office uses and near high capacity transportation facilities
- Campus-style clusters of warehousing, office, service industries, light manufacturing plants, and public facilities compatible with surrounding areas
- Low scale flex and office uses compatible with light industrial uses
- Community trails and sidewalks allow pedestrian and bicycle connections to surrounding areas





Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Pedestrian/ Bike Paths
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity



General Industry

SAMPLE DEVELOPMENT CONCEPT

This illustration represents one potential way that the policies in the Land Use chapter for this land use could be interpreted. Alternate concepts that follow these policies may also be acceptable. This development concept is only for illustrative purposes and design guidelines, policies and ordinance requirements are a factor, particularly with respect to detailed requirements such as landscaping

- Located with access to interstate and arterial highways and/or railroads
- Low density and low rise industrial buildings well screened and separated from adjacent communities because of their potential for creating adverse environmental impacts
- Wide separations and buffers, particularly to adjacent residential neighborhoods
- Limited office uses to support industrial complex





Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Pedestrian/ Bike Paths
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity

Chart 4. Mixed Use Designation Descriptions		
	Level 1: Areas Noted Below as "Rural or Village Center" or "Small Town or Suburban Center"	**Level 2: Areas Noted Below as "Medium Town or Suburban Center"**
1. Basic Description	• Located in the PSA where public services and utilities are available. • Located at the intersections of collector or arterial streets and intended to serve as local community focal points with a friendly blend of useful services, shopping, or employment and close-in housing just as in traditional town and village centers. • Have natural characteristics such as terrain and soils suitable for compact mixed use development or redevelopment. • Contain a mixture of uses, rather than uses segregated into individual areas for residences, retail, office, and services. • Designed with a pedestrian focus with good multimodal connections to surrounding areas and recreation opportunities. • Designed as lower intensity areas to be compatible with surrounding context and with transition areas and step downs in densities to respect nearby historic and/or residential areas. • Designed with a mix of uses that is compatible with the surrounding area, and is consistent with the specific area descriptions below.	• Located in the PSA where public services and utilities are available. • Designed as existing or future activity centers where higher density development, redevelopment, and/or a broader spectrum of land uses are encouraged. • Located at or near interstate interchanges or the intersections of major thoroughfares, or adjacent to mixed use areas of similar intensity, and intended to maximize the economic development potential of these areas by providing for more intensive commercial, office, and industrial development, with ancillary residential uses to make a complete community. • Have characteristics such as terrain, high-capacity access and visibility that support higher density development with high design quality to serve as a countywide focal point. • Include mixed uses within buildings such as office or residential above ground floor retail for most buildings. Single use buildings should be integrated into a neighborhood of mixed uses and densities to create a more urban neighborhood character. • Designed as a walkable mixed-use community that supports multi-modal transportation choices and fosters substantial pedestrian activity.
2. Recommended Uses and Land Allocations	• While no specific mix of uses is prescribed for Level 1 mixed use areas except as noted in the Specific Mixed Use Area descriptions below, each development should be designed as a complete community to foster pedestrian access to a wide range of employment, residential, recreational, civic and service opportunities. In addition, compatibility with surrounding context is paramount and land use mix and density should be aligned with the surrounding context. • Within the general mix of uses noted in the Specific Mixed Use Area descriptions below, specific land area allocations should be within the following ranges. Land area allocations are guidelines and considerations of community compatibility may modify these to fit in better with the surrounding context: o Residential area: 30-60% o Non-residential area: 40-70% o Civic, open space and recreation areas: 20% • Note that the above are land allocations, not floor area allocations. Due to the typically higher Floor Area Ratios for commercial versus residential development, it would be expected that these land allocations would yield a much higher proportion of nonresidential floor area over residential floor area in a typical development.	• While no specific mix of uses is prescribed for Level 2 mixed use areas except as noted in the Specific Mixed Use Area descriptions below, each development should have a mix of uses that complements the area and should be designed as a complete community to foster pedestrian access to a wide range of employment, residential, recreational, civic and service opportunities. • Within the general mix of uses noted in the Specific Mixed Use Area descriptions below, specific land area allocations should be within the following ranges. Land area allocations are guidelines and variability may be allowed if alternate allocations can be shown to better meet the land use objectives of this district as described herein: o Residential area: 20-50% o Non-residential area: 50-80% o Public/Civic area: 5% o Open space and recreation areas: 10% • Note that the above are land allocations, not floor area allocations. Due to the typically higher Floor Area Ratios for commercial versus residential development, it would be expected that these land allocations would yield a much higher proportion of nonresidential floor area over residential floor area in a typical development

3. Recommended Density and Intensity	• Densities and intensities should be generally as follows but variability may be allowed only to better achieve compatibility with surrounding communities. Note that these include a minimum as well as maximum range. This is intended to ensure that these community-serving areas be used for their community development function and not be locked into low intensity single uses that preclude their function as a local activity area. Densities and intensities should be net, exclusive of open spaces and unbuildable areas. • Non-residential FAR: 0.2 to 0.4 • Residential density: 4-8 units/acre • Number of Stories: o Multi-family Residential: 2-3 o Office: 2-3 o Retail and Service Commercial: 1-2. Single-story buildings should only be located when integrated into a plaza or other public gathering space. • Developments at the higher ranges of density are not recommended unless they can be shown to be more compatible with surrounding community context and offer significant public benefits such as affordable/workforce housing, enhanced environmental protection, a high degree of access to multi-modal/transit transportation, or significant civic or recreational amenities.	• Densities and intensities should be generally as follows but variability may be allowed if alternate densities and intensities can be shown to better meet the land use objectives of this designation as described herein. Note that these include a minimum as well as maximum range. This is intended to ensure that these prominently located areas be used for their economic development function and not be locked into low intensity uses that preclude future higher economic returns. Note also there is some flexibility language in the densities to allow for unique context considerations or innovative master plan approaches. Densities and intensities should be net, exclusive of open spaces and unbuildable areas. • Non-residential FAR: 0.3 to 1.0 • Residential density: 6-12 units/acre • Number of Stories: o Multifamily Residential: 2-5 o Office: 2-6 o Retail and Service Commercial: 1-2. Single story buildings should only be located when integrated into a plaza or other public gathering space. • Developments at the higher ranges of density are not recommended unless they offer significant public benefits such as affordable/workforce housing, enhanced environmental protection, a high degree of access to multi-modal/transit transportation, or significant civic or recreational amenities.

Mixed Use Development Standards	
4. General Language	a. All developments should refer to the Residential and Commercial/Industrial Development Standards, including Affordable and Workforce Housing, Enhanced Environmental Protection, and Transportation and Mobility, along with the Mixed Use Development Standards. All developments should also refer to the Character Design Guidelines for more specific guidance on development character. b. Mixed Use developments should create vibrant urban/small town environments that bring compatible land uses, public amenities, and utilities together at various scales. These developments should create pedestrian-friendly, complete communities, with a variety of uses that enable people to live, work, play, and shop in one place. c. Mixed Use developments require nearby police and fire protection, high capacity road access, access to public utilities, large sites, environmental features such as soils and topography suitable for intense development, and proximity or easy access to large population centers. The timing and intensity of commercial development at a particular site are controlled by the maintenance of an acceptable level of service for roads and other public services, the availability and capacity of public utilities, and the resulting mix of uses in a particular area. Master plans are encouraged to be submitted to assist in the consideration of Mixed Use development proposals. The consideration of development proposals in Mixed Use areas should focus on the development potential of a given area compared to the area's infrastructure and the relation of the proposal to the existing and proposed mix of land uses and their development impacts. d. Mixed Use developments should focus on place-making. Developments should be designed to create a sense of place and should be seen as community destinations. Focal open spaces, community oriented gathering places, unified architectural design, and a mix of uses and design that encourages pedestrian activity are all examples of creating a sense of place. e. Mixed Use developments should allow for compact development that create more efficient buildings and spaces, which can be less of a burden on the environment, creating a more sustainable community. f. Mixed Use developments should encourage the proximity of diverse uses to make it possible to reduce vehicle trips and vehicle miles traveled, providing for a greater potential for internal capture than with typical suburban development and should provide good multimodal networks for bicycle and pedestrian uses.

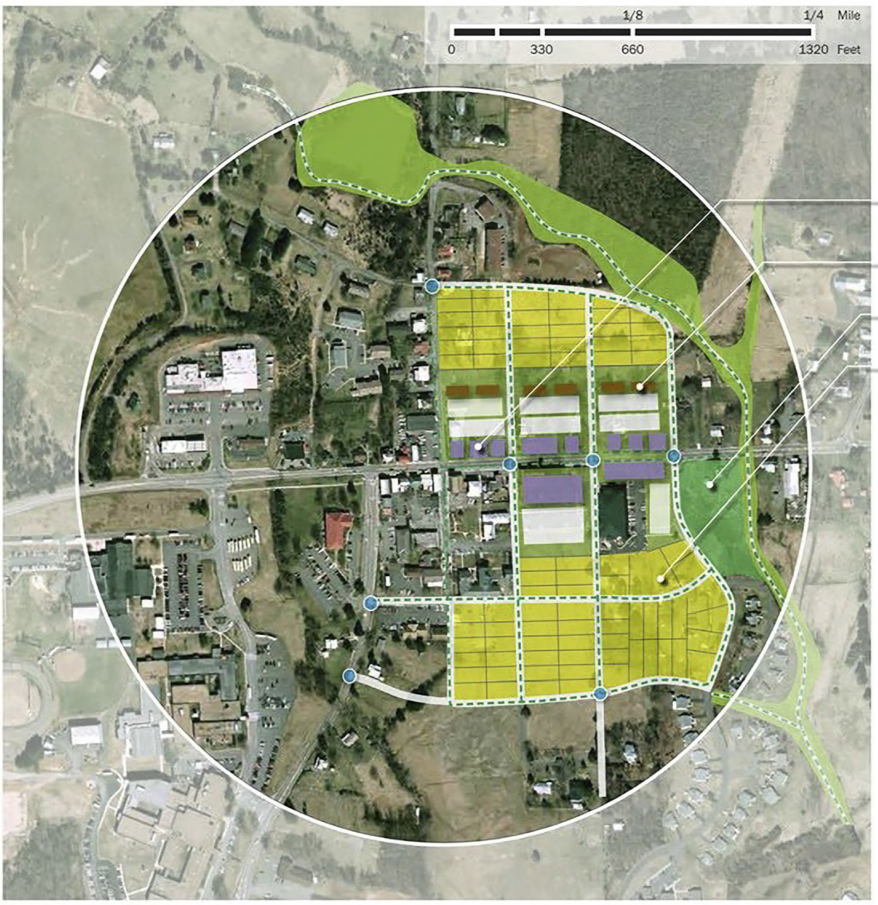
Chart 4. Mixed Use Designation Descriptions	
1. Stonehouse UDA: Medium Town or Suburban Center	The principal suggested uses for the Stonehouse Mixed Use area are light industrial and office/business park. Except for the area between I-64 and Old Stage Road, commercial uses should be clearly secondary in nature, should be limited in scale, comprise a small percentage of the land area of the overall mixed use area, and be oriented towards support services that employees and residents in the Stonehouse area can utilize. The commercial uses should not be developed in a "strip" commercial fashion, but rather should be internally oriented with limited and shared access to Route 30. For the area between I-64 and Old Stage Road, community-scale commercial uses (such as shopping center, hotel, restaurant, and office uses) consistent with prominent interstate interchange access and in support of surrounding residential development are envisioned. For the area between I-64 and Old Stage Road, residential is not a recommended use. The Stonehouse Planned Use Development should be developed in accordance with a binding master plan which maintains the appropriate mixture of principal and secondary uses. Development in the Mixed Use area should also emphasize shared access and parking, consistent treatment for landscaping and architecture, and the preservation of environmental and cultural resources. New residential developments in the Mixed Use area as well as the surrounding existing residential developments should be buffered from the light industrial and office uses through landscaping and architecture treatment, but connected with pedestrian access where possible. Future development in the Stonehouse area will be conditioned on the provision of adequate transportation access.
2. Anderson's Corner UDA: "Rural or Village Center"	Anderson's Corner is one of the few remaining areas in the PSA with significant rural agricultural vistas and contains one of the few remaining rural historic structures in the County, the Whitehall Tavern. Future development should occur in a manner that maintains an appropriate historic setting for the Whitehall Tavern and preserves the rural and historic character of the area. Views from Richmond Road (Route 60) and Route 30 should receive high priority. To accomplish this, significant amounts of open land and fields should be preserved along with agricultural and rural structures in a manner that creates a village commercial node that is integrated with surrounding residential development and suitably transitions to the Rural Lands areas to the west. The suggested principal uses are a balance of office and commercial. Residential is recommended as a supporting but not dominant use, and where it is proposed, the preferred format is integration in mixed use buildings that should be blended into the development of the principal uses for an overall village effect. Master planning of each of the Mixed Use intersection quadrants with adjacent existing and future residential development is strongly encouraged, with the use of shared access points as a primary consideration. Due to the width and traffic volumes on Routes 60 and 30, it is recognized that creation of a unified village effect that encompasses all four quadrants may be difficult, and for this reason, careful quadrant planning as described in the previous sentence will be important, and unique pedestrian connections, if feasible and appropriate, are encouraged. While greater intensities are anticipated, designs and land use patterns should reflect aspects of both appropriate PSA and Rural Lands Development Standards. Buildings and other structures should be small to moderate sized in scale, and of architectural styles that respect local rural and historic traditions. Standardized architectural and site designs should be strongly discouraged. Sections of Richmond Road (Route 60) east of Croaker Road are projected to be at or above capacity in the future. The extent to which development of this area contributes to traffic congestion in those sections of Richmond Road (Route 60) should be an important consideration in the review of development proposals.

3. Toano **UDA: Rural or Village Center**	**The 2006 Toano Community Character Area Design Guidelines and Streetscape Plan recognized the special character of Historic Toano and the Transition Areas that included Forge Road, Chickahominy Road and Toano Drive. Architectural and streetscape guidelines were established for these areas and should be incorporated in any future development or redevelopment of this area. The ultimate goal is to preserve the village character of this historic community.** **Principal suggested uses include moderate density residential development, neighborhood scale commercial establishments, and small office developments. Limited industrial uses may be appropriate as secondary uses provided that they are set back and screened from Richmond Road (Route 60). Preservation and adaptive re-use of historic buildings are encouraged. Redevelopment of existing residential areas and commercial development are also encouraged. The following principles should guide streetscape and building designs in this area:** • **Highlight and honor history;** • **Encourage appropriate growth that enhances unique small town character;** • **Preserve open space, establish communal greenspace;** • **Enhance pedestrian and bicycle environment while slowing vehicular traffic; and** • **Improve streetscape and landscape to create a sense of place.** **For the area west of Richmond Road and north of Forge Road, development should follow the streetscape plan and associated recommendations of the Toano CCA Design Guidelines for creating and maintaining a sense of place in Toano. This area of Toano is located in the "Entrance Corridor from Anderson's Corner" as described in the guidelines and should follow the design elements recommended in the study. Primary uses directly along Richmond Road should be commercial in nature with larger buildings closer to the road. Development of multi-use buildings, with retail on the first floor and residences above are also encouraged. Desired elements include two- and three-story buildings, windows on all floors, and first or second floor balcony. It is important to keep the scale of the building relatively small with density being reduced farther away from Richmond Road. Larger buildings should be broken down into smaller masses to give the appearance of shops or residential units. Buildings removed from Richmond Road should be limited to one and one-half and two stories. Other development in this area should focus more on residential development, with commercial as a clearly secondary use. Densities for this area should be to the lower end of the Moderate Density Residential scale, with building scale and massing decreasing. Vehicle parking and sidewalks should be internal rather than along the perimeter of this residential area, providing a more pleasing transitional view when traveling from Rural Lands into Toano. Buildings should have architectural treatments on the outward facing sides as well as on the front. Enhanced buffers should be provided to preserve existing farm or agricultural uses on adjoining properties. The creation of a street network adjacent and parallel to Richmond Road allows a finer grain of density to develop and contributes to the village-like feel. Additionally, this network should begin to draw development and interest into side streets and neighborhoods. If appropriate, public open space or a village green should also be incorporated into this area.** **Development in the eastern most portion of this area, which abuts Richmond Road to the north and is located south of the industrial properties, is to be appropriately buffered, scaled and sited to retain the historic, rural character of Toano and provide a visual gateway into Toano.**
4. Norge **UDA: Small Town or Suburban Center**	**For the Mixed Use area in the northeast corner of the Richmond Road (Route 60) and Croaker Road intersection, a balance of office uses and moderate density residential is recommended.** **For the Mixed Use area on the north side of Cokes Lane east of the materials distribution yard property and adjacent to the CSX railroad and Mirror Lakes subdivision, a balance of small offices and warehouses and moderate density residential is recommended.** **For lands southwest of the Croaker Road/Richmond Road intersection, suggested uses include commercial and office as primary uses with limited industry as a secondary use.** **The office, warehouse or commercial uses should be compatible with the adjacent residential development in terms of size, scale, and architecture. The architecture should also complement historic structures in Norge. These areas should be designed and developed under a unified development plan or multiple coordinated development plans which emphasize shared access and parking, consistent treatment for landscaping and architecture, and the preservation of environmental and cultural resources. The intensity of development should be conditioned on the provision of sufficient buffering and screening to protect adjacent residential development, and traffic, noise, light, odor and other impacts should be assessed and mitigated. Internal streets and sidewalks should be connected to adjacent properties to the extent possible.**

5. Croaker Interchange **UDA: Medium Town or Suburban Center**	**Future development for the Mixed Use interchange quadrants should be developed in accordance with a binding master plan which maintains the appropriate mixture of principal and secondary uses. The binding master plan shall address how the future development and/or redevelopment of adjacent parcels, including the Mooretown Road/Hill Pleasant Farm Economic Opportunity area, would be integrated into the overall plan of development for the Mixed Use area.** **As development occurs for each of these quadrants, an appropriate mixture of preferred and secondary uses shall be maintained at all times. Future development for these interchange quadrants will be conditioned upon County acceptance of a specific plan and implementation schedule to maintain adequate levels of service on the surrounding road system, including the interstate and the interchange. Suggested uses for the two quadrants are outlined below.** **5A. Northwest Quadrant (adjacent to and east of the Mirror Lakes subdivision)** **The principal suggested uses include commercial and office. Secondary uses may include light industry and moderate density residential development. Moderate density residential development would be accommodated where it does not preclude the development of the principal uses.** **For the three properties to the west of Point O Woods Road and to the north of Croaker Road, suggested uses are those that meet the description and intensity of the Neighborhood Commercial designation (as found in Chart 3, Commercial/Industrial Designation Descriptions in the Land Use section), including medical offices, professional offices, branch banks, day care centers, and small restaurants. These three properties should be designed so they can share a single entrance onto Croaker Road, in a way that implements or incorporates best practices for access management. Particular attention should also be paid to adequately buffering potential development from the existing adjacent residential areas, and complementing the architecture of surrounding uses.** **5B. Southeast Quadrant** **The principal suggested uses for new development or redevelopment include light manufacturing and office. New development or redevelopment within this quadrant is to include adequate buffering for the portion of any parcels designated for Community Character Conservation, Open Space or Recreation.**
6. Lightfoot **UDA: Small Town or Suburban Center**	**For the land east of Richmond Road (Route 60), the principal suggested uses are commercial and office development. The property is adjacent to the railroad and, if passenger or light rail were to become available, would be suitable for a transit- oriented mixed use development with a mixture of limited industry, commercial, and moderate density housing. This broader set of uses could also be recommended if found suitable through a corridor redevelopment plan.** **For lands west of Richmond Road (Route 60), the principal suggested uses are moderate density housing, commercial developments, and office developments. The Lightfoot Corridor is particularly well-suited for the development of workforce housing.** **There are significant capacity issues in this segment of Richmond Road and at the Lightfoot/Richmond Road intersection and Route 199/Richmond Road interchange, with development occurring in both the County and adjacent localities. Measures to mitigate traffic congestion and enhance multimodal facilities will be critical to maintaining the economic vitality of the area and to maintaining an acceptable degree of mobility. Commercial uses should not be developed in a "strip" commercial fashion, and should emphasize shared access and parking as well as consistent treatment for landscaping and architecture. Uses in this area should be compatible and integrate with the adjacent Economic Opportunity designated area to the extent possible.**
7. New Town **UDA: Medium Town or Suburban Center**	**The principal suggested uses are a mixture of commercial, office, residential, and limited industrial.** **Most of this area is governed by a detailed master plan and design guidelines for each distinct area within the New Town development, which provides guidelines for street, building, open space design, and construction similar to the scale, architecture, and urban pattern found in the City of Williamsburg. New development or redevelopment in this area should follow consistent design guidelines and strive to integrate uses.** **A portion of this area is not governed by New Town development master plan and design guidelines, including areas along the west side of Ironbound Road and areas south of Monticello Avenue. These areas should have design, scale and development pattern that is consistent with the New Town development. For the area along the west side of the Ironbound Road corridor, the expansion of existing businesses, or similar uses, is encouraged, with the added opportunity for mixed use structures that incorporate housing as a clearly secondary use in upper stories.**

8. Five Forks **Not a UDA, Use Level 1 Guidance**	**Development at the intersection of John Tyler Highway (Route 5) and Ironbound Road primarily serves nearby residential neighborhoods. The principal suggested uses are community-scale and neighborhood commercial and office uses. Moderate density residential development is encouraged as a secondary use. Development should tie into the larger Five Forks area with complementary building types and connections to surrounding commercial and residential development.** **The property on the west side of Ironbound Road and south side of John Tyler Highway (Route 5) is envisioned to be limited to community-scale and neighborhood commercial and office uses. Specifically, future development on the parcel directly to the south and west of the existing 7-Eleven should not exceed the intensity and density of development identified on the approved master plan and approved proffers for James City County Case Z-9-05/MP-6-05 (Governor's Grove at Five Forks, approved by the Board of Supervisors August 9, 2005).** **For the parcel located at 133 Powhatan Springs Road, historical uses have included a contractor's office/warehouse. Similar small-scale, low-intensity Limited Industrial uses that are consistent in terms of scale and impact to the contractor's office/warehouse and those that can adequately mitigate impacts to adjacent low density residential areas may be appropriate. Expansion of the facilities to more intense industrial or commercial/retail uses is not recommended.** **Preservation and adaptive re-use of historic buildings are encouraged, as is the redevelopment of existing residential and commercial uses in the immediate area. Future development and redevelopment should also reflect the historic and scenic qualities of the Five Forks area and should adhere to the Board adopted Primary Principles for the Five Forks Area. Overall development intensities should be closely monitored to ensure they can be accommodated within the capacities of the existing two-lane roads.**
9. Williamsburg Crossing **UDA: Small Town or Suburban Center**	**The principal suggested uses are commercial, office, and moderate density residential. Continued access management is needed to maintain acceptable levels of service on John Tyler Highway (Route 5). Additional access points beyond those that currently exist for the Route 199 corridor will be strongly discouraged by the County.**
10. Jamestown Ferry Approach **Not a UDA, Level 1 & Level 2 Do Not Apply; See #4 General Language for Guidance**	**This land is located southeast of Jamestown Road and is bounded by Powhatan Creek, Jamestown Road, Jamestown Settlement, and undeveloped residential property. This area is designated as a CCA, and therefore all development should conform to the CCA design principles. Due to the unique character and location of this area, it should be developed in accordance with the approved Shaping Our Shores master plan and emphasis should be given to preserving the tree cover, protecting historic, archaeological, and environmental resources, and providing public access to the James River. Principal suggested uses include recreational and water-related establishments such as marinas and boat launches, but no water-dependent industries. Commercial uses may also be considered appropriate when their scale, intensity, and impacts can be appropriately accommodated. Designs should be encouraged to provide views of and public access to the James River and other points of interest.** **With capacity limitations on Jamestown Road, access management should be strongly encouraged. The traffic generation of any proposal should be in line with the goal of retaining Jamestown Road as a two-lane facility, as widening would significantly impact the visual character of the road.**
11. Routes 60/143/199 Interchanges **UDA: Medium Town or Suburban Center**	**The portion of this area to the south of the interchange is developed with minimal potential for additional development or redevelopment. For any new development or redevelopment that is proposed, the principal suggested uses are commercial, office and limited industrial development.** **For the portion of the Mixed Use area located north of the interchange, there is more potential for development and redevelopment. The principal suggested uses for this corridor are commercial and office development, with moderate density residential development as a secondary use. Future development should be consistent with the design guidelines and integrated with the layout of development planned in the City, including uses, architecture, landscaping, historic resources, and pedestrian amenities. A light rail station would be encouraged in this area should this be a viable option in the future. Given substantial planned development in both the City of Williamsburg and York County, future development should take steps to mitigate roadway and interchange capacity constraints, to the degree possible.**

12. James River Commerce Center **Not a UDA, Level 1 & Level 2 Do Not Apply; See #4 General Language for Guidance**	**Principal suggested land uses are limited industrial and office development. Public facilities are suggested as clearly secondary uses. The intensity of development in this area is conditioned on sufficient buffering and screening of Carter's Grove and other adjacent residential development.**
13. Green Mount **UDA: Small Town or Suburban Center**	**For the Green Mount tracts north of Pocahontas Trail (Route 60), a balanced and integrated mixture of industrial, commercial, and residential uses is suggested. General Industry is the dominant use envisioned for this portion of the County. Uses in this Mixed Use area should therefore be comprised of support uses and should leave sufficient road and water capacity.** **Commercial uses should have a limited market area, primarily focused on direct services to nearby neighborhoods and employment centers, and should not include high traffic generators. In order to protect and enhance the character of the area and to maintain an access level that keeps the area attractive to large-scale economic development, the area should be designed and developed under a unified master plan that provides shared access and parking, compatible landscaping and architectural treatment, adequate buffering and screening, true mixed use concepts, and other measures that ensure it does not develop in a typical strip commercial fashion. Careful coordination between development and transportation issues will be important to avoid worsening the level of service along Pocahontas Road (Route 60), to retain a high degree of mobility through the area, and to preserve the options for improvements and/or alternatives to Pocahontas Road (Route 60). Shared access with the parcel to the north should be preserved as an option.**
14. Treyburn Drive **UDA: Small Town or Suburban Center**	**This land is located west of Treyburn Drive and is bounded by the City of Williamsburg/James City County line to the west and Monticello Avenue to the south. Primary suggested uses for this area include neighborhood-scale commercial establishments and small offices that serve the needs of residents in surrounding neighborhoods. Residential is suggested as a secondary use and, where proposed, should be limited to integrated mixed use buildings. Safe and convenient pedestrian and bicycle connections to the surrounding area including High Street, and the William and Mary School of Education should be provided where feasible. Overall, development should have a limited impact on adjacent residential areas especially in terms of visible parking area, lighting, signage, odor, noise, and hours of operation.** **While RPA and steep slopes limit the developable area, designs should avoid linear strip patterns and instead aim to develop smaller groupings of inter-connected buildings with shared parking and access to Treyburn Drive. As a result, the area should preferably be developed in accordance with a unified development plan.**



Mixed Use Level 1

SAMPLE DEVELOPMENT CONCEPT

This illustration represents one potential way that the policies in the Land Use chapter for this land use could be interpreted. Alternate concepts that follow these policies may also be acceptable. This development concept is only for illustrative purposes and design guidelines, policies and ordinance requirements are a factor, particularly with respect to detailed requirements such as landscaping

Mixed use buildings with ground floor shopping uses to create a traditional small town Main Street design character

A mixed density community with some attached or multifamily housing types mixed in with single family neighborhoods. Workforce housing mixed in with the various housing types

Community focused parks or open space in easy walking distance to residential neighborhoods

A mixture of housing types and densities designed with traditional bolcks and neighborhood patterns, integrated with mixed use buildings and tied together with a community trail system



Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Pedestrian/ Bike Paths
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity



Mixed Use Level 2

SAMPLE DEVELOPMENT CONCEPT

This illustration represents one potential way that the policies in the Land Use chapter for this land use could be interpreted. Alternate concepts that follow these policies may also be acceptable. This development concept is only for illustrative purposes and design guidelines, policies and ordinance requirements are a factor, particularly with respect to detailed requirements such as landscaping

Mixed use clusters designed as "complete communities" around a major interchange

A combination of multifamily and mixed use buildings to create "main street" character with housing and walkable retail uses



Office and employment uses integrated into the community and oriented towards walkable amenities and community open spaces

Ample open space in the community organized as small pocket parks or village greens with buildings fronting on them

A mixture of housing types and densities integrated with commercial and mixed use buildings and tied together with a community trail system

Legend

- Mixed use
- Commercial
- Civic
- Industrial
- Low Density Residential
- Moderate Density Residential - Level 1
- Moderate Density Residential - Level 2
- Parking
- Pedestrian/ Bike Paths
- Common Open Space
- Wooded or Landscaped Buffer Areas
- Roadway Interconnectivity

Goals, Strategies, & Actions

Goals

LU - Achieve a pattern of land use and development that reinforces and improves the quality of life for citizens by encouraging infill, redevelopment, and adaptive re-use within the PSA; limiting development on rural and natural lands outside the PSA; and achieving the other eight goals of this Comprehensive Plan.

Strategies and Actions

LU 1 - Promote the use of land in a manner harmonious with other land uses and the environment.

LU 1.1 - Craft regulations and policies such that development is compatible in scale, size, and location to surrounding existing and planned development. Protect uses of different intensities through buffers, access control, and other methods.

LU 1.2 - Review and update the Zoning Ordinance to ensure consistency between densities and intensities of development recommended by the Comprehensive Plan and the residential and commercial zoning districts.

LU 1.3 - Use policy and ordinance tools to ensure the provision of open space as part of development proposals, as applicable. In particular, maintain or increase incentives for cluster development in exchange for additional open space that provides significant benefits to the community.

LU 1.4 - Require that any development of new public streets, public parks or other public areas, public buildings or public structures, public utility facilities, or public service corporation facilities, inside or outside the Primary Service Area (PSA), be subject to individualized review as provided under Section 15.2-2232, Legal Status of Plan, of the Code of Virginia, as amended.

LU 1. 5 - In coordination with the Board of Supervisors and the County Attorney's Office, update the Planning Commission as-needed on major new planning legislation topics during non-Comprehensive Plan update years.

LU 1.6 - Explore emerging technologies in the renewable energy industry, with the intention of protecting the County's unique rural character, preserving natural resources, and mitigating impacts to neighboring properties.

LU 1.7 - Amend the Zoning Ordinance to address short-term rentals, including re-examining the districts where such uses are permitted.

LU 1.8 - Use the conceptual plan process to provide early input and to allow applicants to better assess critical issues with the goal of having a predictable and timely development plan approval process.

Goals, Strategies, & Actions

LU 2 - Promote pedestrian, bicycle, and automotive linkages between adjacent land uses where practical.

LU 2.1 - Plan for and encourage the provision of strategically located greenways, sidewalks, and bikeways to connect neighborhoods with retail and employment centers, parks, schools, and other public facilities and to effectively connect buildings and activities within individual sites, using the Pedestrian Accommodations Master Plan, the Historic Triangle Regional Bikeways Map, the Greenway Master Plan and other adopted plans for guidance.

LU 2.2 - Facilitate the provision of road interconnections within new developments and between arterial and collector roads by promoting land use and road patterns within the developments which are conducive to such interconnections.

LU 3 - Promote regional cooperation among Hampton Roads localities, particularly the Peninsula, to ensure compatibility of land use planning activities.

LU 3.1 - Promote regional solutions to managing growth through the following actions:

LU 3.1.1 - Engaging in joint planning efforts and allocating resources toward implementation.

LU 3.1.2 - Encouraging redevelopment, compact communities, and mass transit.

LU 3.2 - Communicate with adjacent jurisdictions regarding development plans that have potential impacts on adjacent localities and public facilities. Work with them to coordinate plans and to identify and mitigate areas where there are conflicts.

LU 3.3 - Continue to participate in regional planning processes with York County and the City of Williamsburg. Use the Historic Triangle Coordinated Comprehensive Plan Review Summary Report as a regional planning resource, particularly with regard to transportation and to land use issues in the three geographic focus areas (Riverside/Marquis/Busch, Lightfoot/Pottery, Northeast Triangle and Surrounding Area).

LU 3.4 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, establish a Military Influence Overlay District (MIOD) on the Future Land Use Map.

LU 3.4.1 - For areas within the MIOD, ensure a Fort Eustis representative provides input into development proposals.

LU 3.4.2 - For areas within the MIOD, update the Zoning and Subdivision Ordinances to incorporate the Code of Virginia sections that promote coordination between military installations and local municipalities.

LU 3.4.3 - For areas within the MIOD, update the Zoning and Subdivision Ordinances to establish a Military Influence Area (MIA) overlay district. The exact boundary of the MIA should be determined through additional discussion with Fort Eustis. The Zoning and Subdivision Ordinances should include:

a. Siting guidelines for commercial solar wind farms and wind turbine farms, only if those uses become added to the Use List.
b. Standards and requirements for increased setbacks, buffers, and other design requirements to increase safety and security around the Fort Eustis installation.
c. Vertical obstruction standards and limitations.
d. Additional dark sky lighting requirements, as needed, within the defined air space of the Fort Eustis installation.
e. References to a newly created vertical constraints map identifying locations where tall structures should be prohibited.

LU 3.4.4 - For areas within the MIOD, ensure planned CIP projects would not conflict with the mission of Fort Eustis or otherwise promote incompatible growth with the installation.

LU 3.4.5 - For areas within the MIOD, create a user-friendly plan that provides guidance for a process by which water management issues can be addressed. Include an analysis of the use of the waterway and a strategy for emergency waterway closure, should the need arise.

LU 3.5 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, create a communication and coordination plan with the installation that provides opportunities to share information and a forum to receive feedback.

LU 3.6 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, create an education plan for the community in consultation with the installation.

LU 4 - Direct growth into designated growth areas in an efficient and low-impact manner.

LU 4.1 - Enforce policies of the Comprehensive Plan to steer growth to appropriate sites in the PSA.

LU 4.2 - Provide for low density and moderate density residential development in appropriate locations inside the PSA and prohibit such development on rural lands outside the PSA.

LU 4.3 - Promote infill, redevelopment, revitalization, and rehabilitation within the PSA. Consider the following strategies when appropriate:

LU 4.3.1 - Use of financial tools such as public-private partnerships.

LU 4.3.2 - Revisions to the Zoning Ordinance and/or Subdivision Ordinance or the development of guidelines to provide additional flexibility, clear standards, or incentives, such as expedited plan review.

LU 4.3.3 - Partnerships with government agencies, non-profits, and private entities to facilitate improvements in areas identified for redevelopment.

LU 4.4 - Accommodate mixed-use developments within the PSA, as further defined in the Mixed Use land use designation and development standards. Support design flexibility to promote the mixing of various types of residential and non-residential uses and structures. Encourage mixed use developments and complete communities to develop in compact nodes in well-defined locations within the PSA.

LU 4.5 - Through the development process, reinforce clear and logical boundaries for commercial and industrial property within the PSA.

LU 4.5.1 - Provide sufficient buffering and open space from nearby residential uses.

LU 4.5.2 - Develop in a node pattern with a grid of internal parcels, internal streets, and judicious external connections, rather than in a strip pattern with individual connections along a single street.

LU 4.6 - Emphasize the economic potential of interstate interchanges and encourage a mix of uses. Develop and maintain land use policies and other measures to achieve this strategy.

LU 4.7 - Facilitate the development of sub-area/corridor master plans for strategic areas such as the County's interstate interchanges, Economic Opportunity Designations, and Mixed Use Designations/Urban Development Areas.

LU 4.8 - Encourage development in the Economic Opportunity designations that is consistent with the Economic Opportunity land use designation and development standards. Explore tax incentives or other incentives used by other localities for such designations.

LU 5 - Continue land use planning and perform development review consistent with the capacity of existing and planned public facilities and services and the County's ability to provide such facilities and services.

LU 5.1 - Encourage development of public facilities and the provision of public services within the PSA. As one component of this, maintain a utility policy that, along with other tools such as zoning regulations, supports the PSA as the growth boundary. Within the PSA, extend water and sewer service in the PSA according to a phased plan in accordance with the County's Comprehensive Plan and JCSA's master water/sewer planning. Outside the PSA, restrict the extension of water and sewer utilities.

LU 5.2 - Through the following measures, coordinate allowable densities and intensities of proposed developments with the capacities and availability of water, public roads, schools, and other facilities and services:

LU 5.2.1 - Continue to develop and refine a model or models to assess and track the cumulative impact of development proposals and development of existing and planned public facilities and services.

LU 5.2.2 - Support development of State enabling legislation for adequate public facilities ordinances to extend the policies to already zoned lands, if in a form acceptable to the Board of Supervisors.

LU 5.2.3 - Permit higher densities and more intensive development in accordance with the Future Land Use Map where existing public facilities and services are adequately provided.

LU 5.3 - Ensure that developments are subject to zoning or special use permit review to mitigate their impacts through the following means:

LU 5.3.1 - Require sufficient documentation to determine the impacts of a proposed development, including but not limited to studies of traffic impact, capacity of public schools, historic and archaeological resources, water quality and quantity, other environmental considerations, and fiscal impact.

LU 5.3.2 - Ensure that the recommendations of such studies are adequately addressed prior to preparation of development plans, or in instances where a rezoning or Special Use Permit is required, as part of those applications.

LU 5.3.3 - Continue to calculate and make available up-to-date information on the costs of new development in terms of public transportation, public safety, public schools, public parks and recreation, public libraries and cultural centers, groundwater and drinking water resources, watersheds, streams and reservoirs.

LU 5.3.4 - Consider and evaluate the use of impact fees to help defray the capital costs of public facilities related to residential development.

LU 6 - Enhance and preserve the agricultural and forestal economy and retain the character of Rural Lands and the predominantly wooded, natural, and small-town character of the County.

LU 6.1 - Promote the economic viability of traditional and innovative farming and forestry as industries.

LU 6.1.1 - Support both the use value assessment and Agricultural and Forestal District (AFD) programs to the maximum degree allowed by the Code of Virginia. Explore extending the terms of the County's Districts.

LU 6.1.2 - Seek public and private funding for existing programs, investigate new programs, and support private or non-profit (such as land trust) actions that promote continued agricultural or forestal use of property.

a. Encourage dedication of conservation easements to allow property owners to take advantage of State and Federal tax provisions. Develop a program that would provide information to property owners on the benefits of easement donation, including helping owners consider future possible plans for their property to verify they can be pursued under deed language.
b. Seek a dedicated funding stream for open space preservation programs. Develop information for property owners on the benefits of participating in open space preservation programs.
c. Stay informed of State legislation related to Transfer of Development Rights (TDR) and on the status of TDR programs in Virginia peer localities.

LU 6.1.3 - Continue to update the Zoning Ordinance list of permitted and specially permitted uses in the A-1 zoning district. Investigate adding a development standards policy for those uses that might benefit from a rural location. Continue to look at non-residential uses and development standards that may be appropriate, such as agri-business, eco-tourism, or green energy uses, and uses related to projects that are identified by the Strategy for Rural Economic Development.

LU 6.1.4 - As resources allow, support implementation of the recommendations in the Strategy for Rural Economic Development to maintain and create viable economic options for rural landowners.

LU 6.1.5 - Consider funding a staff position for a rural or agricultural development officer to support and help acquire funding for rural protection programs and to undertake other similar activities.

LU 6.1.6 - Protect farming and forestry uses from conflicting activities by encouraging buffers and open space design and by raising awareness among new rural land purchasers about existing farming and forestry uses in the County.

LU 6.1.7 - Craft regulations and policies in a manner that recognizes the value of, and promotes the conservation of, prime farmland soils and environmentally sensitive areas, and consider impacts to the County's farm and forestal assets in land use decisions.

LU 6.1.8 - Examine the actionable framework from the Lower Chickahominy study and consider incorporating the items recommended by that study that are a best fit with the overall economic development strategies and conservation goals for the County's rural lands.

LU 6.2 - Residential development is not a recommended use in the Rural Lands. Creation of any residential lots should be in a pattern that protects the economic viability of farm and forestal assets, natural and cultural resources and rural character. Amend the Subdivision Ordinance, Zoning Ordinance, utility regulations, and related policies to promote such an overall pattern. Consider providing more than one option, such as the following, so long as an overall very low density pattern can be achieved, and the design and intensity of the development is consistent with the stated Rural Lands designation description and development standards and available infrastructure.

LU 6.2.1 - Revise the R-8 and A-1 Zoning Districts to set lot sizes to be consistent with the stated Rural Lands designation description and development standards. As part of this amendment, consider easing the subdivision requirements, such as eliminating the central well requirement or permitting the waiver of the central well requirement and/or allowing private streets in limited circumstances, as part of an overall balanced strategy.

LU 6.2.2 - Revise the rural cluster provisions in the A-1 zoning district to be more consistent with the Rural Lands designation description and development standards. As part of this amendment, consider easing the subdivision requirements such as eliminating the central well requirement or permitting the waiver of the central well requirement, allowing private streets in limited circumstances, making it a streamlined by-right use at certain scales, allowing off-site septic or community drainfields, etc.

LU 6.2.3 - Consider implementing a subdivision phasing program, where the number of blocks that could be created from a parent parcel within a given time period is limited.

LU 6.2.4 - Consider adding strong buffer and expanded setback regulations to the A-1 and R-8 Districts, particularly if the permitted densities are not lowered in these districts.

LU 6.3 - To help retain the character of Rural Lands, develop additional zoning and subdivision tools (e.g., scenic easement dedication requirements, increased minimum lot sizes, increased setbacks, and/or overlay districts) to protect and preserve scenic roadways such as Forge Road. Consider 400 foot setbacks along Community Character Corridors outside the PSA.

LU 7 - Develop tools for targeted open space preservation inside the PSA that work in concert with the tools used in the Rural Lands, while acknowledging that the PSA is the County's designated growth area.

LU 7.1 - Align eligibility criteria for applications for open space preservation with state and federal eligibility criteria for funding and other County efforts such as green infrastructure and greenway master planning, watershed preservation, and recreational planning, and prioritize properties at greatest threat of development. Monitor development trends and zoning regulations to periodically assess the threat of development and prioritization for properties inside the PSA versus those in Rural Lands.

LU 7.2 - Incorporate rural and open space preservation best practices within the new character design guidelines. Develop additional guidelines as necessary for specific resource protections including historic, environmental, or scenic resources.

LU 7.3 - Refine the buffer and setback standards specifically for visual character protection, addressing viewshed protection and maintenance of community character.

IMPLEMENTATION

Introduction

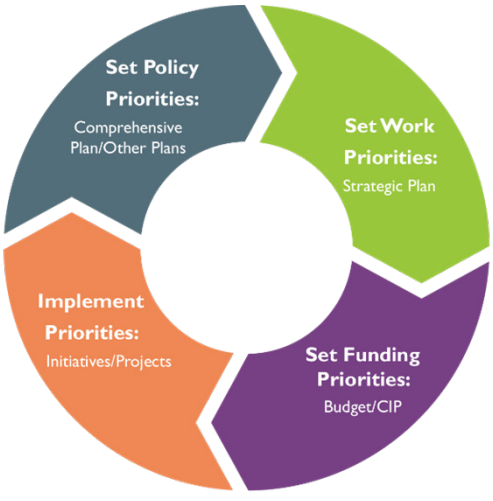
The true value of planning lies ultimately in the implementation of community supported ideas. This Implementation chapter establishes the relationship between the Comprehensive Plan and the County's Strategic Plan that will direct future implementation efforts. It also sets out a series of implementation matrices that provide more detailed information about implementation actions that can help guide the setting of priority actions through the Strategic Plan.

Implementation Guided by Public Inputs

A concerted effort was made during the Engage 2045 planning process to continuously reflect on the guidance being provided by residents and stakeholders of James City County and how that guidance should be incorporated into the Plan. Beginning with the satisfaction gaps identified in the 2019 Citizen Survey and carrying through all four rounds of public engagement during the process, the Planning Commission Working Group (PCWG) carefully considered the cumulative feedback from the community when making decisions about changes to the goals, strategies, and actions included within the Plan. This implementation chapter is the culmination of those efforts and identifies short-term priorities for implementation aimed at achieving the public input priorities established during the Engage 2045 process.

Linkage to the Strategic Plan

In 2018, James City County undertook an extensive planning process to (1) identify all the operational initiatives and capital projects included within the existing Comprehensive Plan and more than 35 other community plans, (2) set priorities among the initiatives and projects included in these plans, and (3) develop a general timing and funding strategy to implement these efforts. The result was the *2035 Strategic Plan: A Guidebook for Investing in the County's Future*.



The Strategic Plan established a new process for defining implementation priorities for James City County. As shown in the graphic to the right, the Comprehensive Plan and other supportive plans (such as the Parks and Recreation Master Plan) identify long-range policy priorities for the County. The next step in the cycle is to build off these policy priorities and identify "work" priorities for County departments and divisions through the Strategic Plan. The Strategic Plan then serves as a guide for setting funding priorities through the County's annual budget and Capital Improvement Program (CIP). Finally, after work plans are developed and funding is secured, initiatives and projects are implemented.

Building off this new process for identifying implementation priorities, the County will need to undertake the following steps to fully implement this Comprehensive Plan.

1. Continue to use the Comprehensive Plan as a policy guide when evaluating rezoning cases, Special Use Permits (SUPs), and other land development proposals.
2. Prepare updates to the County's Zoning Ordinance and continue to refine the newly proposed Design Guidelines to fully implement new policy directions and land use guidance included in this Plan.
3. Update the County's 2035 Strategic Plan to incorporate the specific operational initiatives and capital projects identified in this Comprehensive Plan, focusing on identified priorities included within the Plan.
4. Continue to use the guidance for operational initiatives included in the Comprehensive Plan as a set of criteria for identifying new operational budget expenditures to include in the County's Strategic Plan and ultimately the annual budget.
5. Continue to use the guidance for capital investments included in the Comprehensive Plan as criteria for identifying future public capital infrastructure projects to include in the Strategic Plan and ultimately the County's Capital Improvement Program (CIP).

Implementation Action Matrices

This Comprehensive Plan includes a broad array of Goals, Strategies, and Actions (GSAs) to guide future implementation efforts aimed at achieving the Plan's vision. To assist with implementation, this chapter provides a set of implementation matrices that organize each Plan action into implementation approach categories and by Plan chapter. The implementation matrices are designed to provide necessary information that can assist decision-makers as they prioritize implementation efforts through the County's Strategic Plan. The matrices also include other important implementation information: related public input priorities and prioritization.

Implementation Approaches

The implementation matrices are organized into five categories of implementation actions:

- Regulatory and Guideline Updates;
- Capital Investments and Funding Programs;
- Further Planning Efforts and Initiatives;
- Partnership Opportunities; and
- Guidance for Development Approvals and Enforcement.

The actions within these five categories are then organized by Plan chapter (Community Character, Economic Development, Environment, Housing, Land Use, Parks and Recreation, Population, Public Facilities, and Transportation).

Related Public Input Priorities

Each Plan action is assigned one or more relevant public input priorities included in the vision statement. Through the Strategic Plan, the County may choose to prioritize actions that support implementation of multiple public input priorities before actions that are focused on one input priority. These five public input priorities include:

- Protect Nature
- Preserve Community Character
- Support Affordable Workforce Housing
- Expand Economic Development
- Enhance Quality of Life

(See Chapter 1 Introduction for more information on public input priorities and the vision statement.)

Prioritization

The actions in this Plan will be realized through the implementation of the County's Strategic Plan. This comprehensive plan provides long-range policy guidance and sets out actions for implementation. The Strategic Plan identifies guidance for implementation of County work programs and investments in short, medium, and long-term increments.

As of adoption of this Our County, Our Shared Future Comprehensive Plan, County work was guided by the 2035 Strategic Plan. The operational initiatives and capital projects included in the 2035 Strategic Plan were first identified through other County planning initiatives, such as the County's previous Comprehensive Plan - Toward 2035: Leading the Way. Each initiative and project within the Strategic Plan was assigned a timeframe target for implementation. The 2035 Strategic Plan will be updated to reflect the guidance included in this Comprehensive Plan.

To assist with assigning timeframes for new actions included within this Plan, the PCWG evaluated each of the five lists of actions organized by the implementation approach categories. The PCWG identified several key actions that are recommended for designation as short-term within the future updated Strategic Plan that are important for implementing the public input priorities. These are listed as "Short-Term Priorities" within the following implementation matrices.

Guidance for Development Approvals and Enforcement is the one set of actions that do not have Short-Term priorities identified. This is because these are "policy actions" that are intended to guide day-to-day decision-making and ongoing planning efforts. These actions can be referred to as a checklist when evaluating rezoning cases, SUPs, and other land development proposals.

Regulatory and Guideline Updates Implementation Matrices

The following tables include the regulatory and guideline updates actions for each of the Plan's chapters.

Community Character Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
CC 2.4.1 - Consider updates to the Toano CCA design guidelines to complement the Toano Commercial Historic District.	• Preserve Community Character	
CC 2.6 - In Norge, consider development and adoption of formal design guidelines.	• Preserve Community Character	
CC 2.7 - In the Jamestown/Greensprings area, consider development and adoption of formal design guidelines, and/or guidance on maintaining the historic and rural/ wooded character of that area.	• Preserve Community Character	
CC 3.3 - Continue to improve and protect the character of the County through use of the Character Design Guidelines.	• Preserve Community Character	Short-Term in Strategic Plan
CC 3.3.1 - Further the use of the character design guidelines in legislative review processes and encourage private developers to familiarize themselves with these guidelines as part of educational materials and pre application meetings.	• Preserve Community Character	
CC 3.3.2 - Incorporate the Character Design Guidelines in appropriate portions of the Zoning and Subdivision Ordinances, policies, and other regulations.	• Preserve Community Character	
CC 3.3.3- Incorporate elements of the character design guidelines in other County policy documents and explore if any of the elements could be converted into regulations within the Zoning and Subdivision Ordinances.	• Preserve Community Character	
CC 3.3.4 - Continue to evaluate the Character Design Guidelines and update, revise, and enhance the Guidelines regularly.	• Preserve Community Character	
CC 3.3.5 - Consider developing Character Design Guidelines for rural areas in the County.	• Preserve Community Character	
CC 5.1 - Use County Ordinances and/or policies as enabled by the Code of Virginia to require a more detailed phased clearing plan that minimizes the removal of existing trees and ensures tree preservation requirements are implemented during the site plan review and pre-construction phase of development. Consider developing requirements for County staff to inspect projects pre-and-post construction specifically to ensure compliance with the tree protection requirement of the Zoning Ordinance.	• Protect Nature • Preserve Community Character	
CC 5.4 - Evaluate the appropriateness of street trees along narrow streets or located in neighborhoods with reduced setbacks and update the Streetscape Policy Guidelines accordingly.	• Protect Nature • Preserve Community Character	
CC 6.3 - Pursue the preservation of historic and archaeological sites of the County by: 6.3.2 - Promoting voluntary techniques for preservation of these properties. 6.3.3 - Considering designating areas of the County as historic districts or historic corridors with architectural review. 6.3.4 - Discouraging the demolition or inappropriate use of cultural and historic resources through regulatory and voluntary techniques. 6.3.5 - Integrating the results of the architectural survey into the planning process. 6.3.6 - Exploring opportunities to preserve and enhance Community Character Areas such as those found in Five Forks, Norge and Toano through use of partnerships, pattern books, and design guidelines.	• Preserve Community Character	
CC 7.1 - Update the Communications Facilities section of the Zoning Ordinance as necessary to accommodate the use of new and emerging wireless communication services while preserving community character.	• Preserve Community Character • Enhance Quality of Life	

Economic Development Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
ED 4.6 - Adopt the Virginia C-PACE program to incentivize private development that utilizes environmental conservation techniques.	• Protect Nature • Expand Economic Development	
ED 7.1 - Review and update the Zoning Ordinance to ensure it promotes best practices for home occupations and other small businesses consistent with neighborhood and community character.	• Preserve Community Character • Expand Economic Development	
ED 7.2 - Review and update County regulations, policies, and procedures to ensure they create clear expectations for developing new businesses in targeted industries, and that land use requirements are flexible to changing market trends.	• Expand Economic Development	Short-Term in Strategic Plan
ED 7.3 - Examine and update County regulations to ensure that the County maintains best practices while continuing to accommodate new industries spurred by innovations and changes in technology.	• Expand Economic Development	

Environment Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 1.2 - Promote the use of Better Site Design, Low Impact Development (LID), and effective Best Management Practices (BMPs) by: 1.2.4 - Continuing to develop and enforce new and existing regulations that require soils identification and the consideration of the limitations of these soils for development and agricultural and forestall activities. 1.2.5 - Requiring submission of environmental inventories in order to protect environmentally sensitive lands; to save or most efficiently use permeable soils; and to limit impervious cover. 1.2.6 - Continuing and expanding support for the Clean Water Heritage program in order to provide information on BMP maintenance and assistance to the public and to owners of stormwater management facilities. 1.2.7 - Re-examining provisions in the Zoning Ordinance and other regulations to strengthen tree-protection measures.	• Protect Nature	
ENV 1.5 - Implement comprehensive coastal resource management guidance, consistent with the policy that living shorelines are the preferred alternative for stabilizing eroding shorelines prior to consideration of structural stabilization methods.	• Protect Nature	
ENV 1.5.3 - Consider a policy where the above Shoreline Best Management Practices become the recommended adaptation strategy for erosion control, and where a departure from these recommendations by an applicant wishing to alter the shoreline must be justified at a hearing of the County Wetlands Board.	• Protect Nature	
ENV 1.5.8 - In conjunction with the County Wetlands Board, evaluate the feasibility of adopting a coastal Dunes and Beach Ordinance, pursuant to the Virginia Coastal Primary Sand Dune and Beach Act (currently VMRC handles local applications).	• Protect Nature	
ENV 1.13- Continue to use sound science to update and create the requirements, standards, and specifications used to design, approve, and build BMP facilities in James City County.	• Protect Nature	
ENV 1.20 - Explore Zoning Ordinance amendments that would incorporate recommendations of the Colonial Soil and Water Conservation District as it pertains to equine and other animal stocking rates.	• Protect Nature	Short-Term in Strategic Plan
ENV 2.3 - Promote recycling by developing a post-consumer waste office paper purchasing policy in accordance with the Virginia Public Procurement Act for all County facilities, expanding County facility reduce/reuse/recycling programs, and by increasing private sector and public awareness of recycling opportunities through the County's curbside recycling programs, Recollect website, and Recyclopedia tool.	• Protect Nature • Enhance Quality of Life	

Environment Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 3.2 - Develop specific recommendations for voluntary and regulatory means to protect resources identified in studies, such as the Regional Natural Areas Inventory, and watershed management plans for County watersheds.	• Protect Nature	
ENV 3.3 - Continue to update mandatory tree protection standards and examine tree canopy protection standards.	• Protect Nature • Enhance Quality of Life	
ENV 3.4 - Continue to develop and enforce zoning regulations and other County Ordinances that preserve to the maximum extent practicable rare, threatened, and endangered species; wetlands; flood plains; shorelines; wildlife habitats; natural areas; perennial streams; groundwater resources; and other environmentally sensitive areas.	• Protect Nature	
ENV 3.7.1 - Investigate changes to the Zoning Ordinance including renaming the A-1, General Agricultural District and re-examining lot sizes and clustering provisions to acknowledge and encourage preservation of forested land.	• Protect Nature • Enhance Quality of Life • Preserve Community Character	Short-Term in Strategic Plan (See also related action LU 6.2, 6.2.1)
ENV 4.3 - Promote alternative modes of transportation and a reduction in auto dependency and trip distances through measures in the Zoning Ordinance such as encouraging enhanced pedestrian accommodations and reductions in required parking with approval of a mass or alternative transportation plan, or appropriate similar provisions.	• Protect Nature • Enhance Quality of Life	
ENV 4.4 - Continue to evaluate and update Ordinances and policies to promote the construction of homes, businesses, and public facilities that conserve energy and achieve other green building standards. As one component of this, re-examine the existing Green Building Incentives adopted by the Board on September 11, 2012. Use U.S. Green Building Council's LEED program, Earthcraft, Envision, STAR Communities, WELL Building Standard, the Sustainable Development Code, and other sustainable building programs as guides in this effort.	• Protect Nature • Enhance Quality of Life • Expand Economic Development	
ENV 4.5 - Investigate amending County Ordinances to allow or encourage appropriate energy production and conservation technologies in residential areas.	• Preserve Community Character • Protect Nature	
ENV 4.6 - Investigate ways to amend the County Ordinances to address alternative energy production, and to amend ordinances or include special use permit conditions that protect and enhance natural resource on alternative energy production sites: 4.6.1 - In Ordinances or as development approval conditions, include provisions to minimize clearing of forested land. 4.6.2 - In Ordinances or as development approval conditions, implement best practice documents on the inclusion of native pollinator plants.	• Preserve Community Character • Protect Nature • Enhance Quality of Life	

Housing Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
H 1.1.4 - Offer property tax/abatement/exemption for owners of deteriorating single-family homes that make improvements and either continue to live in the home or enter into an agreement with the County to rent the home to a low- or moderate-income working individual or family. Ensure the exemptions/abatements apply to the value of the improvements and not the entire property that utilizes environmental conservation techniques.	• Preserve Community Character • Support Affordable Workforce Housing	
H 1.2.7 - Explore adding cottage homes to the housing stock in the mobile home parks, including identifying zoning and other regulations that are needed.	• Support Affordable Workforce Housing	

Housing Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
H 2.1 - Guide new developments to incorporate high housing quality and design: 2.1.4 - Propose additional amendments to residential zoning districts to promote diversity within new residential developments by allowing more diverse structure types. 2.1.5 - Promote a scale and density of residential development that is contextually compatible with adjacent and surrounding land uses, supporting infrastructure, and environmental conditions. 2.1.6 - Locate moderate density residential development, including developments within areas of appropriate Mixed-Use designations, in proximity to employment centers and service destinations.	• Preserve Community Character	
H 2.2 - Amend the Zoning Ordinance to facilitate a wider range of housing choices affordable to households with incomes of less than 80% of Area Median Income. Including: 2.2.1 - Review the allowed uses in each zoning district, modify the uses allowed to reflect the current types of uses that exist in the County, and ensure that diverse housing types are specifically included in the use-lists in zoning districts where housing is permitted. 2.2.2 - Reduce site and lot area minimums to facilitate smaller home types and to encourage the development of workforce housing, including by smaller, nonprofit developers. 2.2.3 - Examine options for allowing by-right development of workforce housing. 2.2.4 - Consider form-based zoning to preserve neighborhood character while allowing flexibility in housing options. 2.2.5 - Increase the number of units permitted in multi-family structures in select zones. 2.2.6 - Increase the maximum number of units per acre in all developments that provide for workforce housing.	• Support Affordable Workforce Housing	
H 2.3 - Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing: 2.3.5 - Review and modify the use lists for all zones to encourage residential/ mixed-use developments along specific corridors, and facilitate adaptive reuse opportunities in existing commercial areas. 2.3.9 - Develop a new zoning designation that would simplify motel-to-apartment conversions. 2.3.10 - Consider creating an administrative permitting process for commercial or residential conversions that include workforce housing.	• Support Affordable Workforce Housing • Preserve Community Character • Expand Economic Development	Short-Term in Strategic Plan
H 2.4 - Support the development of accessory apartments as one type of workforce housing, while retaining the residential character of existing neighborhoods: 2.4.1 - Modify the Zoning Ordinance to facilitate the development of more accessory units while retaining the residential character of existing neighborhoods. 2.4.2 - Develop a pattern book, training sessions, and other technical assistance documentation to help homeowners construct accessory units. 2.4.3 - Revise Ordinances to increase the maximum size of detached accessory units to be large enough to accommodate a "reasonably-sized" one-bedroom unit (e.g., up to 750 square feet. 2.4.4 - Revise Ordinances to modify setback, parking, and other requirements to make it easier to build an accessory apartment.	• Support Affordable Workforce Housing • Preserve Community Character	
H 2.6 - Establish an incentive-based inclusionary zoning program to support the development of workforce housing: 2.6.2 - Review the County's existing density bonus system in the Zoning Ordinance. Determine whether providing workforce housing should be a bonus-density priority or a requirement (rather than an option) for any developments proposed over the current baseline density. 2.6.4 - Evaluate the use of a sliding density bonus scale based on the quantity of units and affordability of the product. 2.6.5 - Amend the Zoning Ordinance to establish an Affordable Dwelling Unit (ADU) program under the Code of Virginia Affordable Dwelling Unit Ordinances.	• Support Affordable Workforce Housing • Preserve Community Character	

Housing Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
H 3.1 - Review existing Ordinances to identify barriers to respond to housing needs for special needs populations, including senior citizens, and make amendments, as necessary.	• Support Affordable Workforce Housing	
H 3.2 - Support the concept of "aging in place" by promoting universal design for a portion of units in major subdivisions or multi-family projects.	• Support Affordable Workforce Housing	
H 4.1 - Expand expedited permitting to incentivize production of workforce housing: 4.1.1 - Establish the income threshold not exceeding 80% of AMI necessary for a project to qualify for an expedited review. 4.1.2 - Develop a fast-track subdivision, site plan, and building permit process for qualified workforce housing developments. 4.1.3 - Consider a program to waive, reduce, or rebate development fees for qualified workforce housing developments.	• Support Affordable Workforce Housing	
H 4.2 - Create tax incentives to support the production of workforce housing: 4.2.1 - Create a property tax exemption or abatement for residential properties that guarantee units will be affordable to, and leased to, individuals and families with incomes at or below 60% of AMI. 4.2.2 - Investigate using utility, building permit, and water connection fees and property taxes to incentivize new affordable housing and to be a disincentive for new market-rate housing.	• Support Affordable Workforce Housing	

Land Use Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
LU 1.1 - Craft regulations and policies such that development is compatible in scale, size, and location to surrounding existing and planned development. Protect uses of different intensities through buffers, access control, and other methods.	• Preserve Community Character	
LU 1.2 - Review and update the Zoning Ordinance to ensure consistency between densities and intensities of development recommended by the Comprehensive Plan and the residential and commercial zoning districts.	• Preserve Community Character	
LU 1.3 - Use policy and Ordinance tools to ensure the provision of open space as part of development proposals, as applicable. In particular, maintain or increase incentives for cluster development in exchange for additional open space that provides significant benefits to the community.	• Protect Nature • Preserve Community Character	
LU 1. 5 - In coordination with the Board of Supervisors and the County Attorney's Office, provide updates on state legislation to the Planning Commission on an as-needed basis on the major new planning legislation topics during non-Comprehensive Plan update years.	• Protect Nature • Preserve Community Character • Enhance Quality of Life • Expand Economic Development • Support Affordable Workforce Housing	
LU 1.6 - Explore emerging technologies in the renewable energy industry, with the intention of protecting the County's unique rural character, preserving natural resources, and mitigating impacts to neighboring properties.	• Protect Nature • Preserve Community Character • Enhance Quality of Life • Expand Economic Development • Support Affordable Workforce Housing	Short-Term in Strategic Plan

Land Use Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
LU 1.7 - Amend the Zoning Ordinance to address short-term rentals, including re-examining the districts where such uses are permitted.	• Expand Economic Development • Support Affordable Workforce Housing • Preserve Community Character	
LU 3.4 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, establish a Military Influence Overlay District (MIOD) on the Future Land Use Map. **LU 3.4.2 - For areas within the MIOD, update the zoning and subdivision ordinances to incorporate the Code of Virginia sections that promote coordination between military installations and local municipalities.** **LU 3.4.3 - For areas within the MIOD, update the zoning and subdivision ordinances to establish a Military Influence Area (MIA) overlay district. The exact boundary of the MIA should be determined through additional discussion with Fort Eustis. The Zoning and Subdivision Ordinances should include:** **A. Siting guidelines for commercial solar wind farms and wind turbine farms, only if those uses become added to the Use List.** **B. Standards and requirements for increased setbacks, buffers, and other design requirements to increase safety and security around the Fort Eustis installation.** **C. Vertical obstruction standards and limitations.** **D. Additional dark sky lighting requirements, as needed, within the defined air space of the Fort Eustis installation.** **E. References to a newly created vertical constraints map identifying locations where tall structures should be prohibited.**	• Protect Nature • Preserve Community Character • Enhance Quality of Life • Expand Economic Development • Support Affordable Workforce Housing	
LU 4. 3 - Promote infill, redevelopment, revitalization, and rehabilitation within the PSA. Consider the following strategies as appropriate: **LU 4. 3.2 - Revisions to the Zoning Ordinance and/or Subdivision Ordinance or the development of guidelines to provide additional flexibility, clear standards, or incentives, such as expedited plan review.**	• Protect Nature • Preserve Community Character • Enhance Quality of Life • Expand Economic Development • Support Affordable Workforce Housing	
LU 6.1 - Promote the economic viability of traditional and innovative farming and forestry as industries through measures, including but not limited to, the following: **LU 6.1.3 - Continue to update the Zoning Ordinance list of permitted and specially permitted uses in the A-1 Zoning District. Investigate adding a development standards policy for those uses that might benefit from a rural location. Continue to look at non-residential uses and development standards that may be appropriate, such as agri-business, eco-tourism, or green energy uses, and uses related to projects that are identified by the Strategy for Rural Economic Development.** **LU 6.1.7 - Craft regulations and policies in a manner that recognizes the value of, and promotes the conservation of, prime farmland soils and environmentally sensitive areas, and consider impacts to the County's farm and forestal assets in land use decisions.**	• Protect Nature • Preserve Community Character • Expand Economic Development	

Land Use Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
LU 6.2 - Residential development is not a recommended use in the Rural Lands. Creation of any lots should be in a pattern that protects the economic viability of farm and forestal assets and protects natural and cultural resources and rural character. Amend the Subdivision Ordinance, Zoning Ordinance, utility regulations, and related policies to promote such an overall pattern. Consider providing more than one option, such as the following, so long as an overall very low density pattern can be achieved, and the design and intensity of the development is consistent with stated Rural Lands designation description and development standards and available infrastructure. LU 6.2.1 - Revise the R-8 and A-1 zoning districts to set lot sizes to be consistent with stated Rural Lands designation description and development standards. As part of this amendment, consider easing the subdivision requirements such as eliminating or permitting the waiver of the central well requirement, allowing private streets in limited circumstances, as part of an overall balanced strategy. LU 6.2.2 - Revise the rural cluster provisions in the A-1 zoning district to be more consistent with the Rural Lands designation description and development standards. As part of this amendment, consider easing the subdivision requirements such as eliminating or permitting the waiver of the central well requirement, allowing private streets in limited circumstances, making it a streamlined by-right use at certain scales, allowing off-site septic or community drainfields, etc. LU 6.2.3 - Consider implementing a subdivision phasing program, where the number of blocks that could be created from a parent parcel within a given time period is limited. LU 6.2.4 - Consider adding strong buffer and expanded setback regulations to the A-1 and R-8 districts, particularly if the permitted densities are not lowered in these districts.	• Protect Nature • Preserve Community Character • Expand Economic Development	Short-Term in Strategic Plan
LU 6.3 - To help retain the character of Rural Lands, develop additional zoning and subdivision tools (e.g., scenic easement dedication requirements, increased minimum lot sizes, increased setbacks, and/or overlay districts) to protect and preserve scenic roadways such as Forge Road. Consider 400 foot setbacks along Community Character Corridors outside the PSA.	• Protect Nature • Preserve Community Character	
LU 7.2 - Incorporate rural and open space preservation best practices within the new character design guidelines. Develop additional guidelines as necessary for specific resource protections including historic, environmental or scenic resources.	• Protect Nature • Preserve Community Character • Expand Economic Development	
LU 7.3 - Refine the buffer and setback standards specifically for visual character protection, addressing viewshed protection and maintenance of community character.	• Preserve Community Character	

Public Facilities Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
PF 2.7 - Evaluate the possible use of impact fees to help defray the capital costs of public facilities related to residential development.	• Enhance Quality of Life	
PF 3.5 - Develop policies that support the conservation of water through education and awareness, higher water rates for greater usage, restricting irrigation, and, when financially feasible, rebate programs that reward conservation efforts.	• Protect Nature • Enhance Quality of Life	
PF 4.2 - Review and update as necessary the County's Sustainable Building Policy in accordance with the County's Strategic Plan goals.	• Protect Nature	
PF 4.7 - Consider adopting and using the Virginia C-PACE (Commercial Property Assessed Clean Energy) program to pursue energy retrofit projects for public buildings. Consider setting up the program for use by private property owners as well.	• Protect Nature • Enhance Quality of Life	

Parks and Recreation Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
PR 5.4 - Amend Zoning Ordinance regulations to facilitate development of recreational facilities, including but not limited to neighborhood parks, playgrounds, sport courts, fields and trails within by-right residential developments in accordance with design standards as enabled by the Code of Virginia.	• Enhance Quality of Life • Preserve Community Character • Expand Economic Development	
PR 6.4 - Establish and maintain program performance measures (including goals, objectives, and essential eligibility guidelines) to incorporate consistent standards in program design.	• Enhance Quality of Life	
PR 10.1 - Develop sustainable strategies similar to LEED (Leadership in Energy and Environmental Design) for the design and location of parks and incorporate the strategies into park development guidelines, where feasible.	• Protect Nature • Enhance Quality of Life	

Transportation Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
T 1.2.1 - Limit driveways and other access points and provide shared entrances, side street access, or frontage roads to promote a well-connected and safe road network, consistent with the roadway's functional classification.	• Enhance Quality of Life • Preserve Community Character	
T 1.2.2 - Provide a high degree of inter-connectivity within new developments, adjoining new developments, and existing developments, including County facilities, using streets, trails, sidewalks, bikeways, and multi-use trails to improve accessibility and connectivity, and provide alternate routes for emergency access.	• Enhance Quality of Life • Preserve Community Character	
T 1.2.3 - Concentrate commercial development in compact nodes or in Mixed Use areas with internal road systems and interconnected parcel access rather than extending development with multiple access points along existing primary and secondary roads.	• Enhance Quality of Life • Preserve Community Character	
T1.2.4 - Pursue active outreach for travel demand management in coordination with Hampton Roads Transportation Planning Organization and TRAFFIX to promote flexible work schedules, off-site work arrangements, and telecommuting. Pursue Zoning Ordinance revisions to require bike racks in more developments throughout the County.	• Enhance Quality of Life • Preserve Community Character	
T 1.2.5 - Implement strategies that encourages walking, bicycling, and use of public transit in place of automobile trips.	• Protect Nature • Enhance Quality of Life • Preserve Community Character	
T 1.2.7 - Prepare guiding principles for roads identified in the Comprehensive Plan as needing future improvements. Use these guiding principles during consideration of any plans of development or concurrent with any road improvement project.	• Enhance Quality of Life • Preserve Community Character	
T 1.2.8 - Identify ways to improve access management by reducing driveways and turning movements on the adjacent roadway(s) during consideration of plans of development or concurrent with any road improvement project.	• Enhance Quality of Life • Preserve Community Character	
T 3.3 - Promote increased utilization of public transit through the following actions: (3.3.5) - Require new developments to support bus and transit services at or near the center of mixed use areas, high density multi-family housing communities, and large scale commercial development, and amend the Zoning Ordinance to support this requirement.	• Enhance Quality of Life • Expand Economic Development	
T 3.4 - Encourage pedestrian circulation by providing safe, well-lit, and clearly marked crosswalks and unobstructed sidewalks. Encourage the use of accessible design and provision of shade benches, attractive landscaping, and scenic vistas along pedestrian routes.	• Enhance Quality of Life • Preserve Community Character	

Transportation Chapter | Regulatory and Guideline Updates		
Action	**Related Public Input Priorities**	**Prioritization**
T 4.2 - Utilize planning and design standards for road projects and related improvements which will allow innovation, promote an efficient transportation system, increase public safety, improve visual quality, and expand modal choice for transportation in the County. Require implementation of standards for development proposals and encourage VDOT to incorporate these standards. When improving roads designated as Community Character Corridors, Virginia Byways, or roads outside the PSA, encourage VDOT to be sensitive to the context, including viewsheds, historic sites and structures, and landscaped medians.	• Enhance Quality of Life • Preserve Community Character	

Capital Investments and Funding Programs Implementation Matrices

Community Character Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
CC 1.2 - Continue to explore opportunities and cost-sharing arrangements to bury overhead utilities in Community Character Corridors and Community Character Areas through transportation initiatives.	• Preserve Community Character	Short-Term in Strategic Plan
CC 1.4 - Pursue the expenditure of public funds from sources such as the Capital Improvement Program (CIP) to enhance the appearance of highly visible focal points of the County, including, but not limited to, County entrance corridors, median areas, interstate interchanges, and undeveloped parcels fronting on thoroughfares. Entrance corridors and roads in the proximity of historic landmarks should be prioritized for improvements. Improvements include, but are not limited to, placement of existing utilities underground, beautification through sustainable landscaping or buildings changes, and the acquisitions of easements and properties. The County shall continue to coordinate corridor enhancement efforts within the County and surrounding localities to achieve compatible, attractive corridors.	• Preserve Community Character	
CC 4.2 - Devote resources to and operate programs to preserve or enhance components of the County that significantly contribute to community character, including historic properties and cultural heritage landscapes, scenic properties and viewsheds, agricultural and forestal lands, and entrance corridors, community character corridors, community character areas, and other special places. Integrate these considerations with others found in the Parks and Recreation, Environment and Land Use chapters. In addition, collaborate with other entities, the private sector, and landowners in these efforts.	• Protect Nature • Preserve Community Character	

Economic Development Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
ED 1.3 - Continue to pursue and promote incentives available for new and expanding businesses and industries within certain areas in the County, including Opportunity Zones, Foreign Trade Zones, and Tourism Zones, and develop additional incentives for new and existing business development.	• Expand Economic Development	Short-Term in Strategic Plan
ED 4.4 - Promote desirable economic growth in designated industrial and commercial areas through the provision of water and sewer infrastructure consistent with the Comprehensive Plan policies and the regulations governing utility service in partnership with the James City Service Authority (JCSA), Newport News Waterworks, and HRSD.	• Expand Economic Development	

Environment Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 1.16 - Develop funding and implementation mechanisms for the watershed protection and restoration goals and priorities from watershed management plans adopted by the Board of Supervisors.	• Protect Nature	Short-Term in Strategic Plan
ENV 1.18 - Continue to develop regional, cumulative impact-focused hydraulic studies for County waterways vulnerable to flooding and develop strategies to fix identified problems.	• Protect Nature	Short-Term in Strategic Plan
ENV 1.21 - In a joint endeavor by the Stormwater & Resource Protection Division and Stormwater Program Advisory Committee prepare a multi-year, prioritized list of stormwater-related projects, including stream restoration, health, safety, and water quality that includes estimated costs for design and implementation.	• Protect Nature • Enhance Quality of Life	Short-Term in Strategic Plan

Housing Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
H 1.1.1 - Increase the resources the County dedicates to rehabilitations of single-family homes, prioritizing the homes identified in the 2016 Housing Needs Study and Housing Conditions Study; rehabilitate 10 single-family homes annually to HUD Housing Quality Standards.	• Protect Nature	
H 1.1.2 - Seek additional resources and staffing to be able to rehabilitate a total of 25 homes annually.	• Protect Nature	
H 1.2.6 - Explore the option of the County buying out parks and either retaining control temporarily or transferring control, winding down agreements with current owners by 2030.	• Protect Nature • Enhance Quality of Life	
H 1.3.4 - Apply for funding from Virginia Housing that supports projects in defined redevelopment and revitalization areas.	• Support Affordable Workforce Housing	
H 2.3 - Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing: 2.3.6 - Investigate resources that could support adaptive reuse, including the Low-Income Housing Tax Credit, historic tax credits, and programs supporting housing for residents experiencing homelessness. 2.3.11 - Create a fund to assist owners with the cost of demolishing and redeveloping obsolete commercial buildings.	• Support Affordable Workforce Housing • Preserve Community Character • Expand Economic Development	Short-Term in Strategic Plan
H 2.5.6 - Amend the County's Capital Improvement Program process to ensure that opportunities for creating housing options on public land are considered in conjunction with planning and development of public facilities.	• Support Affordable Workforce Housing	
H 2.5.7 - Identify land that would be suitable for purchase by the County and made available for the development or redevelopment of workforce housing.	• Support Affordable Workforce Housing	
H 3.6 - Seek grant funding to construct affordable senior housing.	• Support Affordable Workforce Housing	
H 5.2 - Expand the local home-buying assistance program: 5.2.1 - Expand down-payment and closing-cost assistance to annually assist 50 income- qualified first-time homebuyers who work in James City County and want to purchase a home in the County.	• Support Affordable Workforce Housing	
H 5.3 - Develop a local rental assistance program: 5.3.1 - Research the experiences of other localities in Virginia that have a locally funded rental assistance program. 5.3.2 - Develop a locally funded rental assistance program (rules and priorities). 5.3.3 - Provide education and outreach to eligible households and landlords. 5.3.4 - Serve 25 families annually through a local rental housing subsidy.	• Support Affordable Workforce Housing	
H 6.1 - Create a dedicated funding source to help produce and preserve for-sale and rental housing affordable to working households.	• Support Affordable Workforce Housing	

Housing Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
H 6.2 - Continue efforts to attract funds from federal and state sources for housing and neighborhood rehabilitation.	• Support Affordable Workforce Housing • Preserve Community Character	
H 6.3 - Create a dedicated funding source for a local housing voucher or rental subsidy program.	• Support Affordable Workforce Housing	
H 6.4 - Create a local housing trust fund and relevant policies to support housing development and preservation.	• Support Affordable Workforce Housing	

Land Use Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
LU 6.1 - Promote the economic viability of traditional and innovative farming and forestry as industries. 6.1.1 - Support both the use value assessment and Agricultural and Forestal District (AFD) programs to the maximum degree allowed by the Code of Virginia. Explore extending the terms of the County's Districts. 6.1.2 - Seek public and private funding for existing programs, investigate new programs, and support private or non-profit (such as land trust) actions that promote continued agricultural or forestal use of property. a. Encourage dedication of conservation easements to allow property owners to take advantage of State and Federal tax provisions. Develop a program that would provide information to property owners on the benefits of easement donation, including helping owners consider future possible plans for their property to verify they can be pursued under deed language. b. Seek dedicated funding stream for open space preservation programs. Develop information for property owners on the benefits of participating in open space preservation programs. 6.1.4 - As resources allow, support implementation of the recommendations in the Strategy for Rural Economic Development to maintain and create viable economic options for rural landowners. 6.1.5 - Consider funding a staff position for a rural or agricultural development officer to support and help acquire funding for rural protection programs and to undertake other similar activities.	• Protect Nature • Preserve Community Character • Expand Economic Development	Short-Term in Strategic Plan (See also related action LU 1.6)

Public Facilities Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
PF 1.2 - Acquire land for, efficiently locate and design, and construct new public facilities in a manner that facilitates future expansion and promotes the maximum utility of resources to meet future capacity needs.	• Enhance Quality of Life • Expand Economic Development	Short-Term in Strategic Plan
PF 1.5 - Construct new facilities consistent with anticipated needs and County fiscal constraints by: 1.5.2 - Acquire public facility sites that will be required by future growth and development.	• Enhance Quality of Life • Expand Economic Development	
PF 2.2 - Identify specific public/private partnership opportunities to provide funding for new and existing public facilities.	• Enhance Quality of Life	
PF 2.3 - Evaluate methods for private development to help defray the costs of public infrastructure investments.	• Enhance Quality of Life	
PF 2.5 - Strive to maintain the AAA bond rating for James City County and the James City Service Authority from all three major rating agencies.	• Expand Economic Development • Enhance Quality of Life	
PF 4.1.1 - Continue to utilize and update as necessary the building automation system that tracks and monitors the indoor environment of most County facilities.	• Protect Nature	

Population Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
PN 3.1 - Continue to offer discounts to facilities, programs and services based on income eligibility and Parks and Recreation's Discount Assistance Program guidelines.	• Enhance Quality of Life	
PN 3.2 - Continue to provide free access to the Abram Frink Jr. Community Center for youth.	• Enhance Quality of Life	
PN 3.6 - Seek grant funding to assist local, nonprofit groups with constructing affordable senior housing	• Enhance Quality of Life • Support Affordable Workforce Housing	

Parks and Recreation Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
PR 1.2 - Prioritize potential property acquisition for parks in underserved areas of the County, as identified in the needs analysis in the current Parks and Recreation Master Plan or the outdoor recreation category of the ConserveVirginia model.	• Enhance Quality of Life	
PR 1.4 - Continue to develop County owned parks based upon approved master plans as funds become available.	• Enhance Quality of Life • Preserve Community Character	
PR 2.2.1 - Continue to seek funding in the Capital Improvements Program (CIP) for the acquisition and use of open space areas and greenways to preserve the scenic, natural and historic character of the area and to promote public access to these sites.	• Protect Nature • Preserve Community Character • Enhance Quality of Life	
PR 3.3 - Support the public provision of bicycle facilities by seeking County funding whenever feasible and by seeking non-County funding sources.	• Enhance Quality of Life	
PR 3.4 - Emphasize the maintenance of existing facilities as a way to make efficient use of limited financial and physical resources.	• Enhance Quality of Life	
PR 7.3 - Continue to evaluate and provide financial assistance to qualifying families and individuals, and continue to offer free access to youth at the Abram Frink Jr. Community Center.	• Enhance Quality of Life	

Transportation Chapter | Capital Investments and Funding Programs		
Action	**Related Public Input Priorities**	**Prioritization**
T 1.3 - Identify road segments with anticipated moderate to severe road capacity deficiencies and develop a plan to mitigate congestion that may include one or more of the following actions: 1.3.1 - Seek funding to add the road segment to the Six Year Improvement Program and consider using public-private partnerships among other mechanisms to fund proposed improvements.	• Enhance Quality of Life • Preserve Community Character	
T 3.1 - Seek funding for a regularly updated list of proposed pedestrian and cycling projects on the Six Year Improvement Program.	• Enhance Quality of Life	
T 3.2 - Actively pursue additional local, state, federal, and private funding to accelerate the construction for all needed modes of transportation facilities.	• Enhance Quality of Life	

Further Planning Efforts & New Initiatives Implementation Matrices

Community Character Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
CC 1.3 - Monitor the status of billboards throughout the County and pursue action, where possible, to remove billboards using all currently available methods, and explore and pursue any new methods as they become available.	• Preserve Community Character	
CC 2.2 - Within the CCA boundaries, continue to establish development management and preservation techniques to meet specific historic preservation and community character needs. Encourage development patterns and building designs that maintain and reinforce the visual separation of CCAs.	• Preserve Community Character	
CC 3.3.6 - Consider incorporating elements of the Character Design Guidelines into the future land use guidelines in the Land Use chapter to ensure consistency between the Community Character and Land Use guidelines.	• Preserve Community Character	Short-Term in Strategic Plan
CC 6.2 - Update the document Preserving Our Hidden Heritage, an assessment of the archaeological resources in James City County. Review the document prior to each Comprehensive Plan revision and perform a complete revision every 10 years to include new site surveys.	• Preserve Community Character	

Economic Development Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
ED 1.1 - Maintain an active and effective economic development strategy, which includes existing business retention and expansion, assistance to new business, new business recruitment and support to the tourism industry.	• Expand Economic Development	
ED 1.2 - Develop and promote strategies and programs to encourage the creation of new and retention of existing small businesses, home-based businesses, and entrepreneurial efforts including women-owned and minority-owned businesses and companies that successfully graduate from the Launchpad Business Incubator.	• Expand Economic Development	
ED 1.2.1 - Fostering new and supporting existing programs to assist small businesses, home-based businesses and entrepreneurial efforts.	• Expand Economic Development	
ED 1.2.2 - Developing strategies that strive to retain those companies who successfully graduate from the Launchpad Business Incubator.	• Expand Economic Development	
ED 1.6 - Promote the creation and retention of businesses that provide full-time job opportunities with wages and benefits sufficient to make housing attainable for employees.	• Enhance Quality of Life • Support Affordable Workforce Housing • Expand Economic Development	
ED 2.1 - Promote tourism, including eco-tourism and agritourism and associated industries as a year-round asset.	• Expand Economic Development	
ED 2.2 - Support the recommendations of the Greater Williamsburg Target Sector Analysis with a particular emphasis on supporting the development of those businesses identified as legacy and emerging businesses within this study by; 2.2.1 - Foster the opportunities for development and expansion of advanced materials and components, food & beverage manufacturing/supply chain, and professional & technical services.	• Expand Economic Development	
ED 2.3 - Support viable traditional and emerging rural economic development initiatives as recommended in the County's Strategy for Rural Economic Development.	• Expand Economic Development	
ED 3.4 - Support businesses, programs, and developments that attract young professionals and retain the community's graduates.	• Expand Economic Development	
ED 4.1 - Encourage the rehabilitation of abandoned and/or underutilized facilities by promoting them to new business.	• Preserve Community Character • Expand Economic Development	

Economic Development Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
ED 4.3 - Promote environmental conservation techniques among new and existing business, including water conservation (such as reclamation of rain or grey water), energy efficiency, and materials management (such as recycling, composting, and material life-cycle considerations).	• Expand Economic Development • Protect Nature	
ED 5.3 - Assess and collaborate on opportunities and advocate for public transit (e.g., commuter rail, light rail, or bus rapid transit service) to economic and business centers within James City County.	• Expand Economic Development	
ED 5.4 - Support continued local access to general aviation facilities.	• Expand Economic Development	
ED 6.2 - Identify and protect historic sites that are important to the heritage of James City County, allowing them to be preserved for future generations.	• Preserve Community Character • Expand Economic Development	
ED 6.3 - Promote existing ecotourism and agri-tourism venues and support the establishment of new ones, where appropriate.	• Preserve Community Character • Expand Economic Development • Protect Nature	
ED 6.4 - Support the development of sporting events and facilities that promote the County as a sports tourism destination and other special events in James City County.	• Expand Economic Development	
ED 6.5 - Support tourism initiatives that promote the Historic Triangle as an arts destination, including cultural and culinary activities.	• Expand Economic Development • Enhance Quality of Life	
ED 7.4 - Continue to monitor the available capacity for non-residential development within the County's Primary Service Area (PSA) and utilize this information when considering land use designation changes as part of the Comprehensive Plan update process.	• Expand Economic Development	
ED 8.1 - Examine the effects of the COVID-19 pandemic on small-businesses and work to develop tools to help prepare the County to mitigate the impacts of future similar scenarios.	• Expand Economic Development	

Environment Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 1.2 - Promote the use of Better Site Design, Low Impact Development (LID), and effective Best Management Practices (BMPs) by: 1.2.1 - Providing stormwater facility maintenance guidelines and assistance directly to BMP owners through training sessions and other tools. 1.2.2 - Promoting public awareness on the benefits of and necessity for BMPs, erosion and sedimentation control, watershed management, and other land disturbance regulations.	• Protect Nature	
ENV 1.4 - Utilize bathymetric, flushing rate, and other available data when locating and providing new public shoreline and water access opportunities.	• Protect Nature	
ENV 1.5.4 - Seek public outreach opportunities, including interpretive signage, to educate citizens and stakeholders on new shoreline management strategies including living shorelines.	• Protect Nature	
ENV 1.5.5 - Follow the development of integrated shoreline guidance under development by Virginia Marine Resource Commission (VMRC).	• Protect Nature	
ENV 1.7 - Identify the specific existing and potential uses of County streams and rivers and identify standards necessary to support these uses. Protect the quality and quantity of these surface waters so they will continue to support these uses. Give consideration to protecting existing and potential water resource uses when reviewing land development applications.	• Protect Nature	Short-Term in Strategic Plan

Environment Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 1.9 - Develop Total Maximum Daily Load (TMDL) Program Action Plans to address water quality impairments within James City County and the Chesapeake Bay, including proposed actions and implementation.	• Protect Nature • Enhance Quality of Life	
ENV 1.12 - Investigate actions needed to implement groundwater protection using suggestions from the Potential Groundwater Management Alternatives section.	• Protect Nature	
ENV 1.14 - Continue to minimize post-construction stormwater impacts through implementation of BMPs to reduce pollutants entering the stormwater system and County waterways by: 1.14.2 - Provide assistance as funding permits to identify failing neighborhood stormwater and drainage facilities and to implement repairs on a prioritized basis. 1.14.3 - Maintain and assess new programmatic fees collected to fund BMP construction inspections and private stormwater facility assessments.	• Protect Nature • Enhance Quality of Life	
ENV 1.15 - Ensure that the County's Municipal Separate Storm Sewer System (MS4) Permit is fully implemented in accordance with the annual program plan and General Permit Number VAR040037: 1.15.1 - Continue to implement public education and outreach programs on the impacts of stormwater, including actions citizens can take to reduce stormwater pollution and the hazards associated with illegal discharges and improper disposal of wastes. 1.15.2 - Continue to provide public participation opportunities, including providing feedback on the County's program plan, and participation in the Stormwater Program Advisory Committee.	• Protect Nature	
ENV 1.17 - Continue to develop watershed management plans for the remaining County watersheds, and to update existing watershed management plans that identify environmentally sensitive areas and specific protection, restoration, and retrofit recommendations. Include in those studies an evaluation of the impact of the change in precipitation events in the watershed.	• Protect Nature • Enhance Quality of Life	
ENV 1.19 - Continue to follow the progress of the Lower Chickahominy Watershed Study and incorporate final recommendations into local policies and Ordinances.	• Protect Nature	
ENV 1.22 - Conduct an analysis of the impacts of sea-level rise, tidal flooding, and non- tidal flooding in the areas around Chickahominy Haven, Powhatan Shores, and other impacted areas based on the work of Virginia Institute of Marine Science, the Commonwealth Center for Recurrent Flooding Resiliency at Old Dominion University, and other relevant agencies.	• Protect Nature	
ENV 2.1 - Continue to educate the public about voluntary techniques to preserve and protect environmentally sensitive lands; wildlife habitats; water quality; and watersheds, agricultural, forestal, and other open space lands through County programs, including but not limited to, the Clean Water Heritage program.	• Protect Nature • Enhance Quality of Life • Preserve Community Character	
ENV 3.1 - Maintain and promote biological and habitat diversity, ecosystem services, and habitat connectivity by protecting wildlife and riparian corridors between watersheds, sub-watersheds, catchments, and tidal and nontidal wetlands, and by developing and implementing a green infrastructure plan.	• Protect Nature • Enhance Quality of Life	
ENV 3.5 - Continue to gather and gain technical knowledge on data that is available to help the County identify and map its natural and cultural assets, and, where appropriate, use such data as an information tool to help guide decisions during the creation of regulations and policies to provide guidance to property owners and development proposal applicants on lands best suited for development, and to inform open space preservation efforts.	• Protect Nature • Enhance Quality of Life • Preserve Community Character	
ENV 3.7 - Seek to maintain and protect forested land and recognize the benefits it provides by sequestering carbon dioxide.	• Protect Nature • Enhance Quality of Life	
ENV 3.7.2 - Assemble a local flood resilience plan to address the County's flood resilience needs using existing plans where available and supplementing with additional documentation where necessary. Incorporate resiliency plan items from other chapters including Transportation, Land Use, and others.	• Protect Nature • Enhance Quality of Life	

Environment Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 4.1 - Continue to implement reduction strategies by reducing building energy and transportation fuel consumption.	• Protect Nature	
ENV 4.2 - Continue utilizing the County's Interdepartmental Energy Team to conduct energy audits, make recommendations on efficiency measures and implement energy management practices.	• Protect Nature	
ENV 4.7 - Continue the current programs that have installed building management control systems in many County facilities which assist in reducing energy consumption. Continue to evaluate renewable energy technologies and energy efficiency improvements during capital maintenance activities.	• Protect Nature	
ENV 4.8 - Continue to manage the County vehicle fleet to improve energy efficiency and reduce emissions by replacing fuel inefficient vehicles, assessing new technologies, and developing an anti-idling policy.	• Protect Nature	
ENV 4.11 - Evaluate adjustments to watersheds, floodplains, and resource protection areas with changes to the VRMC mean high water line: 4.11.1 - Use predicted shoreline protection needs to inform shoreline protection strategies and to re-examine relevant County master plans. 4.11.2 - Notify landowners of likelihood of shoreline impacts based on shoreline protection needs.	• Protect Nature	

Housing Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
H 1.1 - Promote housing rehabilitation to extend the life of existing homes and maintain community character.	• Preserve Community Character • Support Affordable Workforce Housing	
H 1.1.5 - Develop a pattern book to guide housing maintenance and rehabilitation that could include sections on home accessibility modification and aging in place.	• Preserve Community Character • Support Affordable Workforce Housing	
H 1.1.7 - Promote water/sewer connections for low- and moderate-income households by processing applications for the James City Service Authority's deferred payment plan.	• Enhance Quality of Life • Support Affordable Workforce Housing	
H 1.2 - Pursue the preservation and redevelopment of manufactured homes and mobile home parks to prevent further deterioration of these homes and protect the current residents.	• Enhance Quality of Life • Support Affordable Workforce Housing	
H 1.2.1 - Assess the opportunities for improving current mobile home parks.	• Preserve Community Character • Support Affordable Workforce Housing	
H 1.2.2 - Look for opportunities that either attempt to prevent loss of mobile homes or promote responsible redevelopment of mobile home parks while protecting current residents.	• Preserve Community Character • Support Affordable Workforce Housing	
H 1.2.3 - Review and evaluate the current conditions of mobile home parks.	• Preserve Community Character • Support Affordable Workforce Housing	
H 1.2.4 - Establish goals for individual mobile home parks	• Preserve Community Character • Support Affordable Workforce Housing	

Housing Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
H 1.2.5 - Develop guidelines and engage park owners and residents to discuss needs and options to improve parks.	• Preserve Community Character • Support Affordable Workforce Housing	
H 1.2.8 - Advocate for a state-supported mobile home replacement program.	• Support Affordable Workforce Housing	
H 1.2.9 - Coordinate a County mobile-home replacement program.	• Support Affordable Workforce Housing	
H 1.2.10 - Develop a County mobile home decommissioning and recycling plan.	• Support Affordable Workforce Housing	
H 1.3 - Define specific redevelopment/revitalization areas as a means to access additional funding to rehabilitate existing homes and subsidize new workforce housing. 1.3.1 - Periodically review and update the Housing Conditions Study. 1.3.2 - Use the Housing Conditions Study and other sources to affirm or update the identified Housing Rehabilitation Areas shown in Figure H-3. 1.3.5 - Solicit public input to identify areas for rehabilitation/improvement projects and neighborhood or area plans.	• Support Affordable Workforce Housing	
H 2.3 - Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing: 2.3.1 - Inventory the potential adaptive reuse and conversion sites within the County. Include the location, condition, ownership, zoning, and other information about the properties. 2.3.2 - Establish priorities, processes, and guidelines for adaptive reuse projects in the County. 2.3.4 - Conduct corridor studies to evaluate underutilized commercial properties.	• Preserve Community Character • Support Affordable Workforce Housing • Expand Economic Development	
H 2.4 - Support the development of accessory apartments as one type of workforce housing, while retaining the residential character of existing neighborhoods: 2.4.5 - Develop a loan program to help lower-income households build accessory apartments. 2.4.6 - Encourage Homeowners Associations to revise covenants that prohibit accessory units.	• Preserve Community Character • Support Affordable Workforce Housing	
H 2.5 - Explore the use of public land for the development of workforce housing: 2.5.1 - Develop a comprehensive inventory of publicly owned sites, noting whether each site is vacant or has underutilized development capacity. 2.5.2 - Develop criteria for evaluating sites' appropriateness, prioritizing characteristics such as proximity to transit infrastructure and employment areas. 2.5.3 - Identify which publicly owned land is suitable for workforce housing. 2.5.4 - Write a briefing paper outlining the benefits of and process for creating a housing land trust or land bank to serve as a mechanism for acquiring, holding, and, ultimately, deploying public land specifically for workforce housing. 2.5.5 - Create a pilot project to develop workforce housing on public land through a public/private partnership.	• Support Affordable Workforce Housing	
H 2.6 - Establish an incentive-based inclusionary zoning program to support the development of workforce housing: 2.6.1 - Bring together community stakeholders and staff to recommend new incentive-based, inclusionary housing policies. 2.6.3 - Develop a detailed method for calculating affordable price points based on AMI.	• Support Affordable Workforce Housing	
H 2.7 - Periodically review and update the Housing Needs Study.	• Preserve Community Character • Support Affordable Workforce Housing	
H 3.4 - Promote supportive housing, including rental assistance, coupled with case management services for individuals with special needs and individuals who are homeless or at risk of becoming homeless.	• Support Affordable Workforce Housing	

Land Use Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
LU 3.4 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, establish a Military Influence Overlay District (MIOD) on the Future Land Use Map. LU 3.4.5 - For areas within the MIOD, create a user-friendly plan that provides guidance that illustrates a process by which water management issues can be addressed. Include an analysis of the use of the waterway and a strategy for emergency waterway closure, should the need arise.	• Protect Nature	
LU 3.5 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, create a communication and coordination plan with the installation that provides opportunities to share information and a forum to receive feedback.	• Preserve Community Character • Enhance Quality of Life	
LU 3.6 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, create an education plan for the community in consultation with the installation.	• Preserve Community Character • Enhance Quality of Life	
LU 4.8 - Facilitate the development of sub-area/corridor master plans for strategic areas such as the County's interstate interchanges, Economic Opportunity Designations, and Mixed Use Designations/Urban Development Areas.	• Preserve Community Character • Enhance Quality of Life	
LU 4.9 - Encourage development in the Economic Opportunity designations which is consistent with the Economic Opportunity land use designation and development standards. Explore tax incentives or other incentives used by other localities for such designations and consider providing appropriate incentives.	• Expand Economic Development • Support Affordable Housing	
LU 5.1 - Through the following measures, coordinate allowable densities and intensities of proposed developments with the capacities and availability of water, public roads, schools and other facilities and services: LU 5.1.1 - Continue to further develop and refine a model or models to assess and track the cumulative impact of development proposals and development of existing and planned public facilities and services.	• Enhance Quality of Life • Expand Economic Development	
LU 5.2 - Through the following measures, coordinate allowable densities and intensities of proposed developments with the capacities and availability of water, public roads, schools and other facilities and services: 5.2.1 - Continue to develop and refine a model or models to assess and track the cumulative impact of development proposals and development of existing and planned public facilities and services.	• Expand Economic Development • Support Affordable Housing	
LU 5.2 - Ensure that developments subject to zoning or special use permit review to mitigate their impacts through the following means: LU 5.2.3 - Continue to calculate and make available up-to-date information on the costs of new development in terms of Public Transportation, Public Safety, Public Schools, Public Parks and Recreation, Public Libraries and Cultural Centers, Groundwater and Drinking Water Resources, Watersheds, Streams and Reservoirs. LU 5.2.4 - Consider and evaluate the possible use of impact fees to help defray the capital costs of public facilities related to residential development.	• Protect Nature • Preserve Community Character • Enhance Quality of Life • Expand Economic Development • Support Affordable Workforce Housing	Short-Term in Strategic Plan
LU 6.1 - Promote the economic viability of traditional and innovative farming and forestry as industries. 6.1.8 - Examine the actionable framework from the Lower Chickahominy study and consider incorporating the items recommended by that study that are a best fit with the overall economic development strategies and conservation goals for the County's Rural Lands.	• Protect Nature • Preserve Community Character • Expand Economic Development	
LU 7.1 - Align eligibility criteria for applications for open space preservation with state and federal eligibility criteria for funding and other County efforts such as green infrastructure and greenway master planning, watershed preservation, and recreational planning, and prioritize properties at greatest threat of development. Monitor development trends and zoning regulations to periodically assess the threat of development and prioritization for properties inside the PSA versus those in Rural Lands.	• Protect Nature • Enhance Quality of Life	

Public Facilities Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
PF 1.1 - Encourage full utilization of all public facilities, including joint use by different County agencies, to support local community objectives and activities.	• Enhance Quality of Life	
PF 1.3 - Design facilities and services for efficient and cost-effective operations over their expected lives.	• Enhance Quality of Life • Expand Economic Development	
PF 1.5 - Construct new facilities consistent with anticipated needs and County fiscal constraints by: 1.5.1 - Review and update the long-term maintenance program that has been developed which utilizes strategies that result in an overall reduction of energy costs. The goal is to ensure adequate maintenance of existing and proposed facilities. 1.5.3 - Research and use best practices for public facility and service plans in Virginia. 1.5.4 - Pursuant to the strategic planning process that began in Fiscal Year (FY) 2015-16, and in accordance with the Space Needs Assessment that was completed in 2020, develop a service and facility master plan to strengthen the linkage between the Comprehensive Plan, the Capital Improvements Program (CIP) and operating budgets. 1.5.5 - Design and construct County facilities consistent with the Space Needs Assessment for County Administration, Williamsburg-James City County (WJCC) Courts, and WJCC School Administration for 5-year, 10-year, and 20-year (2040) population growth projections.	• Enhance Quality of Life • Expand Economic Development	
PF 1.8 - Explore ways to integrate the various data resources, programs, and systems of the County such that data may be more readily shared and accessed between departments and divisions. Develop minimum standards for data storage that ensure that data is produced and securely stored in compatible formats.	• Enhance Quality of Life	
PF 1.10 - Include public transit stops at new public facility sites.	• Enhance Quality of Life	
PF 1.11 - Continue to use technology, including broadband service, to improve the delivery of public services to the County.	• Enhance Quality of Life	
PF 1.12 - Locate new facilities and the provision of public services near existing and planned population centers, within the existing Primary Service Area (PSA), as defined on the Comprehensive Plan Future Land Use Map so as to provide convenient service to the greatest number of County residents or service consumers.	• Enhance Quality of Life	
PF 1.16 - Develop a long-range plan for future land needs for future schools and other public facilities.	• Enhance Quality of Life	
PF 2.1 - Review annually the adequacy of existing public and private resources to finance needed qualifying public facilities through the County's CIP and annual budget process.	• Enhance Quality of Life	
PF 2.6 - Utilize tools such as life-cycle costing and value engineering (as applicable) to develop the most cost-effective facilities.	• Enhance Quality of Life	
PF 3.3 - Maintain and construct facilities in accordance with service standards and fiscal limitations.	• Enhance Quality of Life	
PF 2.6 - Utilize tools such as life-cycle costing and value engineering (as applicable) to develop the most cost-effective facilities.	• Enhance Quality of Life • Expand Economic Development	
PF 3.3 - Maintain and construct facilities in accordance with service standards and fiscal limitations.	• Enhance Quality of Life	
PF 3.7 - Explore opportunities to develop regional reclamation and reuse technologies and infrastructure in conjunction with neighboring jurisdictions and the Hampton Roads Sanitation District (HRSD).	• Enhance Quality of Life • Protect Nature	
PF 3.8 - Continue to explore alternative sources of a long-term water supply in accordance with the adopted Strategic Plan.	• Enhance Quality of Life • Protect Nature	

Public Facilities Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
PF 4.1 - Utilize energy efficient heating, cooling, ventilation, lighting, and similar systems and designs for newly constructed County facilities, and where feasible, for renovations of existing County facilities. Innovation and technology (such as that found in geothermal heating and cooling systems, green roofs, and solar panels) should similarly be employed where feasible, and where life cycle considerations of cost savings, efficiency, and durability can be clearly expected or demonstrated.	• Enhance Quality of Life • Protect Nature	
PF 4.1.2 - Develop a comprehensive long-range technology plan to keep pace with the building automation industry.	• Protect Nature	
PF 4.4 - Utilize energy efficient vehicles and equipment when they are available and when not otherwise limited by fiscal or functionality considerations.	• Protect Nature	
PF 4.8 - Identify public facilities (including trails and recreational amenities) that would be impacted by sea level rise, flooding or other natural hazards, and consider mitigation strategies for these facilities.	• Enhance Quality of Life • Protect Nature	
PF 4.9 - Consider mitigation strategies for impacts due to sea level rise, flooding and other natural hazards when locating and designing new facilities.	• Enhance Quality of Life • Protect Nature	
PF 5.1 - Evaluate the security of public schools and other County facilities from internal and external threats to better ensure the safety of citizens, visitors, and County staff, and to better protect County assets, sensitive data and data systems, the public water supply, and property.	• Enhance Quality of Life	
PF 5.2 - During renovation or new construction, structurally improve public facilities and buildings to better withstand physical perils (such as high wind, explosion, flooding, etc.) and to enable them to serve as shelters or otherwise continue operating in times of crisis, emergency, or severe weather.	• Enhance Quality of Life	
PF 5.4 - Strive to complete fire and emergency service accreditation through the Center for Public Safety Excellence.	• Enhance Quality of Life	
PF 5.5 - Prepare and maintain detailed emergency preparedness plans to protect the County's citizens, facilities, and infrastructure.	• Enhance Quality of Life	
PF 5.5.1 - Implement measures in County facilities to ensure safe working environments for County staff and citizens such as barriers, physical distancing, personal protective equipment (PPE) provision, and ionization and filtration for air purification in accordance with Center for Disease Control (CDC) and Virginia Department of Health (VDH) guidelines and recommendations during a pandemic.	• Enhance Quality of Life	

Population Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
PN 1.5 - Promote a variety of transportation options to address the needs of individuals with special health issues and a range of physical abilities.	• Enhance Quality of Life	
PN 2.1 - Ensure that youth have adequate and safe facilities where they may participate in programs and services.	• Enhance Quality of Life	
PN 2.4 - Ensure that seniors have adequate and safe facilities where they may participate in programs and services.	• Enhance Quality of Life	
PN 2.6 - Assess recreational interests of all citizens, with emphasis on youth and seniors, and form partnerships to create or enhance programs and facilities to serve these interests.	• Enhance Quality of Life	
PN 2.7 - Promote recreational activities inclusive of all ages and cultures and internally prioritizing programs that meet these needs.	• Enhance Quality of Life	
PN 2.8 - Support the efforts of the Youth Advisory Council to conduct surveys such as electronic (internet/web-based) surveys to identify and prioritize ideas for recreational activities/location for youth.	• Enhance Quality of Life	
PN 3.3 - Promote safety net clinics for all citizens with an emphasis on income constrained households.	• Enhance Quality of Life	

Population Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
PN 3.4 - Develop and operate a mobile integrated healthcare/community paramedicine program.	• Enhance Quality of Life	
PN 3.7 - Increase the participation of eligible families enrolled in the Family Access to Medical Insurance Security Plan (FAMIS), Cover Virginia and Supplemental Nutrition Assistance Program (SNAP) by increasing their awareness of the plans.	• Enhance Quality of Life	
PN 3.8 - Assess food insecurity for lower income households in the County and examine ways to address any identified issues such as partnerships with the nonprofit sector, or possible development incentives for private sector development (such as a grocery store).	• Enhance Quality of Life • Expand Economic Development	Short-Term in Strategic Plan
PN 4.1 - Provide education and promote awareness of physical health, mental health, and social service benefits to all citizens.	• Enhance Quality of Life	
PN 4.2 - Develop and update a Strategic Plan for Seniors (Health, Housing, and Transportation).	• Enhance Quality of Life	
PN 4.6 - Develop a plan to address the health, housing and job placement needs of homeless, lower income, and special needs populations.	• Support Affordable Housing • Enhance Quality of Life	
PN 5.1 - Facilitate extension or improvement of communications coverage in under-served areas of the County.	• Enhance Quality of Life	
PN 5.2 - Actively improve citizen awareness of computer technology and web-based services to improve their access to goods, services, and employment opportunities.	• Enhance Quality of Life	

Parks and Recreation Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
PR 1.1 - Implement the specific strategies and tactics approved in the current James City County Parks & Recreation Master Plan.	• Enhance Quality of Life	
PR 1.3 - Update and develop master plans for County-owned parks to coordinate construction phasing and validate capital improvement requests.	• Enhance Quality of Life	
PR 1.7 - Support programs that promote healthy lifestyles, such as fitness, aerobics, and wellness education.	• Enhance Quality of Life	
PR 2.2 - Update the Greenway Master Plan and develop a new strategic Action Plan based on the current needs, conditions, objectives and funding resources in order to continue to improve bike and pedestrian connectivity in the community.	• Enhance Quality of Life • Protect Nature	
PR 3.1 - Coordinate outdoor recreation, greenway, Purchase of Development Rights, greenspace, community character and environmental protection programs in order to maximize utility of shared resources and funding.	• Enhance Quality of Life • Protect Nature • Preserve Community Character	Short-Term in Strategic Plan
PR 3.2 - Submit grant applications to secure funds for new parks and recreation programs, services, facilities, and related transportation services.	• Support Affordable Housing • Enhance Quality of Life	
PR 4.1 - Seek additional waterfront access on the James, York and Chickahominy rivers to improve and expand water access and blueway trail development, especially in areas currently lacking water access, such as the lower James River.	• Enhance Quality of Life • Protect Nature	
PR 4.2 - Develop recreational components of Jamestown Beach Event Park, James City County Marina, Chickahominy Riverfront Park, and Brickyard Landing in accordance with approved master plans.	• Enhance Quality of Life	
PR 4.4 - Provide more public access to waterways for recreation and as part of a collaborative ecotourism/agritourism strategy.	• Enhance Quality of Life • Expand Economic Development	

Parks and Recreation Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
PR 5.5 - Maintain a comprehensive inventory of privately-owned recreation facilities within the County and apply a percentage of these facilities towards meeting the overall Parks and Recreation Facility and Service Standards.	• Enhance Quality of Life	
PR 6.1 - Include input from teens, at-risk youth, seniors and persons with disabilities in all master plans for new parks.	• Enhance Quality of Life	
PR 6.2 - Re-evaluate the types of programs offered based on changing County demographics and citizen desires.	• Enhance Quality of Life	
PR 6.3 - Continue to offer Inclusion services and conduct assessments with persons with disabilities to ensure necessary accessibility for participation in recreation programs.	• Enhance Quality of Life • Protect Nature	
PR 6.5 - Incorporate leadership and volunteerism in teen programs in an effort to increase skill building and employability within the County.	• Enhance Quality of Life • Expand Economic Development	
PR 6.6 - Include programs and services that build resiliency in at-risk youth and their families.	• Enhance Quality of Life	
PR 6.7 - Continue to maintain the certification of a Nationally Accredited Agency through the Commission for Accreditation of Park and Recreation Agencies.	• Enhance Quality of Life	
PR 7.2 - Plan for multiple points of access for vehicles, pedestrians and bicyclists to improve connectivity between Parks and Recreation Department facilities and surrounding neighborhoods.	• Enhance Quality of Life	
PR 7.4 - Conduct a comparative market analysis to review fees biennially to ensure that programs are offered at fair market value.	• Enhance Quality of Life	
PR 7.7 - Plan for better access to recreation programs and facilities for all through equitable geographic dispersion of facilities.	• Enhance Quality of Life	
PR 8.1 - Continue to distribute brochures and ensure timely, accurate information on the County's website and social media platforms to inform residents and visitors about parks, facilities and recreational opportunities in accordance with approved public information plans.	• Enhance Quality of Life	
PR 8.2 - Provide information at community events regarding Parks and Recreation Department programs and services.	• Enhance Quality of Life	
PR 9.1 - Enhance existing facilities and marketing efforts to fully promote an ecotourism program that promotes passive recreational opportunities within natural open spaces and special environmental and historical areas, and identify and designate public lands in support of this purpose.	• Enhance Quality of Life • Expand Economic Development	
PR 9.2 - Continue to promote interpretive signage and programs that provide educational opportunities in cultural and natural resources.	• Preserve Community Character • Enhance Quality of Life	

Transportation Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
T 1.2 - (1.2.6) - Facilitate the efficient flow of vehicles and minimizing delay through the use of means such as advanced traffic management technology.	• Preserve Community Character • Enhance Quality of Life	

Transportation Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
T 1.3 & 1.3.5 - Identify road segments with anticipated moderate to severe road capacity deficiencies and develop a plan to mitigate congestion that may include one or more of the following actions: 1.3.3 - Develop a distributed grid of routes to provide better traffic distribution in developed areas. 1.3.4 - Maximize current road capacity by adding turn lanes or travel lanes, where appropriate, in a context sensitive manner. 1.3.5 - Design and implementing transit, pedestrian, and/or cycling alternatives along the corridor containing the subject road segments, including multi-use paths and paved shoulders. 1.3.6 - Develop a Master Transportation Plan that prioritizes future road projects. 1.3.7 - Study alternative land uses along congested road segments that will reduce future traffic, with the possibility of re-designating parcels on the Future Land Use Map, transferring density or purchasing development rights.	• Preserve Community Character • Enhance Quality of Life	
T 1.4 - Create a local ranking system for prioritization of road and bike/pedestrian improvement projects using citizen priorities, with emphasis on directing a majority of capacity investments to areas within the Primary Service Area (PSA), while still providing for the maintenance and safety of the facilities for the entire transportation network.	• Preserve Community Character • Enhance Quality of Life	
T 1.6 - Examine safety and configuration improvements compatible with future high speed train service for all at-grade rail crossings in the County.	• Preserve Community Character • Enhance Quality of Life	
T 2.1 - Continue to participate in the Hampton Roads Transportation Planning Organization (HRTPO), which serves as the transportation planning body for the region.	• Preserve Community Character • Enhance Quality of Life	
T 2.2 - Continue the efforts of James City County, the City of Williamsburg, York County, and the Historic Triangle Bicycle Advisory Committee to coordinate and implement a regional bicycle network, including further joint planning and development of regional funding proposals.	• Enhance Quality of Life • Protect Nature	
T 2.3 - Recognize the importance of rail service as a viable transportation mode by participating in regional planning efforts to improve and expand rail service for people and goods.	• Expand Economic Development	
T 2.4 - Continue to research the feasibility and impacts of developing rail and bus rapid transit, which would link employers, residents, and tourists.	• Expand Economic Development • Enhance Quality of Life	
T 2.6 - Pursue funding opportunities for the Birthplace of America Trail (BoAT) and continue joint planning of the trail throughout the region.	• Enhance Quality of Life	
T 2.7 - Consider developing more detailed area plans of select Urban Development Areas (UDAs) in advance of private development proposals to ensure that key land use and transportation integration principles are incorporated, and that private development is leveraged to accomplish wider countywide goals consistent with the Comprehensive Plan. In order to accomplish these area plans, consider applying for technical assistance grants if the state issues additional grant opportunities in the future.	• Preserve Community Character • Enhance Quality of Life • Expand Economic Development	
T 3.3 - Promote increased utilization of public transit through the following actions: 3.3.1 - Continue to support transportation services throughout the Greater Williamsburg Area to improve the quality of life for all in the surrounding communities.	• Enhance Quality of Life	
T 3.6 - Continue to identify and implement changes to the transportation system that improve air quality.	• Enhance Quality of Life • Protect Nature	
T 3.7 - Develop greenways in a manner that supports their use as one element of an integrated transportation system.	• Enhance Quality of Life	

Transportation Chapter | Further Planning Efforts & New Initiatives		
Action	**Related Public Input Priorities**	**Prioritization**
T 3.8 - Develop an inventory of existing bike and pedestrian facilities and continue to update as new facilities are added.	• Enhance Quality of Life	
T 3.9 - Implement the adopted James City County Pedestrian Accommodations Master Plan and Regional Bicycle Facilities Plan by planning for bikeways and pedestrian facilities in primary and secondary road plans and projects.	• Enhance Quality of Life	
T 3.9.1 - Continue to update the Pedestrian Accommodations Master Plan based on citizen input and future studies.	• Enhance Quality of Life	
T 3.10 - Explore and develop new transportation opportunities for citizens through agencies such as Williamsburg Area Transit Authority.	• Enhance Quality of Life	
T 3.11 - Continue to partner with Williamsburg-James City County Schools in pursuit of a Safe Routes to School program that identifies primary walking and biking routes to schools and prioritizes improvements to make those routes safe for children.	• Enhance Quality of Life	
T 4.3 - Look for opportunities to incorporate landscaping and aesthetic elements in planned improvements at Park and Ride lots.	• Preserve Community Character • Enhance Quality of Life	

Partnership Opportunities Implementation Matrices

Community Character Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
CC 1.5 - Preserve the character of rural roads by identifying roads that should be preserved and work with the Virginia Department of Transportation (VDOT) to maintain their rural character while providing an acceptable level of safety.	• Preserve Community Character	Short-Term in Strategic Plan
CC 6.3 - Pursue the preservation of historic and archaeological sites of the County by: CC 6.3.1 - Enlisting the assistance of the County's Historical Commission in updating the County's inventory of historic places.	• Preserve Community Character	

Economic Development Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
ED 1.4 - Cultivate and sustain regional and state partnerships that contribute to economic development efforts, including business attraction, business retention, tourism, small and emerging business support, workforce, education, and quality of life.	• Enhance Quality of Life • Expand Economic Development	
ED 1.5 - Work with William & Mary, Thomas Nelson Community College, and other entities in support of business attraction and expansion of quality and innovative business ventures.	• Expand Economic Development	Short-Term in Strategic Plan
ED 1.7 - Encourage private/public partnerships or similar initiatives to ensure the development and attraction of quality and innovative business ventures.	• Expand Economic Development	
ED 2.2 - Support the recommendations of the Greater Williamsburg Target Sector Analysis with a particular emphasis on supporting the development of those businesses identified as legacy and emerging businesses within this study by; 2.2.2 - Explore partnerships with William & Mary and other entities to attract and expand technology companies, particularly those in the areas of sensor, robotics, modeling and simulation, bioscience, unmanned systems, and emerging technologies.	• Expand Economic Development	
ED 3.1 - Support public and private entities that engage in workforce development, like the Greater Peninsula Workforce Board.	• Expand Economic Development	

Economic Development Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
ED 3.2 - Continue working with Williamsburg/James City County Schools (WJCC), New Horizons Regional Education Center, and local colleges and universities to facilitate technical and professional opportunities for high school and college students through internship, training, and mentorship programs, with the intent of locating more of these opportunities within County.	• Expand Economic Development	
ED 3.3 - Leverage the resources of local colleges and universities to companies seeking technical and research assistance and job training.	• Expand Economic Development	
ED 3.5 - Support collaborations with the William & Mary Office of Economic Development and TNCC to enhance training opportunities that meet the needs of our existing business community and target industry sectors.	• Expand Economic Development	
ED 4.5 - Continue to support public private partnerships to revitalize unique areas within the County such as Toano.	• Preserve Community Character • Expand Economic Development	Short-Term in Strategic Plan
ED 5.1 - Collaborate with the Virginia Department of Transportation (VDOT) and adjacent localities to improve access to interstate and major arterials such as improving Route 60 East and extending Greenmount Parkway.	• Expand Economic Development	
ED 5.5 - Work with regional airport facilities to promote additional direct commercial flights to serve the destinations preferred by James City County businesses.	• Expand Economic Development	
ED 6.1 - Foster tourism development in James City County and the Historic Triangle by continuing to partner with Williamsburg Tourism Council.	• Expand Economic Development	

Environment Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 1.2 - Promote the use of Better Site Design, Low Impact Development (LID), and effective Best Management Practices (BMPs) by: 1.2.3 - Partnering with local, state, and federal agencies, and the Hampton Roads Planning District Commission (HRPDC).	• Protect Nature	
ENV 1.5.7 - Evaluate and consider opportunities for grants, cost sharing partnerships between public entities and private property owners, and other funding sources for construction of living shorelines.	• Protect Nature	
ENV 1.8 - Continue to work with the Virginia Department of Environmental Quality (DEQ), Department of Conservation and Recreation (DCR), and Virginia Department of Health (VDH) to identify existing or potential sources of surface and groundwater pollution and take action to prevent or control the effect of the sources. Continue to enforce all existing regulations to protect all water resources and adopt additional protective measures as necessary.	• Protect Nature • Enhance Quality of Life	
ENV 2.2 - Utilize the Clean County Commission to coordinate citizen efforts in participating in the County recycling program, the Adopt-A-Spot program supported by the Virginia DEQ, Division of Environmental Enhancement, and shoreline clean-up days sponsored by a variety of organizations.	• Protect Nature • Enhance Quality of Life • Preserve Community Character	Short-Term in Strategic Plan
ENV 4.9 - Proactively work with private, local, regional, state and federal organizations to implement innovative solutions to improve air quality, including through the protection and enhancement of natural resources such as forest ecosystems.	• Protect Nature • Enhance Quality of Life	
ENV 4.10 - Use resources from the HRPDC or other applicable organizations to periodically monitor sea level rise at the local and/or regional level.	• Protect Nature	
ENV 4.12 - Continuing James City County's partnership with VIMS and the HRPDC to more fully identify specific issues with respect to riverine flooding, storm surge, sea level rise, and other conditions affecting coastal flooding in James City County.	• Protect Nature	

Housing Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
H 1.1.3 - Hold an annual "Rehab Blitz" day modeled after the partnership with Habitat for Humanity and other nonprofits to target exterior rehabilitation activities in a particular neighborhood.	• Support Affordable Housing • Preserve Community Character	
H 1.1.6 - Continue to support, through marketing, partnering, and other means, nonprofit groups such as Housing Partnerships, Inc., Habitat for Humanity, Community Action Agency, and project: HOMES which have programs providing emergency home repair; preventive maintenance; and counseling in home finance, rental assistance, budgeting, and sanitary health conditions.	• Support Affordable Housing • Preserve Community Character	Short-Term in Strategic Plan
H 1.3.3 - Support private and nonprofit developers and builders that provide or preserve workforce housing by assisting them in obtaining funding and offering technical assistance.	• Support Affordable Housing	
H 2.3 - Support the adaptive reuse and repurposing of old, vacant, and/or underutilized commercial buildings as workforce housing: H 2.3.3 - Identify Virginia-based builders/developers with experience in adaptive reuse and convene a public meeting to discuss and better understand the challenges and opportunities with adaptive reuse. H 2.3.7 - Engage owners of properties that are good candidates for redevelopment or adaptive reuse to explore opportunities. H 2.3.8 - Facilitate connections among property owners and developers, and identify resources that could be employed to facilitate adaptive reuse projects.	• Support Affordable Housing • Preserve Community Character • Expand Economic Development	Short-Term in Strategic Plan
H 3.3 - Continue County support of organizations that address housing for special needs populations, including senior citizens.	• Support Affordable Housing	
H 5.1 - Support and expand access to regional housing resources: 5.1.1 - Financially support the Hampton Roads Housing Resource Portal. 5.1.2 - Link County resources to the regional portal.	• Support Affordable Housing	
H 5.4 - Participate in regional planning efforts to address regional housing issues: 5.4.1 - Coordinate with neighboring jurisdictions to address regional housing concerns and needs. 5.4.2 - Participate in Greater Williamsburg Area and Hampton Roads public/private partnerships to identify and address regional housing issues.	• Support Affordable Housing	

Land Use Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
LU 3.1 - Promote regional solutions to managing growth through the following actions: 3.1.1 - Engaging in joint planning efforts and allocating resources toward implementation. 3.1.2 - Encouraging redevelopment, compact communities, and mass transit.	• Protect Nature • Preserve Community Character • Enhance Quality of Life • Expand Economic Development • Support Affordable Housing	
LU 3.2 - Communicate with adjacent jurisdictions regarding development plans that have potential impacts on adjacent localities and public facilities. Work with them to coordinate plans and to identify and mitigate areas where there are conflicts.	• Preserve Community Character • Enhance Quality of Life • Expand Economic Development	
LU 3.3 - Continue to participate in regional planning processes with York County and the City of Williamsburg. Use the Historic Triangle Coordinated Comprehensive Plan Review Summary Report as a regional planning resource, particularly with regard to transportation and to land use issues in the three geographic focus areas (Riverside/Marquis/Busch, Lightfoot/Pottery, Northeast Triangle and Surrounding Area).	• Protect Nature • Preserve Community Character • Enhance Quality of Life	

Land Use Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
LU 3.4 - In accordance with the recommendations of the adopted Joint Base Langley Eustis (Fort Eustis) Joint Land Use Study, establish a Military Influence Overlay District (MIOD) on the Future Land Use Map. LU 3.4.1 - For areas within the MIOD, ensure a Fort Eustis representative provides input into development proposals. LU 3.4.4 - For areas within the MIOD, ensure planned CIP projects would not conflict with the mission of Fort Eustis or otherwise promote incompatible growth with the installation.	• Preserve Community Character • Expand Economic Development	
LU 4. 3 - Promote infill, redevelopment, revitalization, and rehabilitation within the PSA. Consider the following strategies as appropriate: LU 4. 3.1 - Use of financial tools such as public-private partnerships or tax increment financing. LU 4. 3.3 - Partnerships with government agencies, nonprofits, and private entities to facilitate areas identified for redevelopment.	• Protect Nature • Preserve Community Character • Expand Economic Development • Support Affordable Housing	
LU 5.2 - Through the following measures, coordinate allowable densities and intensities of proposed developments with the capacities and availability of water, public roads, schools and other facilities and services: LU 5.2.2 - Support development of State enabling legislation for adequate public facilities ordinances to extend the policies to already zoned lands, if in a form acceptable to the Board of Supervisors.	• Enhance Quality of Life • Expand Economic Development	
LU 6.1 - Promote the economic viability of traditional and innovative farming and forestry as industries through measures, including but not limited to, the following: LU 6.1.2 - Seek public and private funding for existing programs, investigate new programs, and support private or non-profit (such as land trust) actions that promote continued agricultural or forestal use of property. c. Stay informed of State legislation related to Transfer of Development Rights (TDR) and on the status of TDR programs in Virginia peer localities.	• Protect Nature • Preserve Community Character • Expand Economic Development	Short-Term in Strategic Plan (See also related action LU 1.6.)

Public Facilities Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
PF 1.4 - Develop public facilities as components of regional programs where feasible.	• Enhance Quality of Life • Expand Economic Development	
PF 1.7 - Assist with public education and promotion of existing public services, including career and technical education opportunities. Explore locating technical education and other programs within James City County.	• Enhance Quality of Life	
PF 1.9 - Encourage the provision and location of preschool programs and classrooms throughout the County utilizing government sponsored programs, public schools, private schools, private businesses, churches, nonprofits, and where appropriate, home-based preschools.	• Enhance Quality of Life	Short-Term in Strategic Plan
PF 1.13 - Encourage and support ways for private companies to expand broadband service. Broadband service initiatives could include but are not limited to updating the Zoning Ordinance when changes occur to wireless communication facilities standards, pursuing grant funds when available, and encouraging broader service areas when cable franchise agreements are negotiated.	• Enhance Quality of Life	
PF 1.14 - Collaborate with WJCC Schools to develop a long-range facilities plan.	• Enhance Quality of Life	
PF 1.15 - Support initiatives to collaborate with WJCC Schools to implement the WJCC Strategic Plan.	• Enhance Quality of Life	

Population Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
PN 1.2 - Encourage retrofit of existing high density and multifamily developments and senior living communities to provide stops for public transportation and mobile services.	• Enhance Quality of Life • Protect Nature	
PN 1.4 - Develop new partnerships and alternative means to improve multimodal transportation services within the County.	• Enhance Quality of Life • Protect Nature	
PN 2.2 - Expand access to quality preschool service and affordable childcare through the Bright Beginnings Program and collaborations with Child Development Resources, Advancing Community Excellence (formerly the Community Action Agency) and other partners.	• Enhance Quality of Life	
PN 4.3 - Work with senior-serving agencies to coordinate services to seniors.	• Enhance Quality of Life	
PN 4.4 - Participate in the development of community-wide needs assessments and strategic plans initiated by community organizations and develop a process for staff to report on the progress of these efforts to the Board of Supervisors.	• Enhance Quality of Life	
PN 4.5 - Continue to participate in the Greater Virginia Peninsula Homelessness Consortium and support organizations and/or programs that provide relief for homelessness such as shelter, food, medication, and education.	• Enhance Quality of Life • Support Affordable Workforce Housing	

Parks and Recreation Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
PR 1.5 - Develop parks and fields in conjunction with new school development whenever possible and continue to collaborate with Williamsburg-James City County Schools during the site design process.	• Enhance Quality of Life	
PR 1.6 - Enhance and implement partnerships with Williamsburg-James City County Schools to offer joint programming opportunities and efficiently and fully utilize all athletic fields and gymnasiums to serve both school and community needs.	• Enhance Quality of Life	
PR 2.1 - Continue to coordinate with the Virginia Department of Transportation (VDOT), the Historic Triangle Bicycle Advisory Committee, and local running, hiking and bicycling clubs to develop a bikeway network consistent with the adopted Regional Bikeways Map.	• Enhance Quality of Life • Protect Nature	
PR 2.2.2 - Collaborate with adjacent localities, developers and other interested organizations to align and integrate plans so as to increase bike/pedestrian connectivity.	• Enhance Quality of Life • Protect Nature	
PR 2.3 - Continue to collaborate regionally to improve connectivity of open space, including but not limited to working with Hampton Roads Planning District Commission (HRPDC) and County staff to develop a local level green infrastructure map, which identifies critical natural, cultural and recreational networks, and develop a plan for implementation.	• Enhance Quality of Life • Protect Nature • Preserve Community Character	
PR 2.4 - Work with the National Park Service to realize the recreational and cultural potential of national park sites within James City County.	• Enhance Quality of Life	
PR 4.3 - Collaborate with the National Park Service to continue to provide trail information at designated Chesapeake Bay Gateways and for the Captain John Smith water trail.	• Enhance Quality of Life	
PR 7.1 - Work with Williamsburg Area Transit Authority to improve the public transportation service to County parks and facilities.	• Enhance Quality of Life	
PR 7.5 - Identify potential partnerships with neighborhoods to develop neighborhood programming.	• Preserve Community Character • Enhance Quality of Life	
PR 7.6 - Work collaboratively with lower-income neighborhoods to facilitate improvements to neighborhood parks and recreation facilities.	• Preserve Community Character • Enhance Quality of Life	

Transportation Chapter | Partnership Opportunities		
Action	**Related Public Input Priorities**	**Prioritization**
T 1.5 - Coordinate with the Virginia Department of Transportation (VDOT), adjoining jurisdictions, and prospective developers to implement the most contextually appropriate multimodal improvements for the roadway system.	• Preserve Community Character • Enhance Quality of Life	
T 1.7 - Coordinate the County resiliency plan with VDOT to ensure the County road system is resilient to future sea-level rise and recurring tidal and non-tidal flooding by conducting an analysis of roadways and bridges within areas of future high flood risk.	• Enhance Quality of Life • Protect Nature • Preserve Community Character	Short-Term in Strategic Plan (See also related action ENV 3.7.2)
T 3.3 - Promote increased utilization of public transit through the following actions: 3.3.2 - Pursue greater interconnection between the local and regional transit systems.	• Enhance Quality of Life	
T 3.5 - Work with VDOT to design new or enhanced complete streets that allow for the safe accommodation of automobiles, public transit, pedestrians, cyclists, and other users. Ensure that new roadway improvements by VDOT conform to the Department of Rail and Public Transportation Multimodal Design Guidelines, which have been adopted by VDOT in their current Road Design Manual.	• Enhance Quality of Life	
T 3.12 - Continue to partner with VDOT on promoting park and ride facilities in the County and support the 24-hour operation of the Jamestown-Scotland Ferry.	• Enhance Quality of Life	

Guidance for Development Approvals and Enforcement Implementation Matrices

Community Character Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
CC 1.1 - Ensure that development along Community Character Corridors (CCCs) protects the natural views of the area; promotes the historic, rural, or unique character of the area; and establishes entrance corridors that enhance the experience of residents and visitors.	• Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
CC 1.6 - Development along roads that are important to maintain community character should be carefully monitored so that the build out of surrounding areas will not require improvements such as road widening that disrupt the community character of the areas.	• Preserve Community Character	Used daily in making land use related decisions.
CC 2.1 - Ensure that development in CCAs protects the natural views of the area; promotes the historic, rural, or unique character of the area; and establishes entrance corridors that enhance the experience of residents and visitors.	• Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
CC 2.3 - In New Town, continue to support the design review process by working closely with the New Town Design Review Board and supporting the implementation of New Town's design guidelines.	• Preserve Community Character • Expand Economic Development	Used daily in making land use related decisions.
CC 2.3.1 - For areas within the New Town CCA but not subject to the New Town Master Plan and/or proffers, encourage new development to be consistent with existing adjacent development and the New Town design guidelines.	• Preserve Community Character • Expand Economic Development	Used daily in making land use related decisions.
CC 2.4 - In Toano, encourage developers to apply the adopted design guidelines to projects within the Toano CCA.	• Preserve Community Character • Expand Economic Development	Used daily in making land use related decisions.
CC 2.5 - In Five Forks, encourage developers to apply the adopted Primary Principles to projects within the Five Forks CCA.	• Preserve Community Character • Expand Economic Development	Used daily in making land use related decisions.

Community Character Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
CC 3.1 - Protect vistas and other scenic resources and encourage building, site, and road designs that enhance the natural landscape and preserve valued vistas. These designs should also minimize any potential negative impacts with regard to noise and light pollution and other quality of life concerns.	• Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
CC 3.2 - Require illustrative drawings, including streetscapes, architecture, and perspectives as a binding component for appropriate rezoning and special use permit applications.	• Preserve Community Character • Expand Economic Development	Used daily in making land use related decisions.
CC 4.1 - Continue to gather and gain technical knowledge on data that is available to help the County identify and map its archaeological, historic, and cultural assets, and, where appropriate, use such data as an information tool to help guide decisions during the creation of regulations and policies, to provide guidance to property owners and development proposal applicants on lands best suited for development, and to inform open space preservation efforts.	• Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
CC 5.2 - Promote the Optional Specimen Tree Designation to enable more developers to preserve specimen trees that are not within required tree save areas.	• Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
CC 5.3 - Continue to enforce existing methods/requirements the County uses during planning, pre-construction, construction, and post-construction phases to make sure tree preservation measures are properly performed, resulting in healthier trees, buffers, and proper maintenance.	• Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
CC 6.1 - Require that archaeological studies for development proposals are conducted and require their recommendations to be implemented.	• Preserve Community Character	Used daily in making land use related decisions.

Economic Development Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
ED 4.2 - Encourage new development and redevelopment of non-residential uses to occur mainly in areas where public utilities are either available or accessible within the Primary Service Area (PSA) and infrastructure is supportive.	• Preserve Community Character • Protect Nature • Expand Economic Development	Used daily in making land use related decisions.

Environment Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 1.1 - Using adopted plans and regulations for guidance, pursue development and land use decisions, redevelopment approaches, and reduction of pollution sources that protect and improve the function of wetlands and the quality of water bodies.	• Protect Nature	Used daily in making land use related decisions.
ENV 1.3 - Through the County's Chesapeake Bay Preservation Ordinance, continue to enforce Resource Protection Areas (RPAs) protecting all tidal wetlands, tidal shores, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow, perennial streams, a 100-foot-wide buffer adjacent to and landward of other RPA components, and drinking water reservoirs.	• Protect Nature	Used daily in making land use related decisions.
ENV 1.5.1 - Refer to the guidance presented in the locality's Comprehensive Coastal Resource Management Portal (CCRMP) prepared by the Virginia Institute of Marine Science (VIMS) to guide regulation and policy decisions regarding shoreline erosion control: www.vims.edu/ccrm/ccrmp/portals/james_city/index.php	• Protect Nature	Used daily in making land use related decisions.

Environment Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
ENV 1.5.2 - Utilize established VIMS "decision trees" for on-site review and CCRM Shoreline Best Management Practices for subsequent selection of appropriate erosion control/shoreline BMPs: www.ccrm.vims.edu/decisiontree/index.html	• Protect Nature	Used daily in making land use related decisions.
ENV 1.5.6 - Promote the preservation of open space in areas adjacent to marsh lands to allow for inland retreat of vegetation and additional water containment areas as sea level rises.	• Protect Nature	Used daily in making land use related decisions.
ENV 1.6 - Ensure that water dependent activities such as marinas and docks are located and conducted in an environmentally sensitive manner and include adequate marine sanitation facilities.	• Protect Nature	Used daily in making land use related decisions.
ENV 1.10 - Continue to protect water resources from on-site sewage disposal system failure by: 1.10.1 - Continuing to require Health Department approval for all subdivisions making use of on-site sewage disposal systems. 1.10.2 - Continuing to maintain minimum lot sizes for any property containing an on-site sewage disposal system. 1.10.3 - Continuing to require primary and reserve drain fields for subdivisions with applicable on-site sewage disposal systems. 1.10.4 - Continuing to require the pump out of on-site sewage disposal tanks every five years. 1.10.5 - Continuing to monitor non-traditional on-site sewage disposal trends.	• Protect Nature	Used daily in making land use related decisions.
ENV 1.11 - Continue to implement the Chesapeake Bay Preservation Ordinance in order to protect water quality in all drinking water reservoirs within the County.	• Protect Nature	Used daily in making land use related decisions.
ENV 1.14- Continue to minimize post-construction stormwater impacts through implementation of BMPs to reduce pollutants entering the stormwater system and County waterways by: 1.14.1 - Utilizing available resources, including enforcement of maintenance agreements and covenants.	• Protect Nature	Used daily in making land use related decisions.
ENV 1.15 - Ensure that the County's Municipal Separate Storm Sewer System (MS4) Permit is fully implemented in accordance with the annual program plan and General Permit Number VAR040037: 1.15.3 - Continue to detect and eliminate illegal discharges to the storm sewer system through maintenance of accurate system mapping, annual screening activities and enforcement of County Codes prohibiting illegal discharges. 1.15.4 - Continue to implement programs and ordinances to limit pollution from construction sites through plan approvals, regular inspections and other methodologies. 1.15.5 - Continue to minimize post-construction stormwater impacts through implementation of BMPs to reduce pollutants entering the stormwater system and County waterways. 1.15.6 – Continue to implement pollution prevention and good housekeeping efforts within the County's MS4 service area in order to minimize pollutants from County activities.	• Enhance Quality of Life • Protect Nature	Used daily in making land use related decisions.
ENV 3.6 - Ensure that site development projects, including those initiated by the County, are consistent with the protection of environmentally sensitive areas so that development projects do not exacerbate flooding in flood prone areas.	• Enhance Quality of Life • Protect Nature	Used daily in making land use related decisions.

Housing Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
H 1.18 - Use neighborhood improvement programs and County Code enforcement to discourage blight and the deterioration of housing and neighborhoods.	• Preserve Community Character • Support Affordable Workforce Housing	Used daily in making land use related decisions.

Housing Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
H 2.1 - Guide new developments to incorporate high housing quality and design: 2.1.1 - Promote residential development that provides a range of home types and prices, includes open space and recreational amenities, and permits walking and biking. 2.1.2 - Require adequate street lighting, safe and convenient pedestrian circulation, and appropriate interconnections between residential developments. 2.1.3 - Guide new residential development to areas served by public utilities and that are convenient to public transportation, major thoroughfares, employment centers, schools, recreation facilities, and shopping facilities.	• Preserve Community Character • Support Affordable Workforce Housing	Used daily in making land use related decisions.
H 3.5 - Promote affordable senior housing options, from independent living to Continuing Care Retirement (CCRCs) and skilled care, for all.	• Support Affordable Workforce Housing	Used daily in making land use related decisions.

Land Use Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
LU 1.4 - Require that any development of new public streets, public parks or other public areas, public buildings or public structures, public utility facilities, or public service corporation facilities, inside or outside the Primary Service Area (PSA), be subject to individualized review as provided under Section 15.2-2232, Legal Status of Plan, of the Code of Virginia, as amended.	• Preserve Community Character	Used daily in making land use related decisions.
LU 1.8 - Use the conceptual plan process to provide early input and to allow applicants to better assess critical issues with the goal of having a predictable and timely development plan approval process.	• Enhance Quality of Life	Used daily in making land use related decisions.
LU 2.1 - Plan for and encourage the provision of strategically located greenways, sidewalks, and bikeways to connect neighborhoods with retail and employment centers, parks, schools, and other public facilities and to effectively connect buildings and activities within individual sites, using the Pedestrian Accommodations Master Plan, the Historic Triangle Regional Bikeways Map, the Greenway Master Plan and other adopted plans for guidance.	• Protect Nature • Preserve Community Character • Enhance Quality of Life	Used daily in making land use related decisions.
LU 2.2 - Facilitate the provision of road interconnections within new developments and between arterial and collector roads by promoting land use and road patterns within the developments which are conducive to such interconnections.	• Preserve Community Character • Enhance Quality of Life	Used daily in making land use related decisions.
LU 4.1 - Enforce policies of the Comprehensive Plan to steer growth to appropriate sites in the PSA.	• Protect Nature • Preserve Community Character • Enhance Quality of Life • Expand Economic Development	Used daily in making land use related decisions.
LU 4.2 - Provide for low density and moderate density residential development in appropriate locations inside the PSA and prohibit such development on rural lands outside the PSA.	• Protect Nature • Preserve Community Character • Support Affordable Workforce Housing	Used daily in making land use related decisions.
LU 4. 4 - Accommodate mixed-use development within the PSA, as further defined in the Mixed Use land use designation and development standards. Support design flexibility to promote mixing of various types of residential and non-residential uses and structures. Encourage mixed use developments and complete communities to develop in compact nodes in well-defined locations within the PSA.	• Preserve Community Character • Enhance Quality of Life • Expand Economic Development • Support Affordable Workforce Housing	Used daily in making land use related decisions.

Land Use Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
LU 4. 5 - Through the development process, reinforce clear and logical boundaries for commercial and industrial property within the PSA. 4.5.1 - Provide sufficient buffering and open space from nearby residential uses. 4.5.2 - Develop in a node pattern with a grid of internal parcels, internal streets, and judicious external connections, rather than in a strip pattern with individual connections along a single street.	• Preserve Community Character • Enhance Quality of Life • Expand Economic Development	Used daily in making land use related decisions.
LU 4. 6 - Emphasize the economic potential of interstate interchanges and encourage a mix of uses. Maintain land use policies and other measures to achieve this strategy.	• Expand Economic Development	Used daily in making land use related decisions.
LU 5.1 - Encourage development of public facilities and the provision of public services within the PSA. As one component of this, maintain a utility policy that, along with other tools such as zoning regulations, supports the PSA as the growth boundary. Within the PSA, extend water and sewer service according to a phased plan in accordance with the County's Comprehensive Plan and JCSA's master water/sewer planning. Outside the PSA, restrict the extension of water and sewer utilities.	• Expand Economic Development • Support Affordable Housing • Enhance Quality of Life • Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
LU 5.2 - Through the following measures, coordinate allowable densities and intensities of proposed developments with the capacities and availability of water, public roads, schools and other facilities and services: 5.2.3 - Permit higher densities and more intensive development in accordance with the Future Land Use Map where such facilities and services are adequately provided.	• Enhance Quality of Life	Used daily in making land use related decisions.
LU 5.3 - Ensure that developments are subject to zoning or special use permit review to mitigate their impacts through the following means: 5.3.1 - Require sufficient documentation to determine the impacts of a proposed development, including but not limited to studies of traffic impact, capacity of public schools, historic and archaeological resources, water quality and quantity, other environmental considerations, and fiscal impact. 5.3.2 - Ensure that the recommendations of such studies are adequately addressed prior to preparation of development plans, or in instances where a rezoning or special use permit is required, as part of those applications.	• Expand Economic Development • Support Affordable Housing • Enhance Quality of Life • Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
LU 6.1 - Promote the economic viability of traditional and innovative farming and forestry as industries through measures, including but not limited to, the following: LU 6.1.6 - Protect farming and forestry uses from conflicting activities by encouraging buffers and open space design and by raising awareness among new rural land purchasers about existing farming and forestry uses in the County.	• Protect Nature • Preserve Community Character • Expand Economic Development	Used daily in making land use related decisions.

Public Facilities Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
PF 1.6 - Apply appropriate zoning, land use, and other adopted County criteria when evaluating public facility sites and uses.	• Expand Economic Development • Enhance Quality of Life • Protect Nature • Preserve Community Character	Used daily in making land use related decisions.
PF 2.4 - Maintain and use the fiscal impact model to inform development reviews and facility planning in the County.	• Enhance Quality of Life	Used daily in making land use related decisions.
PF 3.1 - Evaluate the accessibility, capacity and adequacy of new facilities to absorb new development and ensure that development recommendations take this information into account.	• Enhance Quality of Life	Used daily in making land use related decisions.

Public Facilities Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
PF 3.2 - Continue to use the Adequate Public Schools Facilities Test Policy consistent with the WJCC Schools capacity projection methodology. Consider revising the Policy to incorporate the new leave-behind models.	• Enhance Quality of Life	Used daily in making land use related decisions.
PF 3.4 - Apply public facility standards to define facility requirements associated with level of need, appropriate quantity, size, and relationship to population and growth areas.	• Enhance Quality of Life	Used daily in making land use related decisions.
PF 3.6 - Support alternative water supply and conservation projects, such as collection and use of stormwater, reuse of gray water, and reclamation of wastewater, where practical and financially feasible. Identify projects that might benefit from such applications, such as golf course irrigation or new residential, commercial, or industrial uses.	• Protect Nature	Used daily in making land use related decisions.
PF 3.9 - Support initiatives to refine the fiscal impact model to assess development impacts on fiscal health.	• Expand Economic Development • Enhance Quality of Life	Used daily in making land use related decisions.
PF 4.2.1 - Construct new County facilities in accordance with the County's Sustainable Building Policy.	• Protect Nature	Used daily in making land use related decisions.
PF 4.3 - Utilize Low-Impact Development (LID) designs for newly constructed facilities, and where practical, for renovations of existing County facilities.	• Protect Nature	Used daily in making land use related decisions.
PF 4.5 - Evaluate all proposed public facilities for potential impacts and provide buffering and mitigation equal to, or greater than (when practical), that required under County Ordinances.	• Enhance Quality of Life • Preserve Community Character	Used daily in making land use related decisions.
PF 4.6 - Incorporate architectural design features in buildings and structures erected by the County, which support quality design and appearance that enhances local community character.	• Enhance Quality of Life • Preserve Community Character	Used daily in making land use related decisions.
PF 5.3 - Locate and design new public facilities with consideration of Crime Prevention Through Environmental Design (CPTED) principles to protect both County facilities and the people utilizing them. Use CPTED principles when renovating facilities wherever applicable and practical.	• Enhance Quality of Life	Used daily in making land use related decisions.

Population Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
PN 1.1 - Promote public transportation and mobile services stops, within or adjacent to, new high density and multifamily housing and senior living communities.	• Protect Nature • Enhance Quality of Life	Used daily in making land use related decisions.
PN 1.3 - Make destinations more accessible from home and school for all citizens, with an emphasis on youth and seniors, by implementing the Greenway Master Plan, the Pedestrian Accommodation Master Plan, the Regional Bikeway Master Plan, and the Parks and Recreation master plans and integrating them into the design of new development proposals and other projects.	• Protect Nature • Enhance Quality of Life	Used daily in making land use related decisions.
PN 2.3 - Encourage and promote additional safe and licensed childcare businesses, including home-based childcare, near adequate and accessible transportation routes.	• Expand Economic Development • Enhance Quality of Life	Used daily in making land use related decisions.
PN 2.5 - Encourage and promote additional safe and licensed adult care businesses, including home-based adult care, near adequate and accessible transportation routes.	• Expand Economic Development • Enhance Quality of Life	Used daily in making land use related decisions.
PN 3.5 - Encourage and increase awareness of affordable senior housing options, from independent living to Continuing Care Retirement Communities (CCRCs) and skilled care, for all.	• Support Affordable Housing • Enhance Quality of Life	Used daily in making land use related decisions.
PN 4.7 - Continue to support the concept of "aging in place" by promoting strategies such as multigenerational housing for a portion of units in major subdivisions or multifamily projects and/or units built based on the principle of Universal Design making them accessible to all people, regardless of age, disability, or other factors.	• Support Affordable Housing • Enhance Quality of Life	Used daily in making land use related decisions.

Parks and Recreation Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
PR 5.1 - Continue to encourage new development proposals to identify on-site natural resources and design the development layout in a manner that places the natural resources within protected open space parcels.	• Protect Nature • Enhance Quality of Life	Used daily in making land use related decisions.
PR 5.2 - Encourage new developments to dedicate right-of-way and to construct sidewalks, bikeways, and greenway trails for transportation and recreation purposes, and to construct such facilities concurrent with road improvements and other public projects in accordance with the Pedestrian Accommodation Master Plan, the Regional Bikeways Map, and the Greenway Master Plan.	• Protect Nature • Enhance Quality of Life • Preserve Community Character	Used daily in making land use related decisions.
PR 5.3 - Encourage new developments requiring legislative review to provide public recreation facilities consistent with standards in the Parks and Recreation Master Plan. New developments should have neighborhood parks with trails, bikeways, playgrounds, practice fields, sports courts, and open spaces.	• Preserve Community Character • Enhance Quality of Life	Used daily in making land use related decisions.

Transportation Chapter | Guidance for Development Approvals and Enforcement		
Action	**Related Public Input Priorities**	**Prioritization**
T 1.1 - Ensure that new development supports the Community Character Corridor designations of existing and proposed roads. 1.1.1 - Utilize the Travel Demand Leave Behind Model to assess the cumulative impact of new and existing developments.	• Protect Nature • Enhance Quality of Life • Preserve Community Character • Expand Economic Development	Used daily in making land use related decisions.
T 1.2 - Expect new development to follow recommended densities, intensities, and development patterns that will maintain an acceptable level of service on the surrounding roads and intersections consistent with the land use context (rural, suburban, urban) and the functional classification of the roadway. Ensure that new developments do not compromise planned transportation enhancements.	• Preserve Community Character	Used daily in making land use related decisions.
T 1.3 - Identify road segments with anticipated moderate to severe road capacity deficiencies and develop a plan to mitigate congestion that may include one or more of the following actions: 1.3.2 - Avoid the development of high automobile traffic generating uses in or near the subject road segments, as allowed by the Code of Virginia.	• Preserve Community Character • Enhance Quality of Life	Used daily in making land use related decisions.
T 2.5 - Coordinate with Williamsburg Area Transit Authority (WATA) and/or Hampton Roads Transit Authority (HRT) during review of development applications to ensure that proposals are conducive to incorporating the use of transit.	• Enhance Quality of Life	Used daily in making land use related decisions.
T 3.3 - Promote increased utilization of public transit through the following actions: 3.3.3 - Encourage land use development patterns that provide or are accessible to public transit. 3.3.4 - Encourage locating transit-dependent land uses in areas currently served by transit or in areas to be served by transit in the near future.	• Preserve Community Character • Enhance Quality of Life	Used daily in making land use related decisions.
T 4.1 - Guide new developments in designing roadway and parking areas that reduce the visual impact of auto-related infrastructure, especially in Community Character Areas.	• Preserve Community Character • Enhance Quality of Life	Used daily in making land use related decisions.

Updating and Amending the Plan

The Comprehensive Plan represents a long-term vision for the future. It is meant to guide policy decisions for James City County for the long-term; however, the community will likely experience changes throughout the next several years. In order for the Comprehensive Plan to remain a relevant, living document, the Code of Virginia (§ 15.2-2223) requires that local governments update comprehensive plans every five years. James City County takes this requirement and the need to maintain a relevant plan that is representative of community aspirations and current planning issues very seriously. The County is committed to conducting robust public engagement efforts to ensure the Comprehensive Plan is at the forefront of decision-making. As the true value of planning lies ultimately in the implementation of community supported ideas, the County will conduct an update to the James City County 2035 Strategic Plan that will incorporate this Plan's GSAs.

Questions / Comments:

James City County Planning Division
Office Hours: Monday - Friday, 8 a.m. - 5 p.m.
Address: 101 Mounts Bay Road, Building A
Williamsburg, VA 23185
Phone Number: 757-253-6685
Email Address: planning@jamescitycountyva.gov

Note: All maps included in this document are available as digital files or larger scale prints upon request.

June 2022 Final

Hampton Roads Hazard Mitigation Plan







City of Hampton
City of Newport News
City of Poquoson
City of Williamsburg
James City County
York County
City of Norfolk
City of Portsmouth
City of Suffolk
City of Virginia Beach
City of Chesapeake
Isle of Wight County
Town of Smithfield
Town of Windsor
City of Franklin
Southampton County
Surry County
Town of Claremont
Town of Dendron

AECOM

REPORT DOCUMENTATION

TITLE	REPORT DATE
Hampton Roads Hazard Mitigation Plan	June 2022 Final

ABSTRACT

The *Hampton Roads Hazard Mitigation Plan* has been updated for 2022. The region is vulnerable to a wide range of hazards that threaten the safety of residents and have the potential to damage or destroy both public and private property and disrupt the local economy and overall quality of life. While the threat from hazards may never be fully eliminated, the *Hampton Roads Hazard Mitigation Plan* recommends specific actions designed to protect residents, business owners and the built environment.

GRANT/SPONSORING AGENCY

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ACKNOWLEDGEMENTS

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INTRODUCTION

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2022 UPDATE

As part of the 2022 update process, participating communities and stakeholders were engaged in a facilitated process to review all plan components in light of new circumstances. Accordingly, each section of this plan has been updated. At the beginning of each section, there is a synopsis of the changes made to that section as part of the update. The biggest changes for 2022 are in Section 5 and include new information regarding social vulnerability and climate change impacts for each of the hazards assessed in detail in this plan. Pandemic Flu or Communicable Disease and Radon Exposure were added as hazards of interest in the region.

Section 1 was updated to modify the scope to include Surry County, the Town of Dendron and the Town of Claremont, which participated in this Hampton Roads planning process for the first time.

BACKGROUND

The Hampton Roads region of southeastern Virginia is vulnerable to a wide range of natural hazards that threaten the safety of residents and have the potential to damage or destroy both public and private property and disrupt the local economy and overall quality of life.

While the threat from hazards may never be fully eliminated, much can be done to lessen their potential impact. The concept and practice of reducing risks associated with known hazards is referred to as *hazard mitigation*. As discussed in the National Mitigation Framework, mitigation includes the capabilities necessary to reduce loss of life and property by lessening the impact of disasters.

FEMA Definition of Hazard Mitigation

"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures, such as strengthening or protecting buildings and infrastructure, and non-structural measures, such as the adoption of sound land use or floodplain management policies and the creation of public awareness programs. Effective mitigation measures are often implemented at the county or municipal level, where decisions that regulate and control development are made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, projected patterns of future development must be evaluated and considered in terms of how that growth will increase or decrease a community's hazard vulnerability over time.

As a community formulates a comprehensive approach to reduce the impacts of hazards, a key means to accomplish this task is through the development, adoption, and regular update of a local hazard mitigation plan. A hazard mitigation plan establishes the community vision, guiding principles, and the specific actions designed to reduce current and future hazard vulnerabilities.

The Hampton Roads Hazard Mitigation Plan (hereinafter referred to as "Hazard Mitigation Plan", "Plan", or "HMP") is a logical part of incorporating hazard mitigation principles and practices into routine government activities and functions. The Plan recommends specific actions designed to protect residents, business owners, and the developed environment from those hazards that pose the greatest risk. Mitigation actions should go beyond recommending structural solutions to reduce existing vulnerability, such as elevation of structures, retrofitting, and acquisition projects. Local policies that guide community growth and development, incentives tied to natural resource protection, and public awareness and outreach activities should be considered to reduce the region's future vulnerability to identified hazards.

In keeping with federal requirements and to present a review of Hampton Road's risk and vulnerability, state and regional capabilities, and current local capabilities, the Hampton Roads Planning District Commission (HRPDC) prepared this updated Hazard Mitigation Plan over the course of 2021. The planning committee worked throughout the planning period to update mitigation goals, objectives, and recommended actions, as outlined in detail in Section 2. As part of the ongoing mitigation planning process, this Plan is the result of the 2021/2022 mitigation evaluation.

DISASTER MITIGATION ACT OF 2000

In an effort to reduce the Nation's mounting natural disaster losses, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000). Section 322 of DMA 2000 requires that state and local governments develop a hazard mitigation plan in order to remain eligible for pre- and post-disaster mitigation funding. These funds include the Hazard Mitigation Grant Program (HMGP), Hazard Mitigation Assistance (HMA) and the Pre-Disaster Mitigation (PDM) program, which are administered by the Federal Emergency Management Agency (FEMA). Communities with an adopted and federally-approved hazard mitigation plan are eligible for available mitigation funds before and after the next disaster strikes.

This Plan was prepared and updated in coordination with FEMA and the Virginia Department of Emergency Management (VDEM) to make certain it meets all applicable state and federal mitigation planning requirements. In addition, guidance from the March 2013 FEMA manual, *Local Mitigation Planning Handbook* was used by the committee and professional consultants to guide the plan update process. The *Local Mitigation Plan Review Tool*, found in Appendix A, provides a summary of FEMA's current minimum standards of acceptability, and notes the location within the Plan where each planning requirement is met.

NATIONAL MITIGATION FRAMEWORK

The National Mitigation Framework establishes a common platform and forum for coordinating and addressing how the Nation manages risk through mitigation capabilities. Mitigation reduces the impact of disasters by supporting protection and prevention activities, easing response, and speeding recovery to create better prepared and more resilient communities. This Framework describes mitigation roles across a whole community. The Framework addresses how the Nation will develop, employ, and coordinate core mitigation capabilities to reduce loss of life and property by lessening the impact of disasters. Building on a wealth of objective and evidence-based knowledge and community experience, the Framework seeks to increase risk awareness and leverage mitigation products, services, and assets across a whole community or, in this case, across a region.

National Mitigation Framework, Second Edition, June 2016, was published by the Department of Homeland Security to further discuss seven core capabilities required for entities involved in mitigation:

threats and hazards identification, risk and disaster resilience assessment, planning, community resilience, public information and warning, long-term vulnerability reduction, and operational coordination. The document focuses on the need for the whole community (or region) to be engaged in examining and implementing the doctrine contained in the Framework and to create a culture that embeds risk management and mitigation in all planning, decision making and development.

The operational work plan for this Hazard Mitigation Plan Update considered the objectives of the National Mitigation Framework in many aspects of its implementation: building the committee and choosing committee leaders; providing risk and vulnerability data early in the planning process; requesting capability update information from communities to foster understanding of capability gaps early in the planning process; and creating regional mitigation actions that help create a culture of mitigation at the local and regional levels that brings together a larger group of stakeholders.

PURPOSE

The general purposes of this Hazard Mitigation Plan are to:

- protect life and property by reducing the potential for future damages and economic losses that result from natural hazards;
- qualify for additional grant funding, in both the pre-disaster and post-disaster environment;
- speed recovery and redevelopment following future disasters;
- integrate existing mitigation documents;
- demonstrate a firm local commitment to hazard mitigation principles; and
- comply with state and federal legislative requirements tied to local hazard mitigation planning.

SCOPE

This Hazard Mitigation Plan shall be updated and maintained to continually address those natural hazards determined to be of high and moderate risk as defined by the results of the risk assessment (see "Conclusions on Hazard Risk" in Section 5: *Vulnerability Assessment*). This enables Hampton Road's planning committees to prioritize mitigation actions based on those hazards which present the greatest risk to lives and property.

The planning area includes the following communities in Hampton Roads, which were further broken down into 3 categories based on geography:

The Peninsula:

City of Hampton
City of Newport News
City of Poquoson
City of Williamsburg
James City County
York County

The Southside:

City of Norfolk
City of Portsmouth
City of Suffolk
City of Virginia Beach
City of Chesapeake

Western Tidewater:

Isle of Wight County
Town of Smithfield
Town of Windsor
City of Franklin
Southampton County
Surry County
Town of Claremont
Town of Dendron

AUTHORITY

This updated Hazard Mitigation Plan was adopted by each of the participating communities in 2022. A copy of each resolution adopting the Plan is included in Appendix B.

This Plan was developed and updated in accordance with current state and federal rules and regulations governing local hazard mitigation plans. The Plan shall be monitored and updated on a routine basis to maintain compliance with the following legislation:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390); and
- Title 44 Code of Federal Regulations, Part 201, used as the basis for the October 1, 2011, update to FEMA's *Local Mitigation Plan Review Guide*.

APPENDICES

Several appendices are used to provide additional background information and references for information included in this plan. The appendices are referenced within the text, but are included her as an additional tool for navigating the document:

Appendix A - Local Hazard Mitigation Plan Review Crosswalk
Appendix B – Resolutions of Adoption
Appendix C - Hazard Mitigation Planning Committee and Public Meeting Advertisements and Minutes
Appendix D – Public Participation Survey Responses
Appendix E – Review Comments
Appendix F – Mitigation Action Status
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PLANNING PROCESS

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2022 UPDATE

Summaries of each meeting and the procedures followed during the update process were updated for each subsection. Summaries of previous planning processes were removed for brevity and because they are available in previous plans.

OVERVIEW OF MITIGATION PLANNING

Local hazard mitigation planning involves the process of organizing community resources, identifying and assessing hazard risks, and determining how to minimize or manage those risks. This process results in a hazard mitigation plan that identifies specific actions designed to meet the goals established by those that participate in the planning process. To ensure the functionality of each mitigation action, responsibility is assigned to a specific individual, department or agency along with a schedule for its implementation. Plan maintenance procedures are established to help ensure that the plan is implemented, as well as evaluated and enhanced as necessary. Developing clear plan maintenance procedures helps ensure that the Hazard Mitigation Plan remains a current, dynamic, and effective planning document over time.

Participating in a hazard mitigation planning process can help local officials and citizens achieve the following results:

- save lives and property;
- save money;
- speed recovery following disasters;
- reduce future vulnerability and increase future resiliency through wise development and post-disaster recovery and reconstruction;
- enhance coordination within and across neighboring jurisdictions;
- expedite the receipt of pre-disaster and post-disaster grant funding; and
- demonstrate a firm commitment to improving community health and safety.

Mitigation planning is an important tool to produce long-term recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that pre-disaster investments will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, improving water quality, maintaining environmental health, and enhancing recreational opportunities. It is the intent of this document to help identify overlapping community objectives and facilitate the sharing of resources to achieve multiple aims, and to include information wherever possible to demonstrate when the plan is or has been implemented through other planning mechanisms.

PREPARING THE PLAN

44 CFR Requirement

44 CFR Part 201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

The HRPDC used FEMA guidance (FEMA Publication Series 386) to develop and update this Hazard Mitigation Plan. A Local Mitigation Plan Review Tool, found in Appendix A, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within the Plan. These standards are based upon FEMA's Interim Final Rule as published in the Federal Register on February 26, 2002, and October 31, 2007, in Part 201 of the Code of Federal Regulations (CFR).

The planning process included eight major steps that were completed during 2021 through 2022; they are shown in green and yellow in **Figure 2.1**. Each of the planning steps illustrated in Figure 2.1 resulted in work products and outcomes that collectively make up the Hazard Mitigation Plan.

Table 2.1 provides a summary of the National Flood Insurance Program's Community Rating System (CRS) User's Manual 10-step guidance for plan preparation and how that guidance fits within the 10-step, 4-phase process advocated by FEMA. This plan strives to accomplish the steps in each of these processes.

TABLE 2.1: FEMA GUIDANCE AND CRS HAZARD MITIGATION PLANNING GUIDANCE	
FEMA Guidance	**CRS Guidance**
Phase I: Organize Resources Step 1. Get Organized Step 2. Plan for Public Involvement Step 3. Coordinate with Other Departments & Agencies	 Step 1. Organize Step 2. Involve the Public Step 3. Coordinate
Phase II: Assess Risk Step 4. Identify the Hazards Step 5. Assess the Risks	 Step 4. Assess the hazard Step 5. Assess the Problem
Phase III: Develop Mitigation Plan Step 6: Review Mitigation Alternatives Step 7: Draft an Action Plan Step 8: Set Planning Goals	 Step 6. Set Goals Step 7. Review Possible Activities Step 8. Draft an Action Plan
Phase IV: Adopt & Implement Step 9: Adopt the Plan Step 10: Implement the Plan	 Step 9. Adopt the Plan Step 10. Implement, Evaluate, Revise

FIGURE 2.1: HAMPTON ROADS HAZARD MITIGATION PLANNING PROCESS



THE PLANNING COMMITTEE

A community-based planning team made up of local government officials and key stakeholders has continually helped guide the development of this Plan. The committee organized local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan, including reviewing plan drafts and providing timely comments. Additional participation and input from residents and other identified stakeholders were sought through public meetings that described the planning process, the findings of the risk assessment, and the proposed mitigation actions. The committee convened in 2021.

HAMPTON ROADS MITIGATION PLANNING COMMITTEE

Due to the large geographic area covered and the number of communities participating, the project leaders felt that a Steering Committee was necessary to help more efficiently guide the planning process

and facilitate the numerous Working Group members. Thus, the representatives for the communities and stakeholders were divided into a primary Steering Committee and a Working Group. The division was based on discussions with potential committee members from each community and stakeholders and a determination as to which members were most willing to commit themselves to the entire process, to do the majority of the work, to debate goals and objectives and discuss alternatives, and to report back to their constituencies and Working Group members. The participants listed in **Table 2.2a** are the Steering Committee and **Table 2.2b** shows the Working Group members for the 2022 Hampton Roads Hazard Mitigation Plan Update. Names marked with an asterisk indicate the lead person responsible for that community in the planning, update and maintenance process. Specifically, the tasks assigned to the Steering Committee members included:

- participate in mitigation planning meetings and workshops;
- provide best available data as required for the risk assessment portion of the Plan;
- provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan;
- support the development of the Mitigation Strategy, including the design and adoption of community goals and objectives;
- help design and propose appropriate mitigation actions for incorporation into the Mitigation Action Plan;
- review and provide timely comments on all study findings and draft components of the plan; and
- support the adoption of the Hazard Mitigation Plan by community leaders.

The Working Group includes the Steering Committee members. Working Group members were provided the opportunity and invitation to participate in workshops and public meetings, asked for best available data, asked to review and comment on plan elements, and relied upon to ensure successful adoption of the plan in their community. In many cases, the Working Groups for individual communities also met with additional local staff outside of the more official planning process in additional meetings facilitated by Steering Committee members. Additional participation and input from other identified community staff and stakeholders was sought by the Steering Committee during the planning process primarily through e-mails and phone calls. Stakeholder involvement is discussed in more detail later in this section.

TABLE 2.2a: HAZARD MITIGATION PLANNING STEERING COMMITTEE MEMBERS

NAME AND POSITION	COMMUNITY AND AGENCY	EXPERTISE
Tracy Hanger, Emergency Planner	City of Hampton, Emergency Management	Fire Department/Emergency Management
*Hui-Shan Walker, Deputy Coordinator	City of Hampton, Emergency Management	Emergency Management, Public Information
*George Glazner, Deputy Coordinator	City of Newport News, Emergency Management	Emergency Management/Public Information
Heather Brown, Emergency Operations Planner	City of Newport News, Emergency Management	Emergency Management/Public Information
*Michael Bryant, Emergency Management Coordinator	City of Poquoson, Emergency Management	Emergency Management, Public Information
Ken Somerset, Building Official	City of Poquoson, Community Development	Preventive Measures, Property Protection
Michael Teener, Emergency Management Planner	James City County, Emergency Management	Emergency Management, Public Information
*Sara Ruch, Deputy Coordinator	James City County, Emergency Management	Emergency Management/Public Information

TABLE 2.2a: HAZARD MITIGATION PLANNING STEERING COMMITTEE MEMBERS

NAME AND POSITION	COMMUNITY AND AGENCY	EXPERTISE
*Sean Segerblom, District Captain	York County, Fire and Life Safety	Fire Department/Emergency Management, Public Information
Kent Henkel, Environmental Specialist	York County, Public Works	Property Protection, Natural Resource Protection
*Matthew Simons, Coastal Resiliency Manager	City of Norfolk, Office of Resilience	Planning/Preventive Measures, Property Protection, Resiliency
Tristian Barnes, Floodplain Administrator and Principal Planner	City of Norfolk, Planning	Planning/Preventive Measures, Property Protection, Resiliency
*Joseph Rubino, Response & Recovery Specialist	City of Portsmouth, Fire Rescue & Emergency Services	Fire Department/Emergency Management, Public Information
John Millspaugh, Senior Engineer	City of Portsmouth/Arcadis (consultant)	Preventive Measures, Property Protection
Whitney McNamara, Environmental Planner	City of Virginia Beach, Wetlands & Shoreline Construction Team, Planning Administration	Planning/Preventive Measures, Property Protection, Resiliency
*Danielle Spach, Emergency Management Planner	City of Virginia Beach, Emergency Management	Emergency Management, Public Information
Lucy Stoll, Principal Planner	City of Chesapeake, Planning Department	Planning/Preventive Measures, Property Protection, Resiliency
*Robert Gelormine, Senior Planner	City of Chesapeake, Office of Emergency Management	Emergency Management, Public Information
*Will Drewery, Emergency Management Coordinator	Isle of Wight County, Emergency Services	Emergency Management, Public Information
*Vernie Francis, Deputy Chief	City of Franklin, Emergency Services	Emergency Management, Public Information
Carlee Smith, Environmental Specialist	City of Franklin, Community Development Department	Planning/Preventive Measures, Property Protection, Resiliency
Markiella Moore, Citizen member	Stakeholder: Chesapeake National Event Mitigation Advisory Committee (NEMAC)	Public Information, Property Protection
Noelle Slater, Senior Water Resources Engineer	Stakeholder: AECOM	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Bill Egerton, Disaster Program Manager	Stakeholder: American Red Cross, Coastal Chapter	Emergency Services, Public Information
Ed Barnette, Government Liaison	Stakeholder: American Red Cross, Coastal Chapter	Emergency Services, Public Information
Judy Hinch, Citizen	Stakeholder: Old Dominion University Ph.D. student and climate researcher; also Citizen member of Chesapeake NEMAC	Property Protection, Resiliency, Natural Resource Protection
Alex Gurchinoff Schlebach, Emergency Management Specialist	Stakeholder: U.S. Army Corps of Engineers	Structural Flood Control Projects, Property Protection
Robert Angrisoni, Emergency Management Specialist	Stakeholder: U.S. Army Corps of Engineers	Structural Flood Control Projects, Property Protection
Judy Shuck, Regional Coalition Coordinator	Stakeholder: Eastern Virginia Healthcare Coalition	Emergency Services, Public Information
Harrison Bresée, Chief Regional Coordinator, Region 5	Stakeholder: Virginia Department of Emergency Management	Emergency Services
Elaina Dariah, Outreach Manager	Stakeholder: Virginia 211	Emergency Services
Mari Radford/Renee Hupp, Community Planning Lead	Stakeholder: FEMA, Region III	Emergency Services

TABLE 2.2a: HAZARD MITIGATION PLANNING STEERING COMMITTEE MEMBERS

NAME AND POSITION	COMMUNITY AND AGENCY	EXPERTISE
Mark Heckler, Representative	Stakeholder: Hampton Roads Association, Chiefs of Police (also Chief of Police in Chesapeake)	Emergency Services
John Sadler, Emergency Management Administrator	Stakeholder: Hampton Roads Planning District Commission	Planning/Preventive Measures, Property Protection, Resiliency
Ben McFarlane, Senior Regional Planner	Stakeholder: Hampton Roads Planning District Commission	Planning/Preventive Measures, Property Protection, Resiliency
Anas Malkawi, Chief of Asset Management	Stakeholder: Hampton Roads Sanitation District	Structural Flood Control Projects, Property Protection
Leigh Ann Erdman, Emergency Management Specialist	Stakeholder: U.S. Department of Veterans Affairs	Emergency Services
Mark Killgore, Dam Safety Engineer	Stakeholder: Virginia DCR, Dam Safety	Structural Flood Control Projects
David Luke, Safety & Health Program Manager	Stakeholder: Jefferson Labs	Planning/Preventive Measures, Property Protection
Kaleen Lawsure, Senior Project Scientist	Stakeholder: Old Dominion University, Virginia Modeling and Simulation Center	Emergency Management, Public Information
Michael Player, Executive Director	Stakeholder: Peninsulas EMS Council	Emergency Management, Public Information
Steve Pincus, EMS Planner & Emergency Mgmt Coordinator	Stakeholder: Peninsulas EMS Council	Emergency Management, Public Information
Leigh Chapman, Senior Planner & Hampton property owner	Stakeholder: Salter's Creek Consulting	Planning/Preventive Measures, Property Protection, Resiliency
David Long, Executive Director	Stakeholder: Tidewater EMS Council	Emergency Management, Public Information
Ross Weaver, Program Assistant Director	Stakeholder: Wetlands Watch	Property Protection, Resiliency, Natural Resource Protection
Kenton Towner, Emergency Management Coordinator	Stakeholder: William & Mary	Emergency Management, Public Information, Property Protection
Jim Kaste, Professor of Geology	Stakeholder: William & Mary	Property Protection

* Lead person responsible for that community in the planning, update and maintenance processes outlined in Section 8.

TABLE 2.2b: HAZARD MITIGATION PLANNING WORKING GROUP MEMBERS

NAME AND POSITION	COMMUNITY AND AGENCY	EXPERTISE
* Larry Snyder, Deputy Fire Chief	City of Williamsburg, Fire Department	Emergency Management, Public Information, Property Protection
* Richard Stephens, Deputy Coordinator	City of Suffolk, Fire & Rescue	Emergency Management, Public Information, Property Protection
* Michael Stallings, Town Manager	Town of Smithfield	Public Information
* William Saunders, Town Manager	Town of Windsor	Public Information
* Beth Lewis, Community Development Director	Southampton County, Community Development	Planning/Preventive Measures, Public Information, Property Protection
* Ray Phelps, Chief	Surry County, Emergency Management	Emergency Management, Public Information, Property Protection
Angela King, Asst City	City of Hampton, City Attorney's Office	Public Information

TABLE 2.2b: HAZARD MITIGATION PLANNING WORKING GROUP MEMBERS		
NAME AND POSITION	**COMMUNITY AND AGENCY**	**EXPERTISE**
Attorney		
Mohammed Shar, Senior Civil Engineer	City of Hampton, Public Works	Property Protection
Scott Smith, Senior Civil Engineer	City of Hampton, Public Works	Property Protection
Tamara Bullock, Business Services Administration	City of Hampton, Parks & Rec	Natural Resource Protection
Carolyn Heaps, Resiliency Officer	City of Hampton, Community Development	Planning/Preventive Measures, Property Protection, Resiliency
Hanna Sabo, Zoning Administrator	City of Hampton, Community Development	Planning/Preventive Measures, Property Protection
Cashayla Rodgers, Neighborhood Development Associate	City of Hampton, Housing & Neighborhood Services	Planning/Preventive Measures, Property Protection
Sara Snowden, Planner	City of Hampton, Emergency Management	Emergency Management
Brian Lewis, Water Resource Engineer	City of Hampton, Public Works	Property Protection
Jonathan McBride, Divisional Manager	City of Hampton, Housing & Neighborhood Services Division	Planning/Preventive Measures, Property Protection
Bruce Sturk, Director	City of Hampton, Federal Facilities	Public Information
Anna Hammond, Neighborhood Development Associate	City of Hampton, Community Development	Planning/Preventive Measures, Property Protection
Phil Prisco, Building Official	City of Hampton, Community Development	Planning/Preventive Measures, Property Protection
Mike Hayes, Planning & Zoning Administration Manager	City of Hampton, Community Development	Planning/Preventive Measures, Property Protection, Natural Resource Protection
Tim Drewry, Deputy City Attorney	City of Hampton, City Attorney's Office	Public Information
Robin McCormick, Communications Strategist	City of Hampton, Marketing	Public Information
Gwen Pointer, Emergency Mgmt Planner	City of Hampton, Emergency Management	Emergency Management
Nicole DelValle, Emergency Operations Planner	City of Newport News, Emergency Management	Emergency Management
Kathie Angle, Civil Design Engineer	City of Newport News, Public Works	Property Protection
Louis Bott	City of Newport News	Emergency Management
John Anderson, Director	City of Poquoson, Public Works	Property Protection
Thomas Cannella, Planner	City of Poquoson, Planning	Planning/Preventive Measures, Property Protection, Natural Resource Protection
Tonya O'Connell, Asst City Manager	City of Poquoson, City Manager's Office	Public Information
Jessica Davis, Finance Specialist	City of Poquoson, Finance	Public Information
Caroline Dunlap, Emergency Management Planner	James City County, Emergency Management	Emergency Management , Public Information
Mike Woolson, Section Chief, Resource Protection	James City County, General Services	Planning/Preventive Measures, Property Protection
Steve Kopczynski, Fire Chief, Director	York County, Fire & Life Safety	Emergency Management , Planning/Preventive Measures, Property Protection

TABLE 2.2b: HAZARD MITIGATION PLANNING WORKING GROUP MEMBERS		
NAME AND POSITION	**COMMUNITY AND AGENCY**	**EXPERTISE**
Susan Kassel, Director	York County, Planning & Development Services	Planning/Preventive Measures
Amy Parker, Senior Planner	York County, Planning Division	Planning/Preventive Measures
Gail Whittaker, Public Information Officer	York County, Public Affairs	Public Information
Daniel Hudson, Deputy Emergency Mgmt Coordinator	City of Norfolk, Emergency Management	Emergency Management
Jalesha Smith, Management Analyst	City of Norfolk, City Manager's Office of Diversity, Equity & Inclusion	Public Information
Jim Redick, Director	City of Norfolk, Emergency Preparedness & Response	Emergency Management
Scott Mahone, Deputy Emergency Mgmt Coordinator	City of Norfolk, , Emergency Preparedness & Response	Emergency Management
Kyle Spencer, Chief Resilience Officer	City of Norfolk, Office of Resilience	Planning/Preventive Measures, Property Protection, Resilience, Natural Resource Protection
David Topczynski, Deputy Emergency Management Coordinator	City of Portsmouth, Office of Emergency Management	Emergency Management
Stephen Davis, Deputy Emergency Management Coordinator	City of Portsmouth, Office of Emergency Management	Emergency Management
Danielle Progen, Director	City of Virginia Beach, Office of Emergency Mgmt	Emergency Management
Marissa Jones, Office Asst	City of Virginia Beach, Emergency Mgmt	Emergency Management
PJ Scully, Landscape Architect	City of Virginia Beach, Office of Planning	Planning/Preventive Measures, Natural Resource Protection
Brian Spicer, Emergency Mgmt Coordinator	City of Suffolk, Suffolk Fire & Rescue	Emergency Management
Michael Barber, Director	City of Chesapeake, Parks, Recreation & Tourism	Planning/Preventive Measures, Property Protection, Resilience, Natural Resource Protection
David Jurgens, Director	City of Chesapeake, Public Utilities	Property Protection
Ana Elezovic, Planner	City of Chesapeake, Planning	Resilience, Natural Resource Protection
Patrick Hughes, Citizen member	City of Chesapeake, NEMAC	Planning/Preventive Measures
James Haluska, Citizen member	City of Chesapeake, NEMAC	Planning/Preventive Measures
Heather Stanton, Public Utilities Representative	City of Chesapeake, Public Utilities & NEMAC	Property Protection, Planning/Preventive Measures
Michael Johnson, County Administrator	Southampton County	Public Information
Regan Prince, Environmental Specialist	Southampton County, Environmental Services Division	Property Protection
Natalie Rountree, Director	City of Franklin, Community Development	Planning/Preventive Measures, Property Protection, Resilience, Natural Resource Protection

* Lead person responsible for that community in the planning, update and maintenance process outlined in Section 8.

2021/2022 COMMITTEE MEETINGS AND WORKSHOPS

Below is a summary of the key meetings and committee workshops during the 2021/2022 update process. Routine discussions and additional meetings were held by local officials to accomplish planning tasks specific to their department or agency. A consultant team (AECOM, partnered with Salter's Creek Consulting, Inc., of Hampton, Virginia) was hired with grant funds to update the hazard identification and vulnerability analysis, to guide the committee through the planning process based on the revised information and to assist each community with adoption of the final plan. All meeting summary information is included in Appendix C, which includes committee and public meeting minutes, attendance sheets, and correspondence with committee members and stakeholders.

FEBRUARY 25, 2021: PROJECT KICKOFF MEETING

Participants in the Kickoff Meeting discussed the overall approach to updating the Hazard Mitigation Plan, including strategies for outreach and public participation, as well as the steps necessary to meet the requirements of the DMA 2000, and the Community Rating System (CRS) of the National Flood Insurance Program (NFIP). The consultant initiated data collection efforts at the meeting and reviewed the existing list of hazards with the representatives present.

The group discussed project schedule and potential stakeholders and how they would be asked to participate, including tasks such as: reviewing drafts, participating on the committee, and/or attending public meetings. Due to the ongoing COVID-19 safety protocols in place at the time , the group and the consultant decided that each of the main three meetings would be held virtually through online meeting software. Committee meetings would be held virtually, as well.

JULY 27, 2021: FIRST PLANNING COMMITTEE MEETING

The consultant provided an overview of the proposed update approach to committee members. The Committee reviewed the Hazard Identification and Vulnerability Assessment information presented. Committee members discussed the hazards of most critical concern to the region, and concurred to adjust the names of several hazards, removed several hazards and added hazards.

The committee members present voted on their mitigation priorities and ranked hazards using the methodology described in Section 5. The committee considered a list of hazards that included flooding, sea level rise and land subsidence, coastal and tropical storms, severe thunderstorm/hail/lightning, winter storm, drought, high hazard dam failure, tornado, extreme heat, earthquake, wildfire, coastal erosion and landslides, hazardous materials incidents and pandemic flu.

The first part of the meeting focused on the flood analysis, including the hybrid analysis conducted using HAZUS. Participants discussed their frustration with obtaining NFIP repetitive flood loss data and the inability to know flood insurance coverage happening in private flood insurance market. The group discussed nomenclature for Infectious Disease/Pandemic Flu. Surry County requested that landslides not be deleted as it is a significant hazard in their region, and several participants indicated Extreme Heat and Winter Storm should be moved up in the risk assessment.

SEPTEMBER 28, 2021: SECOND PLANNING COMMITTEE MEETING

The second Planning Committee meeting was the beginning of the "Mitigation Strategy Workshops." The meeting began with a presentation on how a complete capability assessment contributes to identification of effective mitigation strategies. The discussion focused on local capabilities and the capability matrix each community was asked to complete.

The consultant helped Committee members review several documents in preparation for the goal setting exercise which was the focus of the workshop. This background helped Committee members maintain continuity and to develop linkages between various local, regional, and state planning efforts.

Data, documents, plans and procedures reviewed as part of the goal setting portion of the planning process included, but were not limited to the following:

- *2018 Commonwealth of Virginia Hazard Mitigation Plan* goals and objectives –
  - These items were reviewed by committee members prior to the work on updating the goals and objectives to help ensure that the regional plan supports and does not contradict the State's goals and objectives;
- Goals, objectives and recommendations from Virginia Beach, Hampton and Norfolk Resiliency planning efforts;
- Goals and objectives from the Virginia Coastal Resilience Master Planning Framework, 2020;
- *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, FEMA January 2013;
- Hampton Roads Planning District Commission three-part study entitled *"Climate Change in Hampton Roads"*;
  - Impacts and Stakeholder Involvement (Phase I, released in February 2010);
  - Storm Surge Vulnerability and Public Outreach (Phase II, released June 2011);
  - Sea Level Rise in Hampton Roads, Virginia (Phase III, released July 2012);
- Each of the existing plan's three primary goals and related objectives; and
- Dam Safety Data Sheets for the region's High Hazard Potential Dams, as well as the list of all State-regulated dams in the region (included in **Appendix H**).

The group was provided a list of potential, broad community goal key phrases extracted from the existing plans in order to encourage brainstorming about revising the goal statements. The members also reviewed existing goal statements from the current plan and other plans pertinent to the region. The group then went to work carefully reviewing the existing mitigation plan goal statements. Participants were encouraged to critique each word in light of the goal key words identified earlier and any changes that had taken place in their communities in the previous five years. The facilitator reworked, grouped together, and presented the revised goals and objectives in real time during the meeting so that the group could arrive at a consensus on the broader mitigation goals and objectives associated with the updated mitigation plan. Detailed notes on the reasoning behind why the mitigation goals and objectives were modified is included in Section 7, which shows the changes and the revised goals and objectives.

The group discussed the current status of COVID-19 protocol and the ability to meet in person for the third workshop. Those present preferred a hybrid approach for Workshop #3 and the development of new and revised mitigation actions for 2022. The consultant proposed a virtual group workshop that would discuss the types of mitigation actions and provide examples and some suggested reading materials, followed by a series of in-person working group meetings, termed "office hours" at three locations in the study area to facilitate review, revision and development of each community's existing mitigation actions.

NOVEMBER 9, 2021: THIRD MITIGATION PLANNING COMMITTEE MEETING

The group reviewed a general list of potential mitigation actions categorized by type and the consultant provided examples, both local and national, of various successful mitigation actions. A brief discussion of the various categories followed. The consultant discussed a variety of mitigation categories for considering and evaluating possible mitigation action alternatives appropriate to each community. Suggested reading materials for the group included:

Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, FEMA 2013;
Mitigation Best Practices – FEMA web site;
Mitigation Success Stories, Association of State Floodplain Managers, 2002;
Mitigation Matters: Policy Solutions to Reduce Local Flood Risk, Pew Charitable Trusts web site;
Zoning for Coastal Flood Resiliency, New York City Planning;

Mitigation Action Portfolio, FEMA web site;
*Buoyant City: Historic District Resiliency & Adaptation Guideline*s, Miami Beach, 2020; and
Coastal Flood Resilience Design Guidelines, Boston Planning & Development Agency, 2019.

The consultant then facilitated a discussion on regional mitigation actions from the 2017 plan and made real-time edits to those actions. Action 1 was modified to remove sidescan Light Detection and Ranging (LIDAR) and replaced with the group's desire to collect lowest floor elevations by collecting existing or creating new Elevation Certificates. Action 2 was edited to reflect desire to use existing mechanisms of the HRPDC to develop additional regional mitigation strategies and host annual workshop on funding. Action 3 was edited to refocus on Hazards U.S. Multi-Hazard (Hazus) input and output data. The group decided to remove Action 4 because a Commodity Flow Study has been identified as a capability gap in regional planning and has been referred to the Local Emergency Planning Committee (LEPC) for completion. The group discussed the addition of several new regional mitigation actions regarding: NFIP repetitive flood loss data analysis at the state or regional level and preparation of repetitive flood loss area analyses; use of radon test kits to test structures; verifying status of significant hazard dams region-wide; and, strengthening/creating transportation networks for evacuation; and partnering with private companies on critical lifeline continuity.

In addition to the facilitated discussion, the consultant cross referenced the final list of proposed mitigation actions and worked with community staff to ensure that each High Hazard Potential Dam listed in Table 4.4 with a "poor" or "unsatisfactory" condition assessment is addressed in the final Mitigation Action Plan. Regional mitigation actions in Section 7 were also added to help clarify the role of the region in addressing dam safety management.

COMMUNITY-SPECIFIC WORKING GROUP MEETINGS

All communities were invited by email to schedule a one-on-one meeting with the consultant toward the end of the planning process. Most of the communities involved in the plan took advantage of these consultant-facilitated brief, in-person meetings at the community level to discuss their final Mitigation Action Plan. Participants worked carefully through a review of the list of existing mitigation actions from their existing plan, deciding which actions to modify or delete based on their progress toward completion. The group then selected and discussed priorities for several new proposed actions suggested by the consultant.

The consultant shared additional review notes on several items that varied by community, and that typically included:

comprehensive plan, resilience plan and strategic plan review notes;
floodplain management regulation review notes;
capabilities or capability gaps noted over the course of the planning process;
repetitive loss area maps (hard copies provided during the meeting);
community-specific critical facility vulnerabilities as shown in the HIRA, and as discussed in the First Planning Committee Meeting; and
other pertinent materials such as news clippings.

While previous plans have benefitted from the synergies of having all communities attend a large workshop to address the MAP revisions and share mitigation ideas, COVID 19 protocols in 2021 required a revised methodology to allow some one-on-one discussion of mitigation actions, but to limit the number of people convened at any one time. The meetings were held over the course of several days in November 2021. York County and the City of Hampton met November 16, 2021 at the City of Hampton Emergency Operations Center. The consultant met with Poquoson representatives on November 16, 2021, as well, in their City Hall Meeting Room. November 19, 2021, in the Isle of Wight Board of Supervisors Board Room, the consultant met with Southampton County, City of Franklin, City of Suffolk, and Isle of Wight County. A virtual meeting was held that same day with James City County staff.

November 22, 2021, the consultant met with City of Williamsburg officials in their Fire Department Headquarters. Finally, on November 30, 2021, the cities of Virginia Beach, Portsmouth, Newport News, Chesapeake and Norfolk sent staff for individual one-hour sessions with the consultant in the HRPDC headquarters in Chesapeake. Attendance for each community was as follows:

City of Hampton	Hui-shan Walker
	Angela King
	Tracy Hanger
	Scott Smith
	Carolyn Heaps
	Sara Snowden
	Brian Lewis
	Jonathan McBride
	Bruce Sturk
	Anna Hammond
	Phil Prisco
	Mike Hayes
	Tim Drewry
	Robin McCormick
City Newport News	George Glazner
	Heather Brown
	Kathy Angle
City of Poquoson	Michael Bryant
	Ken Somerset
	John Anderson
	Thomas Cannella
	Tonya O'Connell
	Jessica Davis
James City County	Michael Teener
	Sara Ruch
City of Williamsburg	David Eagle
	Larry Snyder, Williamsburg
	Erin Burke, Planning Department
	Kenton Towner, William & Mary
	Joanne Chapman, Colonial Williamsburg Foundation
	Sela Gordon
York County	Sean Segerblom, York County
	Kent Henkel
City of Norfolk	Daniel Hudson
	Matthew Simons
	Tristian Barnes

City of Portsmouth	Joseph Rubino
	John Millspaugh (Arcadis)
City of Virginia Beach	Whitney McNamara, Virginia Beach
	Danielle Spach
City of Suffolk	Richard Stephens, Suffolk
City of Chesapeake	Robert Gelormine
	Markiella Moore
Isle of Wight County	Will Drewery
Southampton County	Beth Lewis
City of Franklin	Vernie Francis, Franklin
	Carlee Smith
	Natalie Rountree

Participation in the planning process by the towns of Boykins, Branchville, Capron, Courtland, Ivor, and Newsoms was negligible, despite multiple attempts at communication. PDC staff specifically reached out again to many of these communities in mid-February 2022 to inform them verbally about the final Public Meeting in March, and to encourage their attendance. The PDC called and emailed Boykins on February 22 and 23; they called Branchville and Capron on February 24 and left voicemails; they called Courtland and spoke with the Town Clerk on February 24. The PDC also called and emailed the Mayors of Ivor and Newsoms between February 22 and February 24, 2021. Despite these efforts, the towns did not send representatives to the meetings and, therefore, are not considered participants at the time of initial approval. Their mitigation actions from previous plans have been placed in Appendix J, Archived Mitigation Actions, should they need to reference or edit them in the future.

INVOLVING THE PUBLIC

44 CFR Requirement

Part 201.6(b)(1): The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

Individual citizen involvement provides the planning committee with a greater understanding of local concerns and increases mitigation success by developing community "buy-in" from those directly affected by public policy and planning decisions. As citizens become more involved in decisions that affect their life and safety, they are more likely to gain appreciation of the natural hazards present in their community and take 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 locality safer from the effects of natural hazards.

Public input was initially sought using three primary methods: (1) open public meetings advertised locally; (2) broadly-distributed public survey; and, (3) the posting of the draft Hazard Mitigation Plan on the HRPDC web site. Public meetings were held at three stages of the planning process; early in the process to introduce the plan update process, again in the middle stage to share results of the Hazard Identification and Risk Assessment; and again, after the planning committee workshops, but prior to adoption by governing bodies.

2021/2022 Public Meetings

Three open public meetings were held virtually via Zoom to present the planning process and to review mitigation actions to be included in the Hazard Mitigation Plan.

The first public meeting was held April 20, 2021. The goal was to introduce the public to the planning process and invite their involvement. The group discussed the hazards in the 2017 plan and provided comments on hazards proposed to be included in the update. The facilitator polled the group about their concerns regarding various hazards and provided a Q&A session at the end.

Upon completion of the Hazard Identification and Risk Assessment, the Committee held another open, virtual public meeting on July 29, 2021. This meeting included review of the results of the hazard study for the region, including detailed information regarding exposure, risk assessment and social vulnerability.

Upon completion of a draft Plan, the Committee held another public meeting on the draft Hazard Mitigation Plan on March 2, 2022. The meeting provided further opportunity for the public and identified stakeholders to review and comment on the draft plan. The plan was posted on the HRPDC web site on February 7, 2022, and contact information for the HRPDC Emergency Management Division was provided if the public needed instructions for submitting comments by March 9. The meeting and review period after the March 2 meeting, provided citizens with an opportunity to review the content of the Plan's sections.

All public meetings were advertised broadly by the communities on social media, on physical bulletin boards, and via email to help ensure that local officials, residents, businesses, and other public and private interests in the region, including neighboring communities, were notified on how to be involved in the local mitigation planning process. Additionally, HRPDC and the communities advertised the meetings on their web sites. The public meeting advertisements are included in Appendix C, which also includes all committee and public meeting minutes, attendance sheets, and invitation correspondence.

The public meeting on March 2, 2022 was termed the "Feedback Forum" in an effort to solicit public comment and feedback on the draft plan. Once again, the committee relied on the efforts of multiple community Public Information Officers, web masters, and other communication specialists, including HRPDC's Administrator of the Office of Community Affairs and Civil Rights, to use a variety of sources to spread the word about the planning effort. Records of advertisements and solicitations for involvement are included in Appendix C (meeting minutes), Appendix D (public survey response summaries), and Appendix E (responses to public comments).

Additionally, the plan was reviewed and presented to each community's elected officials at a public hearing prior to adoption. Though the plan was in its final format for these meetings, this did provide additional opportunity to answer questions and present findings to the public and elected officials. The resolution of adoption by each community is included in Appendix B. Adoption dates are shown in **Table 2.3**.

TABLE 2.3: DATE OF PLAN ADOPTION BY ELECTED OFFICIALS

SUBREGION	COMMUNITY	DATE OF PLAN ADOPTION
Peninsula	City of Hampton	August 10, 2022
	City of Newport News	September 27, 2022
	City of Poquoson	June 13, 2022
	City of Williamsburg	July 14, 2022
	James City County	June 28, 2022
	York County	August 2, 2022
Southside	City of Norfolk	July 12, 2022
	City of Portsmouth	September 27, 2022
	City of Suffolk	June 15, 2022
	City of Virginia Beach	June 7, 2022
	City of Chesapeake	July 12, 2022
Western Tidewater	Isle of Wight County	June 16, 2022
	Town of Smithfield	July 5, 2022
	Town of Windsor	July 12, 2022
	City of Franklin	June 27, 2022
	Southampton County	June 28, 2022
	Surry County	July 7, 2022
	Town of Claremont	October 5, 2022
	Town of Dendron	November 7, 2022

Public Survey

A public survey was distributed early in the planning process to solicit additional feedback from attendees. As indicated above, the public survey was also distributed online in spring 2021 as part of the committee's effort to improve and use public feedback. The results of a total 130 responses collected are summarized in Appendix D. Unfortunately, the response period for the survey was somewhat limited due to another public survey ongoing in the region with similar questions and content.

The majority of respondents to the survey were in Norfolk, Portsmouth, Virginia Beach and Chesapeake. Eighty-seven percent of respondents indicated that, beyond COVID-19, they had experienced or been impacted by a natural or manmade disaster. The highest threats were perceived as hurricanes/tropical storms, floods, pandemic flu/disease, and sea level rise. The majority of participants (72%) did not live in the floodplain, while 44% did have a home in the floodplain. Interestingly, 53% of respondents had flood insurance indicating that many with homes out of the floodplain still had flood insurance. Many (84%) had

measures and structural projects were seen as the most effective mitigation actions that local governments could administer.

The information in the survey was distributed to all committee members via the HRPDC's SharePoint data sharing site set up early in the planning process. Committee members were invited via email to review the data, particularly as it related to their community, as soon as the survey closed. The contractor reviewed the responses and used them to inform the development of the Mitigation Action Plan and other components of the plan.

HRPDC Web Site

Throughout the planning process, HRPDC maintained a web site at https://www.hrpdcva.gov/departments/emergency-management/2022-hampton-roads-hazard-mitigation-plan that provided a description of the planning process and posted meeting information. The page included a copy of the draft plan prior to the final Public Meeting to provide the public an opportunity to comment. Those comments are addressed through the standard comment/response format documented in Appendix E.

Brochure

In addition to the public meetings, web site and survey, the Committee issued a brochure template that was distributed by many of the jurisdictions, primarily via social media and web postings on their respective web sites. The brochure template is shown in **Figure 2.2** below and provides background information on the planning process, the Community Rating System, and how citizens can become involved. The blank lines are intended for individual jurisdictions to input contact information for their staff point of contact.

FIGURE 2.1: HAMPTON ROADS HAZARD MITIGATION PLANNING BROCHURE

2022 Hampton Roads Hazard Mitigation Plan Update Process



Hazard Mitigation Planning

A Hazard Mitigation Plan is the result of a planning process to identify hazards and develop strategies to reduce loss of life and property. This planning process is structured around the four phases of the Disaster Mitigation Act of 2000, which the region's planning consultant has aligned with the ten steps of the Community Rating System (CRS). Having an adopted Hazard Mitigation Plan that is updated every five years helps ensure each community in the region is eligible for federal disaster funding following a disaster event.

The Community Rating System (CRS)

The CRS is a national program developed by the Federal Emergency Management Agency (FEMA) to encourage communities to reduce their risk to flood-related hazards. The CRS rewards the efforts communities take that go above and beyond the minimum requirements of the National Flood Insurance Program (NFIP) by providing discounts on flood insurance premiums.

Phase 1
1. Organize Planning Team
2. Plan for Public Involvement
3. Coordinate with Other Agencies

Phase 2
4. Identify the Hazards
5. Estimate Losses

Phase 3
6. Identify Goals & Objectives
7. Develop Potential Mitigation Actions
8. Draft the Mitigation Plan

Phase 4
9. Adopt the Plan
10. Implement and Maintain the Plan

Hazards Addressed by the Hampton Roads Hazard Mitigation Plan

The planning committee has initially identified the following hazards for inclusion in the Hampton Roads Hazard Mitigation Plan:

- Flooding
- Sea Level Rise
- Tropical Storm
- Shoreline Erosion
- Dam Failure
- Tornado
- Winter Storm
- Earthquake
- Wildfire
- Drought
- Extreme Heat
- Hazardous Materials Incident
- Communicable Disease

Citizen Involvement

Citizen participation is an important component of mitigation planning. The planning team needs your input on the types of hazards that are your priority concern, and your opinion on ways to lessen their impact.

- Visit the web site. Get more information and follow the planning process at https://www.hrpdcva.gov. The website contains announcements for upcoming meetings, minutes and presentations from past planning meetings, information on the identified hazards, draft planning documents for review, a public survey, and more.
- Take the survey. A public outreach survey is available online here. Please complete the survey as soon as possible to ensure that your opinion is captured! If you would like a hard copy, please use the email below.
- Send us information or comments. If you have information to share for inclusion in the plan, please contact _____ at _____. The draft plan will be made available for public review on the web site prior to being submitted to FEMA.

INVOLVING STAKEHOLDERS

44 CFR Requirement

Part 201.6(b)(2): The planning process shall include an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

A range of stakeholders, including neighboring communities, agencies, businesses, academia, nonprofits, hospitals, and other interested parties were invited and encouraged to participate in the development of the Hazard Mitigation Plan. Stakeholder involvement was encouraged through notifications and invitations to agencies or individuals to participate in Planning Committee meetings, the Mitigation Strategy Workshops and document review.

In addition to the Planning Committee meetings, the committee encouraged open and widespread participation in the mitigation planning process through the design and publication of advertisements that promoted the open public meetings. These media and social media advertisements and the HRPDC web page postings provided opportunities for local officials, residents, and businesses to offer input.

During the 2021/2022 update process, additional stakeholders were contacted and invited to participate in one of three ways: 1) attend and participate in Committee meetings; 2) attend and participate in the Public Meetings; and/or 3) review draft documents and provide comments and critique.

Additional stakeholders who were invited *and did participate* at some point in the planning process but who were not included on the Steering or Working Committees in Table 2.2 include:

Neighboring communities:
- Brett Major, Gloucester County
- John Hutcheson, Fort Monroe Authority

Local and regional agencies involved in hazard mitigation activities:
- Christina Johnson, Jefferson Labs
- Lewis Bush, Sentara Leigh Hospital

Stakeholder-type organizations that are not represented on the planning committee:
- Perla Santillan, Office of the Chief Medical Examiner for Virginia
- John Cooke, Virginia Department of Health, Office of Emergency Preparedness
- Mike Monteith, Peninsula Community Foundation
- Carolyn Malloy, Virginia EMS
- Gary Lupton, Sr., Virginia 1st

Regional and metropolitan planning agencies:
- Riana Rich, HRPDC
- Danielle Spach, HRPDC (later on the Steering Committee for Virginia Beach);
- Jay Ruffa, Crater Planning District Commission (also representing neighboring communities)
- Katie Moody, PlanRVA (PDC for Richmond region, also representing neighboring communities)

Higher Education Facilities:
- Paul Long, Thomas Nelson Community College
- Jessica Whitehead, ODU ICAR
- Barry Ezell, ODU VMASC
- Pamela Mason, Virginia Institute of Marine Science, College of William & Mary
- William Berquist, College of William & Mary

Other State agencies:
- Allen Evans, Virginia Department of Military Affairs
- John Highsman, Virginia Department of Forestry

State geological agency:
- Anne Witt, Virginia Department of Energy

State emergency management agency;
- Bruce Sterling, VDEM
- Chris Bruce, VDEM

National Weather Service:
- Eric Seymour, NWS Wakefield Office

U.S. Army Corps of Engineers;
- Greg Williams
- Paul Moye

American Red Cross:
- Aubrie McClendon
- Lisa Mike

Representatives from military bases in the region:
- Rob Starr, Joint Base Langley-Eustis
- Steve Harrison, U.S. Coast Guard
- Don Clayton, U.S. Coast Guard.

Additional stakeholders who were invited *but chose not to participate* as stakeholders include:

State agency representatives:
- Virginia Department of Health

Representatives from colleges and universities in the region:
- Christopher Newport University

Representatives from utilities servicing the region:
- Dominion Energy

Social service providers in the region:
- The Planning Council

Representatives from the medical community:
- Riverside Health System.

COMMUNITY PROFILE

Contents

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2022 UPDATE

Section 3 was updated to align the format and content of the existing plans and incorporate the most recent data available for each community. Tables and figures were updated, when necessary, to incorporate data from the 2020 U.S. Census, the 2019 American Community Survey (ACS), the HRPDC and other sources. Surry County data were appended. Figure 3.1, and Figures 3.3 through 3.7 were reviewed and determined to remain relevant; thus, they remain in the plan. Towns in Southampton and Surry County that did not participate in the planning process remain represented in this and subsequent sections with the expectation that they may participate at a later date via plan amendment.

GEOGRAPHY AND THE ENVIRONMENT

Located in the southeastern quadrant of Virginia, the portion of Hampton Roads included in this study is bordered to the north by Gloucester County, to the south by Currituck and Camden Counties in North Carolina, to the east by the Atlantic Ocean and Chesapeake Bay, and to the west by the counties of Sussex and Greenville **(Figure 3.1)**. Although Gloucester County is generally considered part of the Hampton Roads region for planning purposes, the county is participating in hazard mitigation planning processes in conjunction with another, adjacent planning district.

Table 3.1 provides a summary of the geographic characteristics of each of the participating communities.

FIGURE 3.1: THE HAMPTON ROADS REGION OF VIRGINIA

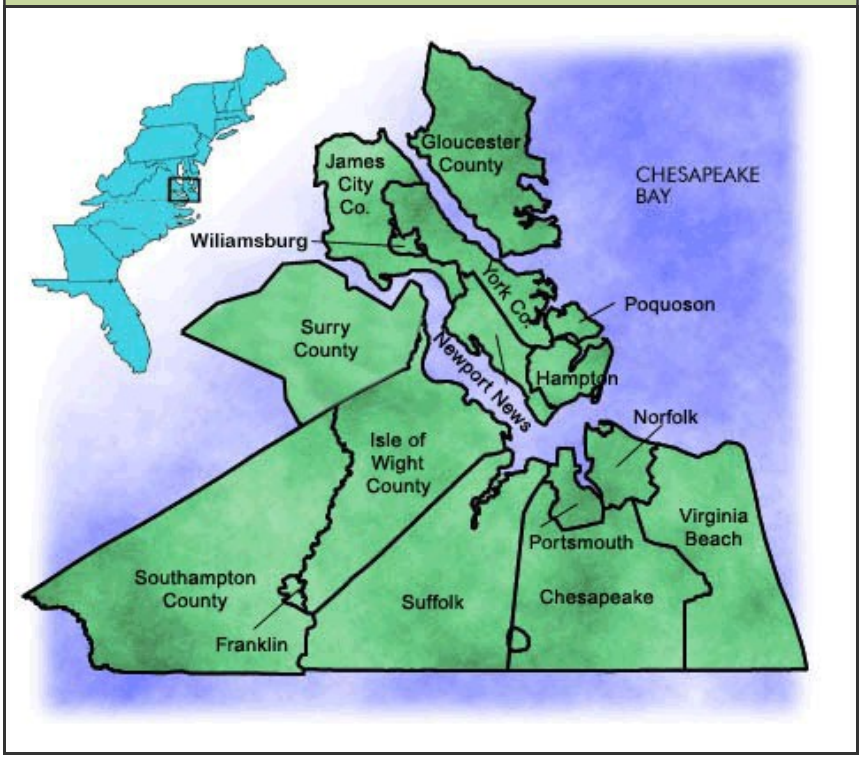


TABLE 3.1: SUMMARY OF GEOGRAPHIC CHARACTERISTICS

SUBREGION	COMMUNITY	2018 LAND AREA IN SQUARE MILES	2018 POPULATION DENSITY PER SQUARE MILE	HOUSING UNITS PER SQUARE MILE
Peninsula	Hampton	52	2,608.3	1,156
	Newport News	70	2,587.4	1,106
	Poquoson	16	770.0	298
	Williamsburg	9	1,687.0	570
	James City County	153	495.7	211
	York County	106	648.3	259
Southside	Norfolk	54	4,570.8	1,791
	Portsmouth	33	2,877.4	1,239
	Suffolk	400	231.8	89
	Virginia Beach	259	1,828.3	706
	Chesapeake	340	717.3	261
Western Tidewater	Isle of Wight County	316	118.6	49
	Smithfield	10	844.1	346
	Windsor	4	675.0	271
	Franklin	8	1,038.5	460
	Southampton	600	29.8	13

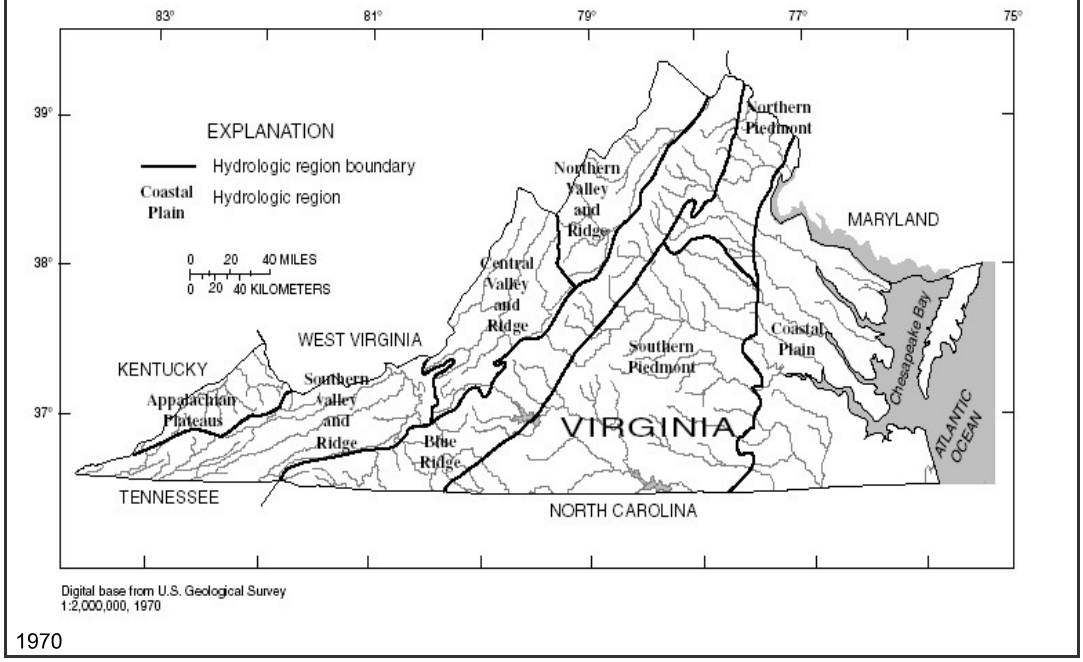
TABLE 3.1: SUMMARY OF GEOGRAPHIC CHARACTERISTICS				
SUBREGION	COMMUNITY	2018 LAND AREA IN SQUARE MILES	2018 POPULATION DENSITY PER SQUARE MILE	HOUSING UNITS PER SQUARE MILE
	County			
	Boykins	<1	854	269
	Branchville	<1	112	57
	Capron	<1	139	69
	Courtland	<1	1,958	523
	Ivor	1	495	152
	Surry County	279	23.6	13
	Claremont	3	107.7	67
	Dendron	4	85.0	32

Source: Weldon Cooper Center (land area and density) and U.S. Census Bureau 2013-2017 American Community Survey Estimates (housing unit data)

Hampton Roads is located within the Atlantic Coastal Plain Physiographic Province, which is characterized by its low, flat relief **(Figure 3.2)**. Much of the region's elevation is nearly level, with the highest elevation point in the study area being just 177 feet above sea level. For example, the overall elevation for the City of Chesapeake averages 12.2 feet above sea level.

The Atlantic Coastal Plain is the easternmost of Virginia's physiographic zones. The zone extends from New Jersey to Florida and includes all of Virginia east of the Fall Line, which is the point at which east-flowing rivers cross from the hard, igneous, and metamorphic rocks of the Southern Piedmont to the relatively soft, unconsolidated strata of the Coastal Plain (U.S. Geological Survey (USGS) 2001).

FIGURE 3.2: PHYSIOGRAPHIC REGIONS OF VIRGINIA

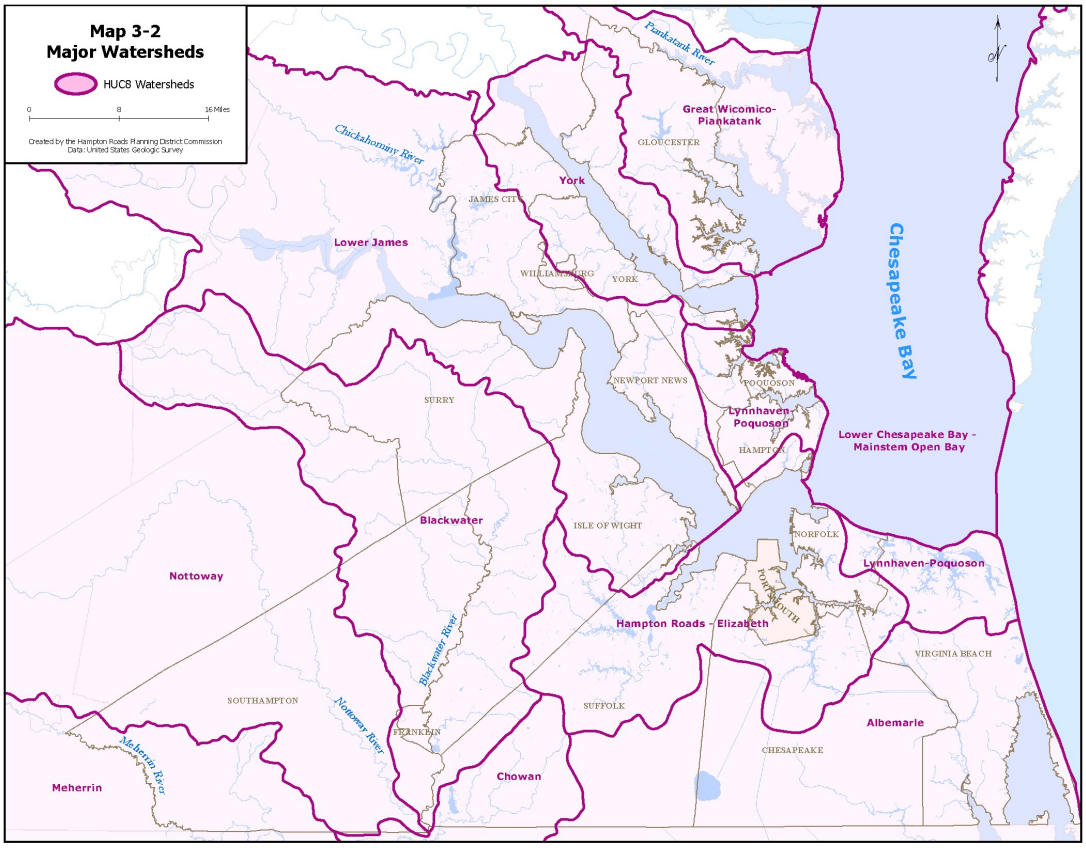


Hampton Roads contains portions of four major river basins: the James River Basin, the York River Basin, Lower Chesapeake Bay, and the Albemarle-Chowan Basin. **Figure 3.3** provides a graphical

illustration of the watersheds designated by their USGS Hydrologic Unit Code. The James River Watershed encompasses approximately 10,200 square miles, and its headwaters are located in Bath and Highland Counties. The James River, which is a part of the larger Chesapeake Bay Basin, empties into the Chesapeake Bay at Hampton Roads. The Lower James subbasin, as shown in **Figure 3.3**, has an area of 1,440 square miles, and the Hampton Roads – Elizabeth subbasin has an area of 425 square miles. The York River Basin encompasses 2,626 square miles with headwaters in Orange County, Virginia. The Lower York River subbasin shown in **Figure 3.3** has an area of just 275 square miles. Several tributaries in the study area flow directly into the Chesapeake Bay, including Poquoson River, Back River, and Lynnhaven River, but the basin also includes the small bays, river inlets, islands and shoreline of the Bay. While the entire basin includes just over 3,000 square miles of land area, just 53% of that land area is within the study area.

Land in both North Carolina and Virginia contribute runoff to the Albemarle-Chowan River Basin. The drainage basin within Virginia is 4,061 square miles, and the basin begins as far west as Charlotte County. Major tributaries include the Meherrin, Nottaway and Blackwater Rivers. In Virginia, there are four distinct sub-watersheds — the Great Dismal Swamp, North Landing River, Northwest River, and Back Bay. These waters flow into the Albemarle and Pamlico Sounds in southeastern North Carolina.

FIGURE 3.3: HYDROGRAPHIC REGIONS OF HAMPTON ROADS



2011

Source: Hampton Roads Regional Water Supply Plan, HRPDC, 2011

According to the Virginia Department of Conservation and Recreation (DCR) natural heritage inventory, there are at least seven important ecological community groups in Hampton Roads that are interrelated with the water resources of the region:

- Pine/Scrub Oak Sandhills – includes slightly elevated sand deposits along the Blackwater and Nottoway Rivers in Southampton and Isle of Wight counties and the City of Suffolk.
- Fluvial Terrace Woodlands – Nottoway River and Chickahominy River
- Bald Cypress – Tupelo Swamps – swamps dominated by old-growth bald cypress along the Blackwater River in Isle of Wight County and the Nottoway River in Southampton County.
- Coastal Plain/Piedmont Swamp Forests;
- Coastal Plain/Piedmont Floodplain Forests;
- Tidal Bald Cypress Forests and Woodlands; and,
- Tidal Freshwater and Oligohaline Aquatic Beds

The Virginia Scenic Rivers program, administered by DCR, identifies, recognizes and provides limited protection to rivers whose scenic beauty, historic importance, recreation value, and natural characteristics make them resources of particular importance. Reaches of the Blackwater, lower James, North Landing and Nottoway Rivers are all designated scenic rivers through the program. Similarly, the Nationwide Rivers Inventory is a register of river segments that possess unique, rare or exemplary features that are significant at a comparative regional or national scale. Segments of the Blackwater, Chickahominy, James, Northwest, Nottoway, Ware, Yarmouth, and York Rivers are designated on the National Rivers Inventory for various reasons. Additional information on the significance of each designated reach can be found at: https://www.nps.gov/subjects/rivers/virginia.htm.

The summer, fall, spring, and winter temperatures in the Hampton Roads region are typically mild. **Table 3.2** provides the annual meteorological averages for maximum, minimum, and mean temperatures, as well as total precipitation from three airports in the coastal part of the region. The region usually receives small amounts of snowfall annually. Additional discussion of weather extremes, including winter storms, is included in Section 4.

TABLE 3.2: ANNUAL METEOROLOGICAL AVERAGES

WEATHER STATION	TEMPERATURE (DEGREES FAHRENHEIT)			TOTAL PRECIPITATION (INCHES)
	MAXIMUM	MINIMUM	MEAN	
Joint Base Langley-Eustis (Hampton) 1918-2007	67.5	51.3	59.4	43.6
Holland (Suffolk) 1933-2008	70.2	47.4	58.8	48.4
Norfolk International Airport 1946-2008	68.5	51.4	59.9	45.3

Source: Hampton Roads Regional Water Supply Plan, HRPDC, 2011

The following information provides a brief overview of the history, geography and unique characteristics of the jurisdictions in the study area.

City of Hampton

Hampton is the oldest continuously settled English-speaking community in the United States. The area now occupied by Hampton was first noted by English colonists before they sailed up the James River to settle in Jamestown, where they visited an Indian village called Kecoughtan.

In 1610, the construction of Fort Henry and Fort Charles at the mouth of Hampton Creek marked the beginnings of Hampton. In 1619, the settlers chose an English name for the community, Elizabeth City. The settlement was known as Hampton as early as 1680, and in 1705 Hampton was recognized as a town. The City of Hampton was first incorporated in 1849. In 1952, Hampton, the independent town of Phoebus, and Elizabeth City County, encompassing Buckroe and Fox Hill, were consolidated under one municipal government.

Benjamin Syms and Thomas Eaton founded the first free public schools in the United States in Hampton. Hampton is the site of Hampton University, established in 1868 to educate freed slaves. St. John's Episcopal parish was founded in 1610, making it the oldest in the country.

Fort Monroe was the only active moat-encircled fort in the country from 1819 until it was decommissioned in 2011. For a long period during the Civil War, the fort was the only Union outpost in the Confederacy. The famous battle between the first ironclad battleships, the Monitor and the Merrimac, was fought just offshore in Hampton Roads, near the Hampton-Newport News municipal boundary.

During the Civil War, rather than surrender to the Federal army, Hampton was burned down by its own troops. Before the fire, Hampton had 30 businesses and over 100 homes. Fewer than six buildings remained intact after the fire. In 1884, fire again besieged Hampton and almost completely destroyed the downtown business district.

Hampton is now a thriving city with numerous industries including high-tech firms, seafood processing, NASA, military, and tourism. Fort Monroe was the headquarters for the U.S. Army Training and Doctrine Command until base decommission in 2011. It has since been redeveloped as a result of the 2005 Base Realignment Closure Commission. The *Fort Monroe Reuse Plan* was signed into effect August 2008, and the city, the Fort Monroe Authority and the Federal government have worked together on implementation of the Plan. Today, Fort Monroe is a National Park with housing units, offices, and public access to the waterfront and the entire fort. The Fort Monroe Authority works to preserve the history of the Fort and maintain the buildings and grounds for continued use. Langley Air Force Base, where historic Langley field was constructed in 1917, is home of the United States' Air Force First Fighter Wing. NASA Langley Research Center, where America's first astronauts were trained, is now a major center for aviation research.

City of Newport News

Established as a town in 1880, Newport News was incorporated as a city in 1896. In the 1960s, the City of Newport News merged with Warwick County to create today's incorporated area.

The most widely accepted version of how Newport News was named relates to Captain Christopher Newport's return to the area from England in 1610. Newport met the Jamestown colonists on Mulberry Island, (located offshore on the James River) as they were preparing to return to England. The news of his arrival with three vessels, a plentiful supply of provisions, and 150 men gave heart to the dispirited colonists who agreed to go back to Jamestown. In gratitude, they named the point of landing "Newport's News." Over the years, the "s" was dropped, thus the name Newport News.

The City of Newport News played a major role in the Peninsula Campaign during the Civil War. Numerous earthen fortifications and attractions that relate to the Civil War are still visible. Additionally, the famous Battle of the Ironclads took place off the shores of Newport News in 1862. Collis P. Huntington, a Northern railroad tycoon from Connecticut, established two major industries in Newport News: the C&O Railroad and Newport News Shipbuilding. Newport News Shipbuilding and Dry Dock Company, established in 1886, built many of the United States' aircraft carriers, including the Enterprise, Kennedy, Washington, Vinson, and Roosevelt. On November 7, 2001, Newport News Shipbuilding signed a merger agreement with Northrop Grumman, and officially became Northrop Grumman Newport News.

The U.S. Army designated the City of Newport News as a Port of Embarkation immediately after America's entry into World War I. The final major military base during WWI was Camp Eustis, which later became known as Fort Eustis. Named after the founder of Fort Monroe's Artillery School of Practice and a War of 1812 veteran, Brigadier General Abraham Eustis, the camp was created in 1918 to meet the need for an artillery firing range. Today, Fort Eustis is the home of the U.S. Army Transportation Corps, and the Transportation Corps Regiment. The U.S. Army Transportation Museum is also located at Fort Eustis.

City of Poquoson

The name "Poquoson" comes from a Native American term that has been translated as either "flat land" or "great marsh." Plum Tree Island National Wildlife Refuge covers approximately 5.5 square miles and dominates the eastern portion of the City. Together with privately owned salt marsh lands, the area makes up the largest saline marsh in the lower Chesapeake Bay.

Poquoson was part of York County for over three centuries and incorporated as a town in 1952. It was later chartered as a city in 1975. It is the oldest continuously named city in Virginia. General agriculture and seafood related businesses remained the predominant activities of the City until the construction of Langley Field in 1917 prior to the United States' entry into World War I. The Field offered residents many employment opportunities either working directly for Langley Field, its many military contractors, or ancillary businesses. Since World War II, Poquoson has been a residential community for people working all over the peninsula.

City of Williamsburg

In 1699, the General Assembly of Virginia established the City of Williamsburg as the colony's capital. The new city, formerly known as Middle Plantation, was named in honor of King William III. In 1722, King George I granted a royal charter incorporating the City of Williamsburg after the fashion of the English municipal borough.

During the 1700's, Williamsburg developed into a bustling capital city and played a singularly historic role in events leading to American Independence. In 1780, the capital of Virginia moved to Richmond, and the Williamsburg area reverted to a quiet college town and rural county seat. In retrospect, Williamsburg's loss of capital city status was its salvation. Many eighteenth century buildings survived into the early twentieth century, when John D. Rockefeller Jr. supported a massive restoration effort. Now a center of tourism and history, the area is preserved and managed by the Colonial Williamsburg Foundation, a non-profit organization.

The College of William and Mary, located in Williamsburg, currently enrolls 5,800 undergraduate and almost 2,000 graduate students. Originally founded on February 8, 1693, William and Mary is the second-oldest institution of higher learning in the United States and the fourth oldest in North America. The school was one of the original Colonial colleges; the College's Wren Building is one of the oldest academic buildings in continuous use in the United States. The College educated several American leaders, including three U.S. Presidents. George Washington served as one of the College's first Chancellors. Robert M. Gates '65, L.H.D. '98, was named twenty-fourth Chancellor of William & Mary by the Board of Visitors at his investiture on February 3, 2012. He succeeded Sandra Day O'Connor, former Associate Justice of the United States Supreme Court, who was appointed in 2005. He was re-invested for a second term on February 8, 2019.

William and Mary was occupied during the Civil War and closed from 1882-1888 due to financial strains (the College had invested in Confederate bonds). In 1888, William and Mary reopened its doors and began to expand. Today, William and Mary is one of Virginia's most-cherished universities and was one of the first universities to become coeducational in 1918. William and Mary is consistently ranked among the premier public universities in America.

James City County

On May 13, 1607, 144 English explorers arrived and soon established James Towne as the administrative center or capitol. In 1634, by order of the King of England, Charles I, eight shires or counties with a total population of approximately 5,000 inhabitants were established in the colony of Virginia. James City Shire, as well as the James River and Jamestown, took their name from King James I, the father of King Charles I. During 1642 or 1643, the name of the James City Shire was changed to James City County. The original county included what is now Surry County across the James River, part of Charles City County, and some of New Kent County.

Williamsburg became an independent city from James City County in 1884; however, the city is still the county seat of James City County, and they share a school system, courts, and some constitutional officers.

James City County encompasses land important in the early history of our nation. Three jurisdictions, James City County, York County, and the City of Williamsburg, work collaboratively on policies, programs, infrastructure, and land use to preserve this historic area.

York County

York County was formed in 1634 as Charles River Shire, named for King Charles I. It was one of the eight original shires in the Colony of Virginia. The county was renamed in 1642-43 as York County. The river, county, and town are believed to have been named for York, a city in Northern England. The first courthouse and jail were located near what is now Yorktown, although the port used for shipping tobacco to Europe was variously called Port of York, Borough of York, York, or Town of York, until Yorktown was established in 1691. Never incorporated as a town, Yorktown is the county seat of York County. The only town ever incorporated within the county's boundaries was Poquoson, which was incorporated in 1952 and became an independent city in 1975.

York County is most famous as the site of the surrender of General Cornwallis to General George Washington in 1781, ending the American Revolutionary War. Yorktown also figured prominently in the Civil War, serving as a major port to supply both Union and Confederate towns, depending upon who held Yorktown at the time.

Yorktown is part of an important national resource known as the Historic Triangle of Yorktown, Jamestown, and Williamsburg, and is the eastern terminus of the Colonial Parkway.

City of Norfolk

The City of Norfolk, located on the Elizabeth River, was founded in 1682 but was not incorporated as a city until 1845. Initially comprised of only 50 acres, the city has grown to a total of 96 square miles today.

Norfolk has seven miles of Chesapeake Bay waterfront and a total of 144 miles of shoreline, including lakefront, rivers and the Bay. Naval Station Norfolk, which was established on the old Jamestown Exposition grounds in 1917, is the world's largest naval base. The city is also home to the North American Headquarters for the North American Treaty Organization (NATO) and Old Dominion University (ODU). Norfolk is the most densely developed jurisdiction in the Southside Hampton Roads region at 4,486 people per square mile.

City of Portsmouth

The City of Portsmouth was founded as a town in 1752 on the shores of the Elizabeth River by Colonel William Crawford. In 1858, the town was separated from the county government and given status as an independent city.

Portsmouth's location as an East Coast deep-water port, and available business sites in proximity to the nation's largest shipyard, have provided a significant impetus for economic growth in the area. Today Portsmouth is in the middle of the dynamic Norfolk-Virginia Beach metropolitan area and home to almost 100,000 people. In addition to the many medical, cultural and recreational facilities within the immediate community, Portsmouth's downtown is bustling with retail, restaurant and service-related businesses. The historic waterfront neighborhood of Olde Towne lines the Elizabeth River and is easily traversed by the famous downtown seawall, and the City of Norfolk is easily accessible by a 5-minute ferry ride across the river.

City of Suffolk

In 1742, the Town of Suffolk, which was originally part of the County of Nansemond, was established. The town was burned by the British in 1779 and damaged by other fires throughout the next century but survived to eventually become incorporated as a city in 1910. In 1974, the City of Suffolk consolidated with the towns of Holland and Whaleyville, and the County of Nansemond. At that point it became the largest city (geographically) in Virginia and the 11th largest in the country, encompassing a total of nearly 430 square miles. This large area is made up of land with woods, lakes, rivers, and rolling terrain.

The City of Suffolk is located along the Nansemond River and is still largely recognized as the "Peanut Capital" of the world and as the home of "Mr. Peanut." In 1912, an Italian immigrant named Amedeo Obici moved from Pennsylvania to Suffolk and opened Planters Nut and Chocolate Company. Today, Suffolk remains a major peanut processing center and transportation hub.

City of Virginia Beach

The first settlement inside the city limits of Virginia Beach was made on Lynnhaven Bay in 1621, and the area first became incorporated as a town in 1908. In 1963, the Town of Virginia Beach merged with Princess Anne County to form the independent City of Virginia Beach.

The city consists of 51.3 square miles of inland water and 258.7 square miles of land. The topography is relatively flat with an average elevation of twelve feet above sea level. The area contains extensive brackish tidal areas, such as the Lynnhaven and Elizabeth River systems, and expansive freshwater tidal areas, such as the North Landing River and Back Bay systems.

Due to a combination of the city's geographic position on the mid-Atlantic coastline and the straddling of two ecologically significant estuaries, Chesapeake Bay and Pamlico Sound, the area serves as the southern limit of many northern plant and animal species. The Back Bay National Wildlife Refuge, established in 1938 and managed by the U.S. Fish and Wildlife Service, is an 8,000-acre freshwater refuge that borders the Atlantic Ocean on the east and Back Bay on the west. The barrier islands feature large sand dunes, maritime forests, freshwater marshes, ponds, ocean beach, and large impoundments for wintering wildfowl.

Virginia Beach is best known as a major resort destination, with miles of beaches and dozens of hotels, motels, and restaurants. The city is also home to several state parks, several protected beach areas, four military bases, a number of large corporations, and two universities. Much of the land remained undeveloped until World War II when the U.S. Navy built Oceana Naval Air Station, followed by three more military bases, including Little Creek, Fort Story, and Dam Neck. Since the end of the war, Virginia Beach has experienced continued rapid growth and is the region's most populous jurisdiction at almost 450,000 people.

City of Chesapeake

Chesapeake's history dates back much further than 1963 when Norfolk County and the City of South Norfolk merged to create Chesapeake. The first English settlement of the area began around 1620 along the banks of the Elizabeth River. Norfolk County's founding dates back to 1636.

In the early months of the Revolutionary War, in December 1775, British Royal Governor Lord Dunmore moved his forces from Norfolk to Great Bridge where his army entrenched itself to await the arrival of American forces. The two armies clashed on December 9, 1775, in the historic Battle of Great Bridge, just a few hundred yards from where the Chesapeake Municipal Center complex stands today. In a brief but decisive battle, the Americans routed Lord Dunmore's forces which fled to Norfolk and later abandoned that city.

In 1793, work began on the Dismal Swamp Canal, an idea first envisioned by George Washington in 1763, when he visited the swamp. Because the canal was dug completely by hand, progress was slow, and expenses were high. The canal opened in 1805. Now on the National Register of Historic Places, the Dismal Swamp Canal is the oldest operating artificial waterway in the country. Both the Dismal Swamp Canal and the Albemarle and Chesapeake Canal are operated by the Army Corps of Engineers and form part of the Atlantic Intracoastal Waterway. According to the City of Chesapeake 2003 Legislative Program Document, the City has more miles of deep-water canals than any other city in the country.

The first local encounter of the Civil War occurred at Sewell's Point in May 1861. Although no battles were fought in the Chesapeake area, Union troops occupied and laid waste to much of the land. When the war ended, Norfolk County took advantage of its abundant natural resources. Its coastal location, miles of riverfront and deep-water harbors and the fertile, level farmland allowed county residents to recover quickly from the wartime destruction, moving without hesitation into the 20th century.

While most of the area retained its rural atmosphere through the early 1900s, the northern section near the growing City of Norfolk began to develop as the suburb of South Norfolk. By 1900, South Norfolk had its own waterworks, public schools and a post office. Two rail lines spurred rapid growth, allowing South Norfolk to incorporate as an independent town in 1919 and a city of the first class, independent of Norfolk County, in 1950.

The area that now comprises Chesapeake grew with residential and commercial development of "community crossroads." These areas are still commonly referred to today with community names such as Pleasant Grove, Great Bridge, Oak Grove, Fentress, South Norfolk, Portlock, Deep Creek, Western Branch, Indian River and Hickory.

During the 1950s, both Norfolk County and South Norfolk fell victim to annexation suits filed by neighboring cities. Between 1950 and 1960, the county lost nearly 50,000 residents and 30 square miles of land area. Under these circumstances, both Norfolk County and South Norfolk officials found it difficult to plan for the future.

In the fall of 1961, city and county officials met to discuss the feasibility of a merger. After several weeks of negotiations, both governing bodies approved a merger agreement on December 22, 1961. On February 13, 1962, citizens of both communities turned out in near-record numbers for a special election and approved the merger. Later that year, in June, the citizens voted again and selected the name "Chesapeake" for the new city. On January 2, 1963, the Chesapeake City Council, with five members from South Norfolk and five from Norfolk County, met for the first time.

Isle of Wight County

Isle of Wight County was established as Worrosquoyacke County in 1634, one of eight counties divided from the Virginia colony. The original boundaries of the county included Lawne’s Creek to the north, the James River to the east, the head of Colonel Pitt's Creek to the south and undeveloped wooded area to the west. In 1656, Ragged Island and Nansemond County were incorporated into Isle of Wight County. A long dispute between the counties of Isle of Wight and Nansemond continued until 1674, when the General Assembly established the boundaries that exist today.

Isle of Wight County is thirty-seven miles in length and maintains an average breadth of eleven miles. The county is comprised of approximately 363 square miles, of which 80 percent is land area. The area contains relatively flat but rolling terrain with average elevation of approximately 80 feet above sea level.

The land generally dips to the northeast from a plateau west of Bethel Church, and from that same plateau, the land dips to the northwest and west. Several swamps, ravines and creeks drain to the James River, the Blackwater River and the Nansemond River.

Today, Isle of Wight's residents enjoy the rural nature of the County coupled with the quaint atmosphere of the two incorporated towns, Smithfield and Windsor. While the local economy remains agriculturally-based, the area's scenic beauty, history and proximity to other attractions in the Hampton Roads area greatly contribute to the tourist draw. In addition, the County is close enough to the transportation hubs and employment centers of the Norfolk-Virginia Beach area to attract year round residents and businesses alike.

Town of Smithfield

The Town of Smithfield was incorporated in 1752 by Arthur Smith, IV, who parceled out his family farm into 72 lots and 4 streets in order to house British merchants and ship captains. The town is located on the banks of the Pagan River, which flows into the James River. Smithfield was a river town from its very beginning, and the livelihood of its residents and continued growth over the years has been influenced by the river. The town measures approximately ten square miles.

Nurtured by trade and commerce, Smithfield soon became a town of industry with four plants devoted to the art of curing the world famous "Smithfield Ham." Located within the town is Smithfield Foods, Inc., the area's largest meat-processing industry as well as a major employer for the region.

Smithfield has many of the charms associated with Hampton Roads communities, including many historic homes representing 18th and 19th century architecture, a revitalized historic downtown, and the character of a former colonial seaport. To preserve the historical charm, the Town of Smithfield and individual property owners enacted a Historic Preservation District Ordinance in 1979. Smithfield offers residents a small-town atmosphere, a high quality school system, affordable housing, a historic downtown, and a state-of-the-art community/conference center.

Town of Windsor

The Town of Windsor is located in the heart of Isle of Wight County. The town's original name was Corrowaugh, and it was established as a post office in 1852. Five years later, the Norfolk and Petersburg Railroad obtained the post office and built a depot called Windsor Station. In 1902, a town charter was granted by the General Assembly and the town became known simply as Windsor.

In 1950, the Windsor Ruritan Club and the Town of Windsor built a "Community House" which has been a valuable asset to the community over the years. Over the next three decades, town services improved and expanded. The streets were upgraded and paved, sidewalks extended, additional streetlights installed, drainage improved, and ditches piped. The privately owned water systems in the town limits were purchased by the town, upgraded, extended and an above ground water storage tower was erected. In 1971, the Windsor Volunteer Rescue Squad was founded and continues to provide service to the town and surrounding community.

In July 2001, the Town of Windsor annexed 2.82 square miles of Isle of Wight County. As a result, the total area increased from one square mile to 3.82 square miles and population increased from approximately 900 to 2,347. Also in 2001, Isle of Wight County helped install a central sewer system in the town which opened up many areas for new homes and businesses. The Town of Windsor remains a small rural town amidst the region's larger, more populated cities which are easily accessible through two main roads bisecting the town, Route 460 and Route 258.

City of Franklin

Franklin was incorporated as a Town within Southampton County in March of 1876. The first official census of 1880 indicated that there were 447 inhabitants within its limits. By 1970, nearly 7,000 people lived in Franklin.

Franklin developed considerable steamboat commerce along the Blackwater River southward to North Carolina ports from the late 1800s and early 1900s through the 1920s. The combination of rail and water transportation led to more rapid growth in Franklin than in the other towns. The steady growth of the Camp family's lumber business after the Civil War accelerated this growth. Franklin also became a major collection point for peanuts in that period. Franklin is now the major center of commerce and industry for Southampton County.

The Blackwater River is a relatively slow moving, dark river that traverses the City and serves as a valuable resource. Residents rely on the river for recreation, using it heavily for boating and freshwater fishing.

Southampton County and towns

The earliest explorations of the area began a few years after the settlement of Jamestown. The inhabitants were then members of several small Indian tribes, mainly the Nottoways and Meherrins, with settlements along the rivers that now bear their names. In 1634, the western limit of English colonization was established at the "Blackwater Line," which extended southeast from Fort Henry (now Petersburg) through the Blackwater Swamp. Increasing pressure from colonists resulted in lifting of the line in 1705, and in following years the County lay in the path of the general southwesterly migration from the James River settlements. The soils were good for farming and there were forests for timber. More settlers were attracted, and later their slaves, as the Indians were gradually collected in reservations before they finally dispersed. There was a remnant of the Nottoway reservation still in existence in 1856 and probably for some years thereafter.

Water commerce to the south on the Blackwater and Nottoway Rivers was prominent in the early history of the County during both the Revolutionary and Civil Wars. Efforts to maintain or interrupt these routes for military supplies resulted in skirmishes on several occasions, but no major battles. South Quay on the Blackwater River was an established port from the early years of the 18th century. A most dramatic event of the County's history between the Revolutionary and Civil Wars was the slave rebellion led by Nat Turner in 1831. This bloody revolt and its aftermath resulted in the deaths of approximately 100 blacks and whites and drew national and international attention from both pro- and anti-slavery factions.

In order to establish a more convenient administrative center, the present County was split off from Isle of Wight County in 1749. The County seat was Jerusalem, renamed and incorporated as Courtland in 1888. The new County is believed to have been named for Henry Wriothesley, third Earl of Southampton, who was active in promoting colonization of Virginia under the English King James I.

The isolation of Southampton County diminished with the coming of the first railroad in 1834, as the first leg of the Portsmouth and Roanoke Railroad (now CSX) extended to the Nottoway River on its way to western Virginia and made connection with water travel to the south on the river. The Petersburg Railroad (now also CSX) had gone into operation west of the Meherrin only a year before. With the coming of the Portsmouth and Roanoke line, Southampton farmers now had access to both the Petersburg and Norfolk markets. In 1858, the Petersburg and Norfolk Railroad was completed, crossing the northeastern section of the County. Courtland eventually gained rail service with the coming of the Atlantic and Danville Railroad in 1888, about the same time the Surry, Sussex and Southampton Railway (now abandoned) provided service from the north central County to Scotland Wharf on the James River in Surry County. The Virginian Railroad (also abandoned) was built through Sebrell and Sedley in 1906. Over the years, the economic life of the County became centered on the railroad depots that were established at road crossings. Towns and villages gradually formed at these points: Newsoms, Boykins, and Branchville; Courtland, Capron, and Drewryville; and Sedley and Sebrell. Ivor to the northeast, perhaps somewhat more associated with the other towns along its railroad (Waverly, Wakefield and Zuni) also formed.

In more recent times the County's highways have assumed an increasing share of the responsibility for transporting farm products, timber, and manufactured products. In addition, improved roads and widespread automobile ownership have enabled the same kind of widely dispersed residential pattern once maintained by farming, but now maintained by community centers of trade, services, and manufacturing employment.

Surry County and Towns

When the first English settlers sailed up the James River in 1607, they first landed on the south side of the river near the present Town of Claremont in Surry County. Here they visited the Quioughcohancock Indians, allies of the Powhatan Confederacy. The English reported that they were graciously entertained during this first visit with the Native American inhabitants. These settlers went on to establish the first English settlement in the New World on Jamestown Island. The Virginia Company listed sixteen settlers on the south side of the James in May of 1625; this is the area which would later become Surry County. Surry County was formed in 1652 from a portion of James City County and was named for the English County of Surrey.

Following the American Revolutionary War, Surry County became part of the new Commonwealth of Virginia. In over 350 years of existence, the County of Surry has taken care to guard its history and its rural nature. The county is home to several picturesque small towns, historic homes and churches, and Chippokes State Park. Surry County is connected to Virginia's Historic Triangle (Jamestown, Williamsburg and Yorktown) by the Jamestown/Scotland Ferry.

Surry County is a rural county characterized by a rolling topography that gradually becomes more level in the eastern portions of the county. Seventy-five percent of the county is forested. Traditionally, forestry and agricultural land uses have supported the majority of employment but have experienced recent decline. Surry County is the location of the Surry Power Station, a nuclear power plant built in 1972 which is the County's main employer.

POPULATION AND DEMOGRAPHICS

According to the *U.S. Census Bureau 2020 Census*, the study area portion of Hampton Roads has a population of 1,693,394 people. **Table 3.3** shows total population breakdowns, including percent of children under the age of 18, percent of elderly population (age 65 and over), and percent of population living below the poverty level. Data in Table 3.3 are based on 2020 Census data and the most recent American Community Survey.

TABLE 3.3: DEMOGRAPHIC CHARACTERISTICS						
SUBREGION	COMMUNITY	TOTAL POPULATION	% UNDER 18 YEARS OLD	% 65 YEARS AND OVER	MEDIAN AGE	% PERSONS IN POVERTY
Peninsula	Hampton	134,510	21	15	35.7	15.2
	Newport News	179,225	23.1	13.3	33.4	15.1
	Poquoson	12,271	22.4	19.6	42.4	5.3
	Williamsburg	14,954	10.4	15.7	24.9	20.7
	James City County	76,523	19.7	25.8	47.0	5.8
	York County	68,280	23.5	16.6	41.3	5.1
Southside	Norfolk	242,742	19.7	10.9	31.1	18.7
	Portsmouth	94,398	23.4	14.5	36.7	16.8
	Suffolk	92,108	24.3	14.2	37.9	10.4
	Virginia Beach	449,974	22.3	13.7	36.6	7.3
	Chesapeake	244,835	24.2	13.0	37.8	8.6
Western Tidewater	Isle of Wight County	37,109	20.8	19.8	44.3	9.1
	Smithfield	8,475	23.1	18.0	40.2	17.0
	Windsor	2,746	23.6	21.5	43.6	11.0
	Franklin	7,967	25.2	19.3	39.4	14.7
	Southampton County	17,631	18.6	20.8	46.9	13.3
	Boykins	516	18.6	12.7	46.3	5.0
	Branchville	118	16.7	10.5	39.5	7.1
	Capron	141	15.8	40.5	59.7	3.8
	Courtland	1,295	23.9	19.7	43.5	17.8
	Newsoms	286	17.1	14.2	47.4	8.4
	Ivor	312	27.4	16.1	40.5	11.9
	Surry County	6,422	16.6	23.9	49.8	11.9
	Claremont	305	10.2	31.9	57.2	20.9
	Dendron	251	20.4	12.5	45.3	12.7

Source: U.S. Census Bureau, 2019 American Community Survey

Table 3.4 provides the population change experienced by communities in the region between 1980 and 2020, as well as the HRPDC population projection through 2045. Much of the projected population increase between 2020 and 2045 is fueled by population growth in rural or suburban areas, not in the more urbanized cities like Hampton, Norfolk, Newport News and Portsmouth.

TABLE 3.4: REGIONAL POPULATION CHANGE AND PROJECTED CHANGE, 1980 - 2045

SUBREGION	COMMUNITY	1980	1990	2000	2010	2020	2045
Peninsula	Hampton	122,617	133,811	138,437	137,436	134,510	139,207
	Newport News	144,903	171,439	180,150	180,719	179,225	189,962
	Poquoson	8,726	11,005	11,566	12,150	12,271	12,637
	Williamsburg	10,294	11,530	11,998	14,068	14,954	18,341
	James City County	22,339	34,859	48,102	67,009	76,523	120,741
	York County	35,463	42,422	56,297	65,464	68,280	85,930
Southside	Norfolk	266,979	261,250	234,403	242,803	242,742	263,837
	Portsmouth	104,577	103,910	100,565	95,535	94,398	97,752
	Suffolk	47,621	52,143	63,677	84,585	92,108	129,682
	Virginia Beach	262,199	393,089	425,257	437,994	449,974	518,777
	Chesapeake	114,486	151,982	199,184	222,209	244,835	317,206
Western Tidewater	Isle of Wight County	21,603	25,053	29,728	35,270	37,109	52,417
	Franklin	7,308	7,864	8,346	8,582	7,967	8,751
	Southampton County	18,731	17,550	17,482	18,570	17,631	20,218
	Surry County	6,046	6,145	6,829	7,058	6,422	7,374
REGION TOTAL		**1,193,892**	**1,424,052**	**1,532,021**	**1,629,452**	**1,678,949**	**1,982,832**

Source: Hampton Roads 2045 Socioeconomic Forecast, HRPDC, July 2020

HOUSING, INFRASTRUCTURE AND LAND USE

According to the U.S. Census Bureau, *2019 American Community Survey 5-Year Estimates*, there are 650,877 housing units in the study area portion of Hampton Roads, with more than 90-percent of the units classified as occupied. The majority of structures were built after 1970 (68%). According to the 2009-2013 American Community Survey Estimates (the most recent period available for all communities in the study area), 56% of all housing units are owner-occupied and slightly more than 40% of the housing units are mortgaged. **Table 3.5** summarizes recent data on housing characteristics. More specific information regarding the vulnerability of residential units to various hazards is provided in Section 5, *Vulnerability Assessment*.

TABLE 3.5: HOUSING CHARACTERISTICS

SUBREGION	COMMUNITY	TOTAL HOUSING UNITS	OCCUPIED UNITS	MEDIAN VALUE	AVERAGE HOUSEHOLD SIZE	% HOUSING STRUCTURES BUILT BEFORE 1970
Peninsula	Hampton	62,444	92%	$193,500	2.42	45%
	Newport News	81,901	92%	$186,600	2.45	35%
	Poquoson	4,926	94%	$307,800	2.67	28%
	Williamsburg	5,753	89%	$320,600	2.17	33%
	James City County	33,993	93%	$334,700	2.45	9%
	York County	27,827	93%	$346,200	2.7	18%
Southside	Norfolk	101,386	92%	$218,000	2.43	59%
	Portsmouth	43,164	92%	$169,600	2.47	56%
	Suffolk	38,364	93%	$263,500	2.70	26%
	Virginia Beach	190,059	94%	$296,200	2.60	21%
	Chesapeake	94,829	96%	$290,900	2.75	20%
Western Tidewater	Isle of Wight County	16,441	93%	$243,000	2.55	23%
	Franklin	3,886	88%	$178,700	2.39	48%
	Southampton County	7,724	88%	$159,700	2.53	37%
	Surry County	3,402	82%	$169,000	2.50	31%
REGION TOTAL		**650,877**	**91%**			**32%**

Source: U.S. Census Bureau, 2020 Census, 2010 Census, and 2019 American Community Survey 5-Year Estimates

The Hampton Roads region provides an integrated network of transportation facilities and infrastructure that includes many interstates (I-64, I-264, I-464, I-564, I-664) and highways (U.S. 13, 17, 58, 60, 258, 460 and State Route 164), along with hundreds of secondary roadways and bridges throughout the area. Route 168 is a four-lane highway that links I-64 to North Carolina and the Outer Banks region, a major

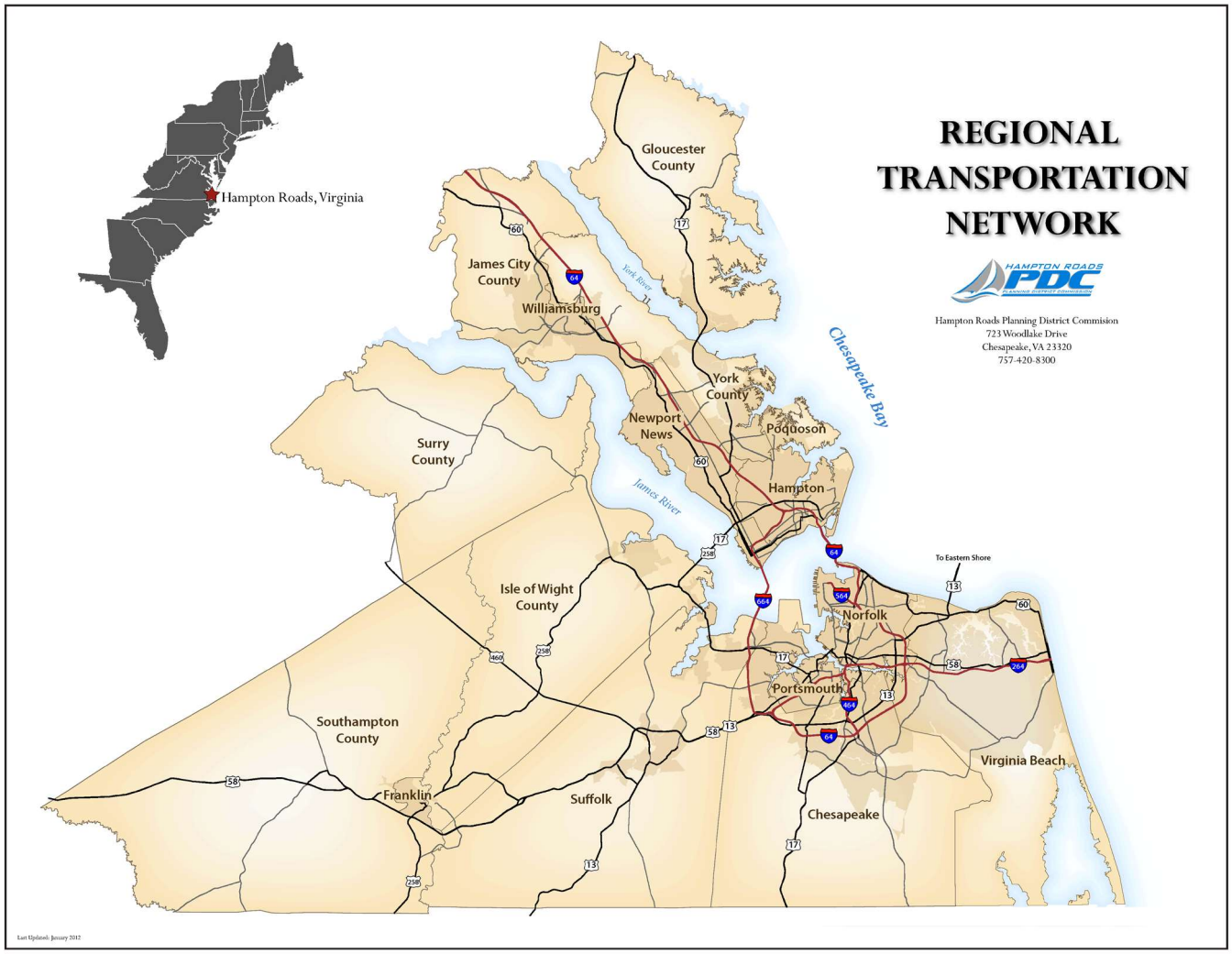
tourist destination throughout the year. US Route 58 and Interstate 64 link Hampton Roads with I-95 and I-85, which are the primary north-south interstate highways in Virginia. The Chesapeake Bay Bridge-Tunnel, which opened in 1964, connects Virginia's Eastern Shore with Virginia Beach and remains one of the world's modern engineering wonders. **Figure 3.4** illustrates the transportation network in the region. Freight rail service is provided by CSX Transportation and Norfolk Southern, Commonwealth Railroad, the Chesapeake and Albemarle Railroad, and the Norfolk/ Portsmouth Beltline. The nearest passenger rail is available through Amtrak at the Newport News station on the Peninsula and a station in downtown Norfolk.

Convenient commercial air service is available through two major airports: Southside's Norfolk International Airport which boasted over 75,000 flight operations in 2019, and the Peninsula's Newport News/Williamsburg International Airport, which services over 430,000 customers each year. The military maintains a long list of airfields in the region with national significance, including Oceana Naval Air Station in Virginia Beach, Naval Station Norfolk, the airfield at Joint Base Langley-Eustis in Hampton, and Fentress Naval Auxiliary Landing Field in Chesapeake. Several other small airports across the region service private aviation.

Water-related infrastructure is prevalent throughout the region's waterways for commercial, industrial, and recreational uses. On the Peninsula, Newport News Shipbuilding, a Division of Huntington Ingalls Industries, is located near the mouth of the James River in Newport News. Massive coal loading piers and facilities were established in the late 19th and early 20th century by the Chesapeake & Ohio (C&O), Norfolk & Western, and Virginian Railways at the end of the Peninsula in Newport News. CSX Transportation now serves the former C&O facility at Newport News. On Southside, over 95 percent of the world's shipping lines call on the Port of Virginia, linking the Commonwealth and the U.S. to more than 250 ports in over 100 countries around the world. With its six terminals across over 1800 acres, 19,885 linear feet of berth and 30 miles of on-dock rail, the Port of Virginia is determined to become the East Coast's leading gateway for global trade. Between 2015 and 2025, the port will have invested $1.5 billion in infrastructure, creating a network to handle any type of cargo, with the deepest channels on the East Coast. Two Class I railroads, CSX and Norfolk Southern, serve the Port via on-dock intermodal container transfer facilities at Virginia International Gateway and Norfolk International Terminals. The service offered by the Class I's is augmented by vital short line rail partners including the Norfolk & Portsmouth Belt Line and the Commonwealth Railway.

Also intersecting the southern part of the study area is a portion of the Atlantic Intracoastal Waterway, a series of federally-maintained inland navigation channels that extend from Norfolk, Virginia to Miami, Florida. The Intracoastal Waterway was authorized by the Rivers and Harbors Act of 1938 and was developed and is still maintained by the U.S. Army Corps of Engineers.

FIGURE 3.4: REGIONAL TRANSPORTATION NETWORK



2012

Source: Hampton Roads Planning District Commission

According to the HRPDC, *Hampton Roads Benchmarking Study,* 2015, the transportation network in Hampton Roads has garnered considerable attention as aging infrastructure and traffic congestion are closely tied to the economy and quality of life within the region. The recent downturn in the economy has affected many aspects of the region's transportation system, with growth in roadway travel coming to a halt and a decrease in air travel from Hampton Roads airports. In spite of relatively lower amounts of travel per capita in Hampton Roads than in competitor regions, congestion is a significant issue, particularly at the bridges and tunnels. Only Washington, DC, Baltimore, and Atlanta had a higher indexed measurement of the extra amount of time trips take during congested peak travel periods in 2011.

As a result of the congestion occurring at the Hampton Roads Bridge Tunnel, an expansion project is underway to increase capacity, ease major congestion and enhance travel time reliability. The Hampton Roads Bridge-Tunnel Expansion is the largest highway construction project in Virginia's history. This transformative undertaking, scheduled for completion in November 2025, will widen the current four-lane segments along nearly ten miles of the I-64 corridor in Norfolk and Hampton, with new twin tunnels

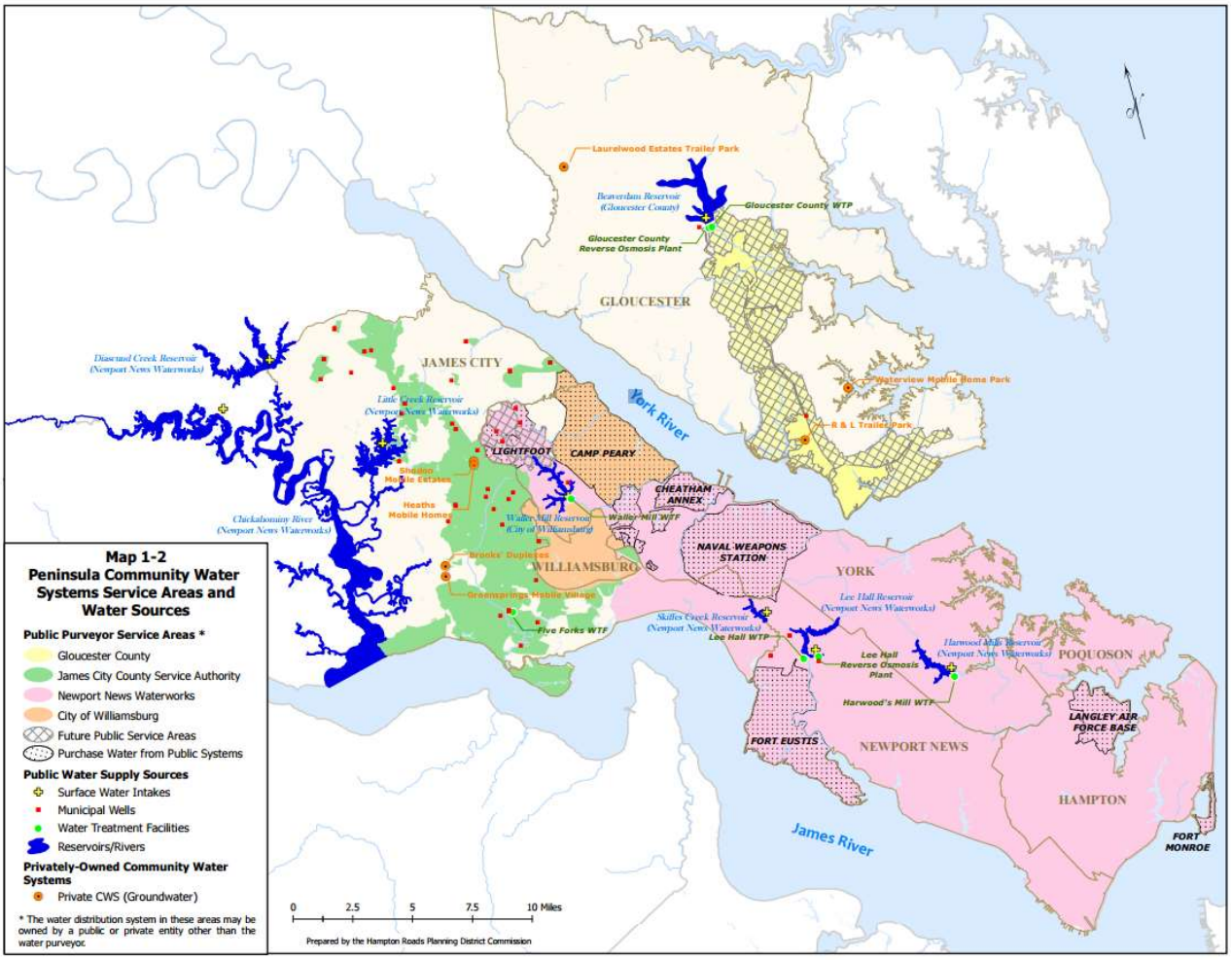
across the harbor. Including the construction contract and owner's costs, the project's total budget is over $3.8 billion, making it one of the largest infrastructure projects in the country.

Public transportation continues to play a small role in the region when compared to some other areas of similar size due in part to low population density and the geography of interspersed water bodies. Norfolk has completed building the region's first light rail line, running 7.4 miles from Eastern Virginia Medical Center to Newtown Road. Light rail has the capability to impact future land use decisions and encourage increased density in development.

The communities of Hampton Roads maintain a significant number of critical facilities and infrastructure that include hospitals, schools, police stations, fire stations, energy facilities, water and wastewater facilities and hazardous material facilities (further discussed in Section 5: *Vulnerability Assessment*). The large military presence provides its own significant facilities and infrastructure base, though these are located on federal land and outside the planning area. Electrical service is supplied throughout the region by Dominion Virginia Power and Franklin Municipal Power & Light (City of Franklin and surrounding areas), and natural gas is provided by Columbia Gas and Virginia Natural Gas. Verizon, Verizon Wireless, FIOS and Cox Communications are primary service provider for cable television, phone and internet service. Surry Power Station is a nuclear power plan located in Surry County, on the south bank of the James River, across from historic Jamestown. The facility provides 14-percent of Virginia's electricity.

In order to examine the existing sources of water in Hampton Roads, the region is divided into three sub-regions. The first sub-region is the Peninsula sub-region, and it is composed of the cities of Hampton, Newport News, Poquoson, and Williamsburg and the counties of Gloucester, James City, and York. There are 26 community water systems that provide water to this sub-region as seen in **Figure 3.5**. According to the Hampton Roads District Planning Commission, these community water systems serviced about 512,000 people in 2011. The water used in the Peninsula sub-region comes from groundwater, reservoirs and the Chickahominy River and serves both urban and rural areas. The majority of the water used comes from surface water in five reservoirs located throughout the sub-region.

FIGURE 3.5: PENINSULA SUB-REGION WATER SOURCES

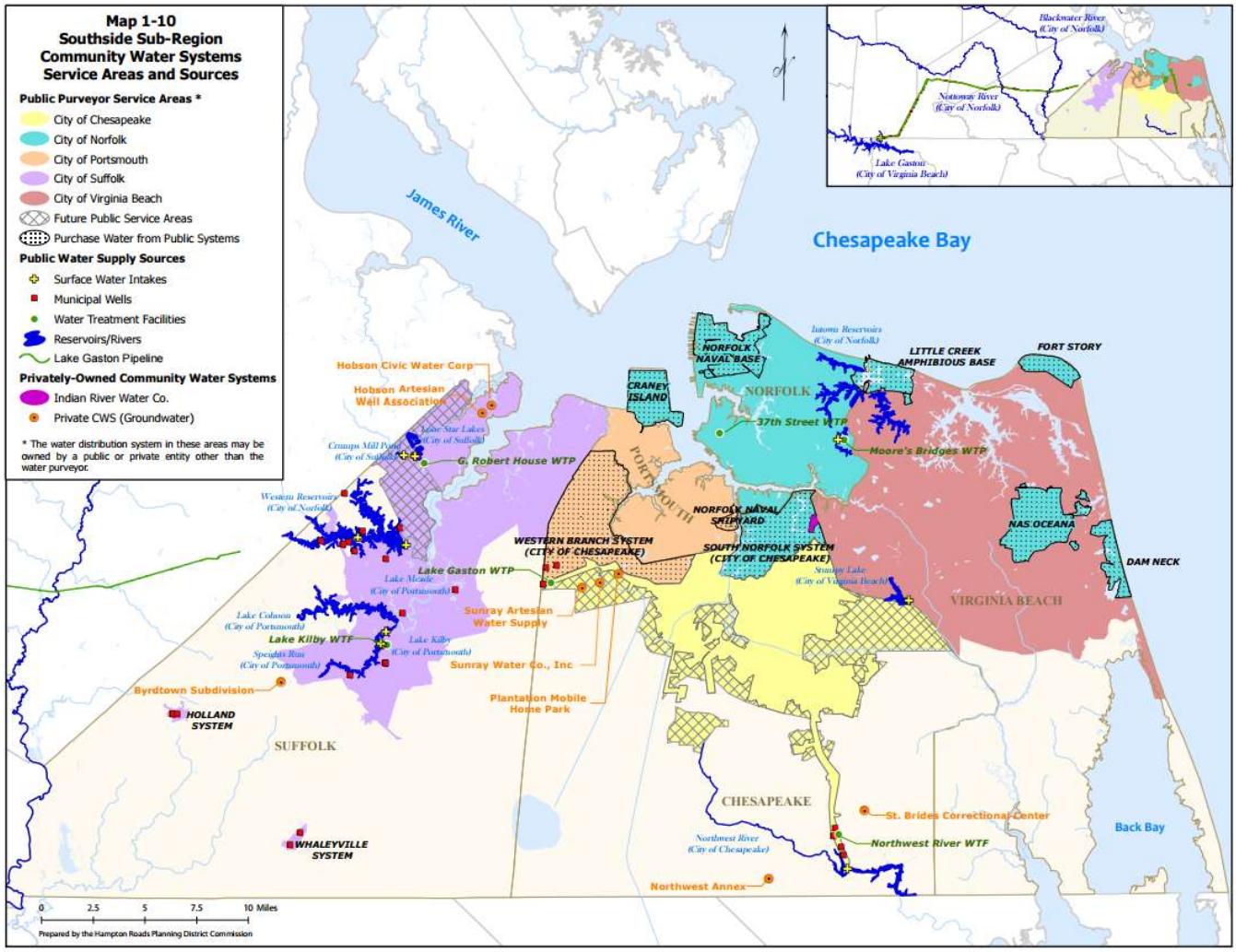


2011

Source: Hampton Roads Regional Water Supply Plan, HRPDC, 2011

The Southside sub-region includes the cities of Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach. Approximately 975,000 people were served by 15 publicly-owned community water systems in 2011. Water sources for the Southside sub-region include aquifers, reservoirs, Lake Gaston, and the Northwest, Blackwater, and Nottoway Rivers and can be seen in **Figure 3.6**. Both urban and rural areas are serviced by the community water systems in the Southside sub-region.

FIGURE 3.6: SOUTHSIDE SUB-REGION WATER SOURCES

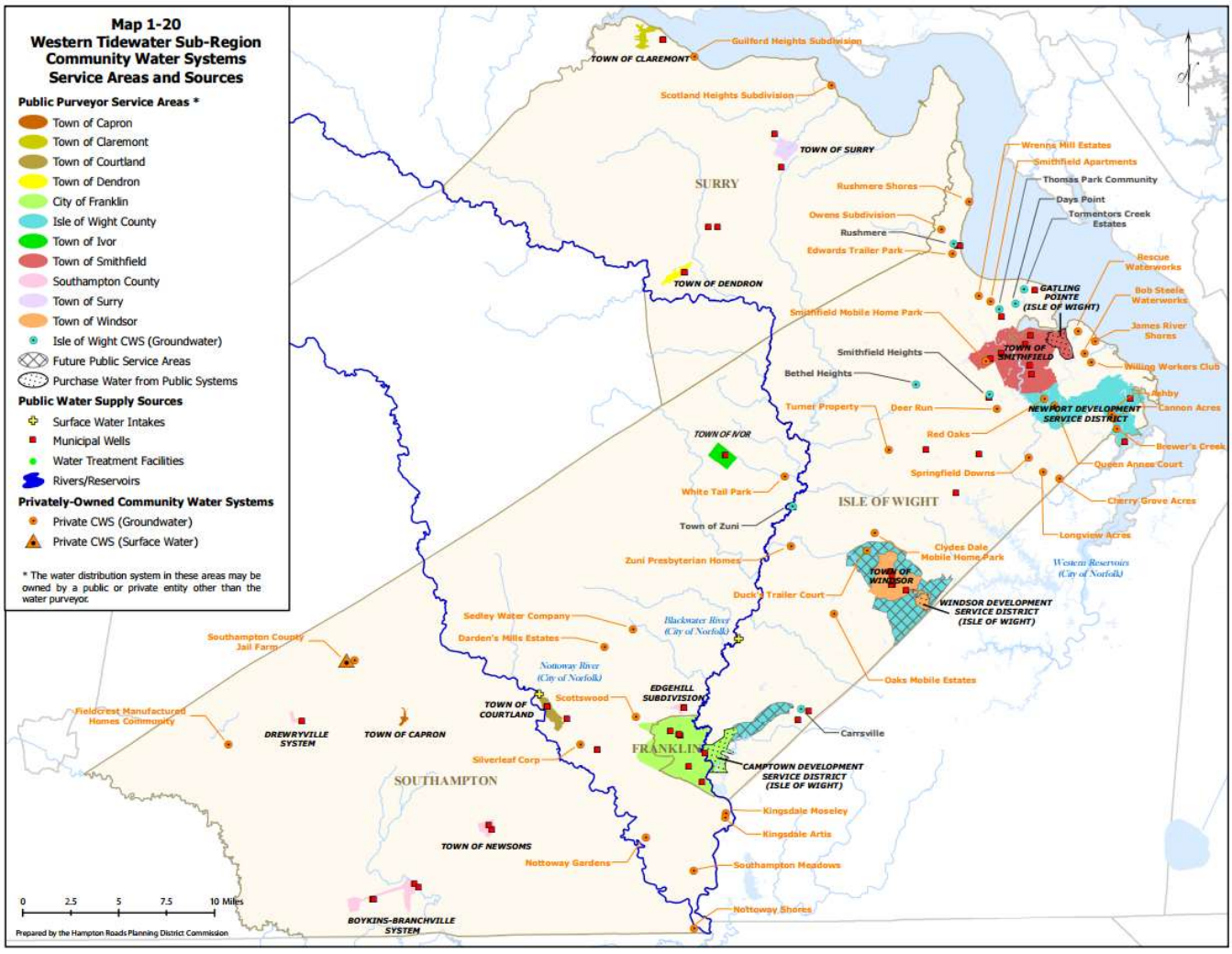


2011

Source: Hampton Roads Regional Water Supply Plan, HRPDC, 2011

The third sub-region in Hampton Roads is the Western Tidewater sub-region. It includes the city of Franklin and the Counties of Isle of Wight, Southampton, and Surry. Since it is a mostly rural sub-region, all but one of the 24 community water systems use groundwater to service 28,000 people. The water sources for the Western Tidewater sub-region can be seen in **Figure 3.7**.

FIGURE 3.7: WESTERN TIDEWATER SUB-REGION WATER SOURCES



2011

Source: Hampton Roads Regional Water Supply Plan, HRPDC, 2011

EMPLOYMENT AND INDUSTRY

Nearly two million people live in or within an hour's drive of the Hampton Roads region, and because of the presence of several military bases, a large proportion of the total population is employed in military- and service-related industries. The military bases not only contribute billions of dollars annually to the regional economy, but also supply a skilled labor force. Over 15,000 trained and disciplined personnel leave the military installations each year, and many of these skilled professionals decide to stay in the area and look for local private sector employment. In addition, there are approximately 40,000 military spouses available to work. The region's tourism industry creates over 10,000 seasonal jobs during summer months. This group provides an additional source of workers to companies with personnel needs that peak at other times of the year. Lastly, over 86,000 students attend eight universities and four community colleges in the area. Most of these students are permanent residents available for part-time or full-time employment while in school and upon graduation.

Table 3.6 shows basic employment data for the study area.

TABLE 3.6: REGIONAL EMPLOYMENT

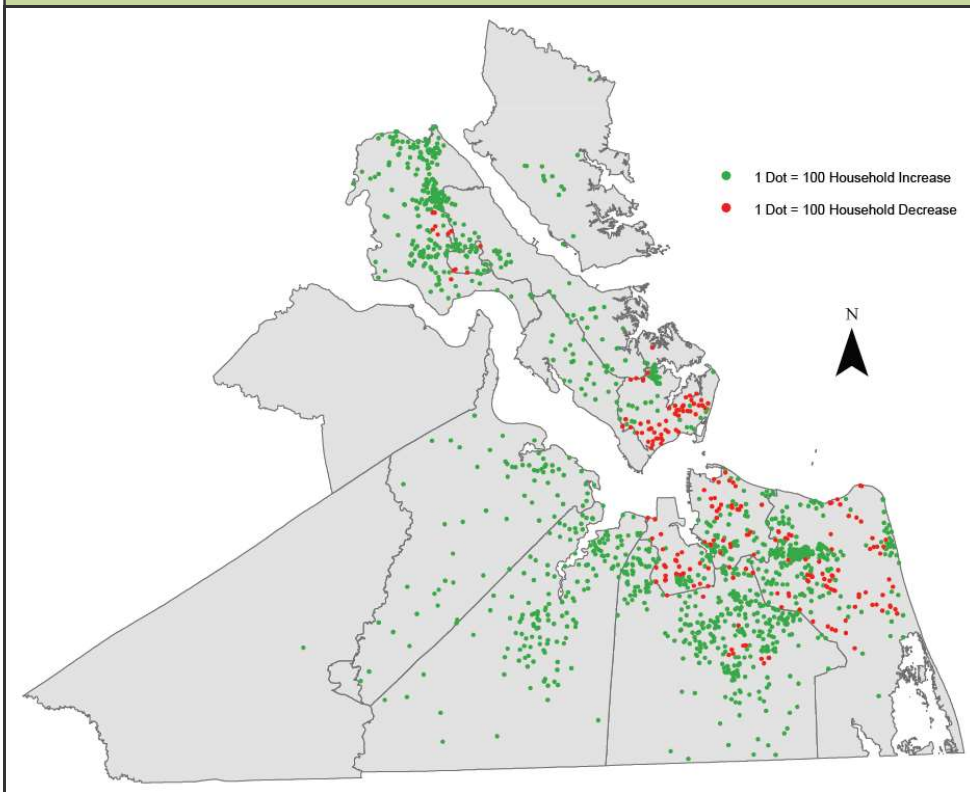
SUB-REGION	COMMUNITY	LABOR FORCE (2020 annual average)	UNEMPLOYMENT RATE (2020 annual average)
Peninsula	Hampton	64,604	8.5
	Newport News	89,715	8.7
	Poquoson	6,249	4.2
	Williamsburg	6,705	8.2
	James City County	36,558	6.1
	York County	32,390	5.6
Southside	Norfolk	111,825	8.7
	Portsmouth	44,701	9.6
	Suffolk	44,546	6.5
	Virginia Beach	230,322	6.2
	Chesapeake	122,036	6.1
Western Tidewater	Isle of Wight County	19,092	5.1
	Franklin	3,640	8.5
	Southampton County	9,063	5.0
	Surry County	3,603	5.7
	VIRGINIA	**4,244,200(September 2021)**	**3.8% (September 2021)**

Source: U.S. Bureau of Labor Statistics, April 16, 2021, except as noted

DEVELOPMENT TRENDS

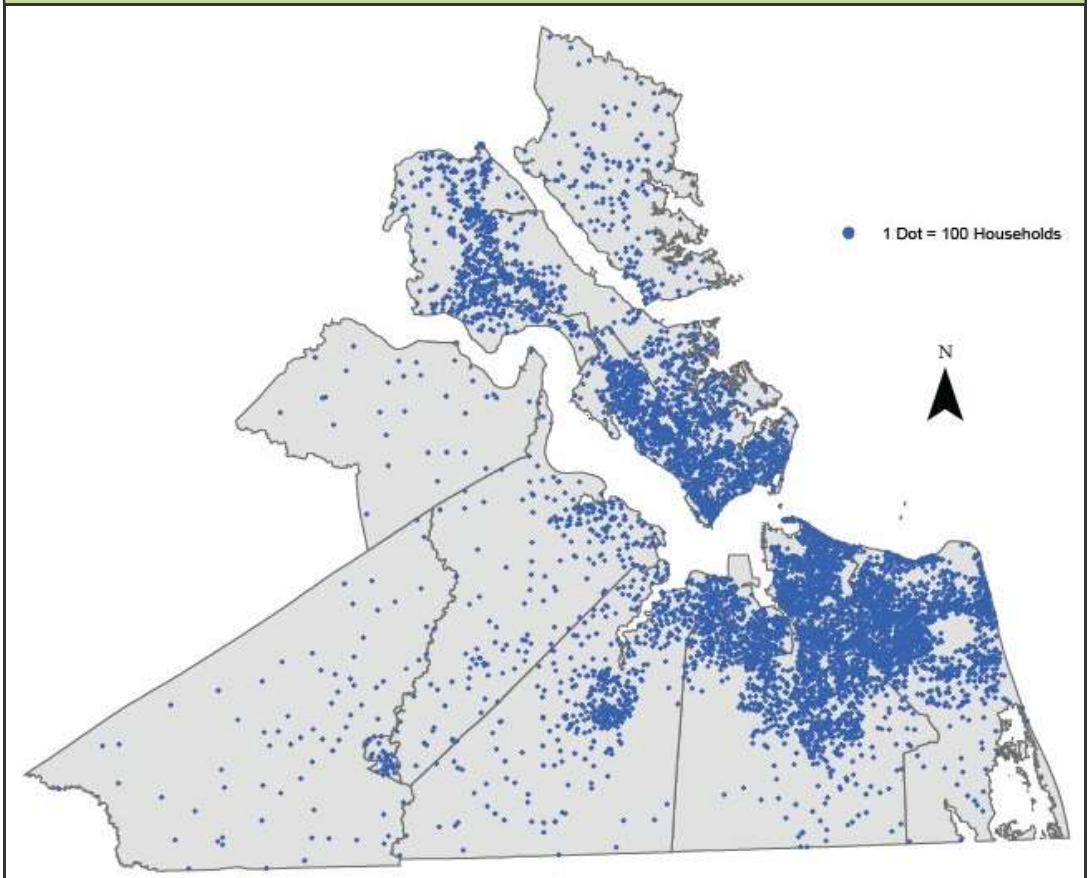
The Hampton Roads 2045 Socioeconomic Forecast prepared by the Hampton Roads Transportation Planning Organization in February 2019 provides the maps shown in **Figures 3.8 and 3.9** to help visualize where demand for employment will impact the number of households in the region. These growth patterns show expected change from 2015 through 2045 and provide a regional summary intended for the purpose of transportation planning; however, the data points shown are also relevant to hazard mitigation planning in that they provide a relative indicator of future housing needs in the region. Where and how those houses will be built influences the region's vulnerability to a range of hazards.

FIGURE 3.8: CHANGE IN HOUSEHOLDS, 2015 TO 2045



Source: Hampton Roads Transportation Planning Organization, Hampton Roads 2045 Socioeconomic Forecast and Transportation Analysis Zones (TAZ) Allocation, February 2019.

FIGURE 3.9: 2045 FORECASTED HOUSEHOLDS



Source: Hampton Roads Transportation Planning Organization, Hampton Roads 2045 Socioeconomic Forecast and TAZ Allocation, February 2019.

The Hampton Roads area expects to add 124,356 net new jobs by 2033. These net new jobs would increase employment by 16.4% with jobs being added to professional and business services, health services, construction and administrative, and waste service sectors. In order to attract workers to these jobs and remain a competitive region that people want to live in, it is imperative that there is adequate housing and transportation and a skilled workforce to do the jobs.

The number of houses needed will vary by jurisdiction. It is estimated that 86,098 net new housing units must be built by 2033. In order to be able to house all of the workers of Hampton Roads, 4,305 net new units must be built each year. Assuming people live near where their jobs are and do not commute, Virginia Beach and Chesapeake will see the most job growth in the region, resulting in more housing units being built. **Table 3.7** illustrates where the housing units need to be built based on how many net new jobs will be in the jurisdiction and whether workers will commute to work or live close to their jobs. The "Remainder of Region" includes Suffolk, Franklin, Gloucester, Isle of Wight, Southampton, Surry, and York County. Gloucester County figures could not be separated out of these published data.

TABLE 3.7: PROJECTED HOUSING DEMAND FOR NEW NET WORKERS 2013-2033

SUBREGION	COMMUNITY	NET NEW JOBS	BY WORK LOCATION	BY CURRENT COMMUTING PATTERNS		
				NON-COMMUTERS	COMMUTERS	TOTAL BY COMMUTING PATTERN
Peninsula	Hampton	2,698	1,800	838	2,693	2,556
	Newport News	5,930	3,911	1,897	3,418	5,316
	James City County and Williamsburg	23,707	17,222	6,860	645	7,506
Southside	Norfolk	13,061	8,947	3,719	3,418	5,316
	Portsmouth	1,675	1,196	414	2,142	2,556
	Virginia Beach	24,661	16,659	11,987	7,974	19,962
	Chesapeake	20,868	13,578	6,634	5,864	12,498
Remainder of Region*		31,756	22,785	12,312	7,976	20,285

** Includes Gloucester County.*
Source: Sturtevant, Lisa. Housing the Future Workforce in the Hampton Roads Region, May 2014. Prepared for Housing Virginia and shared on Hampton Roads Planning District Commission web site.

Due to changes in the demographic of the average net new worker, the type of housing that will need to be built will be different than it has been in the past. The new workers who will move to Hampton Roads will be young people working for lower wages. They will require more single family houses and rental units with moderately priced rent. According to a survey done by the American Community Survey, the percentage of multi-family housing units will increase by 5.2% to 39.7% in the coming years. The percentage of rental units will also increase to 46.5%, compared to 36.4% in previous years. **Table 3.8** illustrates how many housing units will need to be built in each community and the number of units that will be owned compared to those that will be rented. The "Remainder of Region" data include the City of Franklin, and the counties of Gloucester, Isle of Wight, Southampton, Surry, and York.

TABLE 3.8: ADDITIONAL HOUSING UNITS NEEDED BY 2033

SUBREGION	COMMUNITY	TOTAL UNITS NEEDED	SINGLE FAMILY		TOWNHOUSE/MULTI-FAMILY	
			OWNER	RENTER	OWNER	RENTER
Peninsula	Hampton	1,800	1,019	118	240	423
	Newport News	3,911	1,311	495	323	1,782
	James City County and Williamsburg	17,222	8,420	2,938	1,002	4,863
Southside	Norfolk	8,947	3,400	927	930	3,690
	Portsmouth	1,196	401	233	31	531
	Virginia Beach	16,659	6,124	1,920	1,618	6,997
	Chesapeake	13,578	7,684	1,961	916	3,017
	Suffolk	13,730	6,743	2,286	881	3,820
Remainder of Region*		9,055	4,445	1,513	549	2,545
Hampton Roads Region		86,098	39,547	12,391	6,491	27,668

* Includes Gloucester County.

Source: Sturtevant, Lisa. Housing the Future Workforce in the Hampton Roads Region, May 2014. Prepared for Housing Virginia and shared on Hampton Roads Planning District Commission web site.

Virginia law requires that all communities have a comprehensive land use plan and that it be updated every five years. Each county or city government in the study area has adopted a comprehensive plan that provides additional detail on the development trends for that community. Additionally, zoning maps and ordinances within each community further dictate allowable uses and show where future development is guided, or where higher density housing is allowable. Additional information and figures in the Section 5 *Vulnerability Assessment* show recent community development patterns in more detail.

HAZARD IDENTIFICATION AND ANALYSIS

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2022 UPDATE

The hazards significantly affecting the region, as determined by the planning group during the process outlined in Section 2, were updated with current hazard history information from several sources, including the National Centers for Environmental Information (NCEI), National Oceanic and Atmospheric Administration (NOAA) Hurricane Tracks, National Weather Service (NWS), and the *2018 Commonwealth of Virginia Hazard Mitigation Plan*. Flooding Due to Impountment Failure/High Hazard Dam, Pandemic Flu or Communicable Disease, and Radon Exposure were added and described.

INTRODUCTION

This section of the Plan describes the hazards that threaten the Hampton Roads region and provides general background information, local data (e.g., the location and spatial extent), and historical occurrences for each hazard. This section also presents best available data regarding notable historical damages within the region. The hazards discussed in this section are as follows:

- FLOODING
- FLOODING DUE TO IMPOUNDMENT FAILURE/HIGH HAZARD DAM
- SEA LEVEL RISE AND LAND SUBSIDENCE
- TROPICAL/COASTAL STORM

- LANDSLIDE/COASTAL EROSION
- TORNADO
- WINTER STORM
- EARTHQUAKE
- WILDFIRE
- DROUGHT
- EXTREME HEAT
- HAZARDOUS MATERIALS INCIDENT
- PANDEMIC FLU OR COMMUNICABLE DISEASE
- RADON EXPOSURE

44 CFR Requirement

Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Some of these hazards are interrelated (e.g., tropical/coastal storm events can cause flooding and tornado activity, and flooding can be associated with winter storms and erosion); thus, hazard discussions overlap where necessary throughout the risk assessment.

To a large extent, historical records are used to identify the level of risk within the planning area—with the assumption that the data sources cited are reliable and accurate. Maps are provided to illustrate the location and spatial extent for those hazards within the region that have a recognizable geographic boundary (i.e., hazards that are known to occur in particular areas of the region such as the 100-year floodplain). For those hazards with potential risk not confined to a particular geographic area (such as winter storms and tornadoes), historical event locations and/or general information on the applicable intensity of these events across the entire planning area is provided.

For most hazards analyzed in this section, some level of property damage was associated with any or all of the hazard events cataloged. However, for some historic events reports of property damage were not available. Therefore, totals of past property damages derived from historical records are best estimates and should not be used as a stand-alone indicator of hazard risk.

The terms “likely”, “highly likely” and “unlikely” are used to describe the probability of future occurrence for each hazard. Hazards termed “likely” to occur again in the future are expected to occur but may not have occurred with such high frequency in the past that future events are a certainty. Hazards termed “highly likely” have a history of occurrence or have characteristics that make a future event almost guaranteed. “Unlikely to occur” indicates that committee members, based on review of past events, have the impression that any future occurrence will be a rare and unique event.

The *Vulnerability Assessment*, Section 5 of this plan, expands upon the foundation provided here and assesses the vulnerability of the region to these natural hazards.

SUMMARY OF PRESIDENTIAL DISASTER DECLARATIONS

A presidential disaster declaration is issued when a disaster event is determined to be beyond the response capabilities of state and local governments. Since 1953, the first year presidential disaster declarations

were issued in the United States, the region has been named in sixteen such declarations (**Table 4.1**). Under a presidential disaster declaration, the state and affected local governments are eligible to apply for federal funding to pay 75% of the approved costs for debris removal, emergency services related to the storm, and the repair or replacement of damaged public facilities. The types of natural hazards that led to these disaster declarations in Hampton Roads include ice storms, winter storms, hurricanes and tropical storms, the Hurricane Katrina evacuation in 2005 and pandemic. The most recent declarations were for Hurricanes Matthew (2016) and Florence (2018), Tropical Storm Michael (2018), and the Covid-19 Pandemic in 2020.

TABLE 4.1: PRESIDENTIAL DISASTER DECLARATIONS ISSUED FOR HAMPTON ROADS

YEAR	DATE OF DECLARATION	DISASTER NUMBER	DISASTER TYPE	DESIGNATED AREAS
1972	September 8	339	Tropical Storm Agnes	Chesapeake, Hampton, Isle of Wight Co, James City Co, Newport News, Norfolk, Portsmouth, Suffolk, Virginia Beach, Williamsburg, York Co
1996	February 16	1086	Blizzard of 1996	All study area communities
1996	October 23	1135	Hurricane Fran	Hampton, Isle of Wight Co, James City Co, Newport News, Poquoson, Suffolk, Williamsburg, York Co
1998	October 9	1242	Hurricane Bonnie	Chesapeake, Norfolk, Portsmouth, Suffolk, Virginia Beach
1999	September 6	1290	Tropical Storm Dennis and Tornadoes	Hampton
1999	September 24	1293	Hurricane Floyd	All study area communities
2000	February 28	1318	Severe Winter Storms	Franklin, Isle of Wight Co, James City Co, Newport News, Southampton Co, Suffolk, Williamsburg, York Co
2003	September 18	1491	Hurricane Isabel	All study area communities
2005	September 12	3240	Hurricane Katrina Evacuation	All study area communities
2006	September 22	1661	Tropical Depression Ernesto	Isle of Wight Co, James City Co, Newport News, Poquoson, York Co
2009	December 9	1862	Tropical Depression Ida and a Nor'easter	Chesapeake, Hampton, Isle of Wight Co, Newport News, Norfolk, Poquoson, Portsmouth, Virginia Beach
2011	August 26	4024	Hurricane Irene	All study area communities
2016	November 2	4291	Hurricane Matthew	Chesapeake, Franklin, Isle of Wight County, Norfolk, Portsmouth, Southampton County, Suffolk, Virginia Beach
2018	December 18	4411	Tropical Storm Michael	James City County
2018	October 15	4401	Hurricane Florence	Newport News, Hampton, Williamsburg, Isle of Wight County
2020	April 2	4512	Covid-19 Pandemic	All study area communities

Source: FEMA, 2021

NATIONAL CENTER FOR ENVIRONMENTAL INFORMATION STORM EVENT DATABASE

Much of the data in the remaining tables of this section were taken from the NOAA NCEI database. NCEI receives storm data from the NWS which, in turn, receives their information from a variety of sources, including: city, county, state, and federal emergency management officials, local law enforcement officials, skywarn spotters, NWS damage surveys, newspaper clippings, the insurance industry, and the general public. Information on hazard events not recorded in this database is provided in narrative format for each hazard subsection to supplement the NCEI data and to provide a more accurate depiction of historic hazard events in the region. While far from perfect, the NCEI data represents the best weather history data available that covers the entire region, and provides damages.

FLOODING

BACKGROUND

Nationwide, the primary types of flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, nor'easters, and other large coastal storms. Urban flooding occurs when manmade development obstructs the natural flow of water or when impervious surfaces significantly decrease the ability of natural groundcover to absorb and retain surface water runoff.



Photo courtesy of the City of Chesapeake.

Hampton Roads is subject to a variety of flood sources. The three major sources are: coastal flooding and storm surge associated with large amounts of tidally-influenced water being pushed inland from Hampton Roads and nontidal, riverine flooding as a result of excess precipitation in the watershed. Precipitation flooding occurs when rain intensity exceeds capacity of storm drain systems due to blockages or naturally low-lying areas. Tidal floods are influenced by tidal variations and are directly related to land elevation and proximity to the coastline. This type of flooding occurs in the study area with increasing regularity and is exacerbated by wind speed and direction, sea level rise and occurrence in conjunction with other types of flooding.

Similar to hurricanes, nor'easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive storms up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful.

Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding. There are two main components to a nor'easter: (1) a Gulf Stream low-pressure system (counter-clockwise winds) generated off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic, and pulled up the East Coast by strong northeasterly winds at the leading edge of the storm; and (2) an Arctic high-pressure system (clockwise winds) which meets the low-pressure system with cold, arctic air blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation and have the potential for creating dangerously high winds and heavy seas. As the low-pressure system deepens, the intensity of the winds and waves increase and can cause serious damage to coastal areas as the storm moves northeast.

The presence of the Gulf Stream off the eastern seaboard in the winter season acts to dramatically enhance the surface horizontal temperature gradients within the coastal zone. This is particularly true off the Virginia coastline where, on average, the Gulf Stream is closest to land north of 32 degrees latitude. During winter offshore cold periods, these horizontal temperature gradients can result in rapid and intense destabilization of the atmosphere directly above and shoreward of the Gulf Stream. This air mass modification or conditioning period often precedes wintertime coastal extra-tropical cyclone development. The temperature structure of the continental air mass and the position of the temperature gradient along the Gulf Stream drive this cyclone development. As a low pressure deepens, winds and waves can increase and cause serious damage to coastal areas as the storm generally moves to the northeast.

The coastal communities of Virginia are most vulnerable to the impacts of nor'easters. Since the storms typically make landfall with less warning than hurricanes (due to their rapid formation along the coast), residents and business owners may be caught unprepared for the impacts. Fortunately, nor'easters typically occur during the tourist off-season when fewer non-residents are visiting the coast. As with hurricanes, structural vulnerability to nor'easters is proportional to the strength of the structure, with mobile homes being particularly vulnerable.

Additional causes of flooding, especially in the western Tidewater portion of the study area, may include features, such as roadways and pipelines, that act as choke points in the river, blocking debris and restricting the flow of water during heavy flooding events; development of the watershed resulting in the loss of riparian zone and vegetation coverage; land management, including forestry and farming practices; and deficiencies in manmade drainage systems.

The periodic inundation of floodplains adjacent to rivers, streams, and shorelines is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. FEMA has studied and mapped both the 100-year floodplain (with a 1% chance of being equaled or exceeded in any given year), and the 500-year floodplain (with a 0.2% chance of being equaled or exceeded in any given year) for the study area.

LOCATION AND SPATIAL EXTENT

Flooding can occur along all waterways in the region. Localized riverine flooding can occur in areas of Hampton Roads not adjacent to a major body of water. Large sections of the region are low and subject to tidal flooding during hurricanes and severe nor'easters. Flood duration is typically shorter for hurricanes and tropical storms than for nor'easters because the storms tend to move faster and affect only 1 to 2 tidal cycles. The main impacts from flooding include:

- Inundation of low-lying residential neighborhoods and subsequent damage to structures, contents, garages, and landscaping; over time, mold and mildew from flooding can damage building components and mold spores can cause adverse health effects, including allergic reactions;
- Impassable road crossings and consequential risk for people and cars attempting to traverse flooded crossings;
- Damage to public and private infrastructure, possibly including but not limited to water and sewer lines, bridge embankments, and both small and large drainageways;
- Wave action responsible for shoreline damage, and damage to boats and facilities, including ships, ports and shipyards;
- Inundation of critical facilities, possibly including some fire stations, police facilities, public shelters, emergency operations centers (EOC), and several publicly-owned buildings. Public shelter availability is limited by the expected severity of flooding. (See **Table 5.2** for number of critical facilities in flood hazard areas.)
- Recovery time needed to bring critical infrastructure, schools and employers back online. Of particular concern in the region are transportation routes, including school buses, housing for displaced residents and debris management.

Communities in the study area have outlined detailed plans for activating their EOC, protecting critical facilities and taking specific drainage system actions when faced with an impending flood. Since power outages and threats to the water supply can result from both the wind and flood hazard (which often occur simultaneously in the region), residents are advised of appropriate precautions and specific low-lying areas are evacuated to protect the safety of residents, tourists and responders, and to minimize loss of life.

When severe floods occur, the regional economy is severely impacted by the inability of flooded homeowners to get back to work quickly, the slow rebound of closed or debris-strewn transportation routes, the closing of schools and businesses, and the general state of emergency. Power outages and boil-water advisories are common and can affect many thousands of residents and businesses in the region for several days or even weeks if the damage is severe. Severely flooded homes and even whole

neighborhoods result in displaced residents, including schoolchildren. Loss of life due to people traversing flooded roads, remaining in or becoming trapped in flooded structures, and curiosity-seekers watching storm surge is possible. Flooded businesses that decide to close, move or cease operations in the region have an impact on land values and the labor force, as does flood damage to the facilities of large port-related employers in the region such as shipyards and marinas. Time spent repairing flood damage versus productive value-added labor is costly to employers.

Over time, the pressure on communities and elected officials to fix flooding problems has increased in the region. Longer-term impacts to the real estate market from flooding and flood insurance costs are impacting property sales, especially for older homes in the densely-populated floodplains of Hampton, Newport News, Poquoson, Norfolk, Portsmouth and Virginia Beach. The large number of structures vulnerable to flood damage (see Section 5 for more details) and the cost of measures needed to mitigate such a large-scale problem is daunting for emergency managers, floodplain managers, planners and building professionals throughout the region.

Areas identified as vulnerable to flooding are depicted on FEMA's Flood Insurance Rate Maps (FIRMs), which were developed through the National Flood Insurance Program (NFIP), show the existing potential flood hazard areas throughout the region based on the estimated 100-year floodplain (**Figure 4.1**). The 100-year floodplain represents the area susceptible to the 1% annual flood. The 100-year flood, or base flood, has at least a 26% chance of occurring over the life of a typical 30-year mortgage. FIRM data is available through several sources for more detailed viewing at the parcel level:

- Paper FIRMs are available for viewing in each jurisdiction in the study area that participates in the NFIP;
- The FEMA Map Service Center at https://msc.fema.gov/portal/ is the official public source for flood hazard information produced in support of the NFIP;
- The Virginia Flood Risk Information System (VFRIS) is a collaboration between the Virginia Department of Conservation and Recreation (DCR) and the Virginia Institute of Marine Science (VIMS). The tool has flood depths, changes since the last FIRM, limit of moderate wave action (LiMWA), parcel boundaries, and the ability to download flood insurance studies and flood risk reports - http://cmap2.vims.edu/VaFloodRisk/vfris2.html
- Most localities in the study area have property information viewer tools with flood data layers, and several have included additional sea level rise inundation viewers. The following may be helpful:

  Hampton - https://webgis2.hampton.gov/sites/ParcelViewer/Account/LogOn
  Newport News - http://gis2.nngov.com/gis/
  Poquoson - https://parcelviewer.geodecisions.com/Poquoson/Account/Logon
  Williamsburg - https://williamsburg.maps.arcgis.com/apps/webappviewer/index.html?id=a5996d069d934d58bbcf1918129858f8 (does not have flood layer)
  James City County - http://property.jamescitycountyva.gov/JamesCity/Account/Logon
  York County - http://maps.yorkcounty.gov/York/Account/Logon
  Norfolk STORM Map – real-time event mapping - https://orf.maps.arcgis.com/apps/webappviewer/index.html?id=eb7164021ada45fea397d66fa84f4441
  Interactive Norfolk – various GIS layers, including flood zones - https://orf.maps.arcgis.com/apps/webappviewer/index.html?id=eb7164021ada45fea397d66fa84f4441
  TITAN (Tidal inundation Tracking Application for Norfolk) – https://orf.maps.arcgis.com/apps/dashboards/1fd204f3515e40428e77eea7c659a0e1
  Portsmouth - https://www.portsmouthva.gov/328/Flood-Maps
  Suffolk - http://apps.suffolkva.us/realest/
  Virginia Beach - https://gisapps.vbgov.com/map/

Chesapeake - https://www.cityofchesapeake.net/government/city-departments/departments/Real-Estate-Assessor/app.htm
Isle of Wight County, Smithfield, Windsor - http://iowgis.maps.arcgis.com/apps/webappviewer/index.html?id=4889333b70534c018c2c723b4d953f51
Southampton County, Franklin, towns - http://www.southampton.interactivegis.com/index.php#
Surry County - https://parcelviewer.geodecisions.com/surry/Account/Logon

Figure 4.2 shows the 500-year flood hazard area with a 0.2-percent annual chance of flooding) and floodways, which are the channels of rivers or other watercourses and the adjacent land areas that must be reserved in order to discharge the base flood. Floodways are typically reserved for the fastest and strongest flows during the base flood.

Figure 4.3 shows the LiMWA, which delineates the Coastal A Zone, and the Coastal V Zone, or coastal high hazard area, an area of special flood hazard which is subject to high velocity waters from tidal surge or hurricane wave wash.

Figure 4.4a shows the most recent storm surge hazard areas that can be expected as the result of Category 1, 2, 3, and 4 hurricanes, based on the Sea, Lake and Overland Surge from Hurricanes (SLOSH) model. SLOSH is a computerized model run by the NWS to estimate storm surge heights resulting from hypothetical hurricanes by taking into account the maximum of various category hurricanes as determined by pressure, size, forward speed, and sustained winds. The regional analysis represents the composite maximum water inundation levels for a series of parallel tracks making landfall at various points along the coast. The SLOSH model, therefore, is best used for defining the "worst case scenario" of potential maximum surge for particular locations as opposed to the regional impact of one singular storm surge event.

Figure 4.4b shows the Virginia Hurricane Evacuation Routes for Hampton Roads. Termed the "Know Your Zone" initiative, this map and the effort to get the information engrained into residents' minds prior to impending hurricane-related flooding or high winds, emphasizes the importance of warning and evacuating residents and visitors well before weather conditions deteriorate. When a storm is approaching, emergency managers will determine which zones are most at risk considering the intensity, path, speed, tides and other meteorological factors. Emergency managers at the state and local level will work with local media and use social media and other tools to notify residents of impacted zones and what they should do to stay safe. Depending on the emergency, being safe might mean staying at home, a short trip to higher ground, or traveling to a different region of the state. Given the geography of the region and the reliance of the transportation system on tunnels and bridges, early evacuation is a crucial element in public safety.

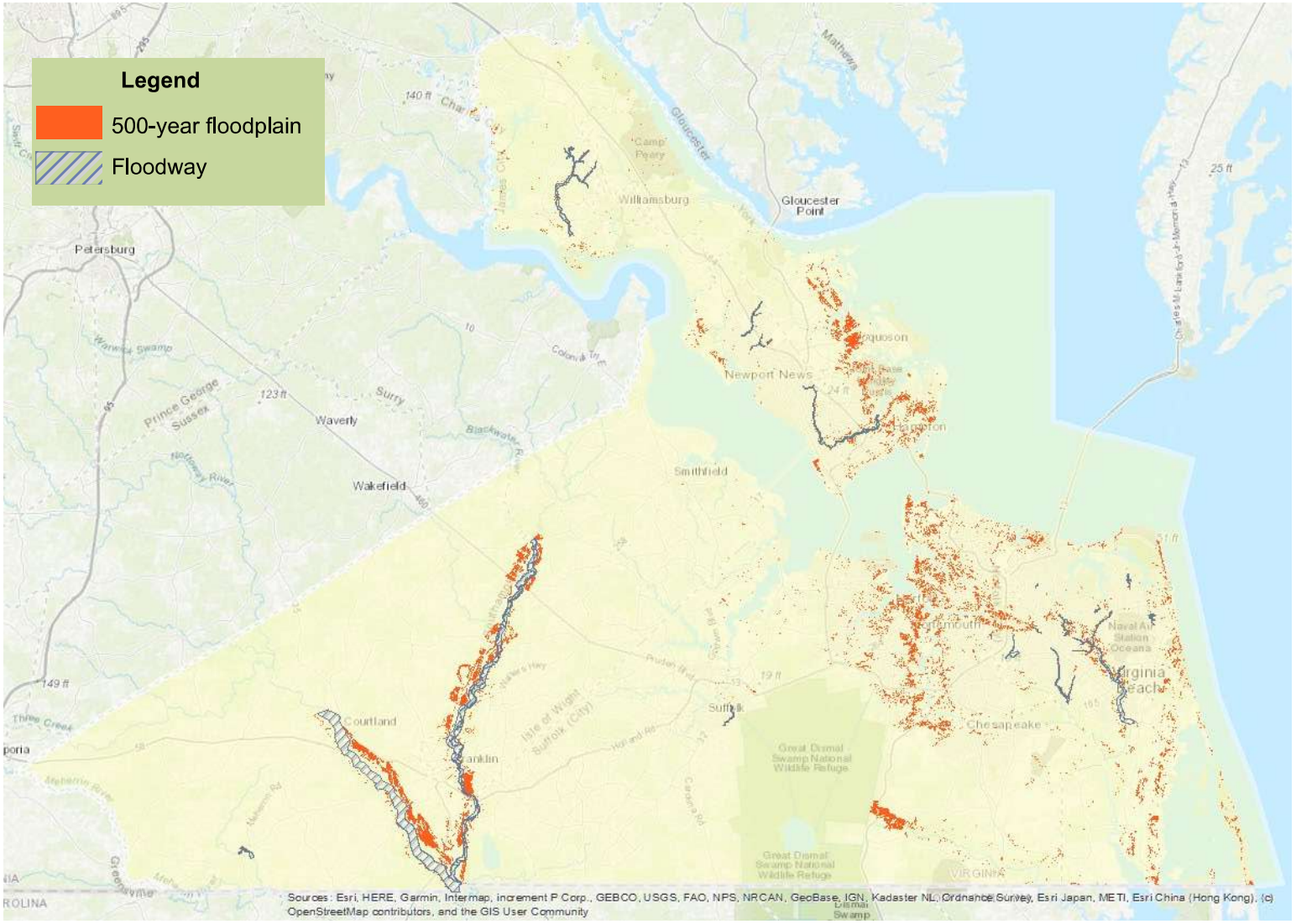
FIGURE 4.1: 100-YEAR FLOOD HAZARD AREAS



2021

Source: Federal Emergency Management Agency, 2021

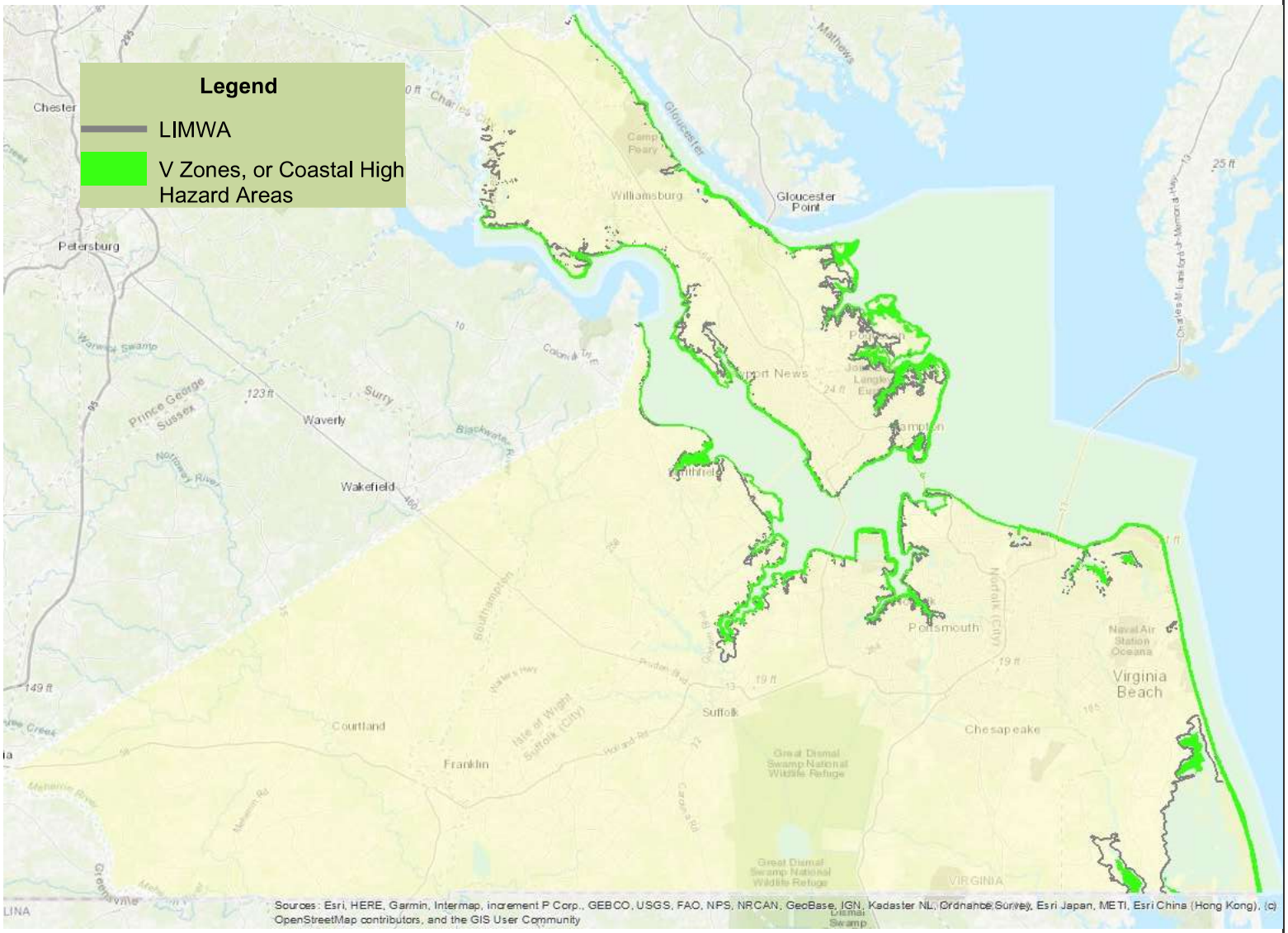
FIGURE 4.2: 500-YEAR FLOOD HAZARD AREAS AND FLOODWAYS



2021

Source: Federal Emergency Management Agency, 2021

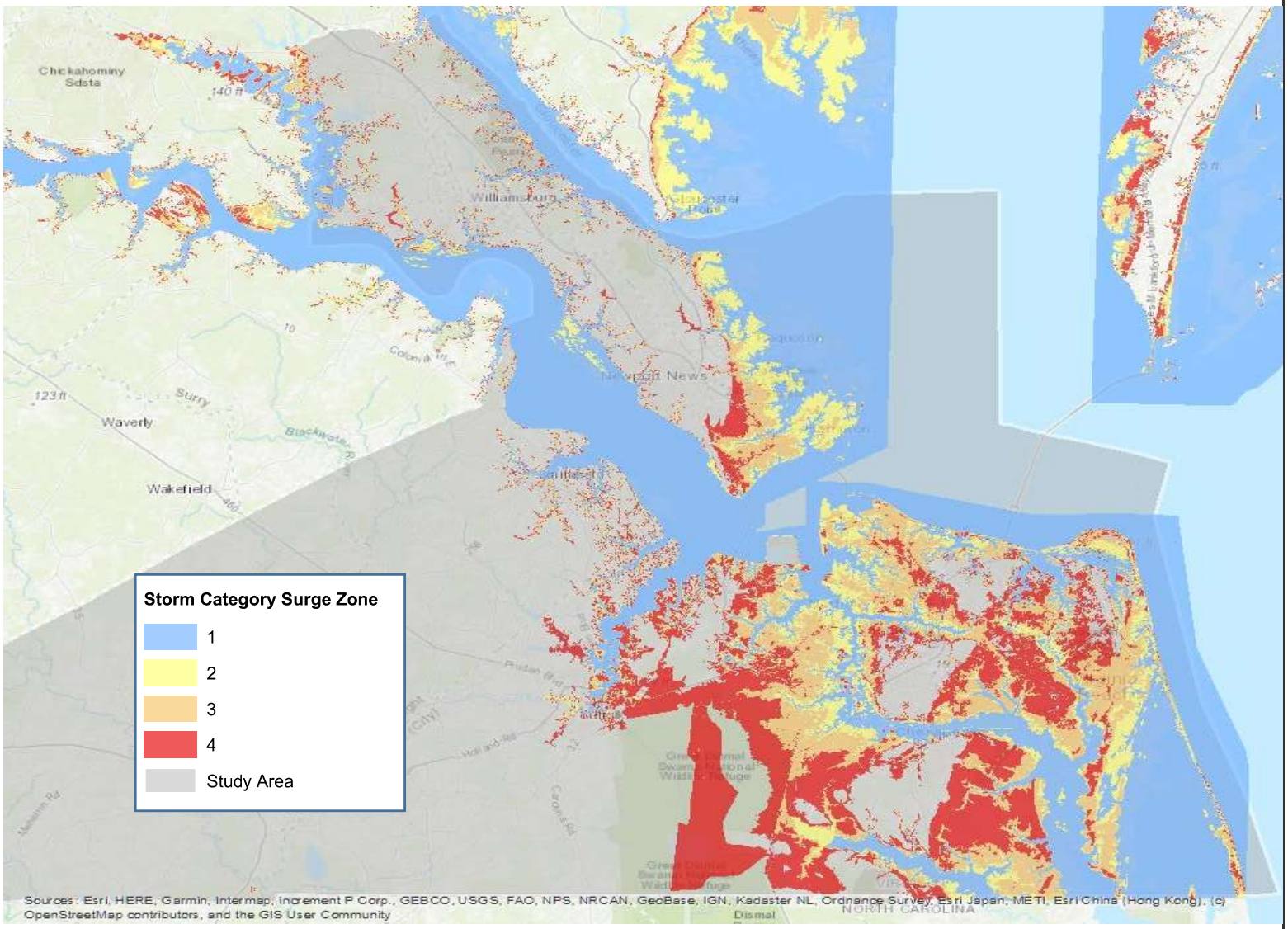
FIGURE 4.3: COASTAL HIGH HAZARD AREAS (V ZONES) AND LIMITS OF MODERATE WAVE ACTION (LIMWA)



2021

Source: Federal Emergency Management Agency, 2021

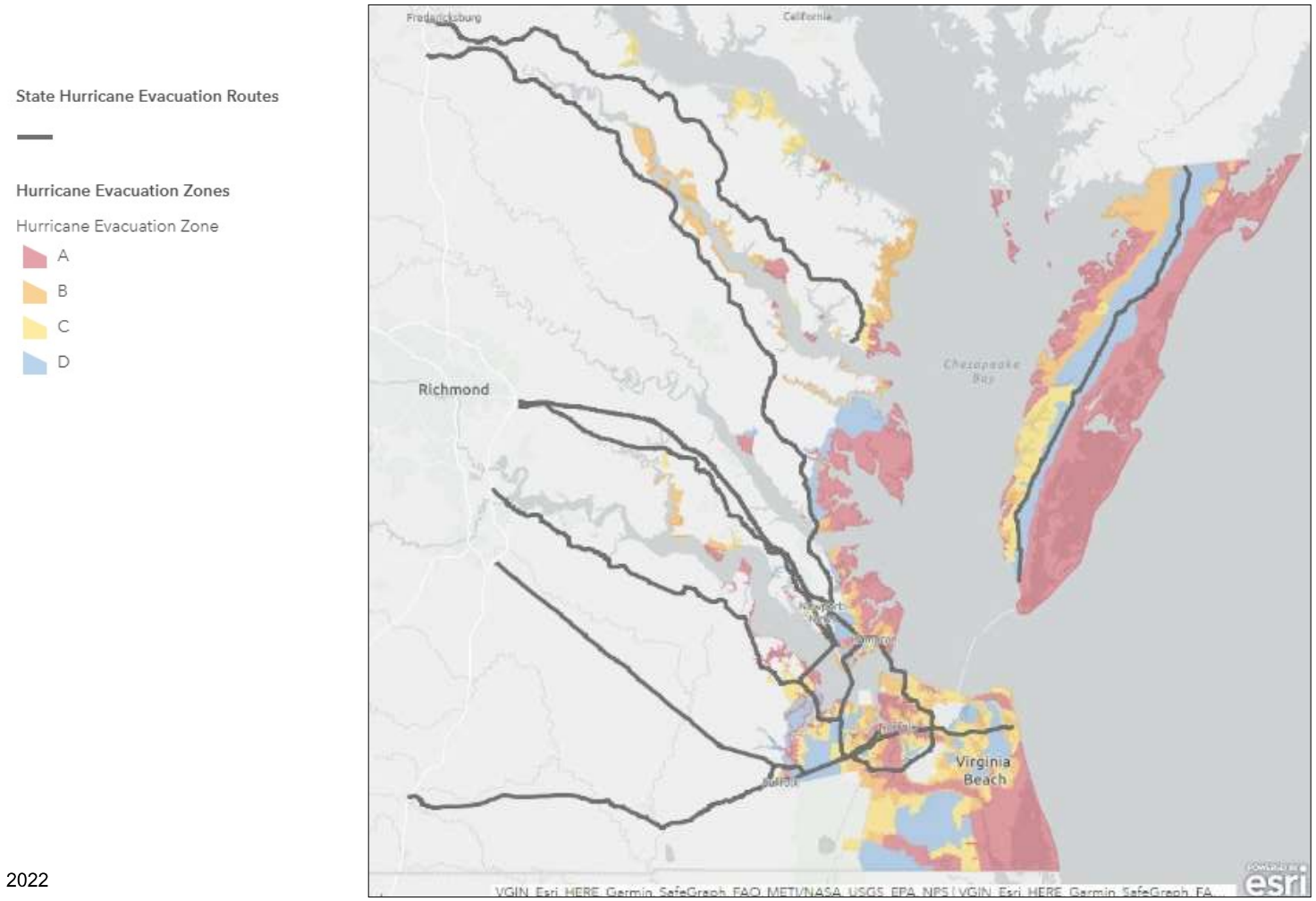
FIGURE 4.4A: HAMPTON ROADS STORM SURGE ZONES



2021

Source: U.S. Army Corps of Engineers, Norfolk District, 2021.

FIGURE 4.4B: VIRGINIA HURRICANE EVACUATION ROUTES



2022

Source: Virginia Department of Emergency Management, 2022.

In addition to floodplains, tidal and non-tidal wetlands within all of Hampton Roads' watersheds help store floodwaters, reduce erosion and filter pollutants. Wetlands are the transition area between aquatic and terrestrial habitats. A primarily low, marshy area, a wetland is saturated or even submerged all or part of the year, with soils that support unique plant and animal life. Wetlands work as a natural measure to help slow down the rising water from storms that may cause flooding, which is accomplished by acting as a giant sponge, absorbing and holding water during storms. Fast moving water is slowed by vegetation and temporarily stored in wetlands. Wetlands also filter pollutants carried by stormwater, which can be trapped by wetland vegetation. These excess nutrients are then used by the plants to promote growth.

Wetlands are resting, nesting, breeding, and spawning areas for many species of fish, shellfish, as well as other plant and animal life. More than one half of all threatened and endangered species depend on wetlands at one point of their life cycle. Hampton Roads, though located entirely within the Coastal Plain, spans a diverse range of habitats, including sandy ocean beaches, salt marshes of the Chesapeake Bay, wind tidal fresh marshes, dry sandhills, seasonally wet ponds and blackwater swamps. These habitats support many rare and significant plant communities and rare species, including:

Mabee's Salamander	*Ambystoma mabeei*	State threatened
Tiger Salamander	*Ambystoma tigrinum*	State endangered
Piping Plover	*Charadrius melodus*	State & Federal threatened
Wilson's Plover	*Charadrius wilsonia*	State endangered
Red-cockaded Woodpecker	*Dryobates borealis*	State & Federal endangered
Peregrine Falcon	*Falco peregrinus*	State threatened
Gull-billed Tern	*Gelochelidon nilotica*	State threatened
Black Rail	*Laterallus jamaicensis*	State endangered & Federal threatened
Yellow Lance	*Elliptio lanceolata*	State & Federal threatened
Atlantic Pigtoe	*Fusconaia masoni*	State & Federal threatened
Northeastern Beach Tiger Beetle	*Cicindela dorsalis dorsalis*	State & Federal threatened
Atlantic Sturgeon	*Acipenser oxyrinchus*	State & Federal endangered
Roanoke Logperch	*Percina rex*	State & Federal endangered
Eastern Big-eared Bat	*Corynorhinus rafinesquii macrotis*	State endangered
Little Brown Myotis	*Myotis lucifugus*	State endangered
Northern long-eared Myotis	*Myotis septentrionalis*	State & Federal threatened
Tricolored bat (=Eastern pipistrelle)	*Perimyotis subflavus*	State endangered
Loggerhead (Sea Turtle)	*Caretta caretta*	State & Federal threatened
Canebrake Rattlesnake	*Crotalus horridus [Coastal Plain population]*	State endangered
Chicken Turtle	*Deirochelys reticularia*	State endangered
Eastern Glass Lizard	*Ophisaurus ventralis*	State threatened
Sensitive Joint-vetch	*Aeschynomene virginica*	State & Federal threatened
Harper's fimbry	*Fimbristylis perpusilla*	State endangered
Small Whorled Pogonia	*Isotria medeoloides*	State endangered & Federal threatened
New Jersey Rush	*Juncus caesariensis*	State threatened
Narrow-leaved Spatterdock	*Nuphar sagittifolia*	State threatened
Reclining Bulrush	*Scirpus flaccidifolius*	State threatened

Source: Virginia Department of Conservation and Recreation, Natural Heritage Program, April 2022

Coastal wetlands absorb the erosive energy of waves, thus reducing further erosion. The vegetation provides a buffer to the shoreline from the wave action while the root systems provide support to help hold the soil together. Once plant material is removed or destroyed, the erosion potential increases dramatically. When any type of wetlands are filled in or drained, the areas designed by nature to control floodwaters from damaging storms, extreme high tides, and extreme precipitation are lost.

Existing natural area preserves in the region include: Antioch Pines; Blackwater Ecological Preserve; Blackwater Sandhills; Cypress Bridge; False Cape; Grafton Ponds; North Landing River; Northwest River; and, South Quay Sandhills. There are approximately 236,660 acres of conserved lands in the region, with the largest concentrations in Chesapeake, Suffolk, Virginia Beach, and York County. Conservation targets of special significance in the Hampton Roads region include:

- Pine barren communities;
- Seasonal depression ponds and other significant wetlands;
- Large blocks of old-growth cypress-tupelo swamps;
- Habitat for rare reptiles and amphibians;
- Lands along the Northwest and North Landing rivers; and
- Forestland along the Blackwater, Meherrin and Nottoway rivers.

SIGNIFICANT HISTORICAL EVENTS

Many flood events that have occurred in the region have been the result of coastal storms, tropical storms or hurricanes. Other localized flooding occurs when heavy rains fall during high tide causing waters that would normally drain quickly to back up because of the tides. Based on historical and anecdotal evidence, it is clear that there is a relatively high frequency of flooding in the region. Some of the notable flood events to impact Hampton Roads are discussed below.

The "**Dreadful Hurricane of 1667"** occurred on September 6th. This system is considered one of the most severe hurricanes to ever strike Virginia. On September 1st, this same storm was reported in the Lesser Antilles. The hurricane devastated St. Christopher as no other storm had done before. The "great storm" went on to strike the northern Outer Banks of North Carolina and southeastern Virginia. The wind turned from the northeast to due south and finally to the west, which suggested a track similar to the August 1933 hurricane. This 1667 hurricane lasted about 24 hours and was accompanied by very violent winds and tides. Approximately 10,000 houses were blown over. Area crops (including corn and tobacco) were beat into the ground. Many cattle drowned in area rivers and bays by the twelve foot storm surge and many people had to fleet the region. The foundations of the fort at Point Comfort were swept into the river. A graveyard of the First Lynnhaven parish church tumbled into the waters. Twelve days of rain followed this storm across Virginia. This system is blamed for the widening of the Lynnhaven River. Ships in regional rivers sustained great damage.

The Storm of 1749 is one of the most notable storms to occur in the region. It was responsible for the formation of Willoughby Spit, a formation of land approximately two miles long and a quarter mile wide. This storm created a 15-foot storm surge that flooded much of the region.

On **March 1-3, 1927** a nor'easter hit the region with high winds gusting to 62 mph at Cape Henry and 52 mph at Norfolk. Heavy snow fell across North Carolina into Virginia and travel was delayed for two to three days. In Virginia Beach, high tide and heavy surf on March 2 inflicted considerable damage. The beaches in some places were washed back 50 feet and denuded of the overlying sand, exposing the clay beneath.

The Chesapeake-Potomac hurricane struck the region on **August 23, 1933** and created a high tide in Norfolk of 9.69 feet above Mean Lower Low Water (MLLW), a record for the area. Eighteen people were killed by this storm that also flooded downtown Norfolk and destroyed homes at Ocean View. Winds were recorded at 70 mph in Norfolk, 82 mph at Cape Henry, and 88 mph at the Naval Air Station in Norfolk.

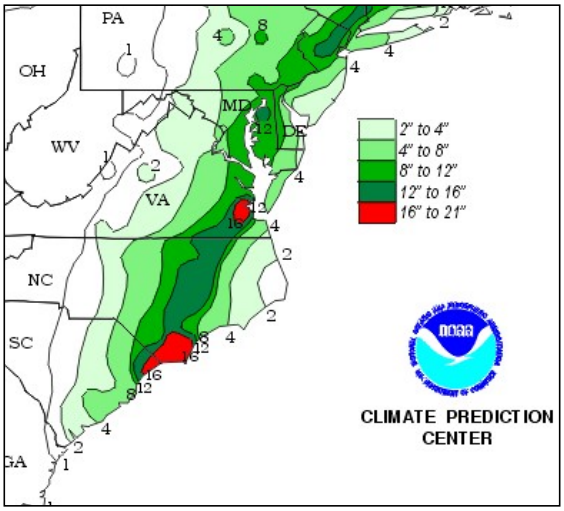
Flooding of **August 13-18, 1940**, was the result of four significant rainfall events within a three-week period. During this historical flood for the region, the Blackwater River crested at 21.9 feet, approximately 10 feet above flood stage for the City of Franklin. One of the primary causes of this flood event was an unnamed tropical cyclone that meandered across the southeast United States for four days before dissipating on August 15. Rains began in earnest in Virginia on August 13 as the storm entered the state from the west. Deluges flooded locations statewide with 4.76 inches of rainfall being measured in Hampton Roads. The Meherrin River at nearby Emporia reached a flood of record stage on August 17 when the river crested at 31.5 feet, 8.5 feet above flood stage. A total of 16 deaths in Virginia and neighboring states are directly attributed to this flood event.

On **April 11, 1956**, a severe nor'easter gave gale winds (greater than 40 mph) and unusually high tides to the Tidewater Virginia area. At Norfolk, the strongest gust was 70 mph. The strong northeast winds blew for almost 30 hours and pushed up the tide, which reached 4.6 feet above normal in Hampton Roads. Thousands of homes were flooded by the wind-driven high water and damages were large. Two ships were driven aground. Waterfront fires were fanned by the high winds. The flooded streets made access to firefighters very difficult, which added to the losses.

The Ash Wednesday storm of 1962 produced very severe flooding throughout the Hampton Roads region partly because it occurred during "Spring Tide" (sun and moon phase to produce a higher than normal tide). The storm moved north off the coast past Virginia Beach and then reversed its course moving again to the south and bringing with it higher tides and waves which battered the coast for several days. The storm's

center was 500 miles off the Virginia Capes when water reached nine feet at Norfolk and seven feet on the coast. Huge waves toppled houses into the ocean and broke through Virginia Beach's concrete boardwalk and sea wall. Houses on the bay side also saw extensive tidal flooding and wave damage. The beaches and shorefront had severe erosion. Locals indicated that the damage from this storm was worse in Virginia Beach than that caused by the 1933 Hurricane. The islands of Chincoteague and Assateague on the Eastern Shore were completely submerged. Receding water exposed hundreds of thousands of dead chickens drowned by the flooding. The Virginia Department of Health (VDH) indicated that it was an extreme health hazard and asked all women, children, and elderly to evacuate. A million dollars in damage was done to NASA's Wallops Island launch facility and an estimated $4 million in wind and flood damages occurred in the City of Hampton. Winds were recorded at speeds up to 70 mph causing 40-foot waves at sea. This storm also produced Virginia's greatest 24-hour snowfall with 33 inches and the greatest single storm snowfall with 42 inches (these were recorded in the mountainous western region of the Commonwealth).

In September of 1999, **Hurricane Floyd** was responsible for wind and flood damage in the Hampton Roads region. Several trees were uprooted as wind speeds were recorded between 50 and 80 mph across the region. This event brought over 10 inches of rain to Chesapeake, and approximately 13 inches to the Southampton County/City of Franklin area, and occurred just two weeks after Tropical Storm Dennis had saturated the area with 6.2 inches of rain. Hurricane Floyd caused the Great Dismal Swamp to overflow its banks creating flooding along the Northwest River. In Suffolk, during Hurricane Floyd in 1999, Speight's Run spillway was compromised rendering Turlington Road impassable. Other dams in Suffolk were overtopped by what was reported as 8 feet of water. In western Tidewater, primary routes out-of-service due to flooding included U.S. Highway 58 near Franklin and Interstate 95 south of Petersburg to Emporia. Riverine flooding was extensive and prolonged throughout the Chowan River Basin with the Blackwater, Meherrin and Nottoway Rivers all exceeding flood stage. Water levels within the City of Franklin were estimated to be more than four feet above the previous flood of record, which occurred in August 1940, making it the new flood of record. Gage height indicated that the water reached a height of 26.27 feet on September 18, 1999. By early morning on September 16, the Blackwater River had made its way to Main Street bringing four to five feet of water to even the higher elevations of Downtown Franklin, and floodwaters continued to rise at a rate of approximately six inches per hour. Approximately 100 homes and 182 businesses were totally destroyed as a result of the flooding. Floodwaters did not begin to recede until September 21, and home and business owners were not able return to their properties and begin to evaluate their losses until September 28. The flooding was a 500-year flood of record for parts of the basin. Also, there were enormous agricultural/crop losses due to the flooding.



Rainfall totals from Hurricane Floyd.
Source: NOAA Climate Prediction Center, 1999

On **October 17, 1999**, a flash flood, which resulted from very heavy rainfall associated with Hurricane Irene, ranged from five to nine inches in the City of Franklin and Southampton County. The precipitation resulted in numerous flooded roads and road closures due to high water. Specific problem areas in Franklin included: a ditch along Armory Drive near the Wal-Mart Shopping Plaza where fast-moving water and drainage issues caused some road erosion; and flooding near the library caused problems along Second Avenue.

In September of 2003, **Hurricane Isabel** caused widespread flooding, comparable to that caused by the 1933 hurricane and the Ash Wednesday Storm of 1962. Hurricane Isabel proved to be the costliest disaster in Virginia's history. The storm produced a high storm surge (four to five feet in Southside Hampton Roads)

which inundated the tidal portions of the region's creeks and rivers. Damage from flooding was extensive to structures and infrastructure in the planning area. The NFIP processed more than 24,000 Isabel claims in six states and the District of Columbia, totaling nearly $405 million. As a result of polluted runoff, VDH forbade gathering shellfish in the Virginia portion of the Chesapeake Bay, and rivers flowing into the bay. On September 18, 2003, Hurricane Isabel made landfall off the coast of northeast North Carolina. The hurricane, which had originally been a Category 5 storm, reached Chesapeake as a weak Category 1 storm. The magnitude of Hurricane Isabel's impact on the region was historic with rain, storm surge, and wind severely affecting many areas. Rainfall from Hurricane Isabel averaged four to seven inches over large portions of eastern North Carolina, east-central Virginia, and Maryland.

Although no damage was reported in the NCEI records, several streets in Franklin flooded as a result of precipitation associated with **Tropical Storm Ernesto** during the first four days of **September, 2006**. Ernesto strengthened throughout the day on Thursday, August 31 with maximum sustained winds reaching 70 mph. The Tropical Storm made landfall in Brunswick County, North Carolina near Long Beach at 1130 PM on Thursday, August 31. Ernesto moved north across the Coastal Plain of North Carolina on Friday, September 1, reaching southeastern Virginia as a Tropical Depression during the late afternoon on Friday. The system became extratropical late Friday evening as it moved across eastern Virginia. The Blackwater River crested at 15.61 feet according to stream gage data.

Between **October 7 and 10, 2006**, a strong low pressure system off the North Carolina coast coupled with an upper level cutoff low to dump intense rainfall across portions of southeastern Virginia and western Tidewater. Rainfall amounts in excess of 10 inches resulted in numerous road closures and moderate to major river flooding from late Friday, October 6th through Saturday, October 7th. In Franklin, the Blackwater River flooded much of downtown Franklin. Numerous businesses and residences sustained water damage, with estimates of property damage totaling approximately $4 million and crop damage estimated at $700,000. The Blackwater River crested October 10, 2006, at 22.77 feet.



Downtown Franklin during the October, 2006 flood. Source: City of Franklin photo

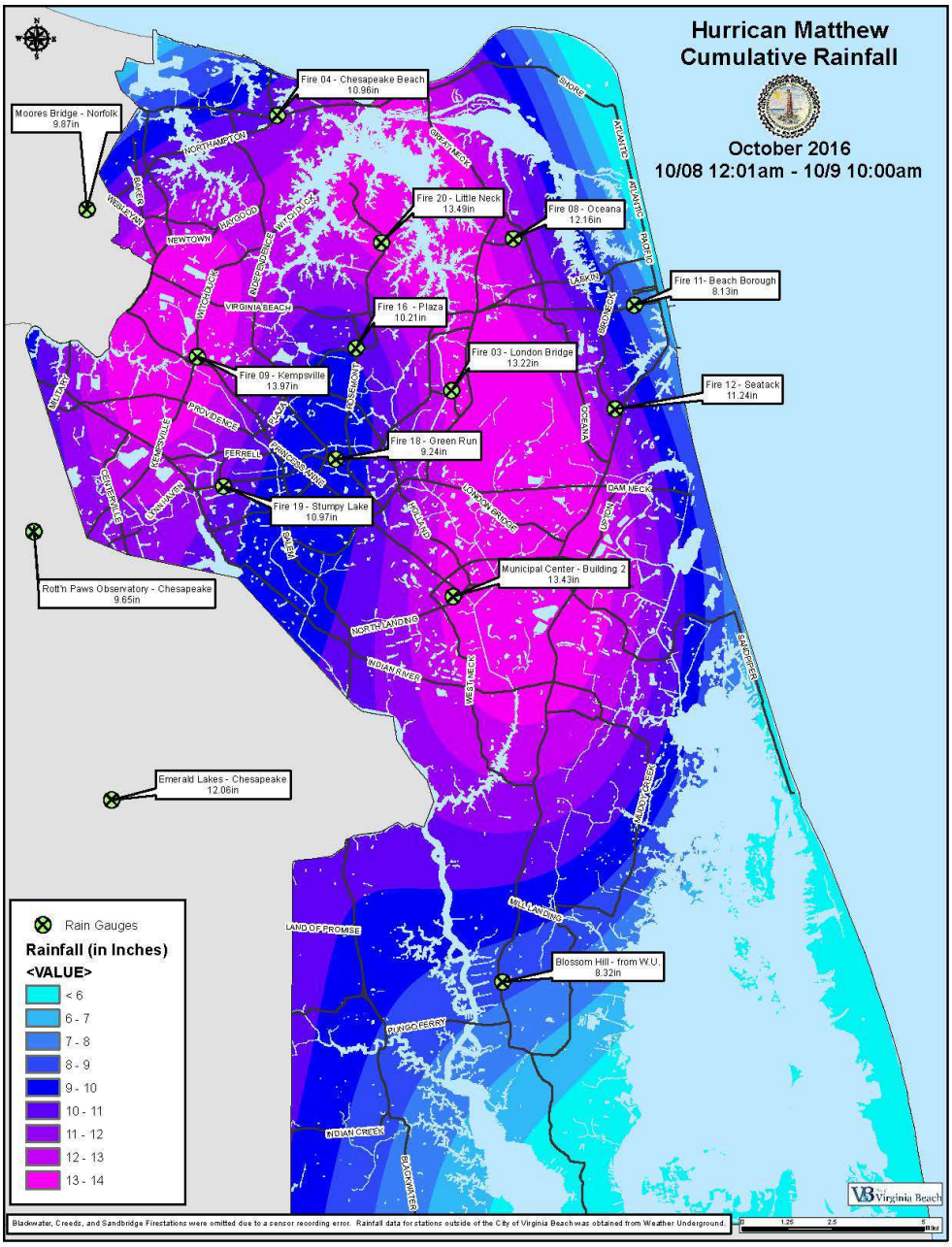
The November **2009 Mid-Atlantic nor'easter** (or "Nor'Ida") was a powerful storm that caused widespread flooding throughout the region. Persistent onshore flows brought elevated water levels for four days. At Sewells Point, a max storm tide of 7.74 feet MLLW was recorded on November 13th, the third highest recorded tide of all time at that location. Widespread coastal damage and major flooding occurred as a result of seven inches of rainfall and large wind-driven waves impacting beaches. Damage in Virginia exceeded $38.8 million, of which 64% was in Norfolk alone. According to the NWS, 7.4 inches of rain fell in Norfolk between November 11 and 13. Hurricane-force winds also affected the region, with a peak gust of 75 mph recorded at Oceana.

In August 2011, **Hurricane Irene** moved northward over the Outer Banks of North Carolina and just off the Virginia coast, producing heavy rains which caused widespread flooding across most of south central and southeast Virginia Saturday morning, August 27th into early Sunday morning, August 28th. Storm total rainfall generally ranged from six to as much as 12 inches. Heavy rains associated with Hurricane Irene produced widespread lowland flooding across much of Southside Hampton Roads, including roadways which were washed out or closed. Great Bridge reported 10.75 inches of rain. Deep Creek reported 9.72 inches of rain. Very heavy rainfall ranged from five to nine inches in the City of Franklin and Southampton County. The precipitation resulted in numerous flooded roads and road closures due to high water. Fort Monroe estimated wind and water caused an estimated $2.2 million in damage to properties leased by the Fort Monroe Authority.

At the end of October 2012, **Tropical Cyclone Sandy** moved northward well off the Mid Atlantic Coast producing heavy rain which caused flooding across much of eastern and southeast Virginia. Storm total rainfall ranged from four inches to as much as 10 inches across the area. Numerous roads were closed due to flooding. Storm total rainfall ranged from three to six inches across Chesapeake. Although the storm did not cause the destruction locally that it did in the northeast, it remains a significant rain and coastal flood event for parts of the Hampton Roads region.

In early October 2016, the combination of the tropical moisture from **Hurricane Matthew**, combined with a cold front moving across the middle Atlantic, allowed for heavy rain to fall from North Carolina through Southeast Virginia. Some locations across the Tidewater region of Virginia received more than 10 inches of rain for the storm total. This created considerable flooding across the region with many roads becoming impassible and some even washed out. According to the National Weather Service, Deep Creek in Chesapeake recorded 10.01 inches on October 9; areas in Norfolk and Portsmouth recorded just shy of 10 inches by late on October 8, or the morning of October 9. Rainfall totals on the Peninsula ranged from 5 to 9 inches. **Figure 4.5** shows the cumulative rainfall totals for Virginia Beach. The rainfall and resultant flooding resulted in 5,576 Virginia homeowners and renters applying to FEMA for disaster assistance. As of January 2017, more than $7.4 million in individual housing assistance grants and nearly $1.6 million in other needs assistance had been approved for residents of the 7 designated cities: Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk and Virginia Beach. In addition to the FEMA grants, and SBA loans, the NFIP paid out $46.8 million to 2,263 claimants to settle Flood Insurance Claims. The *Virginia Pilot* reported that Matthew damaged roughly 2,000 structures at a cost of about $30 million. In Virginia Beach in particular, the extraordinarily heavy rainfall overwhelmed the existing drainage system and left infrastructure incapable of performing to design expectations. The storm has marked a turning point for City leaders as they prioritize flood mitigation projects in coming years.

FIGURE 4.5: HURRICANE MATTHEW CUMULATIVE RAINFALL, VIRGINIA BEACH 2016



Source: City of Virginia Beach

Table 4.2 provides information on significant flood events documented by the NCEI between 1995 and December 2020 for the study area, representing the most recent data available. These events resulted in two reported deaths and one reported injury, and $189,684,000 million in property damages reported to the NCEI. Additional unreported property damages are likely. Additional data on repetitive flood losses is provided in Chapter 5. Bolded events in **Table 4.2** are described in additional detail above.

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
SURRY COUNTY	1/19/1996	Flood	0/0	-	1 to 2 feet of water on Rte. 10 between Surry and Bacon Castle Rd.
SOUTHAMPTON	6/11/1996	Flash Flood	0/0	-	Heavy rain in 3 hours caused road closures in the Sebrell area.
NORFOLK	6/18/1996	Flood	0/0	-	Heavy rain in 2 hours caused road closures in the Ocean View and Willoughby Spit sections of Norfolk.
VIRGINIA BEACH	6/18/1996	Flood	0/0	$10,000	Heavy rain in a few hours caused road closures in Lynnhaven and Oceanfront sections of Northern Virginia Beach.
VIRGINIA BEACH	6/20/1996	Flood	0/0	-	Heavy rain in 1 hour caused road closures in the Alanton and Oceana sections of Virginia Beach.
NORFOLK and VIRGINIA BEACH	7/18/1996	Flash Flood	0/0	-	Heavy rain in 6 hours caused road closures with people trapped in cars along the 300-400 block of East Little Creek Road and along Campostella Road. Flooding was also reported in the Kempsville area along Indian River Road and Princess Anne Road. High water was reported in the Oceanfront area along Atlantic Avenue.
CHESAPEAKE	7/18/1996	Flash Flood	0/0	-	Heavy rain in a few hours resulted in water along Bainbridge Boulevard and Freeman Avenue and a split of Interstate 64 and 264.
VIRGINIA BEACH	7/18/1996	Flash Flood	0/0	-	Heavy rain in a few hours resulted in flooding in the Kempsville area along Indian River Road and Princess Anne Road and the Oceanfront area along Atlantic Avenue.
NORFOLK	7/31/1996	Flood	0/0	-	Streets were flooded due to two storms in an afternoon.
NEWPORT NEWS, YORK/POQUOSON, NORFOLK/HAMPTON/ PORTSMOUTH, AND VIRGINIA BEACH	4/23/1997	Coastal Flood	0/0	-	Moderate coastal flooding caused tides to peak at 5.8ft above the Mean Lower Low Water especially in Willoughby Spit, Ghent, and downtown sections of Norfolk, the Old-Town section of Portsmouth, the Buckroe Beach and Grandview sections of Hampton, and the Sandbridge section of Virginia Beach. Minor coastal flooding was reported in Newport News and York county.
NORFOLK AND VIRGINIA BEACH	6/3/1997	Coastal Flood	0/0	-	Minor to moderate flooding resulted in loss of part of the boardwalk and a couple lifeguard stands in Virginia Beach and several streets flooded in downtown Portsmouth and downtown Norfolk.
VIRGINIA BEACH, YORK/POQUOSON, NORFOLK/HAMPTON/ PORTSMOUTH, AND NEWPORT NEWS	10/19/1997	Coastal Flood	0/0	-	Minor to moderate flooding resulted in streets being closed and water in a few houses in Norfolk, downtown Portsmouth, Sandbridge and Sandfiddler areas of Virginia Beach. Minor flooding was reported in Newport News and York County.
VIRGINIA BEACH, NEWPORT NEWS, NORFOLK, AND YORK	1/27/1998	Coastal Flood	0/0	$1,500,000	A Nor'easter caused high tides and moderate coastal flooding combined with gale and storm force winds. A couple houses were damaged and power outages were scattered across the Hampton Roads area.
NORFOLK, HAMPTON, PORTSMOUTH, VIRGINIA BEACH, NEWPORT NEWS, AND YORK/POQUOSON	2/4/1998	Coastal Flood	0/0	$75,000,000	A Nor'easter caused gale & storm force winds & high tides that resulted in moderate to severe coastal flooding with damage to buildings, road closures, & scattered power outages especially in Norfolk, Virginia

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					Beach, and Hampton. Willoughby & Ocean View had the most damage.
NORFOLK, CHESAPEAKE, VIRGINIA BEACH, SUFFOLK, and PORTSMOUTH	7/24/1999	Flash Flood	0/0	-	Roads were flooded including Hampton Boulevard. Parts on Interstate 264, Ballahack Road, and Military Highway in Chesapeake were flooded. Many other roads were flooded and impassable.
VIRGINIA BEACH, NORFOLK, CHESAPEAKE, AND PORTSMOUTH	8/14/1999	Flash Flood	0/0	-	Primary roads and underpasses were flooded including Route 13 in Chesapeake.
VIRGINIA BEACH, NORFOLK, CHESAPEAKE, SUFFOLK, AND PORTSMOUTH	9/7/1999	Flash Flood	0/0	-	A line of thunderstorms caused flooding on roads.
SUFFOLK	9/7/1999	Flash Flood	0/0	-	Road (1500 block Camp Pond Road) flooded out.
CHESAPEAKE, ISLE OF WIGHT, SUFFOLK, NORFOLK, FRANKLIN, SOUTHAMPTON, PORTSMOUTH, NEWPORT NEWS, HAMPTON, YORK, JAMES CITY, POQUOSON, SURRY COUNTY AND WILLIAMSBURG	**9/15/1999**	**Flash Flood**	**0/0**	**$35,000**	**Hurricane Floyd caused heavy rain and widespread flooding and flash flooding across eastern Virginia. 12 to 18 inches of rain fell in the Tidewater region. Numerous roads were washed out and several rivers exceeded flood stage including the Chowan River Basin and the Blackwater, Meherrin, and Nottoway Rivers. There were enormous agricultural losses due to flooding.**
SUFFOLK, SOUTHHAMPTON, ISLE OF WIGHT, FRANKLIN, NORFOLK, VIRGINIA BEACH, CHESAPEAKE, PORTSMOUTH, NEWPORT NEWS, POQUOSON, YORK, AND HAMPTON	**10/17/1999**	**Flash Flood**	**0/0**	**-**	**Heavy rainfall associated with Hurricane Irene caused flooded roads and road closures.**
JAMES CITY	7/19/2000	Flash Flood	0/0	-	Heavy rain caused flooding and standing water across the intersection of Routes 30 and 60 near Toano.
HAMPTON, NEWPORT NEWS	7/24/2000	Flash Flood	0/0	$350,000	Heavy rain caused 35 residences to be evacuated due to high water on Scoggin Circle and Grimes Road in the Buckroe Beach section of Hampton. Widespread flooding of main and secondary roads was reported in Newport News.
SOUTHAMPTON, POQUOSON, YORK AND SURRY COUNTY	7/24/2000	Flash Flood	0/0	-	Flooding on secondary roads and several roads washed out. Three interstate off-ramps were closed due to flooding in York.
NORFOLK	7/26/2000	Flash Flood	0/0	-	Heavy rain flooded roadways and caused closure of underpasses on Tidewater Drive in downtown Norfolk. Flooding also occurred at Chesapeake Boulevard and Chesapeake Street in the East Ocean View section of Norfolk.
SUFFOLK	7/30/2000	Flash Flood	0/0	-	Heavy rain caused flooding of Kings Fork Road in the western part of the city.
SOUTHAMPTON CO AND SURRY CO	8/3/2000 – 8/4/2000	Flash Flood	0/0	$2,000	Heavy rain caused flooding on Route 58 near Drewryville and two minor accidents

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					on Route 308 were due to high water. Heavy rain caused flooding on Route 31 between Dendron and Scotland. Flooding also occurred on Route 10 in Surry.
PORTSMOUTH, AND NORFOLK	8/11/2000	Flash Flood	0/0	-	Flooding caused the closure of Interstate 264 at Frederick Boulevard. The intersections of Granby Street and Brambleton Avenue, Princess Anne Road and Monticello Avenue, and City Hall Avenue and Granby Street were all closed due to high standing water in Norfolk. Also, underpasses on Campostella Avenue, Tidewater Drive and Colley Avenue were closed due to accumulated water.
VIRGINIA BEACH	8/14/2000	Flash Flood	0/0	-	Widespread flooding caused the closure of several roads in the vicinity of Princess Anne Plaza. Sections of Rosemont Road were closed due to flooding.
SOUTHAMPTON COUNTY AND SURRY COUNTY	9/1/2000	Flash Flood	0/0	-	Several roads flooded. Route 10 under water near the Surry/Prince George county line.
NORFOLK	9/5/2000	Flash Flood	0/0	-	Heavy rain caused the side of an underpass wall to slide into the road at Granby Street and Interstate 64 resulting in road closure.
SOUTHAMPTON / FRANKLIN	9/5/2000	Flood	0/0	$3,000	The Nottoway and Blackwater Rivers flooded and caused some road closures including: Route 653 from Route 719 to Cary's Bridge, Route 619 at the intersection of Route 629, Route 614 from Route 622 to the Isle of Wight county line, and Route 651 (Indian Town Road) from Route 35 at Hancock Peanut to Route 652.
SUFFOLK AND ISLE OF WIGHT	6/16/2001	Flash Flood	0/0	-	Flooding caused one road closure near Whaleyville. Knoxville Road, Rose Drive, and numerous other secondary roads were impassable around Windsor.
NORFOLK	7/23/2001	Flash Flood	0/0	-	One car was submerged at the underpass on Colley Avenue and 21st Street and roads were covered with water.
SOUTHAMPTON	8/18/2001	Flash Flood	0/0	-	Flooding resulted in impassable roads and high water on Route 35.
HAMPTON AND NEWPORT NEWS	6/14/2002	Flash Flood	0/0	-	Streets were flooded and water was shooting out of a manhole cover.
VIRGINIA BEACH, NORFOLK, HAMPTON, AND NEWPORT NEWS	8/28/2002	Flash Flood	0/0	-	Heavy rains caused roads closures along Rosemont at the Virginia Beach Boulevard and around Kings Grant area. A car stalled in deep water. Union street and areas near City Hall and Granby were flooded in Norfolk. A section of West Mercury Boulevard and Powhatan Parkway in Hampton were closed due to high water. Roads were closed at the intersection of 27th and Buxton streets and flood barricades were in place at the City Line Apartment Complex in Newport News.
VIRGINIA BEACH AND NORFOLK	10/11/2002	Flash Flood	0/0	-	Atlantic Avenue was closed in Virginia Beach between 42nd and 65th streets due to flooding. The intersection of Tidewater Drive and Virginia Beach Boulevard in Norfolk were flooded.

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
NEWPORT NEWS, YORK/POQUOSON, NORFOLK/HAMPTON/ PORTSMOUTH, AND VIRGINIA BEACH	4/10/2003	Storm Surge/tide	0/0	-	Flooding occurred at high tide resulting in water in some streets portions of the Middle Peninsula and Hampton Roads.
NEWPORT NEWS AND YORK	7/19/2003	Flash Flood	0/0	-	Heavy rain caused street flooding near Leesville Mill Subdivision. Route 17 was reported closed at intersection with Route 173 due to street flooding.
NEWPORT NEWS	8/5/2003	Flash Flood	0/0	-	6 families had to be evacuated due to flash flooding.
POQUOSON	8/17/2003	Flash Flood	0/0	-	High water occurred on Poquoson and Huggins roads, and also in Hunts Neck are and in yards.
SUFFOLK, HAMPTON, NEWPORT NEWS, NORFOLK, AND PORTSMOUTH	**9/3/2003**	**Flash Flood**	**0/0**	**-**	**Streets were flooded in northern Suffolk. Many roads closed due to high water, including 27th and Buxton Streets in Newport News and the 8000 block of Hampton Boulevard in Norfolk.**
NEWPORT NEWS AND YORK	5/19/2004	Flash Flood	0/0	-	High water on Warwick Boulevard between 36th and 50th Street and at Center and Jefferson Avenue, and underpasses along Main Street and Center Avenue. Dare Road reported closed due to high water in York.
NEWPORT NEWS	5/22/2004	Flash Flood	0/0	-	High water at Flint Drive and Tillerson Drive.
PORTSMOUTH	6/10/2004	Flash Flood	0/0	-	High water at Airline Boulevard and I-264 and at intersection of Oregon and Dakota Roads.
CHESAPEAKE	7/4/2004	Flash Flood	0/0	-	A section of Route 17 in the Great Dismal Swamp Area was washed out due to rain.
NORFOLK, ISLE OF WIGHT CO, SURRY CO	7/25/2004	Flash Flood	0/0	-	Streets were flooded in downtown Norfolk including Waterside Drive. Lawnes Creek Bridge on Route 10 near Rushmere and several other roads were reported closed due to flooding in Isle of Wight. Route 617 closed due to flooding in Surry County.
SURRY COUNTY	7/29/2004	Flash Flood	0/0	-	Road closed on Route 611 near the intersection of Highway 40 due to flooding.
NORFOLK AND PORTSMOUTH	8/2/2004	Flash Flood	0/0	-	Some streets were flooded including the intersection of Park Avenue and Virginia Beach Boulevard and at the intersection of Robinhood Road and I-64 Underpass. Duke and Randolph Streets reported closed due to high water. Flooding on I-264 and Portsmouth Boulevard in Portsmouth.
CHESAPEAKE	7/13/2005	Flash Flood	0/0	-	One half mile of Murray Drive near Fentress in the Green Haven subdivision was underwater.
SUFFOLK, CHESAPEAKE, PORTSMOUTH, AND NORFOLK	8/9/2005	Flash Flood	0/0	-	College Drive and Camelia Drive flooded in Suffolk. Parts of Taylor Road were flooded in Chesapeake. Numerous roads were closed including Hampton Boulevard with vehicles flooded in Norfolk. Effingham and London Boulevard and the entrance to Route 264 at Frederick Boulevard were flooded in Portsmouth.
NORFOLK / HAMPTON / PORTSMOUTH…, NORFOLK, SUFFOLK, PORTSMOUTH, CHESAPEAKE, HAMPTON, NEWPORT	10/8/2005	Flood	0/0	-	Street flooding reported at Hampton Boulevard and Terminal Boulevard, Granby Street and Tidewater Drive, 900 Block of East Oceanview Avenue, Virginia Beach Boulevard and Brambleton, Princess Anne and Monticello Avenue. Areas of flooding

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
NEWS, AND POQUOSON					were reported along sections of Route 58, on College Drive in the College Square Section, and on Kilby Shores Drive in Suffolk. The 56th block of Cranny Brook Road, Bunch Boulevard at Dwight Avenue, Powhatan and Vahallia, Scott Drive at Westhaven, 264 West bound off ramp, and Gateway Drive were closed due to flooding in Portsmouth. Bruce Road was closed near Tyre Neck Road in Western Branch part of Chesapeake. Grimes Road and Lee Street were under water in Hampton. Buxton Avenue was closed at 25th Street in Newport News. North Lawson Road was flooded in Poquoson.
CHESAPEAKE, NORFOLK, PORTSMOUTH, SUFFOLK, AND VIRGINIA BEACH	6/14/2006	Flash Flood	0/0	-	Heavy rain from the remnants of Tropical Storm Alberto caused flash flooding and road closures and the closure of Bainbridge Boulevard near the Triple Decker Bridge in Chesapeake. Brambleton Avenue near Route 264 overpass was closed and flooding occurred at Texas Avenue in the Norvell Heights area in Norfolk. The 2000 block of Frederick Boulevard was closed due to flash flooding in Portsmouth. The 2500 block of Pruden Boulevard was closed due to flash flooding in Suffolk. Atlantic Avenue between 49th and 71st streets was closed in Virginia Beach due to flash flooding.
YORK, HAMPTON, ISLE OF WIGHT, AND NEWPORT NEWS	6/23/2006	Flood	0/0	-	High water on several roads including Main Street in Isle of Wight.
SUFFOLK, NORFOLK, VIRGINIA BEACH, CHESAPEAKE, SOUTHAMPTON, FRANKLIN, YORK, PORTSMOUTH, HAMPTON, JAMES CITY CO, SURRY CO AND NEWPORT NEWS	**9/1/2006**	**Flash Flood**	**0/0**	**-**	**Numerous streets flooded with a couple feet of water including Route 600 between Routes 614 to 623 in Southampton, Route 264 ramp to Frederick Boulevard in Portsmouth, London Bridge Road and Corporate Landing Street in Virginia Beach, Route 64 at Mercury Boulevard in Hampton, Route 664 at 35th street to Jefferson Avenue in Newport News, and Route 632 in James City. Route 630 in Surry County closed.**
YORK / POQUOSON	**9/1/2006**	**Coastal Flood**	**0/0**	**$1,900,000**	**Tides of 4 to 5 feet above normal caused significant property damage across portions of the Virginia Peninsula and Middle Peninsula near the Chesapeake Bay and adjacent tributaries.**
NORFOLK AND YORK	**10/6/2006**	**Coastal Flood**	**0/0**	**$200,000**	**Strong onshore winds caused moderate coastal flooding during high tide and caused road closures and power outages in western portions of the southern Chesapeake Bay.**
SOUTHAMPTON, ISLE OF WIGHT, FRANKLIN, SURRY COUNTY AND JAMES CITY	**10/7/2006**	**Flash Flood**	**0/0**	**$8,800,000**	**Intense rainfall caused river flooding, road closures, and power outages in western portions of the southern Chesapeake Bay. HWY 460 was closed from Ivor to the Sussex county line. HWY 258 and parts of HWY 460 near Windsor in Isle of Wight. The Blackwater River flooded much of downtown Franklin where numerous businesses**

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					and residences sustained water damage. Crop damage and road closures in Surry County.
NORFOLK, YORK, CHESAPEAKE, SUFFOLK, AND VIRGINIA BEACH	11/22/2006	Coastal Flood	0/0	$225,000	Strong onshore winds caused moderate coastal flooding during high tide and caused road closures across portions of eastern and southeast Virginia including the intersection of Tidewater Drive and Brambleton Avenue and the intersection of Virginia Beach Boulevard and Tidewater Drive. The 700 block of North Main Street and East Constance Road in the 100 block between North Main and Katherine Street were closed due to high water in Suffolk.
NORFOLK AND VIRGINIA BEACH	6/26/2007	Flash Flood	0/0	-	Heavy rain caused flash flooding on roads and in underpasses including Tidewater Drive underpasses. Flooding was reported on Virginia Beach Blvd and Kempsville Road in Virginia Beach.
PORTSMOUTH AND NORFOLK	4/21/2008	Flash Flood	0/0	-	Heavy rains caused flash flooding and road closures across portions of southeast Virginia.
SUFFOLK	5/5/2009	Flash Flood	0/0	-	Isolated thunderstorm produced heavy rain which caused flash flooding across portions of Suffolk. High water was reported at the 3800 Block of Whaleyville Boulevard in Whaleyville.
SOUTHAMPTON	8/5/2009	Flash Flood	0/0	-	Isolated thunderstorms produced heavy rains which caused flash flooding across portions of Southampton county and a section of State Highway 186 was flooded and partially closed.
PORTSMOUTH, CHESAPEAKE, AND NORFOLK	8/12/2009	Flash Flood	0/0	-	Scattered thunderstorms produced heavy rain which caused flash flooding and road closures across portions of southeast Virginia. Gracie Road and State Highway 407 were flooded in Chesapeake. Westbound Route 264 at the downtown tunnel was closed from Norfolk to Portsmouth. Road was flooded at South Brambleton Road and Kimball Terrace near the Exit 11A interchange of Interstate 264 in Norfolk.
HAMPTON	8/13/2009	Flash Flood	0/0	-	Isolated thunderstorm produced heavy rain which caused flash flooding across portions of Hampton.
NEWPORT NEWS	8/14/2009	Flash Flood	0/0	-	Isolated thunderstorm produced heavy rain which caused flash flooding across portions of Newport News.
NORFOLK	8/22/2009	Flash Flood	0/0	-	Scattered thunderstorms produced heavy rain which caused flash flooding and road closures in numerous locations downtown, including the Ghent area and in the vicinity of Old Dominion University.
CHESAPEAKE, ISLE OF WIGHT, NEWPORT NEWS, NORFOLK, VIRGINIA BEACH, YORK, SURRY COUNTY AND SUFFOLK	**11/12/2009**	**Coastal Flood**	**0/0**	**$39,250,000**	**A Nor'easter produced moderate to severe coastal flooding across much of eastern and southeastern Virginia causing flooding of streets, homes, and businesses. Tidal flooding took out the clubhouse north of the Godwin Bridge, and destroyed a number of piers in Suffolk. The flooding was extensive, well above what was experienced in Isabel, in the Long Creek, Lynnhaven**

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					Colony and Bay Island areas of Virginia Beach. In Surry County, several streets, homes and businesses were flooded in low lying areas of the county close or directly exposed to the James River. Many decks and piers were damaged or destroyed.
CHESAPEAKE, NORFOLK, VIRGINIA BEACH, AND YORK	12/19/2009	Coastal Flood	0/0	$40,000	A coastal low pressure area produced moderate to severe coastal flooding across much of eastern and southeast Virginia and several streets, homes and businesses were flooded in low lying areas
VIRGINIA BEACH, PORTSMOUTH, AND HAMPTON	7/29/2010	Flash Flood	0/0	-	Scattered thunderstorms produced flash flooding across portions of southeast Virginia and numerous roads were flooded in north Virginia Beach, the City of Hampton, and the City of Portsmouth.
PORTSMOUTH, HAMPTON, YORK, NORFOLK, AND CHESAPEAKE,	9/30/2010	Flash Flood	0/0	-	Thunderstorms produced flash flooding and caused road closures including Portsmouth Boulevard, County Street, Effingham Street, and the Interstate 264 Exit at Effingham.
VIRGINIA BEACH, CHESAPEAKE, FRANKLIN, ISLE OF WIGHT, NORFOLK, PORTSMOUTH, SOUTHAMPTON, SUFFOLK, YORK, HAMPTON, JAMES CITY, NEWPORT NEWS, SURRY COUNTY AND JAMES CITY COUNTY	**8/27/2011**	**Flood**	**0/0**	**-**	**Hurricane Irene produced heavy rains which caused widespread flooding and either closed or washed out roadways. Rainfall ranged from four to twelve inches across the region.**
SURRY COUNTY	9/7/2011	Flash Flood	0/0	-	The combination of the remnants from Tropical Storm Lee and a frontal boundary draped over the region caused heavy rain which produced flash flooding. Blackwater swamp rose and flooded a road. Portions of Carsley Road were impassable due to high water.
SOUTHAMPTON	9/9/2011	Flood	1/1	-	The driver of a vehicle drowned after his vehicle went into a swamp in Southampton county. The passenger was able to escape from the vehicle.
VIRGINIA BEACH	9/28/2011	Flash Flood	0/0	-	Scattered thunderstorms caused heavy rain which produced flash flooding and flooded Jeanna Street and Shore Drive.
ISLE OF WIGHT, NEWPORT NEWS, AND YORK	5/15/2012	Flash Flood	0/0	-	Scattered thunderstorms produced heavy rain and flash flooding resulting in flooding on several roads and high water west of Carrollton in Isle of Wight. In Newport News, flooding was reported on Interstate 64 at Jefferson Avenue. Several accidents were reported near the Patrick Henry Mall. The underpasses at Main Street and Center Avenue were flooded several feet. Winterhaven Drive had several cars floating. There was significant flooding off of Harpersville Road. There was flooding at the Virginia Living Museum. Three feet of water was reported on a road in the Coventry Subdivision in York.
NEWPORT NEWS AND HAMPTON	8/25/2012	Flash Flood	0/0	$2,000,000	Scattered thunderstorms produced heavy rain which caused flash flooding which

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					resulted in flooding on Warwick Boulevard, Main Street, Deep Creek Road and cars were submerged on Warwick Boulevard just west of Mercury Boulevard in Newport News. An apartment building was flooded in Hampton.
HAMPTON	8/28/2012	Flash Flood	0/0	-	Scattered thunderstorms produced heavy rain which caused flash flooding. Fox Hill Road was almost impassable at Mercury Boulevard due to flooding. Other roads were closed or impassible and an apartment complex was evacuated.
SOUTHAMPTON	8/28/2012	Flood	0/0	-	Scattered thunderstorms produced heavy rain which caused flooding and road closures mainly western sections along and south of Route 58.
ISLE OF WIGHT, VIRGINIA BEACH, YORK, SUFFOLK, NEWPORT NEWS, CHESAPEAKE, NORFOLK, SURRY COUNTY AND JAMES CITY COUNTY	**10/28/2012**	**Coastal Flood**	**0/0**	**$2,144,000**	**Tropical Cyclone Sandy produced very strong winds which caused moderate to severe coastal flooding especially on the James River, York River, Chesapeake Bay, and at Sewells Point. Some streets were flooded in Chesapeake. Water levels reached 2.5 to 3.5 feet above normal along the James River up into Surry County.**
NEWPORT NEWS, JAMES CITY, ISLE OF WIGHT, HAMPTON, CHESAPEAKE, WILLIAMSBURG, PORTSMOUTH, SUFFOLK, YORK, VIRGINIA BEACH, AND NORFOLK	**10/29/2012**	**Flood**	**0/0**	**-**	**Tropical Cyclone Sandy produced very strong winds which caused flooding and closed numerous roads.**
YORK	7/21/2013	Flash Flood	0/0	-	Scattered thunderstorms produced heavy rain which caused flash flooding. Flooding was reported along Farm Road just off of Route 17. Oriana Road (Route 620) was flooded just north of Newport News Airport. Two to three inches of water was over roadway along Route 17 just south of the Coleman Bridge.
NORFOLK, PORTSMOUTH, AND CHESAPEAKE	5/16/2014	Flood	0/0	-	Heavy rain caused flooding during high tide. Numerous roads were closed due to high water. The first floor of some apartments and a couple of cars were under water in Ghent. Norfolk Public Schools experienced flooding inside some of their buildings.
VIRGINIA BEACH	7/9/2014	Flood	0/0	-	Scattered severe thunderstorms produced heavy rain which caused minor flooding on Sandbridge Road.
NORFOLK, ISLE OF WIGHT, AND PORTSMOUTH	7/10/2014	Flood	0/0	-	Scattered severe thunderstorms produced heavy rain which caused some minor flooding on Windsor Boulevard in Windsor and Elm Street in Portsmouth.
VIRGINIA BEACH	7/15/2014	Flood	0/0	-	Scattered severe thunderstorms produced heavy rain which caused some minor flooding at the intersection of Baxter Road and Princess Anne Road and on Mill Dam Road near First Colonial Road.
SUFFOLK	7/24/2014	Flash Flood	0/0	-	Scattered thunderstorms produced heavy rain which caused flash flooding on Clay Street with water flowing into homes in

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					Suffolk. A car was partially submerged in high water in the Pleasant Hill area.
ISLE OF WIGHT, NEWPORT NEWS, PORTSMOUTH, NORFOLK, CHESAPEAKE, AND HAMPTON	9/8/2014	Flood	0/0	-	Showers and scattered thunderstorms produced locally heavy rainfall and resulted in flooding across portions of southeast Virginia. Several roads were flooded or impassable over northeast Isle of Wight county. Several roads were flooded in southern portions of Newport News, including 26th Street near Interstate 664, and Warwick Boulevard and 35th Street. Also, several streets were flooded around Mercury Boulevard. An apartment complex was evacuated in Hampton. Heavy rain closed several roads and underpasses across the region.
SURRY COUNTY	7/11/2015	Flood	0/0	-	Scattered thunderstorms produced heavy rain. There were multiple reports of water over the road along Route 10 in Surry.
VIRGINIA BEACH, NORFOLK, HAMPTON, POQUOSON, YORK, CHESAPEAKE, ISLE OF WIGHT, NEWPORT NEWS, JAMES CITY, SURRY AND SUFFOLK	10/2/2015	Coastal Flood	0/0	1,000,000	A tidal departure of 3 to 4 feet resulted in moderate flooding along the Atlantic coast and Chesapeake Bay. A combination of Hurricane Joaquin near the Bahamas and strong high pressure over New England produced strong onshore winds over the Mid-Atlantic. The strength and duration of the onshore winds produced moderate coastal flooding along the Atlantic Coast and Chesapeake Bay.
VIRGINIA BEACH	1/23/2016	Coastal Flood	0/0	-	A tidal departure of 2.5 to 3.5 feet resulted in moderate coastal flooding along the Atlantic Ocean and Chesapeake Bay. The peak water level at the Chesapeake Bay Bridge Tunnel was 5.72 feet at 606 am on January 23.
CHESAPEAKE	7/1/2016	Flash Flood	0/0	-	Scattered showers and thunderstorms in advance of a cold front produced heavy rain and caused flash flooding across portions of eastern and southeast Virginia. Rainfall totals ranged from five to as much as eleven inches in areas where flash flooding occurred.
CHESAPEAKE, NORFOLK, PORTSMOUTH	7/19/2016	Flood, Flash Flood	0/0	-	Scattered thunderstorms in advance of a cold front produced heavy rain and caused flash flooding across portions of southeast Virginia. Flooding on Bainbridge Blvd at Rte 13; water covering Olney Rd with vehicles stuck in water; streets flooded on Old Town Portsmouth with vehicles trapped.
VIRGINIA BEACH, NORFOLK	7/31/2016	Flash Flood	0/0	-	Heavy rain from thunderstorms caused flash flooding, with rainfalls ranging between 2 and 7 inches. 2800 block of Shore Drive closed, roads closed near Fairfield Shopping Center, Little Creek/Ft Story, and streetlights out in Ocean View.
PORTSMOUTH, SUFFOLK, CHESAPEAKE, NORFOLK, VIRGINIA BEACH, ISLE OF WIGHT, SOUTHAMPTON, FRANKLIN	9/21/2016	Flood	0/0	$1,085,000	The combination of a stalled frontal boundary and the remnant low pressure area that was Tropical Storm Julia, produced heavy rain which caused flooding across much of southeast Virginia from Wednesday morning, September 21st into early Thursday morning, September 22nd. Numerous roads washed out or closed.

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
ISLE OF WIGHT, FRANKLIN, SUFFOLK SOUTHAMPTON, NORFOLK, PORTSMOUTH, CHESAPEAKE, YORK, NORFOLK, NEWPORT NEWS, HAMPTON, JAMES CITY, VIRGINIA BEACH, POQUOSON, SURRY	**10/8/2016**	**Flood, Flash Flood, Coastal Flood**	**1/0**	**$56,140,000**	**The combination of a cold front moving through the mid-Atlantic and Post Tropical Cyclone Matthew tracking northeast just off the coast, produced heavy rain which caused flash flooding. Strong northeast or north winds over southeast Virginia causes coastal flooding over the study area. Heavy rain caused an extended period of significant flooding. Numerous roads were impassable or closed for several days, and many homes and businesses were impacted. Numerous roads were impassable or closed, and some small creeks or streams were out of their banks due to heavy rain causing flash flooding. Coastal storm tides of 2 to 3.5 feet above astronomical tide levels were common, with only minor beach erosion reported. The maximum storm tide reached 5.86 feet MLLW at Sewalls Point, which resulted in moderate coastal flooding.**
CHESAPEAKE	3/31/2017	Flash Flood	0/0	-	Knee high water was reported at Sparrow Intermediate School.
VIRGINIA BEACH	7/24/2018	Flood	0/0	-	Numerous roads were flooded and closed for several days across much of central and eastern portions of Virginia Beach due to heavy rain.
VIRGINIA BEACH	8/6/2018	Flood	0/0	-	High water was reported on Interstate 64 at Mile marker 291. Vehicle accident was reported due to the high water.
NORFOLK	8/11/2018	Flash Flood	0/0	-	Neighborhood roadways were flooded. Rainfall total of 2.19 inches was measured in 45 minutes. Colley Avenue was closed due to flooding at the underpass. One vehicle was caught in the flood waters.
CHESAPEAKE, VIRGINIA BEACH	8/20/2018	Flood	0/0	-	Thunderstorms caused heavy rain that flooded roads.
HAMPTON	9/9/2018	Flood	0/0	-	Road was closed due to flooding at Coliseum Drive and Merchant Lane. Radar estimates indicated that two to four inches of rain had fallen in the area.
JAMES CITY COUNTY, YORK COUNTY	10/12/2018	Flash Flood	0/0	-	Showers and scattered thunderstorms associated with Tropical Cyclone Michael produced heavy rain which caused flash flooding across portions of central and south central Virginia and the Middle Peninsula. Several roads remained impassable or closed across much of the county due to lingering flooding. Route 737 was flooded at Otey Drive.
CHESAPEAKE, NORFOLK	6/7/2019	Flash Flood	0/0	-	Slow moving thunderstorms produced intense rainfall of 4 to 6 inches resulting in flash flooding on June 7th. Flooding was reported at Triple Decker Bridge underpass at Bainbridge Boulevard and Highway 113 in South Norfolk. Monticello Drive and 16th Street were closed due to flooding.
NORFOLK, CHESAPEAKE	8/7/2019	Flash Flood	0/0	-	Thunderstorms produced heavy rain which caused flash flooding. Reported along Chesapeake Boulevard, Johnstons Road, and Auburn Drive, at the intersection of 26th and 27th Streets, Granby Street and

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					Colonial Avenue, and outside of WTKR studio. Also, portions of Boush Street were impassible. Oxford Street and Newport Avenue and streets in Ocean View were impassible due to high water.
VIRGINIA BEACH	8/22/2019	Flood	0/0	-	Minor street and roadway flooding was reported.
NORFOLK, VIRGINIA BEACH, YORK COUNTY, SURRY COUNTY	9/6/2019	Coastal Flood	0/0	-	Very strong northeast to north winds associated with Hurricane Dorian produced tidal anomalies between 2.5 and 3.5 feet over the southern Chesapeake Bay. This caused moderate coastal flooding over portions of the study area. Sewells Point reached 5.87 feet MLLW at 342 pm on September 6. Some streets were flooded and closed, and vehicles were stranded in the Ghent area.
YORK COUNTY, JAMES CITY COUNTY, SURRY COUNTY	10/11/2019	Coastal Flood	0/0	-	Persistent north or northeast winds, along with high waves, produced tidal anomalies between 2.0 and 3.0 feet over the York and James Rivers. This caused moderate coastal flooding. Yorktown USCG Station reached 5.24 feet MLLW.
VIRGINIA BEACH, NORFOLK	11/17/2019	Coastal Flood	0/0	-	Very strong northeast to north winds produced tidal anomalies between 2.0 and 3.0 feet over the southern Chesapeake Bay. This caused minor to moderate coastal flooding over portions of Virginia Beach and Norfolk. Chesapeake Bay Bridge Tunnel reached 5.88 feet MLLW. Some streets were flooded.
JAMES CITY COUNTY	5/19/2020	Coastal Flood	0/0	-	Minor to moderate tidal flooding occurred over portions of James City county along the James River. Jamestown reached 4.72 feet MLLW.
YORK COUNTY, JAMES CITY COUNTY	5/29/2020	Flash Flood	0/0	-	Right lane of Interstate 64 East at Mile Marker 240 was closed due to high water. Portions of Merrimac Trail were impassible due to high water.
PORTSMOUTH, CHESAPEAKE	6/20/2020	Flash Flood	0/0	-	In Portsmouth, total rainfall of 3.38 inches was reported, with 3.00 inches of rain reported in one hour. Several roads were flooded.
VIRGINIA BEACH	7/1/2020	Flash Flood	0/0	-	Interstate 264 East and West bound lanes were flooded. Two lanes were closed due to high water. Total rainfall between 3.37 inches and 4.05 inches was reported across the area.
VIRGINIA BEACH	8/4/2020	Coastal Flood	0/0	-	Strong south to southeast winds associated with Tropical Storm Isaias resulted in moderate (perhaps some locally major) tidal flooding over portions of Virginia Beach adjacent to Back Bay.
VIRGINIA BEACH, CHESAPEAKE	8/6/2020	Flash Flood	0/0	-	Flash flooding was reported in the Dam Neck area of Virginia Beach. Numerous cars were flooded. Rainfall total of 5.50 inches was reported. Some water was reported in garages and starting to enter homes.
CHESAPEAKE, VIRGINIA BEACH, NORFOLK	8/11/2020	Flash Flood	0/0	-	Water over the roadway reported near Chesapeake Square Mall, and along Great Neck Rd. Several streets were flooded in the city of Norfolk with water almost up to

TABLE 4.2: SIGNIFICANT FLOOD EVENTS (1995 - 2021)					
LOCATION	DATE OF OCCURRENCE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					car windows near Redgate Avenue in Ghent.
JAMES CITY COUNTY, YORK COUNTY, NEWPORT NEWS, SURRY COUNTY, SOUTHAMPTON COUNTY, ISLE OF WIGHT COUNTY	8/15/2020	Flash Flood	0/0	-	All north and south lanes were closed on Route 614 near John Tyler Memorial Highway due to flooding, Dare Rd had lane closures, multiple roads in Newport News and York County impassible, portions of Rte 10, Rte 616, roads in Colony Pines neighborhood closed, and flooding the Rushmere area.
ISLE OF WIGHT COUNTY, SURRY COUNTY, SOUTHAMPTON COUNTY, YORK COUNTY	9/9/2020	Flash Flood	0/0	-	Windsor Elementary School partially flooded (no damages reported), Post Office in Isle of Wight Co flooded, multiple roads closed, washed out or impassable; water rescues performed and cars stranded in Smithfield/Isle of Wight County.
JAMES CITY COUNTY, VIRGINIA BEACH, ISLE OF WIGHT COUNTY, PORTSMOUTH	9/18/2020	Flash Flood	0/0	-	Post Tropical Cyclone Sally tracking northeast across the Southeast United States and off the Mid Atlantic Coast produced heavy rain which caused flash flooding across portions of southeast Virginia. Multiple road closures, including Centerville Road, Brick Bat Road, Nike Park Rd, and roads in Virginia Beach. One person rescued from car in Lansdowne, Virginia Beach.
ISLE OF WIGHT COUNTY, HAMPTON, NORFOLK, CHESAPEAKE, YORK COUNTY, SURRY COUNTY, SOUTHAMPTON COUNTY, NEWPORT NEWS, WILLIAMSBURG, JAMES CITY COUNTY, VIRGINIA BEACH, SUFFOLK, PORTSMOUTH, FRANKLIN	11/12/2020	Flood, Flash Flood	0/0	-	Deep tropical moisture streaming northward into the mid-Atlantic region combined with the approach of a cold front and low pressure, produced heavy rain which caused flash flooding across portions of central and southeast Virginia. Numerous roads were impassible or closed due to continued flooding from heavy rainfall throughout the study area, including standing water on portions of interstate highways.
YORK COUNTY	12/24/2020	Flash Flood	0/0	-	Intersection of Airport Road and Mooretown Road was closed due to high water over the roadway.
TOTAL			**2/1**	**$189,684,000**	

Source: NCEI (1995 to January, 2021 data)

PROBABILITY OF FUTURE OCCURRENCES

Flooding remains a highly likely occurrence throughout the identified flood hazard and storm surge areas of the Hampton Roads region. Smaller floods caused by heavy rains and inadequate drainage capacity will be frequent, but not as costly as the large-scale floods caused by hurricanes and coastal storms, which may occur at less frequent intervals.

FLOODING DUE TO IMPOUNDMENT FAILURE/HIGH HAZARD DAM

Flooding in the region is also possible as the result of a dam that malfunctions or is overtopped. There are approximately 80,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.



Lake Burnt Mills in Suffolk.
Photo source: City of Suffolk

Though dams have many benefits, they also can pose a risk to communities if not designed, operated and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream of the dam. The failure of dams has the potential to place large numbers of people and great amounts of property in harm's way.

Flooding due to impoundment failure refers to a collapse, overtopping, breaching, or other failure that causes an uncontrolled release of water or sludge from an impoundment, resulting in downstream flooding. Dam or levee failures can occur with little warning. Intense storms may produce a flood in a few hours or even minutes from upstream locations. Flash floods can occur within six hours of the beginning of heavy rainfall, and impoundment failure may occur within hours of the first signs of breaching. Other failures and breeches can take much longer to occur, from days to weeks, because of debris jams or the accumulation of melting snow.

Failure of dams may result in catastrophic localized damages. Vulnerability to dam failure is dependent on dam operations planning and the nature of downstream development. Depending on the elevation and storage volume of the impoundment, the impact of flooding due to dam failure may include loss of human life, economic losses such as property damage and infrastructure disruption, and environmental impacts such as destruction of habitat. Flooding following a dam failure may occur due to any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity;
- Internal erosion caused by embankment or foundation leakage or piping, or earth movement resulting from an earthquake;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, or other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway;
- High winds, which can cause significant wave action and result in substantial erosion; or
- Intentional criminal acts.

Dams are classified by DCR, with a hazard potential depending on the downstream losses estimated in event of failure. Hazard potential is not related to the structural integrity of a dam but strictly to the potential for adverse downstream effects if the dam were to fail. State regulatory requirements administered by DCR, such as the frequency of dam inspection, the standards for spillway design, and the extent of emergency operations plans, are dependent upon the dam classification. **Table 4.3** provides additional information on these classes and the possible effects on downstream areas if failure were to occur.

TABLE 4.3: VIRGINIA DAM CLASSIFICATION SYSTEM

HAZARD POTENTIAL	DESCRIPTION	INSPECTION
High (Class I)	Failure will cause probable loss of life or serious economic damage (to buildings, facilities, major roadways, etc.)	Annual, with inspection by a professional engineer every 2 years.
Significant (Class II)	Failure may cause loss of human life or appreciable economic damage (to buildings, secondary roadways, etc.)	Annual, with inspection by a professional engineer every 3 years.
Low (Class III)	Failure would result in no expected loss of human life, and cause no more than minimal economic damage	Annual, with inspection by a professional engineer every 6 years.

Source: 2018 Commonwealth of Virginia Hazard Mitigation Plan

The owner of each regulated high, significant, or low hazard dam is required to apply to DCR for an Operation and Maintenance Certificate. The application must include an assessment of the dam by a licensed professional, an Emergency Action Plan, and the appropriate fee(s), submitted separately. An executed copy of the Emergency Action Plan or Emergency Preparedness Plan must be filed with the appropriate local emergency official and the Virginia Department of Emergency Management. The Virginia Soil and Water Conservation Board, a division of DCR, issues Regular Operation and Maintenance Certificates to the dam owner for a period of six years. If a dam has a deficiency but does not pose imminent danger, the board may issue a Conditional Operation and Maintenance Certificate, during which time the dam owner is to correct the deficiency. After a dam is certified by the board, annual inspections are required either by a professional engineer or the dam owner, and the Annual Inspection Report is submitted to the regional dam safety engineer.

Dam risk can be classified as incremental, non-breach or residual risk. Incremental risk is the risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or misoperation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but loss of the pool can result in significant consequences in the pool area upstream of the dam. Non-breach risk is the risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios. Residual risk is the risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk as "risk remaining at any time" (FEMA, 2015, p A-2). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue.[1]

At this time, limited information is available to conduct an analysis of incremental, non-breach and residual risk relative to the high hazard potential dams in the region. Please refer to Section 3.11: Flooding Due to Impoundment Failure of the *2018 Commonwealth of Virginia Hazard Mitigation Plan*, as amended, for

[1] FEMA, Rehabilitation of High Hazard Potential Dams Grant Program Guidance, June 2020

additional information regarding the statewide approach to dam risk. That section of the state's plan is hereby incorporated by reference.

The Commonwealth of Virginia relies upon FEMA's definition of risk: "Risk is the product of the likelihood of a structure being loaded, adverse structural performance, and the magnitude of the resulting consequences." Risk data are compiled in the state's Dam Safety Inventory System (DSIS) for each high hazard dam. DCR, VDEM and local emergency and planning staff are given copies of emergency action plans and plans include detailed information on risk to the following:

- Dwellings
- Schools
- Hospitals
- Businesses
- Railroads:
- Utilities:
- Parks:
- Golf Course
- Public Trails
- Emergency Infrastructure.

The summary impacts shown in **Table 4.4** are drawn from the information in DSIS and the EAPs for the high hazard potential dams, These data represent how Virginia summarizes significant economic, environmental and social impacts from a dam incident. Factors considered in risk assessment include the population at risk, land use, inspection condition assessment and any missing studies such as stability analyses under normal and extreme loading conditions (seismic and hydrologic), and any measures underway that affect the operational status, such as drawdowns or temporary pumps and siphons, when dams are compromised.

LOCATION AND SPATIAL EXTENT

Owners of impounding structures are required to have dam break inundation zone maps that meet the standards of the Virginia Impounding Structure Regulations. The properties that are identified within the dam break zone are recorded in the dam safety emergency action plan for that impoundment. DCR is pursuing efforts to make this information available in a digital form, but it is not currently available for all dams. The *2018 Commonwealth of Virginia Hazard Mitigation Plan* indicates that such data would greatly improve ability to identify impact and vulnerability due to dam inundation.

Table 4.4 lists the high hazard dams in the study area from DCR's database and includes key details regarding each dam's basic characteristics, Emergency Action Plan status and a summary of expected impacts resulting from dam failure. Three dams with a "poor" condition rating (Harwood's Mill Dam, Little Creek Dam in James City County, and Godwin's Millpond Dam in Suffolk) are considered to have a greater risk of flooding and are a potential target for mitigation action.

TABLE 4.4: HIGH HAZARD DAMS IN THE HAMPTON ROADS REGION									
COMMUNITY	NAME OF DAM	DAM TYPE	YEAR BUILT	PRIMARY PURPOSE	TOP HEIGHT (FEET)	TOP CAPACITY (ACRE FEET)	EMERGENCY ACTION PLAN STATUS (LAST APPROVAL DATE)	SUMMARY IMPACTS	MOST RECENT CONDITION ASSESSMENT
York County	Harwood's Mill Dam	Earth	1919	Water Supply	27	5,845	Active (08/18/2016)	172 homes, 21 roadways	Poor
York County	Waller Mill Dam	Earth	1965	Recreation & Water Supply	40	7,274	Expired (8/25/2005)	3 homes, 1 business, 3 roadways, 1 downstream dam	Fair
James City County	Little Creek Dam	Earth	1980	Water Supply	67	32,143	Active (4/26/2016)	2 homes, 2 roadways	Poor
James City County	Diascund Creek Dam	Earth	1961	Water Supply	35	29,093	Active (08/18/2016)	208 homes, 25 roadways	Fair
Williamsburg	Lake Matoaka Dam	Earth	1694	Recreation	24	587	Expired (04/30/2008)	7 homes, 2 businesses, 4 utilities, 1 roadway	Fair
Norfolk	Lake Whitehurst	Gravity	1900	Water Supply	26	4,200	Expired (5/31/2011)	none listed	Fair
Virginia Beach	Lake Smith Dam	Earth	1885	Water Supply	15.35	1,385	Expired (5/31/2012)	352 homes, 2 roadways, 1 downstream dam	Fair
Virginia Beach	Little Creek Reservoir	Earth	1899	Water Supply	7.6	1,819	Expired (5/31/2011)	none listed	Fair
Chesapeake	Chesapeake Energy Center Bottom Ash Dam	Earth	1955	Coal Ash Storage	20	56	Active (11/14/2018)	none listed	Satisfactory
Suffolk	C-Pond Dam	Earth	1962	Other	52	29,800	Active (04/24/2020)	287 homes, 4 roadways, 1 downstream dam	Satisfactory
Suffolk	Godwin's Millpond Dam	Earth	1960	Water Supply	14	214	Expired (03/14/2013)	1 home, 3 businesses, 1 road	Poor
Suffolk	Lake Burnt Mills	Earth	1942	Water Supply	46.5	18,500	Active (09/16/2019)	310 homes, 8 roadways, 1 downstream dam	Fair
Suffolk	Lake Cohoon	Earth	1919	Water Supply	28.8	9,300	Active (07/13/2015)	39 homes, 1 business, 1 railroad, 5 roadways, 1 downstream dam	Satisfactory
Suffolk	Lake Kilby	Earth	1892	Water Supply	18.6	3,400	Active (07/13/2015)	1 downstream dam	Satisfactory
Suffolk	Lake Meade Dam	Gravity	1958	Water Supply	25	9,281	Active (08/10/2020)	86 homes, 29 businesses, 5 railroads, 2 parks, 17 roadways	Satisfactory
Suffolk	Speight's Run Dam	Earth	1957	Water Supply	25.7	4,000	Active (07/13/2015)	2 downstream dams	Satisfactory
Suffolk	Western Branch	Earth	1963	Recreation & Water Supply	41	35,300	Active (09/16/2019)	310 homes, 8 roadways	Satisfactory
Isle of Wight County	ASB Pond	Earth	1901	Other	16.7	1,103	Active (4/24/2020)	52 homes, 7 roads, 1 downstream dam	Fair

TABLE 4.4: HIGH HAZARD DAMS IN THE HAMPTON ROADS REGION

COMMUNITY	NAME OF DAM	DAM TYPE	YEAR BUILT	PRIMARY PURPOSE	TOP HEIGHT (FEET)	TOP CAPACITY (ACRE FEET)	EMERGENCY ACTION PLAN STATUS (LAST APPROVAL DATE)	SUMMARY IMPACTS	MOST RECENT CONDITION ASSESSMENT
Isle of Wight County	B-1 Pond Dam	Earth	1950	Other	13	668	Expired (12/17/2013)	54 homes, 6 roadways	Satisfactory
Isle of Wight County	B-2 Pond Dam	Earth	1901	Other	15.3	1,668	Expired (12/17/2013)	54 homes, 6 roadways	Satisfactory
Newport News	Lee Hall Reservoir Dam	Gravity	1893	Water Supply	23.7	4,640	Active (1/31/2019)	861 homes, 1 business, 3 schools, 2 parks, 28 roadways	Satisfactory

Source: Virginia Department of Conservation and Recreation, Dam Safety Inventory System, May 2021

Appendix H contains a list of all dams in the study area from the DCR database, as well as the DCR Dam Safety Data Sheet for each high hazard dam, ordered alphabetically by dam name. Each data sheet includes general characteristics, watershed information, technical basics, hydrology/hydraulics data, inspection dates and condition, EAP quick reference data, potential impacts and a detailed map of each impoundment. Section 3.11 of the *2018 Commonwealth of Virginia Hazard Mitigation Plan* is also hereby adopted by reference, specifically the information regarding dams in the region.

SEA LEVEL RISE AND LAND SUBSIDENCE

BACKGROUND

Global sea level is determined by the volume and mass of water in the world's oceans. Sea level rise occurs when the oceans warm or ice melts, bringing more water into the oceans. Sea level rise caused by warming water or thermal expansion is referred to as steric sea level rise, while sea level rise caused by melting snow and ice is called eustatic sea level rise. The combination of steric and eustatic sea level rise is referred to as absolute sea level rise. Absolute sea level rise does not include local land movements. Additionally, while it is often represented as a global average, absolute sea level rise varies from place to place as a result of differences in wind patterns, ocean currents, and gravitational forces.

The primary consequences of continuing sea level rise are interrelated and include:

Increased Coastal Erosion – Sea level rise influences the on-going processes that drive erosion, in turn making coastal areas ever more vulnerable to both chronic erosion and episodic storm events (Maryland Commission on Climate Change, 2008). Secondary effects of increased erosion include increased water depths and increased sediment loads which can drown seagrass and reduce habitat and food sources for fish and crabs. Increased wave action contributes to the increased erosion as the wave energy attacks intertidal and upland resources.

Inundation of Normally Dry Lands – The loss of coastal upland and tidal wetlands through gradual submergence or inundation is likely over time. Wetlands can provide protection from erosion, subdue storm surges, and provide a nursery and spawning habitat for fish and crabs. Without impediments, such as hardened shorelines, and with a slow enough rate of sea level rise, wetlands can normally migrate upland. However, if barriers are present and sea level rise outpaces upland migration, wetlands can drown in place (*Virginia Governor's Commission on Climate Change*, 2008). Many communities in the region have noted an influx of requests in recent years for bulkhead repair as a result of more frequent inundation behind failing bulkheads. Tidal wetlands are slowly migrating landward. The loss of wetlands means increased coastal and shoreline erosion, reduced storm surge protection, and reduction in nursery and spawning habitat for fish and crabs.

Coastal Flooding – An increase in duration, quantity, and severity of coastal storms results in increased flood damages to infrastructure. Increased sea level and/or land subsidence increases the base storm tide, which is the storm surge plus astronomical tide (Boon, Wang, and Shen, undated). Ultimately, sea level rise increases the destructive power of every storm surge. Minor storms that may not have caused damage in the past will begin to affect infrastructure in the future (Boon, et al, undated). Higher wave energy from higher storm tides will translate each storm's destructive forces landward. The damage caused by major storms becomes increasingly costly. Sea level rise will threaten the longevity and effectiveness of stormwater drainage systems and other infrastructure, especially during significant rain events that occur during high tides such as that which may be caused by a nor'easter.

Saltwater Intrusion – As sea level rises, the groundwater table may also rise, and saltwater may intrude into freshwater aquifers. This impact may have secondary impacts related to drinking water and agriculture, even for home gardeners.

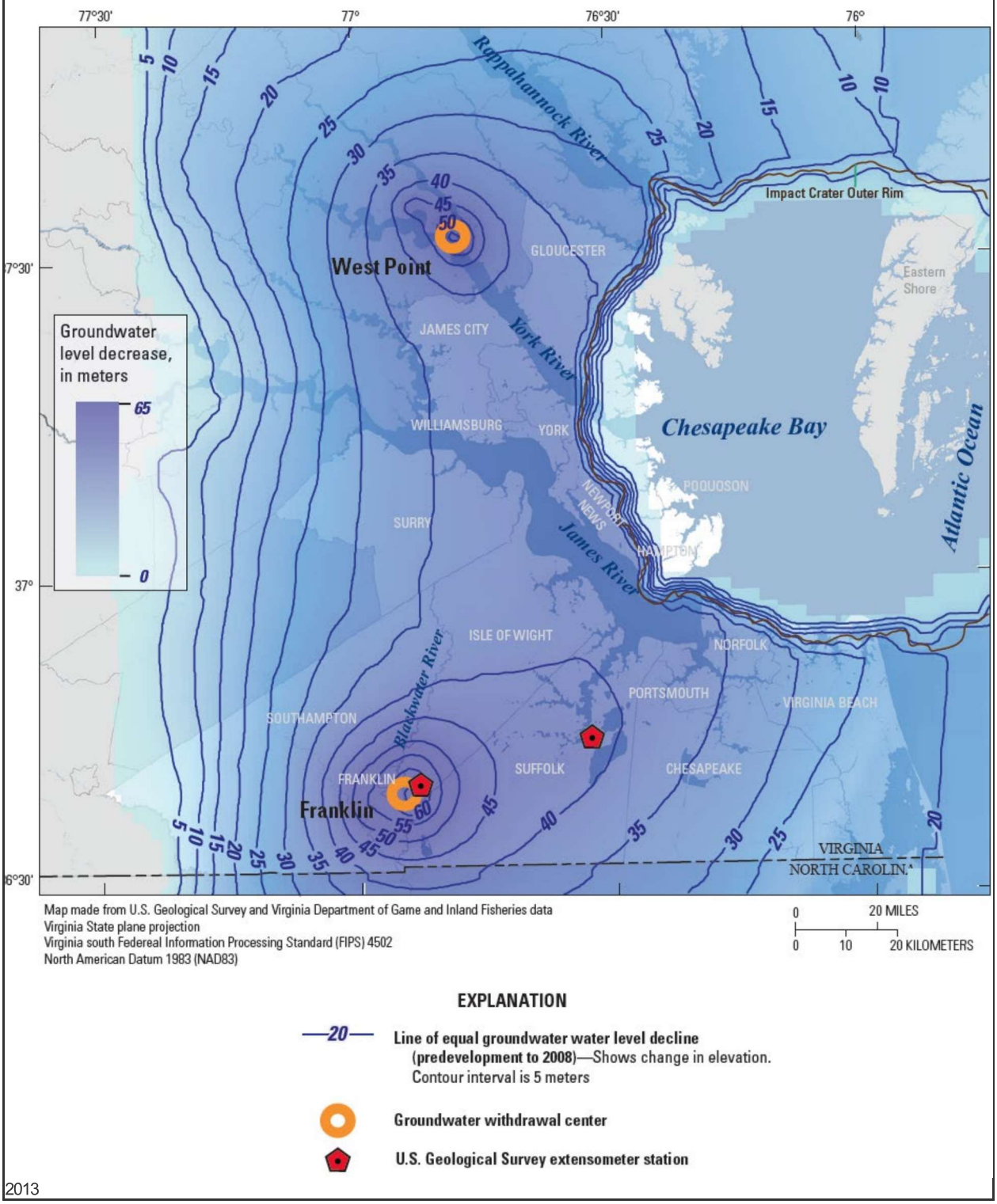
LOCATION AND SPATIAL EXTENT

According to the Old Dominion University Center for Sea Level Rise, sea level rise has a very localized spatial extent related to past development activities. Historically, many of the region's large and small waterways were filled, creating developable land upon which infrastructure, residences and businesses were constructed. Subsequently, as sea level has risen, these areas have been the first to experience the effects. Water begins to retrace ancient flow paths, flooding neighborhood streets and stormwater outfalls. The outfalls are then less capable of handling rainfall runoff because the pipes must also accommodate rising sea water. This phenomenon exacerbates and prolongs flood events.

Several factors are influencing the rates of sea level rise relative to land in the Hampton Roads region, including an increased volume of water in the oceans from melting ice. Some scientists believe that thermal expansion of a gradually warming ocean increases ocean volume. The rate of sea level rise is relative to the land adjacent to the sea; land subsidence is the downward movement of the earth's crust. The Hampton Roads region is experiencing both regional subsidence (along the east coast of the United States) and local subsidence, exacerbating the effects of storms. Subsidence alone can damage wetland and coastal marsh ecosystems and damage infrastructure, but when combined with sea level rise, the effects can be even more devastating.

Local subsidence is believed to be the result of settlement or compaction of subsurface layers resulting from groundwater withdrawals and glacial isostatic rebound (USGS, *Land Subsidence and Relative Sea-Level Rise in the Southern Chesapeake Bay Region*, 2013). Groundwater withdrawals in the region, primarily seen near the pumping centers of Franklin and West Point, decrease pressure and therefore water levels in the aquifer system. As a result, the aquifer system compacts and the land surface subsides. Borehole extensometers, like the one in Franklin, Virginia measure compaction or expansion of aquifer thickness. Scientists also use surface monitoring data such as that from tidal stations, geodetic surveying and remote sensing in an effort to determine how much land subsidence can be attributed to aquifer compaction. **Figure 4.6** illustrates the spatial extent of changes in groundwater level in the Hampton Roads region that are thought to contribute to land subsidence.

FIGURE 4.6: GROUNDWATER LEVEL DECREASES FROM 1900 TO 2008

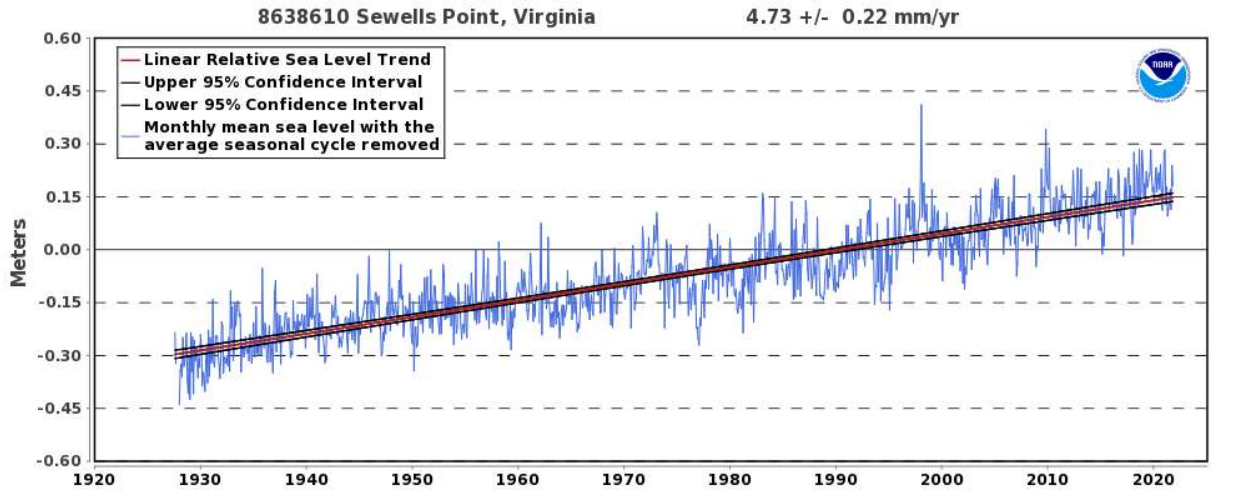


Source: USGS, Land Subsidence and Relative Sea-Level Rise in the Southern Chesapeake Bay Region, 2013

NOAA has compiled data from regional tide gauges to document the rates of sea level rise. There are four local stations with data pertinent to the region, and the rates of sea level rise range from 1.23 feet to 1.98 feet per 100 years.

At Sewell's Point, Naval Station Norfolk, the local NOAA tide station with the longest period of record, the mean sea level trend is 4.73 millimeters/year with a 95% confidence interval of +/- 0.22 mm per year, based on monthly mean sea level data from 1927 to 2020 (**Figure 4.7**). This rate is equivalent to a change of 1.55 feet in 100 years. The plot shows the monthly mean sea level without the regular seasonal fluctuations due to coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents. The long-term linear trend is also shown, including its 95 percent confidence interval.

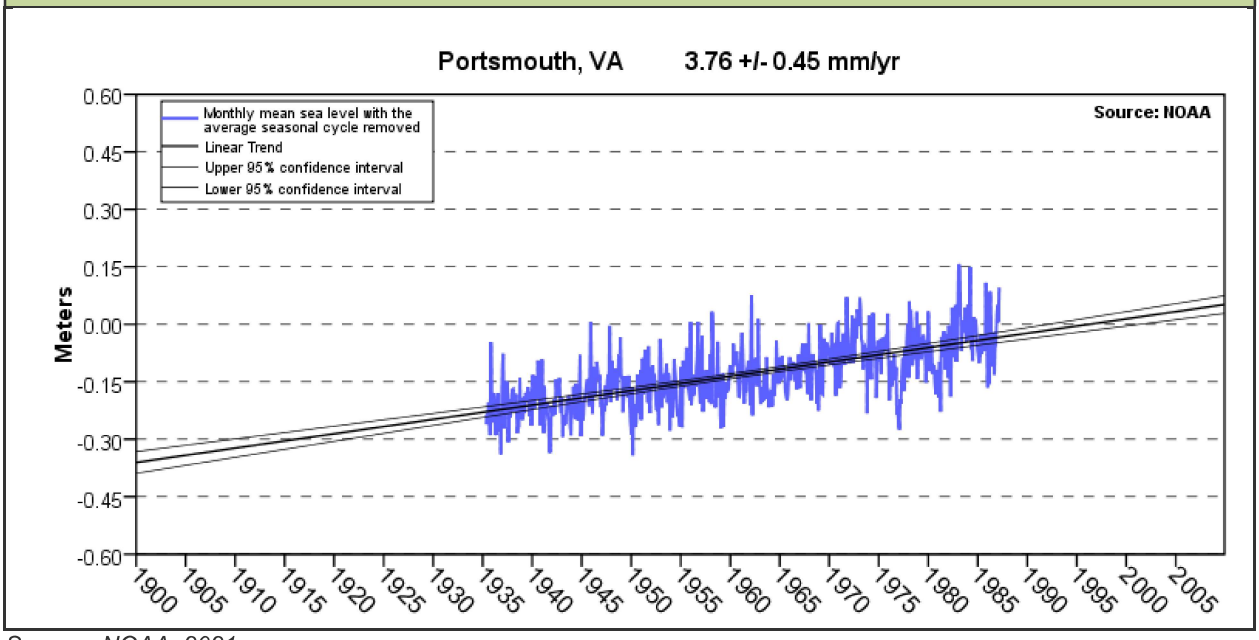
FIGURE 4.7: MEAN SEA LEVEL TREND, SEWELLS POINT, VIRGINIA



Source: NOAA, 2021

At Downtown Portsmouth, the mean sea level trend is 3.76 millimeters/year with a 95% confidence interval of +/- 0.45 mm/year based on monthly mean sea level data from 1935 to 1987 (**Figure 4.8**). This rate is equivalent to a change of 1.23 feet in 100 years.

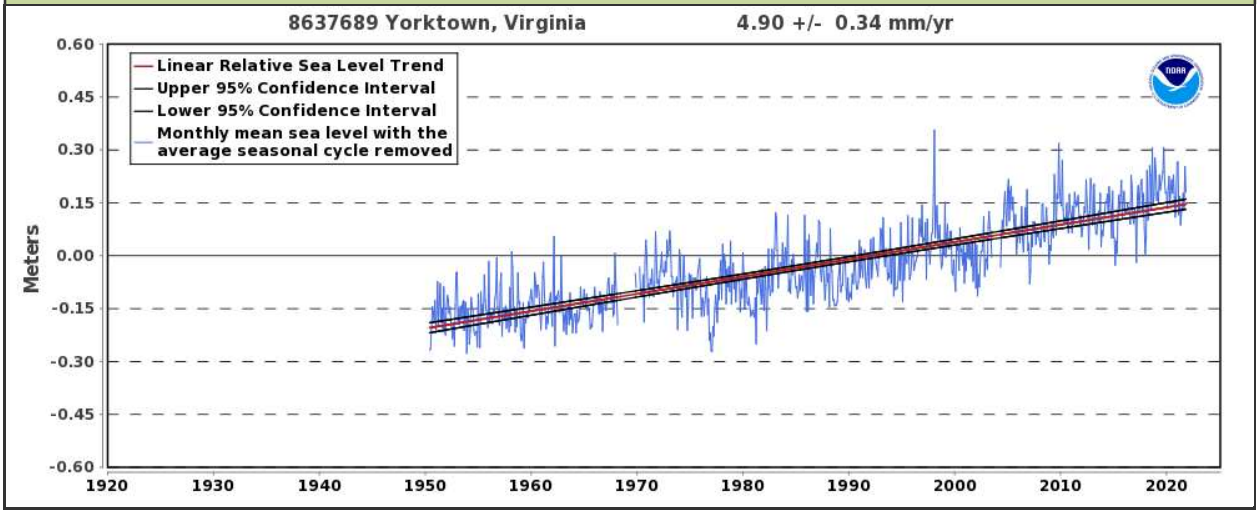
FIGURE 4.8: MEAN SEA LEVEL TREND, PORTSMOUTH, VIRGINIA



Source: NOAA, 2021

At Yorktown, Virginia, as shown in **Figure 4.9**, the mean sea level trend is 4.90 millimeters/year with a 95-percent confidence interval of +/- 0.34 mm/yr based on monthly mean sea level data from 1950 to 2020, which is equivalent to an increase of 1.61 feet in 100 years.

FIGURE 4.9: MEAN SEA LEVEL TREND, YORKTOWN, VIRGINIA



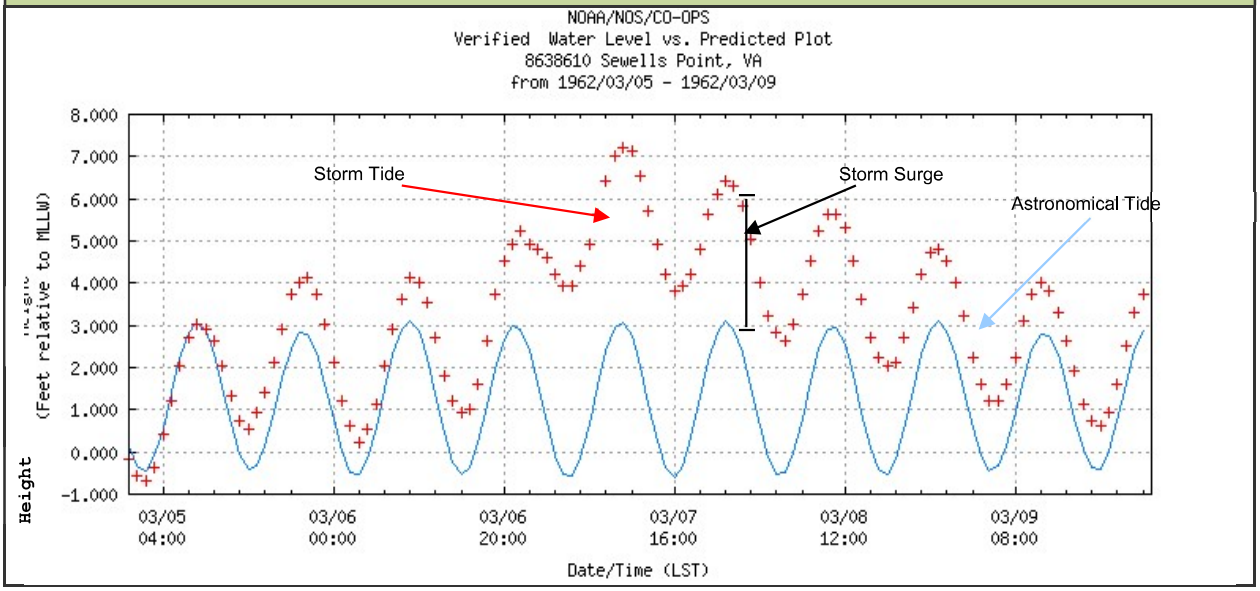
Source: NOAA, 2021

SIGNIFICANT HISTORICAL EVENTS

Unlike wildfires, earthquakes or coastal storms, the impacts of sea level rise are not felt or recorded in a matter of hours or days, but instead are slowly observed, recorded, and experienced over decades and centuries. However, scientists at VIMS have gathered data from several historical storms and made careful comparisons in an effort to highlight the historical impact of sea level rise locally.

The **Ash Wednesday Storm of 1962** produced a peak storm tide of approximately 7.2 feet MLLW at Sewell's Point (see **Figure 4.10**). If that same storm were to occur at mean high tide in 2030, using the sea level rise rates calculated above for Sewell's Point, the astronomical tide would be approximately one foot higher. Since the storm tide is obtained by adding the storm surge to the astronomical tide, the same storm could then produce a storm tide of over 8 feet MLLW. By comparison, Hurricane Isabel in 2003 produced a storm tide of 7.887 feet MLLW and caused an immense amount of damage.

FIGURE 4.10: ASTRONOMICAL AND STORM TIDES FOR 1962 STORM



Source: NOAA, 2008

Similarly, Boon (undated) concluded that sea level rise contributed to the similarity of two storms, the **August 1933 hurricane** and **Hurricane Isabel** in 2003. The storms had comparable peak storm tides of 8.018 feet MLLW (1933) and 7.887 feet MLLW (2003), and both peaks occurred very shortly before or after astronomical high tide, yet the 1933 storm occurred during spring tides and Isabel during neap tides. As a result, the storm surge in the 1933 storm was much higher and, all things being equal, the data would not have shown the storm surge that it did for Isabel had it not been for the constant adjustment of MLLW to account for as much as 1.35 feet of sea level rise between August, 1933 and September, 2003 (**Table 4.5**).

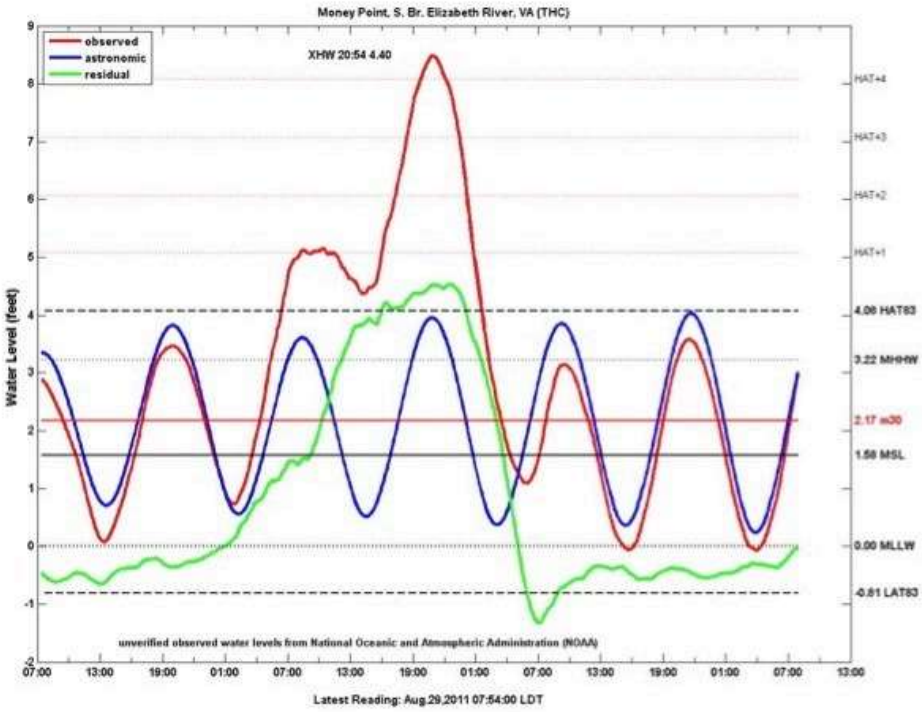
TABLE 4.5: AUGUST 1933 HURRICANE AND HURRICANE ISABEL (BOON, UNDATED)

STORM	STORM TIDE (HEIGHT IN FEET ABOVE MLLW)	STORM SURGE (HEIGHT IN FEET ABOVE NORMAL)	MEAN WATER LEVEL (HEIGHT IN FEET ABOVE MLLW)
August 1933	8.018	5.84	0.95
Isabel – September 2003	7.887	4.76	2.30
1933 -2003	0.131	1.08	-1.35

A mere tropical depression, **Ernesto** struck Hampton Roads on September 1, 2006. At Sewells Point, the storm surge reached a peak of about four feet above monthly mean sea level for the lunar month, but occurred at low tide. Boon (*Ernesto: Anatomy of a Storm Tide,* undated) concludes that if the peak storm surge had occurred at high tide, the storm tide peak would have reached seven feet MLLW, or just 0.9 feet below Isabel's peak storm tide.

Scientists have also focused on data from Money Point, Virginia, on the southern branch of the Elizabeth River near Portsmouth. In *Sea Level Rise and Coastal Infrastructure: Prediction, Risks and Solutions*, Bilal M. Ayyub and Michael S. Kearney observe that during the extratropical storm event which occurred in mid-November 2009, the maximum extratidal storm tide height of 4.69 feet at Money Point exceeded the extratidal height of 4.43 feet observed there during Hurricane Isabel. Again, during Hurricane Irene in 2011, the VIMS Tidewatch tool showed that Money Point experienced the highest water levels in the area, at 4.4 feet above highest astronomical tide. **Figure 4.11** shows observed water levels (red), predicted astronomic tide (blue), and the storm surge (green).

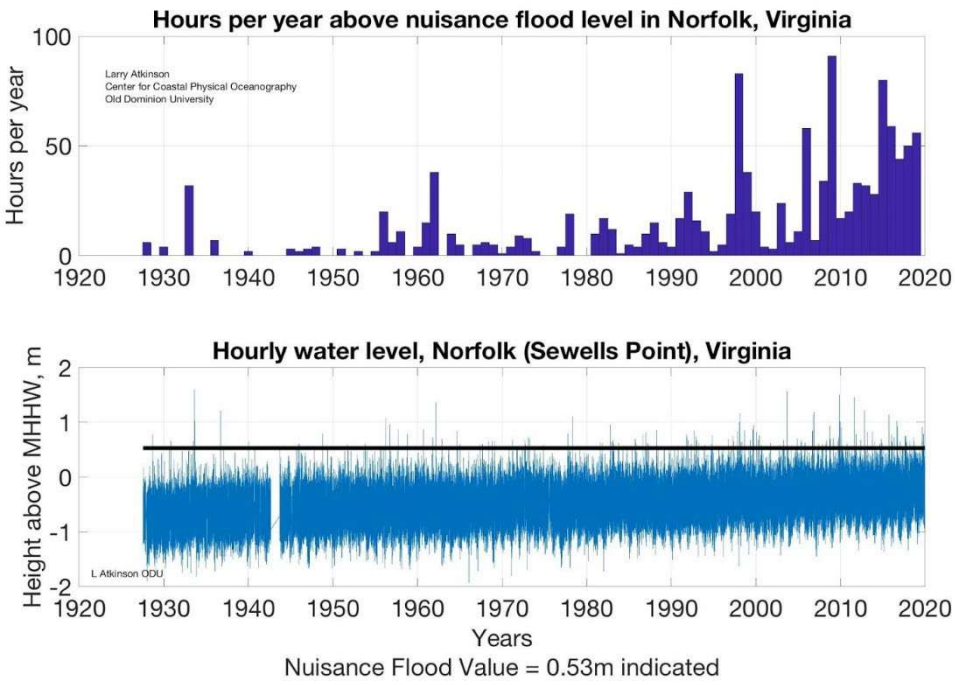
FIGURE 4.11: HURRICANE IRENE, TIDEWATCH DATA FOR MONEY POINT, VA



Source: Virginia Institute of Marine Science, 2011

The impacts of sea level rise are being felt on an almost daily basis in many parts of Hampton Roads. Dr. Larry Atkinson at the Old Dominion University Center for Coastal Physical Oceanography, compiled **Figure 4.12** which graphically shows the increasing problem of nuisance flooding in Norfolk. Nuisance flooding, sometimes referred to as "sunny day flooding" is a water level value determined by the NWS in collaboration with regional emergency managers. Regionally, that level is 0.53 meters (1.7 feet) above Mean Higher High Water: the horizontal black line in the lower panel of Figure 4.12. The upper panel shows there are occasional years with abnormally high hours of flooding. These are typical during a major hurricane or northeasters with long durations in the area. There is a slow, steady increase from about 2005. Based on this plot some exposed parts of Hampton Roads can expect at least 40 to 50 hours of nuisance flooding per year in the coming years. The lower panel shows the hourly water level since 1927.

FIGURE 4.12: NUISANCE FLOODING IN NORFOLK

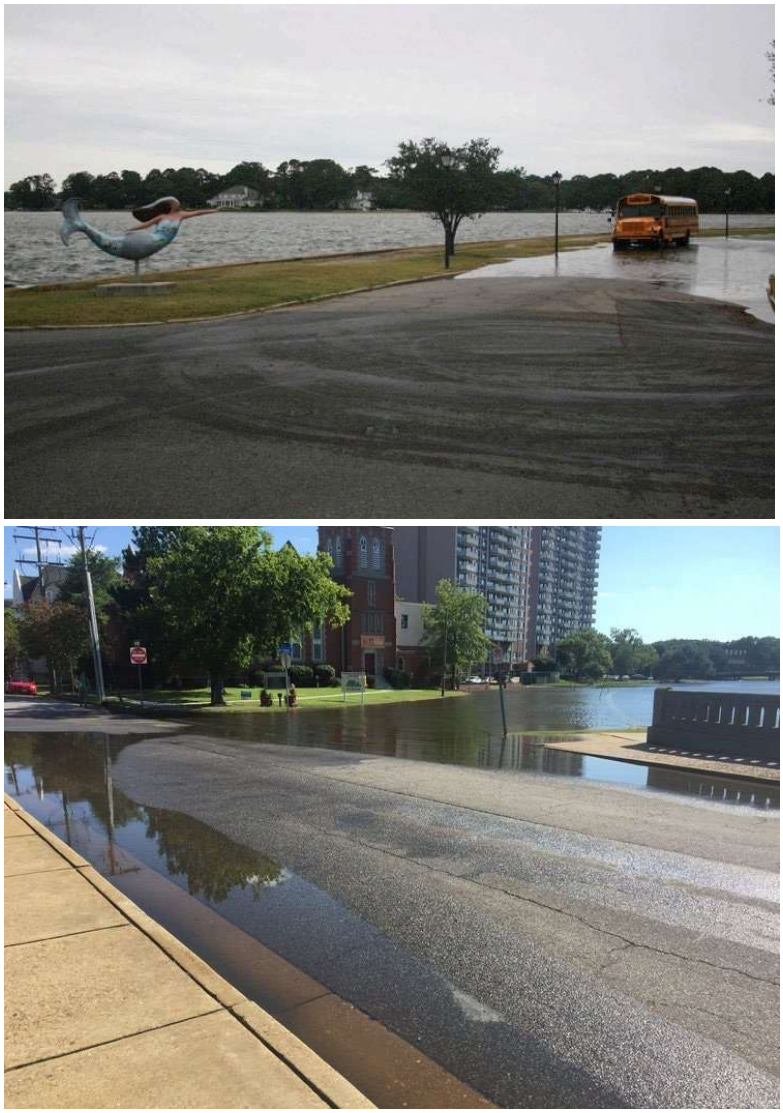


Source: L. Atkinson Online Blog, Old Dominion University, March 2020

The impacts of sea level rise are similar to the effects of flooding outlined above, but the frequency and severity of flooding can be expected to continue to increase, which has longer-term effects.

As nuisance flooding increases, Hampton Roads' population is becoming more accustomed to driving through salt-water flooded roads, cleaning out flooded buildings, and working through the impacts of each minor flood. But the longer-term economic impacts discussed above for flooding are slowly becoming more apparent. More communities must commit to long-term capital expenditures on flood mitigation and infrastructure rather than new investments in economic development, for example. More property owners must spend their wages on flood insurance, flood repair, and flood mitigation rather than on tangible goods. And the real estate market suffers when structures are subject to repetitive flooding with increasing frequency. Even nuisance flooding of crawl spaces or garages detracts from the ability of a house in a repetitive flood loss area to accrue value in the long-term. Days out of school for students locally are increasing annually due to flooding, and the impact on students and parents is sobering from an economic standpoint.

Impacts on the environment are apparent as shoreline erosion from more frequent shoreline inundation contributes to loss of trees, wetland grasses and other valuable habitats of the intertidal zone. Damage to these sensitive features is important because it could affect the important local seafood industry which relies on the intertidal zone as a fish and shellfish nursery, and because of the difficulty of recreating these habitats elsewhere. Also, eroded shorelines are more vulnerable to damage from severe flood events in the future.

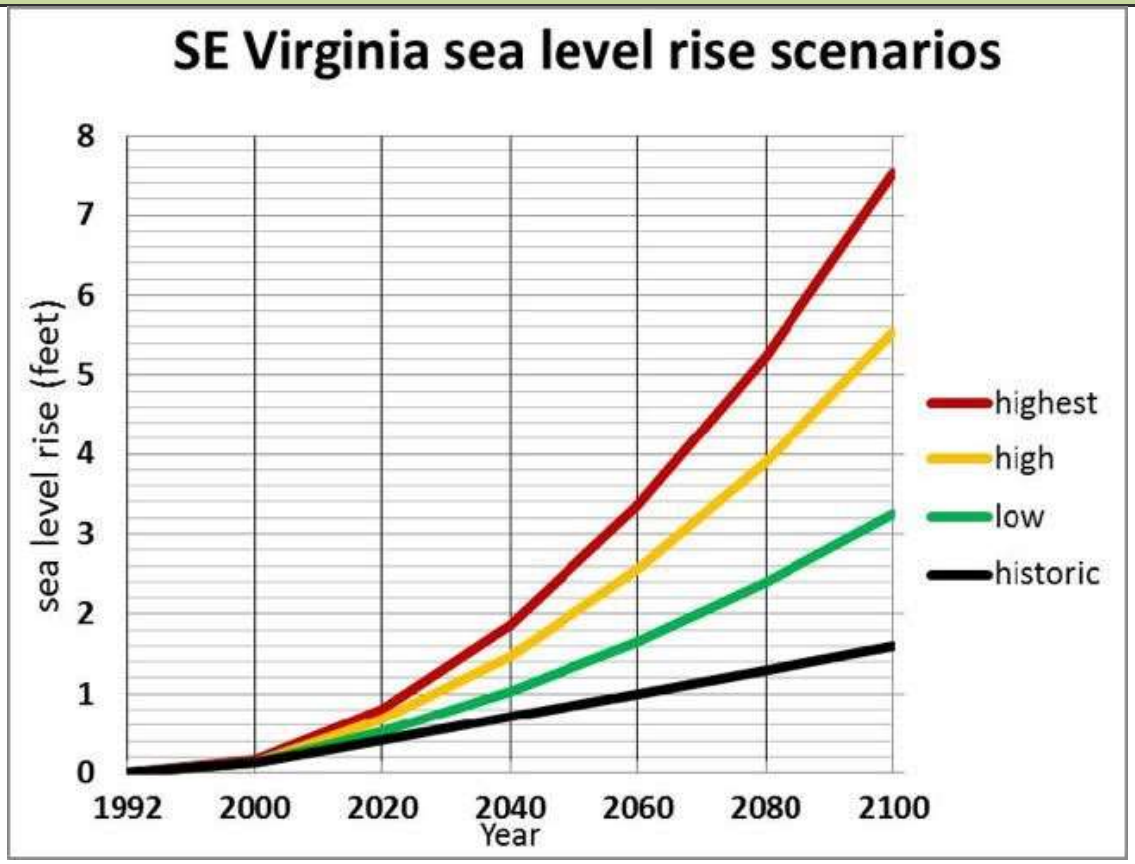


Nuisance flooding in Norfolk.
Source: Wetlands Watch

PROBABILITY OF FUTURE OCCURRENCE

In a report to the Virginia General Assembly in 2013 entitled *Recurrent Flooding Study for Tidewater Virginia*, VIMS presented four scenarios of sea level rise. Each scenario, as shown in **Figure 4.13** represents a possible trajectory for sea level rise in the region. The lowest, historic scenario is based on observed rates of rise and does not account for any acceleration. The low scenario incorporates some acceleration using assumptions about future greenhouse gas emission. The high scenario is based on the upper end of projections from semi-empirical models using statistical relationships in global observations of sea level and air temperature. And the highest scenario is based on consequences of global warming, ice-sheet loss and glacial melting. Each scenario was customized for conditions in southeastern Virginia, including using estimates for subsidence. The report concludes that regional planners should anticipate a 1.5-foot rise in sea level above the 1992 datum within the next 20 to 50 years (2033-2063). According to the VIMS report, "sea level rise will make it easier for the current patterns of weather events to generate damaging flood events in the future. Increases in storm intensity and/or frequency will only aggravate that circumstance."

FIGURE 4.13: SOUTHEAST VIRGINIA SEA LEVEL RISE SCENARIOS

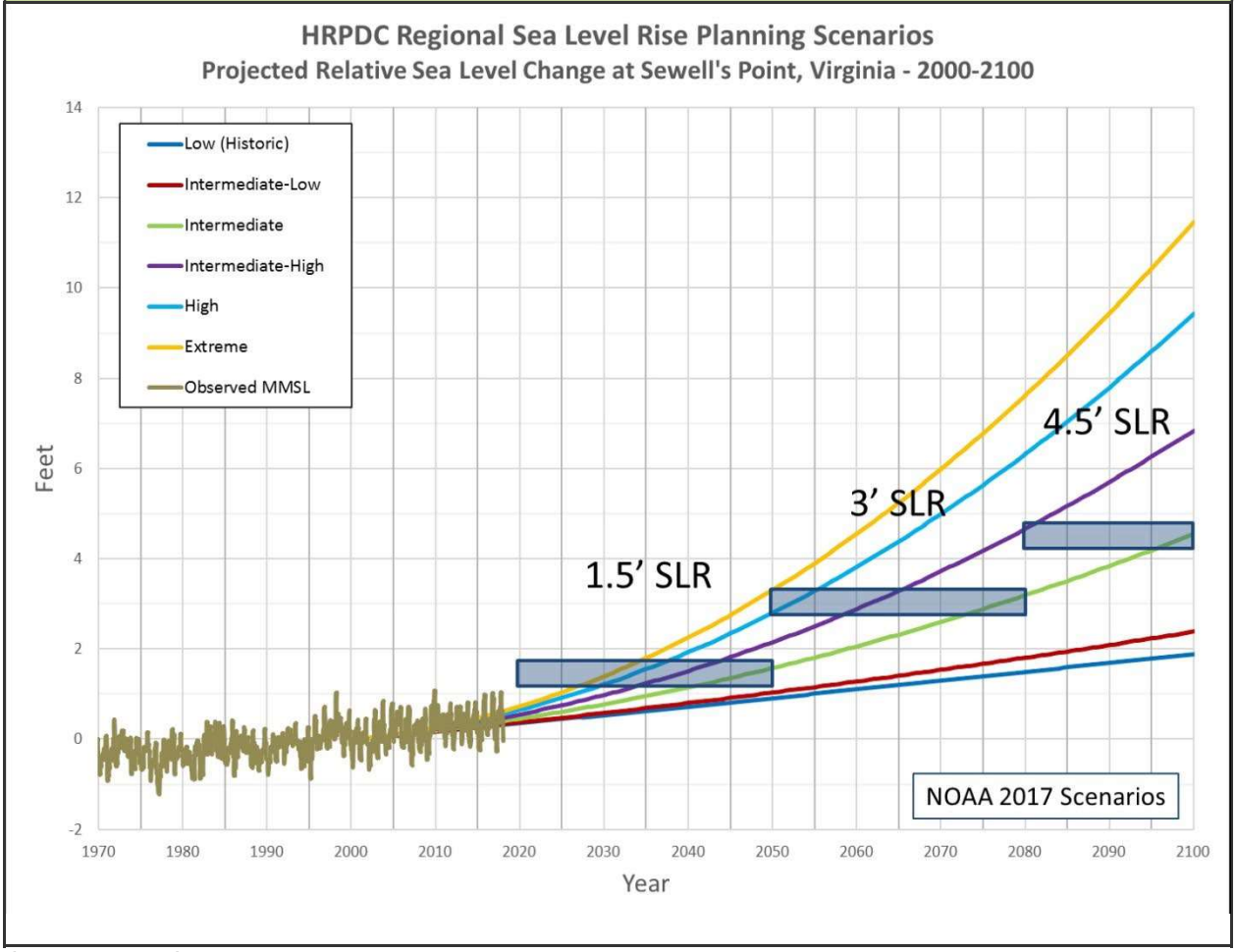


Source: VIMS, Recurrent Flooding Study for Tidewater Virginia, 2013 HRPDC web site, accessed May 19, 2021.

Following issuance of the 2013 study by VIMS and subsequent discussion, on October 18, 2018, the HRPDC approved and adopted a resolution encouraging local governments within the region to consider adopting policies that incorporate sea level rise into planning and engineering decisions. The approved Sea Level Rise Planning Policy and Approach incorporates and expounds on the concepts in the 2013 report and adds three unique time-based planning horizons. The policy recommends the following relative sea level rise scenarios as depicted in **Figure 4.14**:

- 1.5 ft above current mean higher high water (MHHW) for near-term (2018-2050);
- 3 ft above current mean higher high water (MHHW) for mid-term (2050-2080); and
- 4.5 ft above current mean higher high water (MHHW) for long-term (2080-2100).

FIGURE 4.14: SOUTHEAST VIRGINIA SEA LEVEL RISE SCENARIOS



Source: HRPDC web site, accessed May 19, 2021.

The rationale behind this important resolution of agreement is that sea level rise is projected to be significant for Hampton Roads. Factoring it into planning and design decisions will reduce risk and damage from flooding and storm surge. Significant advances in climate modeling and analysis of observed trends support development of new sea level rise projections at the local level that are improvements above previously recommended projections. A regional consensus on values and approaches for sea level rise planning can, therefore, provide support for local efforts, assist with regional coordination, and encourage state and federal agencies to adopt similar standards.

The document also recommends selecting appropriate sea level rise curves and designs based on the risk tolerance and costs associated with individual projects. HRPDC staff is working to develop more specific implementation recommendations for categories of projects and policies.

TROPICAL/COASTAL STORM

BACKGROUND



Hurricane Isabel approaches North Carolina and Virginia in September of 2003. Photo source: NASA

Hurricanes and tropical storms are characterized by closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere and with a diameter averaging 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a mechanism to transport built-up heat from the tropics toward the poles. In this way, they are critical to the earth's atmospheric heat and moisture balance. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are particularly vulnerable to storm surge, wind-driven waves, and tidal flooding which can prove more destructive than cyclone wind[2].

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is September 10th. The Atlantic Ocean averages about 10 storms annually, of which six reach hurricane status (NASA Earth Observatory online at: http://earthobservatory.nasa.gov).

As a hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour (mph), the system is designated a tropical storm, given a name, and is monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 mph the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Hurricane Wind Scale which rates hurricane intensity on a scale of one to five, with five being the most intense. The wind scale, recently revised to remove storm surge ranges, flooding impact and central pressure statements, is shown in **Table 4.6**.

[2] For purposes of this risk assessment, coastal flood hazards associated with hurricanes and tropical storm events are included under the "flood" hazard.

TABLE 4.6: SAFFIR-SIMPSON HURRICANE WIND SCALE		
CATEGORY	MAXIMUM SUSTAINED WIND SPEED (mph)	DAMAGE SUMMARY
1	74–95	Very dangerous winds will produce some damage.
2	96–110	Extremely dangerous winds will cause extensive damage.
3	111–129	Devastating damage will occur
4	130–156	Catastrophic damage will occur.
5	157 +	Catastrophic damage will occur.

Source: National Hurricane Center

Categories 3, 4, and 5 are classified as "major" hurricanes, and while hurricanes within this range comprise only 20% of total tropical cyclones making landfall, they account for over 70 percent of the damage in the United States. **Table 4.7** describes the damage that could be expected for each hurricane category.

TABLE 4.7: HURRICANE DAMAGE CLASSIFICATIONS		
STORM CATEGORY	DAMAGE LEVEL	DESCRIPTION OF DAMAGES
1	MINIMAL	Well-constructed frame homes could have damage to roofs, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	MODERATE	Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	EXTENSIVE	Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	EXTREME	Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	CATASTROPHIC	A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center web site, 2015

Storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to twenty feet. The storm surge arrives ahead of the storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Water rise can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas. A storm surge is a wave that has outrun its generating source and become a long period swell. The surge is always highest in the right-front quadrant of the direction in which the hurricane is moving. As the storm approaches shore, the greatest storm surge will be to the north of the hurricane eye. Such a surge of high water topped by waves driven by hurricane force winds can be devastating to coastal regions, causing severe beach erosion and property damage.

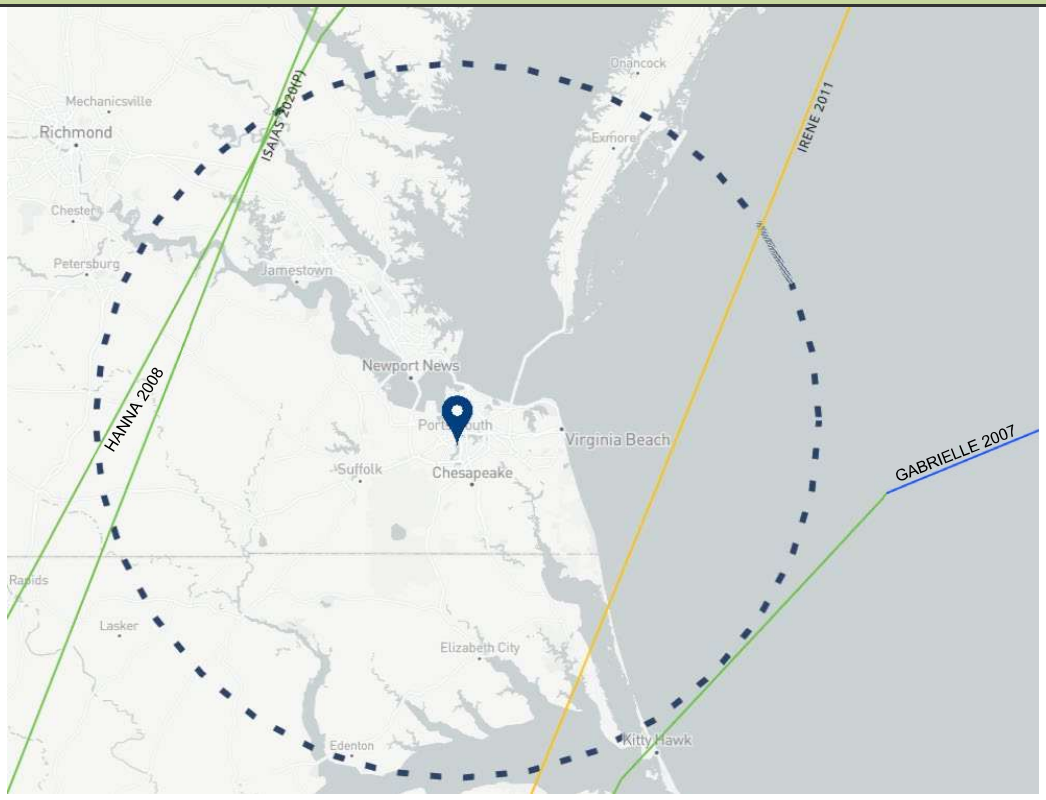
Storm surge heights and associated waves are dependent upon the shape of the continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Damage during hurricanes may also result from spawned tornadoes and inland flooding associated with heavy rainfall that usually accompanies these storms. For the purposes of this report, the storm surge impacts in the region are discussed under the Flooding hazard.

LOCATION AND SPATIAL EXTENT

Hampton Roads is in an area that can expect to experience hurricane damage in any given year. Since the mid-1800s, numerous tropical cyclones have affected Virginia, causing the deaths of over 225 people and costing the Commonwealth more than a billion dollars in damages.

A total of 76 significant storms have passed within 75 miles of Hampton Roads since 1851 (**Figures 4.15 and 4.16**). Two Category 3 hurricanes passed within 75 miles of the region (unnamed storms in 1879 and 1899), eight were Category 2 hurricanes, 16 were Category 1 hurricanes and 50 were tropical storms. Tropical and extratropical depressions are not mapped in these figures.

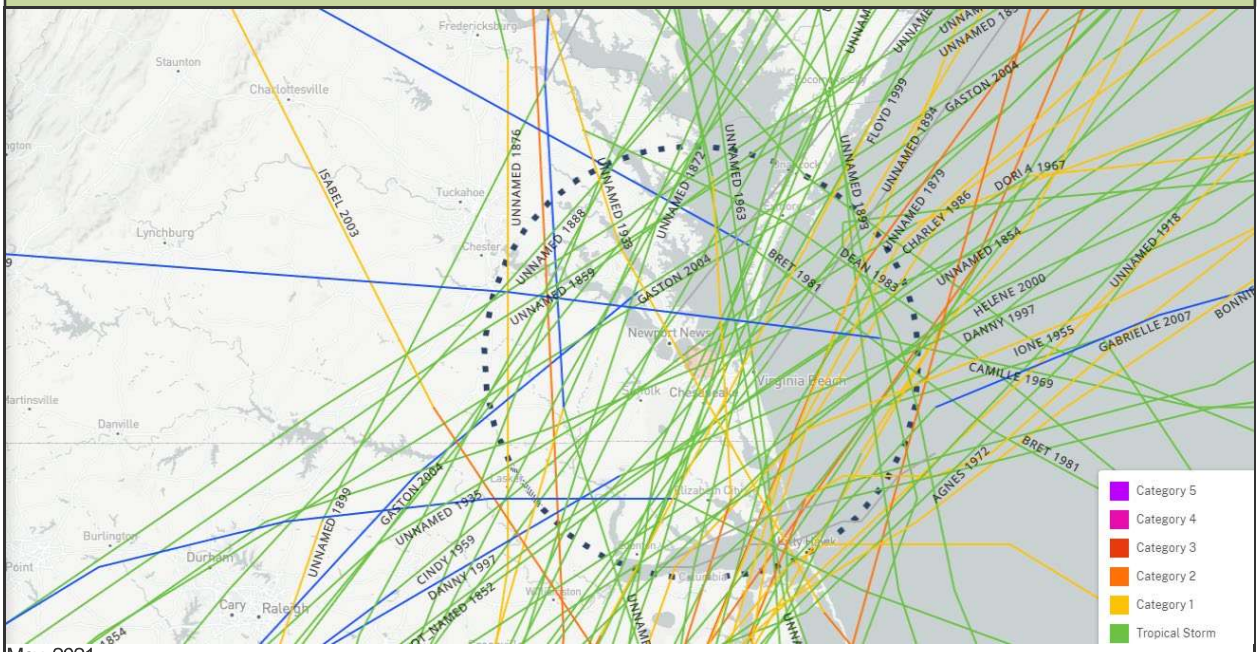
FIGURE 4.15: HISTORICAL STORM TRACKS WITHIN 75 MILES OF HAMPTON ROADS SINCE 2005



May, 2021

Source: NOAA Historical Hurricane Tracks, May 2021. Extratropical storms and Tropical Depressions at the time they passed within the radius are not included.

FIGURE 4.16: HISTORICAL STORM TRACKS WITHIN 75 MILES OF HAMPTON ROADS, 1851-2005



May, 2021

Source: NOAA Historical Hurricane Tracks, May, 2021

In Hampton Roads, the negative impacts of wind from the Category 1 and 2 hurricane events the area has experienced are consistent with the damage described in Table 4.7. Wind damage in the region from events in recent memory has been marked by a large number of downed trees, damage to roofs, siding and signs, power outages of typically less than a week as a result of downed power lines and trees across lines, and wind-blown debris damage and accumulation. Downed trees can temporarily block roadways, impeding transportation; however, these blockages are typically repaired swiftly by Virginia Department of Transportation (VDOT) and local roadway maintenance crews. Business interruptions resulting from power outages are commonplace and many restaurants and cold storage facilities can be negatively impacted, especially by prolonged outages. Commodities such as ice and gas are in high demand to power both home and business generators. Since wind and flood events typically occur simultaneously, the combined impacts are more devastating in flood-prone areas. Roof damage from wind can subsequently result in rain damage to structures, as well. Combined storm surge and wind impacts to shorefront areas at Virginia Beach, Norfolk, and Hampton may make some homes and businesses uninhabitable for days to weeks at a time.

SIGNIFICANT HISTORICAL EVENTS

The NWS began keeping weather records on January 1, 1871. Prior to that, information on past hurricanes and tropical storms to impact the Hampton Roads region were taken from ships logs, accounts from local citizens, newspapers, and other sources. There are several historical references to major storms that affected coastal Virginia in the 1600's and 1700's. Some of these storms were strong enough to alter land masses, including the widening of the Lynnhaven River (September 6, 1667) and formation of Willoughby Spit (October 19, 1749). These reports also indicate severe flooding caused by these storms (12-15 feet of flooding in some cases).

Better records have been kept since 1871. One of the first storms to be well documented was a hurricane in **October 1878** that resulted in Cobb and Smith Islands on the Eastern Shore being completely submerged.

One of the worst storms to impact the region occurred in August 1933 when a hurricane known as the **Chesapeake-Potomac Hurricane of 1933** passed just west of the Hampton Roads area. The storm made landfall in northeastern North Carolina and moved northwest. This hurricane produced the record high tide for the area which exists today, at a level of 9.69 feet above MLLW. The highest sustained wind was 88 mph at the Naval Air Station (NAS). Less than a month later, another hurricane struck the area with winds again clocked at 88 mph at NAS, but tides only rose to 8.3 feet above MLLW.

Another unnamed storm occurred in **September of 1944** creating the fastest one-minute wind speed to ever be recorded in the area of 134 mph at Cape Henry. Gusts were estimated to be 150 mph. The local NWS office recorded 72 mph winds with gusts to 90 mph.

Although the center of circulation for **Hurricane Hazel** in 1954 did not pass within 75 miles of the region, wind speeds of 78 mph were recorded at Norfolk Airport with gusts up to 100 mph and an unofficial reading of 130 mph was also reported in Hampton.

In 1960, **Hurricane Donna** passed through the region with a fastest one-minute wind speed of 73 mph at Norfolk Airport, 80 mph at Cape Henry and estimated 138 mph at Chesapeake Light Ship. Lowest pressure of 28.65 inches holds the area record for a tropical storm. Three deaths were documented in association with this hurricane.

On August 27, 1998, **Hurricane Bonnie** tracked over the region after passing over the northern Outer Banks. Winds speeds were sustained at 46 mph with gusts to 64 mph at Norfolk International Airport. Four to seven inches of rain combined with near hurricane force winds knocked out power to 320,000 customers across Virginia. Highest tide was recorded at 6.0 feet above MLLW. This was the most significant storm to impact the region since Hurricane Donna in 1960.

On September 6, 1999, downgraded **Hurricane Floyd** passed directly over Virginia Beach on a track similar to Hurricane Donna in 1960. Wind speeds were recorded at 31 mph with gusts to 46 mph. Rainfall amounts of 12-18 inches were recorded in portions of eastern Virginia, causing extensive flooding in the Southside Hampton Roads region.

In the 1990s, several storms had a less direct path over Hampton Roads, but nonetheless impacted the weather severely. In 1996, **Hurricanes Bertha and Fran** impacted the region, followed by **Hurricane Danny** in 1997, **Hurricane Bonnie** in 1998, and **Hurricanes Dennis, Floyd, and Irene** in 1999. Although each of these storms was downgraded by the time they reached Hampton Roads, they each created problems for the region when they passed through, and two resulted in Federal Disaster declarations (Bonnie and Floyd) for the region. **Tropical storms Helene** in 2000 and **Kyle** occurred in 2002, and of course, **Hurricane Isabel** caused $1.6 billion damage in the region in 2003, and claimed 33 lives (*The Virginian Pilot,* 9/4/06). During Isabel, wind speeds of 54 mph with gusts to 75 mph in Norfolk and significant beach erosion were reported.

Of the five storms that have passed through the region since the original Hazard Mitigation Plans were developed (Alberta, Ernesto, Barry, Gabrielle, Hanna and Irene), Hanna initially appeared to forecasters to have the worst characteristics. **Tropical Storm Hanna** tracked up the Mid-Atlantic coast on September 6, 2008, with maximum sustained winds around 50 mph. Hanna originally made landfall near the border of North and South Carolina around 3:20 am on the 6th. The storm tracked across eastern North Carolina during the early afternoon hours before turning northeast across southeastern Virginia later in the afternoon. Hanna eventually tracked across the Chesapeake Bay and into Delaware during the evening hours. With the track of Hanna being to the east, the strongest winds were also confined to the east of Hampton Roads. The highest sustained wind of 55 mph with a peak gust of 68 mph was recorded at the 3rd Island Bay Bridge Tunnel. Minimum pressure of 991 MB was recorded at the 3rd Island Bay Bridge Tunnel. Coastal storm tides of two feet or less above astronomical tide levels were common, with only minor beach erosion reported. Near the coast, as well as inland, tropical storm winds knocked down numerous trees and power lines, as well as caused minor structural damage. No fatalities or injuries were attributed to the winds.

Contrary to expectations and forecasts, however, **Ernesto** in early September 2006 proved very damaging because of coastal flooding. State officials blamed Ernesto for six deaths across Virginia and an estimated $33 million in statewide damage (*The Virginian Pilot,* 9/4/06). Additional discussion of the regional flood-related impacts from Ernesto is shown in Table 4.2.

Hurricane Irene, in late August 2011, first struck the U.S. as a Category 1 hurricane in eastern North Carolina, then moved northward along the Mid-Atlantic Coast. Wind damage in coastal North Carolina, Virginia, and Maryland was moderate, with considerable damage resulting from falling trees and power lines. Irene made its final landfall as a tropical storm in the New York City area and dropped torrential rainfall in the Northeast that caused widespread flooding. Irene was the first hurricane to hit the U.S. since Ike in September 2008. Irene's landfall in eastern North Carolina and path northward were accurately predicted more than four days in advance by NOAA's National Hurricane Center, which used information from weather satellites, hurricane models, aircraft observations, and other data.



Flooding at the "Triple Decker Bridge" resulting from Hurricane Sandy.

Photo credit: City of Chesapeake

Hurricane Sandy, in October 2012, was again expected to bring extreme hurricane conditions to southeastern Virginia. Fortunately, the storm track veered away from the Virginia coast and spared the region much of the devastation wrought in the northeast. Some areas of Virginia were included in the Presidentially-Declared Disaster for the storm, but Hampton Roads saw little more than flooding in low-lying areas and limited wind damage, and therefore was not among declared communities.

After landfall along the northwestern coast of Florida on June 7, 2013, **Tropical Storm Andrea** moved northeastward with additional acceleration across northeastern Florida and southeastern Georgia, with the center passing over Savannah, Georgia. During this time, the storm maintained an intensity of 40 knots, with the strongest winds occurring mainly over water to the east and southeast of the center. As the cyclone moved into South Carolina, it started to merge with a baroclinic zone, which caused Andrea to become extratropical over northeastern South Carolina. The center of the post-tropical cyclone moved rapidly across eastern North Carolina and southeastern Virginia, over the Atlantic near the New Jersey coast, and across eastern Long Island to eastern Massachusetts. One traffic incident related to the storm appears to have caused one death in Virginia, but the location of the accident was not reported in the National Hurricane Center Tropical Cyclone Report on the storm.

August 4, 2020 – The center of **Tropical Storm Isaias** tracked north just inland of the Middle Atlantic Coast from late Monday night, August 3rd through Tuesday morning, August 4th. The tropical storm produced tropical storm force winds and associated wind damage across portions of eastern Virginia. Tropical storm winds downed and uprooted several trees and power lines, produced significant structural damage, and caused power outages across the county. Wind gust of 67 mph was measured at NTU. Wind gust of 59 mph was measured at Virginia Beach. Property damage of $2.8 million was reported.

Table 4.8 shows the historical storm tracks within 75 miles of Hampton Roads since 1851 that are the basis for **Figures 4.15 and 4.16**. While Tropical Storm Arthur in 2014 does not appear to have tracked within the search radius used for **Table 4.9** and **Figure 4.16**, the storm nonetheless produced tropical storm force winds and locally heavy rainfall across portions of southeast Virginia from late Thursday night, July 3rd into midday Friday, July 4th. Rain bands associated with Arthur produced generally one to two inches of rainfall across portions of the Virginia Beach. Back Bay reported 1.30 inches of rain. A wind gust of 47 knots was measured at Oceana NAS, and a wind gust of 43 knots was measured at Lynnhaven. The gusts caused

minor structural damage which was reported to total $5,000. Norfolk International Airport reported 1.46 inches of rain. A wind gust of 38 knots was measured at Norfolk NAS.

Three additional tropical storms caused damage in the study area over the past five years that deserve mention, despite the fact that their storm tracks did not fall within the parameters outlined for Figure 4.16 or Table 4.8:

September 2, 2016 - **Tropical Storm Hermine** moving northeast along the Southeast Coast then off the Mid Atlantic Coast produced tropical storm force winds, minor to moderate coastal flooding, and locally heavy rainfall across portions of Hampton Roads, the Middle Peninsula, and the Virginia Eastern Shore from Friday afternoon, September 2nd into Saturday night, September 3rd. Rain bands produced generally 2 to 4 inches of rainfall across the county. Norfolk reported 4.15 inches of rain. Norfolk South reported 3.77 inches of rain. Norfolk International Airport reported 2.68 inches of rain. The highest sustained wind of 39 knots with a peak wind gust of 48 knots was measured at Norfolk International Airport. Wind gust of 45 knots was measured at NAS Norfolk. Tropical storm wind gusts caused minor tree and structural damage. Coastal storm tides of 2 to 3.5 feet above astronomical tide levels were common, with only minor beach erosion reported. The maximum storm tide reached 6.16 feet MLLW at Sewells Point, which resulted in moderate coastal flooding Saturday morning into Saturday afternoon. Damages tallied $35,000 across the region.

September 5, 2019 - **Hurricane Dorian** tracking northeast along the North Carolina coast and just off the Virginia coast produced tropical storm winds and associated wind damage across portions of southeast Virginia. Tropical storm winds downed and uprooted several trees and power lines, produced minor structural damage, and caused power outages across the county. Wind gust of 55 mph was measured at Naval Auxiliary Landing Field Fentress in Chesapeake. Power poles were broken in some areas, and shingles were blown off the roof of a house. Damages of $340,000 were reported.

Damages attributed to Post Tropical Cyclone Michael in October of 2016 were attributed primarily to Flooding as described in the section above.

TABLE 4.8: HISTORICAL STORM TRACKS WITHIN 75 MILES OF HAMPTON ROADS (SINCE 1851)

DATE OF OCCURRENCE	STORM NAME	WIND SPEED (mph)	STORM CATEGORY AT LANDFALL
8/25/1851	UNNAMED	45	TROPICAL STORM
9/10/1854	UNNAMED	45	TROPICAL STORM
8/20/1856	UNNAMED	60	TROPICAL STORM
9/17/1859	UNNAMED	60	TROPICAL STORM
9/27/1861	UNNAMED	70	TROPICAL STORM
11/2/1861	UNNAMED	80	CATEGORY 1 HURRICANE
9/18/1863	UNNAMED	70	TROPICAL STORM
10/26/1872	UNNAMED	45	TROPICAL STORM
9/29/1874	UNNAMED	70	TROPICAL STORM
9/17/1876	UNNAMED	90	CATEGORY 1 HURRICANE
10/23/1878	UNNAMED	105	CATEGORY 2 HURRICANE
8/18/1879	UNNAMED	115	CATEGORY 3 HURRICANE
9/9/1880	UNNAMED	80	CATEGORY 1 HURRICANE
9/10/1881	UNNAMED	70	TROPICAL STORM
9/11/1882	UNNAMED	45	TROPICAL STORM
9/23/1882	UNNAMED	45	TROPICAL STORM
9/12/1883	UNNAMED	45	TROPICAL STORM
8/26/1885	UNNAMED	80	CATEGORY 1 HURRICANE
7/2/1886	UNNAMED	40	TROPICAL STORM
9/11/1888	UNNAMED	40	TROPICAL STORM
10/12/1888	UNNAMED	60	TROPICAL STORM
9/25/1889	UNNAMED	45	TROPICAL STORM
6/17/1893	UNNAMED	65	TROPICAL STORM
10/23/1893	UNNAMED	50	TROPICAL STORM

TABLE 4.8: HISTORICAL STORM TRACKS WITHIN 75 MILES OF HAMPTON ROADS (SINCE 1851)

DATE OF OCCURRENCE	STORM NAME	WIND SPEED (mph)	STORM CATEGORY AT LANDFALL
9/29/1894	UNNAMED	85	CATEGORY 1 HURRICANE
10/10/1894	UNNAMED	75	CATEGORY 1 HURRICANE
9/23/1897	UNNAMED	70	TROPICAL STORM
10/26/1897	UNNAMED	60	TROPICAL STORM
8/18/1899	UNNAMED	120	CATEGORY 3 HURRICANE
10/31/1899	UNNAMED	65	TROPICAL STORM
7/11/1901	UNNAMED	80	CATEGORY 1 HURRICANE
6/16/1902	UNNAMED	40	TROPICAL STORM
9/15/1904	UNNAMED	65	TROPICAL STORM
9/1/1908	UNNAMED	50	TROPICAL STORM
8/25/1918	UNNAMED	40	TROPICAL STORM
12/3/1925	UNNAMED	45	TROPICAL STORM
9/19/1928	UNNAMED	45	TROPICAL STORM
8/23/1933	UNNAMED	80	CATEGORY 1 HURRICANE
9/16/1933	UNNAMED	90	CATEGORY 1 HURRICANE
9/6/1935	UNNAMED	75	CATEGORY 1 HURRICANE
9/18/1936	UNNAMED	100	CATEGORY 2 HURRICANE
8/2/1944	UNNAMED	50	TROPICAL STORM
9/14/1944	UNNAMED	105	CATEGORY 2 HURRICANE
10/20/1944	UNNAMED	40	TROPICAL STORM
6/26/1945	UNNAMED	50	TROPICAL STORM
7/7/1946	UNNAMED	65	TROPICAL STORM
8/14/1953	BARBARA	105	CATEGORY 2 HURRICANE
8/31/1954	CAROL	100	CATEGORY 2 HURRICANE
8/12/1955	CONNIE	80	CATEGORY 1 HURRICANE
9/20/1955	IONE	70	TROPICAL STORM
7/10/1959	CINDY	40	TROPICAL STORM
7/30/1960	BRENDA	50	TROPICAL STORM
9/12/1960	DONNA	105	CATEGORY 2 HURRICANE
9/14/1961	UNNAMED	40	TROPICAL STORM
9/1/1964	CLEO	45	TROPICAL STORM
9/17/1967	DORIA	40	TROPICAL STORM
8/28/1971	DORIA	65	TROPICAL STORM
6/22/1972	AGNES	50	TROPICAL STORM
7/1/1981	BRET	60	TROPICAL STORM
9/30/1983	DEAN	65	TROPICAL STORM
9/14/1984	DIANA	60	TROPICAL STORM
9/27/1985	GLORIA	105	CATEGORY 2 HURRICANE
8/18/1986	CHARLEY	80	CATEGORY 1 HURRICANE
9/25/1992	DANIELLE	65	TROPICAL STORM
7/13/1996	BERTHA	75	CATEGORY 1 HURRICANE
7/24/1997	DANNY	45	TROPICAL STORM
8/28/1998	BONNIE	85	CATEGORY 1 HURRICANE
9/16/1999	FLOYD	80	CATEGORY 1 HURRICANE
9/24/2000	HELENE	45	TROPICAL STORM
10/12/2002	KYLE	45	TROPICAL STORM
9/18/2003	ISABEL	100	CATEGORY 2 HURRICANE
8/14/2004	CHARLEY	40	TROPICAL STORM
9/10/2007	GABRIELLE	40	TROPICAL STORM
9/06/2008	HANNA	70	TROPICAL STORM
8/28/2011	IRENE	75	CATEGORY 1 HURRICANE
8/4/2020	ISAIAS	69	TROPICAL STORM

Source: NOAA Historical Hurricane Tracks, May 2021

PROBABILITY OF FUTURE OCCURRENCES

It is likely that the region will be impacted by hurricanes and tropical storms in the future. Direct impacts from hurricanes category 3 and 4 intensity are rare in Hampton Roads due to 1) historical tracks remaining offshore or impacting land before reaching Hampton Roads; and 2) cooler Atlantic Ocean water temperatures north of Cape Hatteras, which diminish a storm's ability to maintain intensity, or intensify. A Category 5 hurricane is considered implausible in Hampton Roads due to the cooler water temperatures mentioned above. The effects of smaller hurricanes (Categories 1 and 2 with wind speeds from 74-110 mph) and tropical storms (sustained wind speeds of at least 39 mph and torrential rains) will be frequent, as storms making landfall along the North Carolina and Virginia coastlines could impact the region in any given year.

LANDSLIDE/COASTAL EROSION

BACKGROUND

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year. Major storms such as hurricanes and tropical storms may cause more sudden, rapid erosion by combining heavy rainfall, high winds, heavy surf and storm surge to significantly impact riverbanks and the shoreline.

As it relates to natural hazards that threaten property damage, there are two types of erosion: riverine erosion and coastal erosion. The primary concern of both riverine and coastal erosion is the gradual removal of rock, vegetation and other sediment materials from riverbanks, stream beds and shorelines that result in soil instability and possible damages to property and infrastructure.

The average annual erosion rate on the Atlantic coast is roughly 2 to 3 feet per year; however, erosion rates vary greatly from location to location and year to year. A study by The Heinz Center (2000), *Evaluation of Erosion Hazards*, states that over the next 60 years, erosion may claim one out of four houses within 500 feet of the U.S. shoreline. It also states that nationwide, erosion may be responsible for approximately $500 million in property loss to coastal property owners per year, including both damage to structures and loss of land. To the homeowners living within areas subject to coastal erosion, the risk posed by erosion is comparable to the risk from flooding and other natural hazard events.

In Hampton Roads, shoreline, or coastal, erosion poses the most significant threat, and is a long-term hazard that undermines waterfront homes, businesses, public facilities and infrastructure along shorelines, even rendering structures uninhabitable or unusable. Shoreline erosion is driven by a number of natural influences such as sea level rise and land subsidence, large storms such as tropical storms, nor'easters and hurricanes, storm surge, flooding and powerful ocean waves. While coastal flooding in the region is typically a short term event, shoreline erosion in Hampton Roads may best be described as a relatively slow natural process occurring over the long term, with occasional major impacts wrought by coastal storm and flooding hazards. Manmade influences such as coastal development and some shoreline stabilization projects can exacerbate shoreline erosion, even when initially intended to minimize immediate erosive effects. Many older shoreline stabilization features in Hampton Roads are vulnerable to the effects of shoreline erosion and their failure can cause subsequent catastrophic failure of parking lots, port facilities, marinas, parks, garages, roads and other waterfront features. The features are not typically critical to the life, health and safety of residents, but nonetheless are costly and time-consuming to repair for both public and private entities. While not as sudden as other hazard events discussed in this plan, shoreline erosion influences the stability and condition of coastal property and beaches when other short-term hazard events occur. For example, erosive forces may undermine tree roots and revetments along a shoreline, exacerbating the effects of flooding and sea level rise.

In Hampton Roads' more vulnerable Atlantic Ocean and Chesapeake Bay shorelines, the same large waves that are capable of causing severe shoreline erosion often attract onlookers, tourists and surfers drawn to the waves' magnitude and power. Locally, fatalities then result when these people are unexpectedly caught up in the surf and strong offshore currents, or rip currents, hindering their return to shore.

A landslide is the downslope transport of a mass of soil and rock material and refers to a number of different varieties of ground movement landforms and processes. The primary driving force for a landslide is gravity, but other factors may contribute to the failure of a slope. Landslides are usually triggered by heavy rainfall, rapid snow melt, oversteepening of slopes by stream incision, or earthquakes, while certain man-made changes to the land, such as slope modification or drainage alteration, can greatly increase the likelihood of landslides. Sometimes a landslide may move slowly down a slope, but often the movement can occur

without warning and be extremely fast. Soil creep and slumping cause property damage gradually, whereas rockslides and debris flows can sweep away people and property instantaneously. In the United States, landslides annually cause up to $2 billion in damages and take between twenty-five and fifty lives.[3]

Landslides occur in many manifestations and are usually classified according to the type of material involved and the mode of downslope movement. The material can range from loose earth to blocks of solid rock. These materials may then move downslope by falling, sliding or flowing. The following are some of the more important types of mass movement:

Rockfalls entail large blocks of bedrock breaking off a cliff face and tumbling downslope;

Rockslides occur when a detached section of bedrock slides down an inclined surface, frequently along a bedding plane;

Earthslides involve masses of soil moving down a slip face, usually on top of the bedrock;

Creep is the slow, continuous, imperceptible downslope movement of soil and rock particles;

Rotational slides or slumps result from the rotation of a cohesive unit of soil or rock down a slip surface, leaving a curved scarp; and

Debris flows develop on steep slopes as a result of heavy rainfall that saturates the soil, which under the extra weight and lubrication breaks loose and becomes a slurry that takes everything with it, including large trees and houses. Channeled debris flows can reach speeds approaching a hundred miles an hour and strike without warning.

Landslides are most common in the mountainous terrain of Virginia because of the presence of steep slopes and highly fractured bedrock over shallow soils. The lower-relief areas of the Piedmont and Coastal Plain also have landslides, but they are often smaller and generated by human disturbance, such as making an oversteepened road cut. The most disastrous landslide events have been associated with heavy rainfall along the steep slopes of the Blue Ridge Mountains and the Appalachians. Areas that are prone to mass movement include areas where landslides have occurred in the past; steep slopes with an angle greater than 30 degrees; and oversteepened cuts and fills, particularly due to home and road building. Research in North Carolina has revealed that about fifty-six percent of recent landslides happened on slopes that had been altered in some way by development.

Landslides are capable of destroying buildings, rupturing utility and other lifelines, while blocking transportation routes. Urban development can increase the damages caused by a landslide. Damages sustained by roads and highways during a landslide can result in long-term loss of use of certain transportation routes and contribute to increased traffic and emergency response times in the affected region. The soil movement that occurs during a landslide can destabilize structural supports for pipelines potentially resulting in pipeline ruptures and decreased or loss of service in a region.

The severity of a landslide is dependent on many factors including the slope and width of the area involved, the speed of the earth movement, and any structures or infrastructure directly in the path of the slide. Impacts of a landslide can range from a minor inconvenience to a life-threatening situation when automobiles and buildings are involved.

LOCATION AND SPATIAL EXTENT

Shoreline erosion is a significant concern in the Hampton Roads region. According to VIMS, the Atlantic and Chesapeake Bay coasts in the region are very dynamic in terms of shoreline change and sediment transport processes. VIMS and other agencies occasionally perform studies to determine long-term shoreline change patterns for various locations across the region. However, these studies are largely

[3]Virginia Department of Energy, 2021

intended to track shoreline and dune evolution through natural and manmade alterations, and are not designed to determine erosion rates or areas of coastal erosion. While FEMA does not map erosion hazard areas, FIRMs produced by the agency do indicate the highest risk areas for coastal flooding with significant wave action (termed V zones, velocity zones, or coastal high hazard areas)[4]. For purposes of this plan, areas identified as coastal high hazard zones on the FIRM are also assumed to be at risk of shoreline, or coastal, erosion.

Another factor in accurately determining specific shoreline erosion hazard areas is the continuous implementation of shoreline reinforcement or nourishment projects completed by federal, state and local government agencies. Typically, areas of high concern with regard to long term erosion are addressed through shoreline hardening or stabilization projects, such as seawalls, breakwaters and beach sand replenishment. For example, in 2002, the Virginia Beach Erosion Control and Hurricane Protection Project protected more than six miles from the imminent hazards of shoreline erosion through sand replenishment. Many other projects have been completed in the region and still others are pending approval and/or funding[5].



This photo, taken while the Virginia Beach Erosion Control and Hurricane Protection Project was underway, shows the significant difference between the unimproved area and the area of the widened beach berm already completed.

Source: City of Virginia Beach

HISTORICAL OCCURENCES

Shoreline erosion events typically occur in conjunction with hurricanes, tropical storms and nor'easters, so the list of "Ocean and Lake Surf" events provided from the NCEI database is not considered comprehensive (**Table 4.9**). Some of the damages listed duplicate damages shown for coastal flooding events and/or may apply to areas outside of the study area for this plan; however, the descriptive details indicate the nature of shoreline erosion damage (and fatalities) associated with this select group of events in Hampton Roads.

[4] For more information on FEMA V-zones, refer to the Flood hazard discussion within this section.
[5] In order to counter effects of coastal erosion, Virginia Beach's shoreline has been renourished annually since 1951.

TABLE 4.9: OCEAN AND LAKE SURF EVENTS (1993 - 2020)					
LOCATION	DATE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
Virginia Beach	8/31/1993	Heavy Surf	1/0	$0	A 15-year-old boy drowned, presumably caught in a strong undertow, as Hurricane Emily was approaching the North Carolina coast.
Isle of Wight, Norfolk, Suffolk, Virginia Beach, Portsmouth	11/17/1994	Coastal Flooding	0/0	$655,000	Strong easterly flow between Hurricane Gordon, a category 1 storm meandering 150 miles south of Cape Hatteras, and a strong anticyclone over New England, caused significant coastal flooding and damage in Sandbridge. The worst flooding occurred on the 18th, when tides were running 4 feet above normal. The heaviest damage occurred along 14th Street, where 100 feet of the fishing pier washed away. Several homes suffered minor damage, with two requiring extra work to remain in place. A 1000-foot stretch of road and several protective steel bulkheads were damaged. Seas, which were as high as 18 feet 60 miles east of the Virginia Capes, and 7 feet near the mouth of the Chesapeake Bay, forced the Naval Carrier George Washington to remain 2 miles offshore Thursday night through Friday morning. The above-normal tides caused other minor flooding in Tidewater. The Nansemond River overflowed its banks in Suffolk, causing minor flooding. High tides on the James and Pagan Rivers, caused several roads to be under water in eastern Isle of Wight County on the 17th.
Isle of Wight, Norfolk, Suffolk, Virginia Beach	12/23/1994	Coastal Flooding	0/0	$65,000	A double-structured storm system produced minor coastal flooding in the Tidewater region on the 23rd. The effects were much less than expected as the main storm moved well east of the mid-Atlantic before curling northwest into Long Island. The secondary low pressure area was significantly weaker, but still produced northeast winds of 35 to 45 mph around Tidewater. High tides of 1 to 3 feet above normal caused most of the flooding. In the Sandbridge section of Virginia Beach, a beachfront home collapsed into the sea. The combination of pounding surf and wind from flow around Hurricane Gordon in late November and this event finished off the home. In addition, a few more bulkheads were flattened. Several roads in the Tidewater area had minor flooding, including Rescue Road in Smithfield (Isle of Wight Co).
Virginia Beach	8/13/1995	Rip Current	1/0	$0	Vacationer from New York drowned after venturing too far into severe rip current conditions.

TABLE 4.9: OCEAN AND LAKE SURF EVENTS (1993 - 2020)					
LOCATION	DATE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
Norfolk, Virginia Beach, Newport News, York County, Poquoson	4/24/1997	Coastal Flooding	0/0	$0	Moderate coastal flooding occurred across portions of the Hampton Roads area during the time of high tide April 23rd and continued into April 24th. The areas most seriously affected included the Willoughby Spit, Ghent, and downtown sections of Norfolk, the Old-Town section of Portsmouth, and Sandbridge at Virginia Beach. Tides peaked at 5.8 feet above Mean Lower Low Water (MLLW) at Sewells Point in Norfolk. Based on reports received from downtown Norfolk and the Grandview section of Hampton, tides were somewhat higher in the estuaries (Lafayette River, the Hague, the Harris and Back Rivers) draining into the Elizabeth River and Hampton Roads.
Norfolk, Virginia Beach, Portsmouth	6/3/1997	Coastal Flooding	0/0	$0	Minor to moderate flooding occurred across portions of Hampton Roads during high tide the evening of June 3rd. In Virginia Beach, officials reported part of a new boardwalk washed away and several lifeguard stands lost. Crawford Parkway in downtown Portsmouth was reported flooded and in downtown Norfolk, several streets were reported under water.
Norfolk, Virginia Beach, Portsmouth, Newport News, Poquoson	10/19/1997	Coastal Flooding	0/0	$0	Minor to moderate flooding occurred across portions of Hampton Roads during high tide Sunday, October 19th. Some minor flooding was reported in low-lying areas of Norfolk, with water in a few homes and a few streets closed. Minor flooding was also reported in downtown Portsmouth and in the Sandbridge and Sandfiddler areas of Virginia Beach. Tides peaked between 5.2 and 5.8 feet above MLLW at Sewells Point in Norfolk. Minor coastal flooding was reported in portions of Newport News and York county.
Norfolk, Virginia Beach, York County, Poquoson, Newport News	1/27/1998	Coastal Flooding	0/0	$1,500,000	A Nor'easter battered eastern Virginia on January 27th and 28th. Slow movement of the storm combined with the highest astronomical tides of the month resulted in an extended period of gale to storm force onshore winds which drove tides to 6.44 feet above MLLW at Sewells Point. Tide levels resulted in moderate coastal flooding throughout Hampton Roads. One house collapsed into the Atlantic Ocean at Sandbridge. Another home sustained severe damage. The rainfall combined with the gale and storm force winds resulted in scattered tree limbs downed across much of eastern Virginia. In addition, there were widely scattered power outages.

TABLE 4.9: OCEAN AND LAKE SURF EVENTS (1993 - 2020)					
LOCATION	DATE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
Norfolk, Virginia Beach, York County, Poquoson, Newport News	2/4/1998	Coastal Flooding	0/0	$75,000,000	A Nor'easter battered eastern Virginia from February 3rd through the 5th. The slow movement of the storm resulted in an extended period of gale to storm force onshore winds which drove tides to 7.0 feet above MLLW at Sewells Point. Tide levels resulted in moderate to severe coastal flooding throughout Hampton Roads. Norfolk, Virginia Beach and Hampton reported some structural damage to buildings along the bay and coast, as well as significant beach erosion. Norfolk reported main roads and intersections under 3 feet of water or greater with many roads impassable. North facing areas in Willoughby and Ocean View suffered the greatest damage. In the Chick's Beach area of Virginia Beach, 4 condominiums were undermined by the tidal flooding, and residents of those buildings had to be evacuated. Twenty-nine house fires were also reported in Norfolk as a result of flood water shorting out furnaces. The rainfall combined with the gale and storm force winds resulted in some trees downed across much of eastern Virginia. In addition, there were widely scattered power outages.
Hampton	9/18/2003	Coastal Flooding, Heavy Surf			Hurricane Isabel caused historic flooding and severe erosion in the region. In Hampton, the coastal flooding, heavy surf and wave action breached the barrier beach at Factory Point.
Virginia Beach	1/29/2005	Heavy Surf	1/1	$0	A small boat with 2 men on board was heading out of Rudee Inlet. They made it through the first set of breakers then stopped the boat. A wave overtook them and flipped the boat. One man climbed onto and stayed with the overturned boat and was rescued. He was treated for mild hypothermia and later released. The other man died of hypothermia.
York County, Poquoson	9/1/2006	Coastal Flood	0/0	$1,900,000	Tides of 4 to 5 feet above normal combined with 6 to 8 foot waves caused significant damage to homes, piers, bulkheads, boats, and marinas across portions of the Virginia Peninsula and Middle Peninsula near the Chesapeake Bay and adjacent tributaries.
Norfolk, York County, Hampton	10/6/2006	Coastal Flood	0/0	$200,000	Strong onshore winds resulted in major coastal flooding during times of high tide. Tidal departures were 2.5 to 3.5 above normal during the event. A strong low pressure system off the North Carolina coast coupled with an upper level cutoff low to dump intense rainfall across portions of southeast Virginia. Rainfall amounts in excess of 10 inches resulted in numerous road closures and moderate to major river flooding from late Friday, October 6th through Saturday, October 7th. Up to 28,000 Dominion Virginia Power customers lost power during the event.

TABLE 4.9: OCEAN AND LAKE SURF EVENTS (1993 - 2020)

LOCATION	DATE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
Norfolk, Chesapeake York County, Hampton	11/22 and 11/23/2006	Coastal Flood	0/0	$145,000	Strong onshore winds caused moderate coastal flooding during times of high tide. Tidal departures were about 3 feet above normal during the event. An intense low pressure system off the North Carolina coast combined with an upper level cutoff low to provide very strong winds, heavy rains, and moderate coastal flooding across portions of eastern and southeast Virginia from late November 21st into afternoon November 23rd.
Virginia Beach	5/23/2009	Rip Current	1/0	$0	A man body boarding was caught up in a rip current and pulled offshore. Officials performed CPR, but it failed to revive the man and he died.
Isle of Wight, Chesapeake, Newport News, York County, Hampton	11/12/2009	Coastal Flood	0/0	$16,200,000	An intense Nor'easter produced moderate to severe coastal flooding across much of eastern and southeast Virginia and the Virginia Eastern Shore. The peak tide height at Money Point was 8.59 feet above MLLW, which was 6.17 feet above the astronomical tide. That tide height was 0.3 feet higher than the previous record storm tide measured at this location during Hurricane Isabel in September 2003.
Norfolk, Virginia Beach, York County, Chesapeake	12/19/2009	Coastal Flood	0/0	$30,000	A strong coastal low pressure area produced moderate to severe coastal flooding across much of eastern and southeast Virginia. The peak tide height at Money Point was 6.77 feet above MLLW. Several streets, homes and businesses were flooded in low lying areas close or directly exposed to the Chesapeake Bay. The peak tide height at Yorktown was 5.32 feet above MLLW. Several streets, homes and businesses were flooded in low lying areas of the county close or directly exposed to the Chesapeake Bay.
Virginia Beach	8/25/2011	Rip Current	1/0	-	A surfer who got caught in a rip current drowned in Virginia Beach.
Virginia Beach	6/16/2012	Rip Current	1/0	-	A man was caught up in a rip current and drowned in Virginia Beach.
Chesapeake, James City County, Newport News, York County, Norfolk, Isle of Wight, Virginia Beach, Suffolk, Hampton	10/28/2012	Coastal Flood	0/0	$2,060,000	Tropical Cyclone Sandy moving northward well off the Mid Atlantic Coast then northwest into extreme southern New Jersey produced very strong northeast winds followed by very strong west or northwest winds. The very strong winds caused moderate to severe coastal flooding across portions of eastern and southeast Virginia. Water levels reached 3.5 feet to around 4.5 feet above normal adjacent to the Chesapeake Bay resulting in moderate to severe coastal flooding. Flooding of streets due to the combination of rain and storm surge was widespread during the height of the storm. However, water levels were lower than Irene in 2011.

TABLE 4.9: OCEAN AND LAKE SURF EVENTS (1993 - 2020)

LOCATION	DATE	TYPE OF EVENT	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
Chesapeake, James City County, Newport News, York County, Norfolk, Isle of Wight, Virginia Beach, Suffolk, Hampton, Poquoson	10/2-3/2015	Coastal Flood	0/0	$1,000,000 (Norfolk)	Anomalously strong/nearly stationary high pressure over New England produced strong onshore winds over the Mid-Atlantic. The strength and duration of the onshore winds produced moderate coastal flooding along the Atlantic Coast and Chesapeake Bay. A tidal departure of 3 to 4 feet resulted in moderate flooding along the Chesapeake Bay.
Virginia Beach	7/9/2019	Rip Current	1/0	-	A 35 year old male drown after being caught in a rip current while trying to save a child at False Cape State Park.
Norfolk, Virginia Beach, York County, Surry County	9/6/2019	Coastal Flood	0/0	-	Very strong northeast to north winds associated with Hurricane Dorian produced tidal anomalies between 2.5 and 3.5 feet over the southern Chesapeake Bay. This caused moderate coastal flooding over portions of Hampton Roads.
York County, James City County, Surry County	10/11/2019	Coastal Flood	0/0	-	The combination of low pressure sitting off the New Jersey coast and strong high pressure over southeast Canada resulted in persistent north or northeast winds over the region. Persistent winds and high waves produced tidal anomalies between 2 and 3 feet above normal high water levels.
Virginia Beach, Norfolk	11/17/2019	Coastal Flood	0/0	-	The combination of high pressure over northern New England and low pressure just off the Middle Atlantic Coast resulted in very strong northeast to north winds over the southern Chesapeake Bay, which caused minor to moderate coastal flooding.
James City County	5/19/2020	Coastal Flood	0/0	-	Combination of strong high pressure over New England and low pressure over southeast U.S. produced a persistent northeast or east wind into James River, which caused minor to moderate coastal flooding at Jamestown tidal gauge and some locations in the county. Minor to moderate tidal flooding occurred along James River. Jamestown reached 4.72 feet MLLW.
Virginia Beach	8/4/2020	Coastal Flood	0/0	-	The center of Tropical Storm Isaias tracked north just inland of the Middle Atlantic Coast from August 3-4. Winds caused moderate (perhaps some locally major) tidal/coastal flooding across portions of SE Virginia, including portions of Virginia Beach adjacent to Back Bay.
Totals			**7/1**	**$98,755,000**	

Source: NCEI, 2021

Analysis of the landslide hazard history in the Hampton Roads study area is limited by the availability of data and reporting of incidents; however, scientists at the Virginia Department of Energy (Virginia Energy) maintain a statewide database of incidents reported to the department since 2004. That database does not contain any historical incidents in the Hampton Roads region, although one incident in New Kent County is on the border with James City County, along the Chickahominy River. The Claytor landslide, as it was termed, was reported by the homeowner who reported movement started during Hurricane Irene (2011). Headscarp is 5 feet from porch steps, two 10-foot sections of seawall at base of slope have been either toppled or covered by sediment from previous landslides. This is a series of concave erosional scarps along the riverbank. Additional reports of landslides along the James River in Surry County, especially after Hurricane Isabel (2003), have been made to county officials, but additional details were not available.

While details are preliminary, State geologists suggest that evidence shows in the Richmond-Crater and Virginia Peninsula regions, there is a higher incidence of landslide initiation near the contact between the Eastover and the Yorktown Formations, two pervasive geological units in the Virginia Coastal Plain. Slopes can be further destabilized due to excess runoff from development, including stormwater drains and gutters.

PROBABILITY OF FUTURE OCCURENCES

Shoreline erosion over the long-term and short term will likely continue to occur in the Hampton Roads region. Shoreline erosion will be more immediate and severe during hurricanes, tropical storms and nor'easters.

TORNADO

BACKGROUND

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the NWS, tornado wind speeds normally range from 40 to more than 200 mph. The most violent tornadoes (EF5) have rotating winds of 200 mph or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.



Each year, an average of over 1,200 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (NOAA, 2002 and 2014). They are more likely to occur during the spring and early summer months of March through June and can occur at any time of day, but are likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and tens of miles long.

Waterspouts are weak tornadoes that form over warm water and are most common along the Gulf Coast and southeastern states. Waterspouts occasionally move inland, becoming tornadoes that cause damage and injury. However, most waterspouts dissipate over the open water causing threats only to marine and boating interests. Typically, a waterspout is weak and short-lived, and because they are so common, most go unreported unless they cause damage.

The destruction caused by tornadoes ranges from light to devastating depending upon the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light or wood-framed construction such as residential homes (particularly mobile homes), and tend to remain localized in impact. The traditional Fujita Scale for tornadoes, introduced in 1971, was developed to measure tornado strength and associated damages. Starting in February of 2007, an “enhanced” Fujita (EF) Scale was implemented, with somewhat lower wind speeds at the higher F-numbers, and more thoroughly-refined structural damage indicator definitions. **Table 4.10** provides a summary of the EF Scale. Assigning an EF Scale rating to a tornado involves the following steps:

- Conduct an aerial and ground survey over the entire length of the damage path;
- Locate and identify damage indicators in the damage path;
- Consider the wind speeds of all damage indicators and assign an EF Scale category for the highest wind speed consistent with wind speeds from the other damage indicators;
- Record the basis for assigning an EF scale rating to a tornado event; and
- Record other pertinent data related to the tornado event.

TABLE 4.10: ENHANCED FUJITA (EF) SCALE FOR TORNADOES	
EF RATING	3 SECOND GUST (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	over 200

Source: NWS Storm Prediction Center

In Virginia, tornadoes primarily occur from April through September, although tornadoes have been observed in every month. Low-intensity tornadoes occur most frequently; tornadoes rated EF2 or higher are very rare in Virginia, although EF2, EF3, and a few EF4 storms have been observed. According to the *2018 Commonwealth of Virginia Hazard Mitigation Plan*, Virginia ranks 28th in terms of the number of tornado touchdowns reported between 1950 and 2006.

Tornadoes are high-impact, low-probability hazards. The net impact of a tornado depends on the storm intensity and the vulnerability of development in its path. Because the path of each tornado is unique to each event, general descriptions of impacts in Hampton Roads can be drawn from the impacts of previous storms (see also **Table 4.11** below). Communities rarely activate Emergency Operation Centers before tornadoes due to the short warning times, but after extreme events with catastrophic damage that displace a large number of residents, such activation may become necessary.

In Hampton Roads, a high intensity tornado, while unlikely, could be expected to impact almost everything within the storm's path: homes, especially those constructed prior to the use of building codes; infrastructure, especially above-ground power lines in the commercial zones and bridges throughout the region; cars and personal property; landscape elements such as trees, fences and shrubs; and even human lives. Downed trees can block roadways, impeding traffic and blocking access and egress if any of the region's thoroughfares are impacted. Manufactured homes are particularly vulnerable to damage in the event of tornadoes, as well, particularly if they were placed outside of flood zones and before building codes were in effect requiring foundation tie-downs.

Tornadoes associated with tropical cyclones are somewhat more predictable. These tornadoes occur frequently in September and October when the incidence of tropical storm systems is greatest. They usually form around the perimeter of the storm, and most often to the right and ahead of the storm path or the storm center as it comes ashore. These tornadoes commonly occur as part of large outbreaks and generally move in an easterly direction. Tracking and prior notification by the National Weather Service and local news media helps save lives locally.

Most tornado strikes in the region have been EF0 or EF1 and the effects were somewhat less than as described above for severe storms. Critical damage to structures in the tornado's path is common, with indiscriminate damage to public-and privately-owned structures, some infrastructure, and downed trees that make transportation difficult. In areas adjacent to the path, minor damage, especially to roofs and windows from trees and flying debris, can also be expected. While downed trees may block transportation routes and result in power outages for some customers, these impacts are typically cleared within a few days.

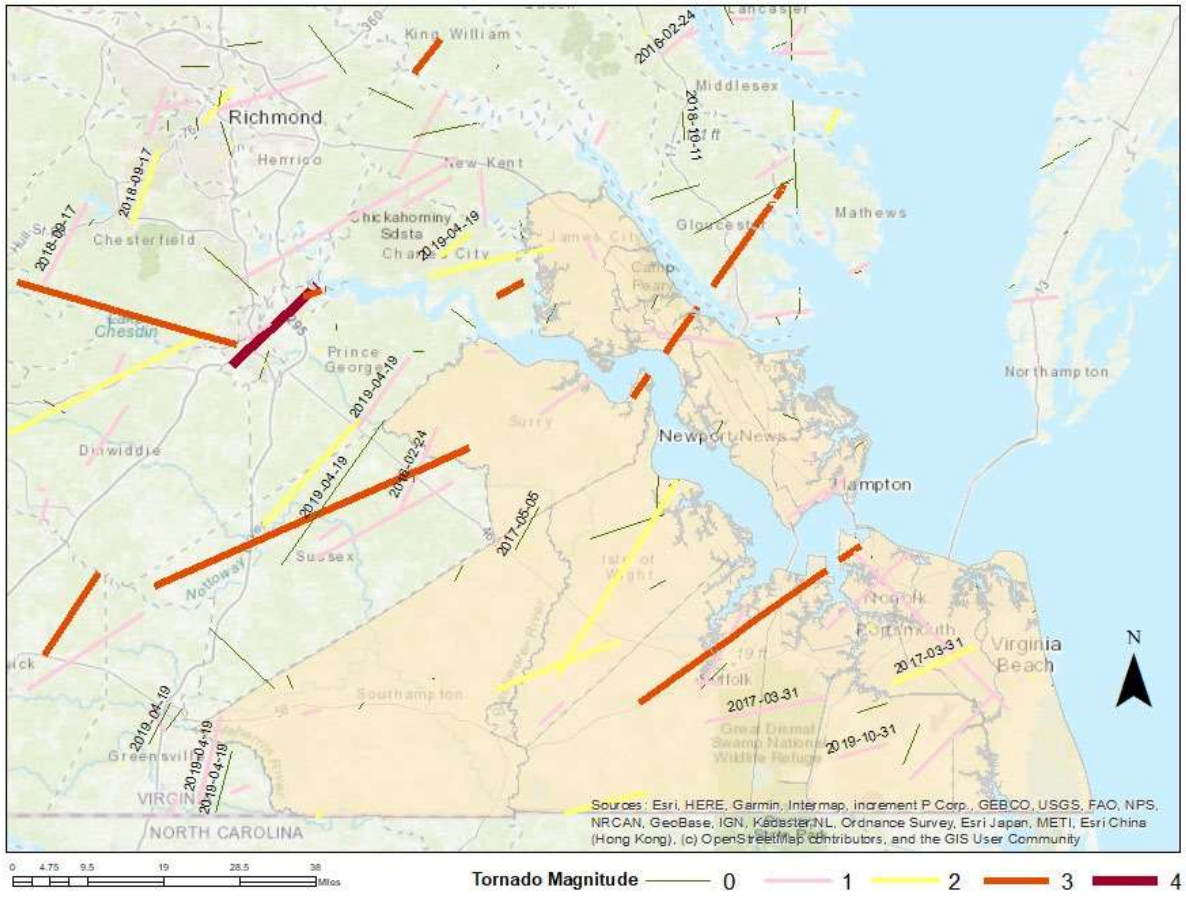
LOCATION AND SPATIAL EXTENT

Tornadoes typically impact a relatively small area; however, it is impossible to predict where in the planning area a tornado may strike. Vulnerability of individual structures is based largely on building construction materials and standards, availability of safe rooms and advanced warning system capabilities. In cases

involving intense tornadoes, the best defense against injury or death is a properly engineered safe room or tornado shelter, neither of which is standard practice in the region. Likewise, advanced warning system capabilities are limited to Reverse 911, Emergency Alert System warnings and NWS weather radio broadcasts.

Figure 4.17 illustrates the approximate location where confirmed tornadoes have touched down in and near the Hampton Roads region since 1950. The most recent tornadoes, between 2016 and 2019, are additionally notated with the date of their occurrence.

FIGURE 4.17: HISTORIC TORNADO TOUCHDOWNS AND TRACKS: 1950-2020



October, 2021

Source: NCEI, 2021

SIGNIFICANT HISTORICAL EVENTS

Hampton Roads has experienced 47 days with reported damaging tornadoes since 1995. The tornadoes occurring since 1995 had strengths up to EF3. Damage estimates for these tornadoes exceed $63.09 million. **Table 4.11** lists historical tornadoes that touched down in the study area (NCEI web site). Beginning with the Suffolk tornado in 2008, the magnitude rating switched to Enhanced Fujita Scale.

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021

LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
ISLE OF WIGHT	7/12/1996	F1	0	$25,000	Small tornado damaged 10-15 homes and several trees in Moorfield subdivision of Smithfield.
YORK	7/12/1996	F1	0	$15,000	Tornado cut a 2-mile-long path across part of Naval Weapons Station Yorktown. Numerous trees, homes and cars were damaged.
HAMPTON	9/4/1996	F0	0	$1,000	Weather personnel at Langley Air Force Base observed a small tornado about 1/2 mile north-northwest of their building. Minor damage to a few vehicles and tops of trees occurred.
CHESAPEAKE	7/24/1997	F1	0	$400,000	Tornado had a track of approximately 1 mile and was an estimated 50 yards in width.
NORFOLK	7/24/1997	F1	0	$400,000	Tornado path started in south Norfolk just south of Poindexter Street on Guerriere Street. The tornado then continued north-northeast into the Berkley Avenue Industrial Park before crossing into the southern portion of Norfolk and lifting after causing damage on Roseclair and Joyce Streets. One business, a car wash was destroyed, and six sustained major roof damage. One home was damaged in Chesapeake, with damage to a couple of additional structures in the Roseclair and Joyce Street areas of Norfolk.
NORFOLK	7/24/1997	F0	0	$100,000	Tornado first touched down west of Route 460 between Liberty Street and Indian River Road. The tornado tracked north-northeast across Indian River Road and across the eastern branch of the Elizabeth River before lifting east of Harbor Park and south of I-264. Minor damage to several structures, mostly residential.
CHESAPEAKE	4/9/1998	F0	0	$25,000	Tornado with speeds of 60-70mph in Chesapeake. Damage was seen just south of intersection of Dominion Boulevard and Great Bridge Boulevard. Several trees were downed/topped in the Riverwalk Subdivision. Damage to a couple of homes as a result of trees falling on them. Tornado moved east-northeast to just northwest of intersection of Volvo Parkway and Kempsville Road. Several trees were downed/topped in this area as well, with a couple of homes damaged by falling trees/limbs. Tornado appeared to remain just above ground, with all structural damage resulting from falling trees/limbs.
HAMPTON	9/4/1999	F2	0/6	$7,720,000	Tornado touchdown in the city of Hampton. Extensive structural damage in a 3 block area. Three apartment complexes and an assisted living facility condemned. Two

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					additional apartment complexes partially condemned. Many roofs were lifted off buildings and as many as 800 vehicles were reported damaged. This tornado formed in area ahead of tropical storm Dennis.
VIRGINIA BEACH	7/24/2000	F0	0	$20,000	A waterspout that formed over Back Bay came ashore at Campbell Landing Road and destroyed 20' x 30' foot outbuilding before dissipating. Many trees were blown down; camper shells and lawn furniture were tossed across neighborhood.
SUFFOLK	5/21/2001	F0	0	$25,000	Tornado occurred in 5000 block of Manning Road. Several small outbuildings destroyed including 30' wooden shed.
SUFFOLK	6/1/2001	F1	0	$15,000	Tornado touched down near Jackson Road. Tornado became a funnel cloud and then touched down again just south of Sleepy Hole Road and passed through Sleepy Hole Golf Club. Tornado continued north northeast through Chatham Woods with extensive damage along Burning Tree Lane.
NEWPORT NEWS	8/11/2001	F0	0	$50,000	Weak tornado damaged a couple of mobile homes and produced minor damage at townhouse complex near Fort Eustis.
SUFFOLK	2/22/2003	F0	0	$25,000	Several 50-60 foot trees were pushed over into houses. Numerous tree trunks were twisted and tops sheared off.
SOUTHAMPTON	5/9/2003	F0	0	$10,000	Damage to trees and outbuildings, and minor damage to home by a tornado in northwest Southampton County.
YORK	8/7/2003	F1	0	$20,000	Tornado damage occurred near Victory Boulevard and Running Man Trail, with about a dozen trees down. Damage to 4 houses from trees snapping off and falling on the homes.
VIRGINIA BEACH	8/8/2003	F0	0	$5,000	Tornado briefly touched down with minor damage reported at Salem Crossing Shopping Center.
NORFOLK	9/18/2003	F0	0	-	Brief tornado occurred in association with Isabel. No damage reported.
SOUTHAMPTON COUNTY	6/25/2004	F1	0	$2,000	F1 tornado downed numerous large trees in a swamp.
SUFFOLK	6/25/2004	F1	0	$2,000	F1 tornado downed numerous trees near intersection of Route 660 and Route 668.
SUFFOLK	6/25/2004	F0	0	$2,000	F0 tornado damage to trees on Cypress Chapel Road in Whaleyville.
CHESAPEAKE	8/14/2004	F0	0	$5,000	Tornado associated with Tropical Storm Charley damaged a fence and downed trees.
JAMES CITY COUNTY	8/30/2004	F0	0	$5,000	F0 tornado downed or damaged several trees.
JAMES CITY COUNTY	8/30/2004	F0	0	$5,000	F0 tornado downed or damaged several trees near Drummonds Field Subdivision and the James River.
POQUOSON	8/30/2004	F0	0	$5,000	F0 tornado downed trees on River Road and Wythe Creek Road.
HAMPTON	8/30/2004	F0	0	$5,000	F0 tornado damaged a shed and trees on Hall Road.
YORK COUNTY	8/30/2004	F0	0	$10,000	F0 tornado downed trees and damaged roofs at Pinewood Drive and Highway 134.

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
YORK COUNTY	8/30/2004	F0	0	$10,000	F0 tornado blew roof off of garage and damaged trees.
SOUTHAMPTON	7/2/2005	F0	0	-	F0 tornado touched down near Freemans Pond Road then crossed Route 460.
SOUTHAMPTON	7/8/2005	F1	0	$2,000	F1 tornado caused damage near Old Belfield Road.
VIRGINIA BEACH	7/14/2005	F0	0	$2,000	Brief tornado touchdown caused minor damage to golf practice facility and downed tree limbs near Dam Neck Road and Holland Road.
JAMES CITY	1/11/2006	F1	0/2	$20,000	F1 tornado caused intermittent damage at Jamestown Beach Campground and Foxfield subdivision. One trailer and pop-up camper were destroyed at campground and caused minor injuries to two occupants. Two townhomes suffered minor roof and siding damage in subdivision.
PORTSMOUTH	8/11/2006	F0	0	-	Waterspout near the mouth of the James River came on shore near Churchland High School. No damage or injuries were reported.
HAMPTON	8/11/2006	F0	0	-	Waterspout near mouth of the James River came on shore just south of Beach Road in Grandview section of Hampton.
SUFFOLK	4/28/2008	EF3	0/200	$30,000,000	A tornado touched down with damage first noted about 2 miles northeast of Lummis. The tornado crossed Route 58, downing trees as it moved northeast. The tornado strengthened just south of the intersection of Route 10 and Route 58, where it damaged several homes and an elementary school as well as downing numerous trees. The intense tornado crossed Route 58 again and then Route 10 before hitting the Freedom Plaza shopping center where it destroyed a strip mall and tossed around numerous cars. One car was impaled into a building adjacent to the strip mall. Thereafter, the tornado moved into 2 subdivisions east and northeast of Obici Hospital. Many homes were damaged with at least a dozen completely destroyed. The tornado then continued into Driver where it damaged a number of homes and businesses and downed numerous trees. The tornado then appeared to lift just north of Driver, although amateur video and pictures suggested that the tornado maintained close contact with the ground as it tracked northeast across northern portions of Portsmouth to the Norfolk Naval Air Station.
SOUTHAMPTON COUNTY	4/28/2008	EF0	0	$5,000	A brief tornado touched down about a half mile east of Capron off Highway 58 near Douglas Drive. Several trees were downed or snapped off.
PORTSMOUTH	4/28/2008	EF1	0	$60,000	The tornado moved from northeast Suffolk across northern portions of Portsmouth. The tornado maintained close contact with the ground and downed several trees and produced some structural damage. While in Suffolk, the tornado was rated as EF3, but in Portsmouth it was rated as EF1.

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
NORFOLK	4/28/2008	EF1	0	$100,000	The tornado maintained close contact with the ground as it moved from northern Portsmouth to the Norfolk Naval Air Station. The tornado damaged vehicles and a building at Pier 2, and numerous trees were blown down or snapped off. The tornado remained rated as EF1 from northern Portsmouth to the Norfolk Naval Air Station.
JAMES CITY COUNTY	4/28/2008	EF0	0	$200,000	A brief tornado touched down in James City county about 6 miles northwest of Jamestown. Several trees were uprooted or snapped off, and there was some minor damage to homes in the area.
ISLE OF WIGHT	4/28/2008	EF1	0	$184,000	A tornado touched down near Carrsville in southern Isle of Wight county. The tornado damaged eleven homes and six agricultural buildings along Harvest Drive and Eleys Lane.
FRANKLIN	9/26/2008	EF0	0	-	Brief tornado touchdown in an open field near S.P. Morton Elementary School. No damage reported.
ISLE OF WIGHT	4/20/2009	EF0	0	$5,000	EF0 tornado tracked along nearly 8-mile track from near Raynor east-northeast to approximately one mile northwest of Smithfield.
CHESAPEAKE	5/4/2009	EF0	0	$10,000	EF0 tornado touched down in Great Bridge section south of Cedar Road between Shillelagh Road and Battlefield Boulevard.
SOUTHAMPTON COUNTY	10/27/2010	EF0	0	$50,000	An EF0 tornado destroyed a carport, overturned a shed and downed several trees. Debris was scattered toward northeast about 100 yards.
SOUTHAMPTON COUNTY	4/16/2011	EF1	0	$30,000	Brief tornado touched down in southwest Southampton County. Numerous trees were snapped off and a few structures were damaged. The most significant damage was to a farm equipment shelter and a roof on a home.
JAMES CITY COUNTY	4/16/2011	EF3	0	$50,000	Tornado tracked from Surry County into Kingsmill section of James City County. Tornado tracked from James City County into York County.
YORK COUNTY	4/16/2011	EF3	0	$15,000	The tornado mainly affected the Yorktown Naval Weapons Station.
ISLE OF WIGHT COUNTY	4/16/2011	EF2	0	$300,000	Tornado damage was along a nearly continuous 20-mile damage path from east of Walters to just southwest of Smithfield. More than 2 dozen homes were damaged. Farm equipment was picked up and tossed around on several farms.
VIRGINIA BEACH	8/27/2011	EF0	0	$150,000	Weak tornado (EF0) severely damaged a home on Sandpiper Road. Minor damage to one other home.
HAMPTON	6/1/2012	EF1	0	$1,000,000	Tornado began on James River just east of Monitor Merrimac Bridge Tunnel. Its track went over Chesapeake Avenue, through downtown Hampton to Hampton Yacht Club before moving across Mercury Boulevard, then dissipating over the Chesapeake Bay.
ISLE OF WIGHT	1/11/2014	EF0	0	$40,000	The tornado touched down on Bob White Road just north of Woodland Drive, then continued northeast about 2 miles nearly paralleling Woodland Drive before lifting

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					near Quaker Road in Isle of Wight. The tornado touched down just north of Route 10, then continued northeast into Mogarts Beach area. Tornado was on the ground about 1.4 miles before dissipating over James River.
HAMPTON	1/11/2014	EF0	0	$100,000	Tornado touched down near Routten Road and Cabell Lane where around 50 trees were snapped and homes had 10 to 20 percent of their roof shingles blown off. The tornado traveled east northeast damaging the roof of Fox Hill Central Methodist Church and completely ripping roof off of the City of Hampton school maintenance compound on Windmill Point Road. Tornado moved to Canal Road snapping trees, damaging residential rooftops and blowing out windows of a car. Tornado continued on to completely destroy the Fox Hill Athletic Association Building on Grundland Drive, before ending at the Grandview Nature Preserve.
VIRGINIA BEACH	7/4/2014	EF0	0	$25,000	A brief EF-0 tornado associated with a squall from Hurricane Arthur touched down near Lynnwood in Virginia Beach. Numerous trees were snapped and uprooted along Lynndale Road and Kline Drive.
NORFOLK	7/4/2014	EF0	0	$5,000	Tornado touched down near the Forest Lawn Cemetery in Norfolk.
VIRGINIA BEACH	7/10/2014	EF0	0/10	$300,000	A weak tornado caused significant damage to a home from the roof being blown off. There was also damage to several other structures including a school gymnasium. A large pool window was blown out.
SURRY COUNTY	2/24/2016	EF1	0	$15,000	Tornado tracked from Sussex County into Surry County before lifting. Several trees were down, but no structural damage was observed.
SUFFOLK	3/31/2017	EF1	0	$200,000	An EF1 tornado touched down along and just west of White Marsh Road, about 2 miles southeast of downtown Suffolk. A number of trees were downed or snapped off, and one outbuilding was destroyed and its' debris damaged the adjacent house. Tornado crossed White Marsh Road, where it entered the Great Dismal Swamp, and was no longer visible. The tornado then tracked eastward into the Deep Creek area of Chesapeake.
CHESAPEAKE	3/31/2017	EF1	0	$50,000	Tornado tracked from the Great Dismal Swamp in Suffolk eastward to the Deep Creek section of Chesapeake. There was minor tornado damage on the east edge of the Dismal Swamp in the Deep Creek section.
CHESAPEAKE	3/31/2017	EF2	0	$3,900,000	EF0 tornado first touched down on Green Tree Road in Chesapeake causing damage to three warehouses. The tornado then quickly lifted off the ground and continued east. The tornado touched down again just east of Kempsville Road along Kemp Bridge Lane as an EF0 rapidly intensifying to EF1. On the east side of Kemp Bridge

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					Lane, several homes lost sections of their roofs and outer walls were removed. Winds were approximately 97 mph. The tornado intensified as it moved east destroying an empty mobile home and severely damaged a metal storage building. The tornado strengthened to an EF2 before striking Real Life Christian Church on Centerville Turnpike. The church, a large metal constructed building, was destroyed by the tornado as the sanctuary was completely demolished. The tornado weakened some as it continued to travel east and then northeast across Stumpy Lake. The tornado then tracked northeast into Virginia Beach.
VIRGINIA BEACH	3/31/2017	EF2	0	$4,000,000	Tornado emerged from Stumpy Lake along Elbow Road as an EF0 causing some significant damage to siding and shingles to homes just north of Elbow Road. The tornado crossed Round Hill Drive, and then Elbow Road itself as it re-intensified to an EF1. The tornado crossed Elbow Road as an EF1 causing significant damage to oak trees which fell trapping a car under numerous trees. Tornado continued as a weak EF1 to Salem Road causing some significant roof damage to homes. It briefly weakened as it moved northeast causing damage to siding and shingles along Starwood Arch, Antelope Place, Salem Lake Boulevard and Morning View Drive. Tornado intensified, crossed Centennial Circle damaging homes along Daiquiri Lane and Darrow Street. By the time the tornado crossed Rock Lake Loop, it had intensified back to EF1 intensity causing some severe roof damage to homes from Rip Rap Court to River Rock Arch. This is where the tornado reached its widest point, up to 350 yards wide, causing damage to around 100 homes in this area alone. Several homes in this area were damaged beyond repair as winds reached to 110 mph (high end EF1). The tornado continued northeast destroying the clubhouse and press box at the Lansdowne High School ball field. Several sets of bleachers were tossed well over 200 yards. The tornado weakened as it crossed Princess Anne Road and Tidewater Community College. The tornado moved across Rosemont Drive as an EF0 damaging numerous homes along Light Horse Loop and Storm Bird Loop. The last visible damage from the tornado was across Buckner Boulevard near the east end of Purebread Drive.
CHESAPEAKE	4/6/2017	EF0	0	$100,000	Touched down near Delia Drive where it destroyed an RV and stripped siding off a house. It moved north northeast and severely damaged a concession stand, a small barn and an outbuilding at Hickory Ridge Farm on Battlefield Boulevard. The tornado proceeded to cross Battlefield Boulevard then crossed Head of the River

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					Road where it reached its strongest point with an estimated wind speed of up to 80 mph. Numerous pine trees were snapped, blocking the road and taking down power lines. The tornado then crossed Beaverdam Road maintaining intensity near 75 mph. The tornado weakened as it crossed Land of Promise Road, but was still strong enough to down a pine tree into a house.
SOUTHAMPTON COUNTY	5/5/2017	EF0	0	$4,000	First touched down just north of Route 460 along Crumpler Toad just north of Ivor. The tornado continued north northeast, crossing adjacent Warrique Road and Aberdeen Road. The survey team found several trees uprooted along this route, with chunks of asphalt from nearby road construction found to be scattered in the field. The tornado continued north northeast into Surry County.
SURRY COUNTY	5/5/2017	EF0	0	$2,000	Uprooted several trees near and along Aberdeen Road before lifting just east of Walls Bridge Road.
JAMES CITY COUNTY	10/11/2018	EF1	0	$150,000	Touched down on the northern side of the Colonial Heritage Club just south of Norge. Tracked northwest toward Toano and downed several trees. One tree went through a house on Arthur Hill Road. A roof was blown off a house near Candle Station before the tornado lifted just to the east of Toano.
SOUTHAMPTON COUNTY	4/19/2019	EF1	0	$5,000	Tracked through Greensville County and into extreme southwest Southampton County. Tornado caused damage to several trees.
ISLE OF WIGHT COUNTY	4/19/2019	EF0	0	$15,000	Touched down near Mill Swamp Road and Wrens Mill Road in northern Isle of Wight County. The tornado tracked northward crossing King`s Landing Lane before continuing into the James River. Numerous trees, including large oak trees, were snapped or uprooted along the tornado path. One tree was downed on a house.
YORK COUNTY	4/19/2019	EF0	0	$150,000	Touched down near Colonial Parkway immediately east of the interchange with Queens Drive. The tornado tracked north northeast producing substantial tree damage, power line damage, and some home damage along Queens Drive. The tornado likely lifted north of Queens Lake.
NEWPORT NEWS	4/19/2019	EF0	0	$50,000	Likely touched down as a waterspout over Warwick River. The tornado tracked northeast through Sanford, Carriage Hill, and Denbigh. It produced mainly tree damage, particularly near Sanford Elementary, and destroyed a small shed. Tornado lifted before reaching Route 60 near Denbigh Village Center.
SUFFOLK	5/11/2019	EF1	0	$350,000	Touched down just east of Main Street in downtown Suffolk and quickly moved off to the east intersecting Route 58 twice before heading into the Great Dismal Swamp after moving through the Wilson Pines area. Numerous trees were snapped off or uprooted. At least 14 homes and 6

TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					business were damaged with shingles torn off roofs, windows blown in, an air conditioner ripped from a roof, and at least one home had the roof impaled by a tree.
CHESAPEAKE	10/31/2019	EF1	0	$35,000	EF1 touched down near Benefit Road. It moved rapidly to the east northeast, producing mainly EF0 damage with numerous trees uprooted or large branches snapped off. The most widespread and significant damage of EF1 category occurred near or along Dewald Road where several large hardwood trees were uprooted and a camper was destroyed. Some roof, shingle, and spouting damage to homes was also observed. The tornado then lifted prior to reaching Route 168.
SOUTHAMPTON COUNTY	8/4/2020	EF2	0	$8,000,000	TS Isaias - Path of storm damage consistent with an EF2 tornado. Damage began near Southampton Power Station off General Thomas Highway and ended 4 miles north of Sebrell near Farmers Bridge Road. It first touched down in a wooded area and caused numerous trees to be snapped about 6 miles southeast of Courtland. The tornado then moved northeast and into Courtland, where it caused damage to numerous homes and businesses along Highway 58, including lifting the second story roof off a hotel building. Several vehicles were also overturned. The tornado then continued to travel northeast where more trees were snapped or uprooted. The tornado finally lifted just north of Sebrell near Farmers Bridge Road.
SUFFOLK	8/4/2020	EF1	0	$4,000,000	TS Isaias - Path of storm damage consistent with an EF2 tornado. The damage began near the Southampton Power Station off General Thomas Highway and ended 4 miles north of Sebrell near Farmers Bridge Road. The tornado first touched down in a wooded area and caused numerous trees to be snapped about 6 miles southeast of Courtland. The tornado then moved northeast and into Courtland, where it caused damage to numerous homes and businesses along Highway 58, including lifting the second story roof off a hotel building. Several vehicles were also overturned. The tornado then continued to travel northeast where more trees were snapped or uprooted. The tornado finally lifted just north of Sebrell near Farmers Bridge Road.
SUFFOLK	8/4/2020	EF0	0	$10,000	TS Isaias - Damage began west of Great Dismal Swamp and ended 3.5 miles southeast of Windsor just north of Highway 460. Damage was limited to snapped or uprooted trees along the path.
JAMES CITY COUNTY	8/4/2020	EF1	0	$100,000	TS Isaias - Tornado came onshore near River Oaks Road and Cypress Isle in Governor's Land producing tree damage. It intensified to 85-90 mph near the intersection of River Oaks Road and

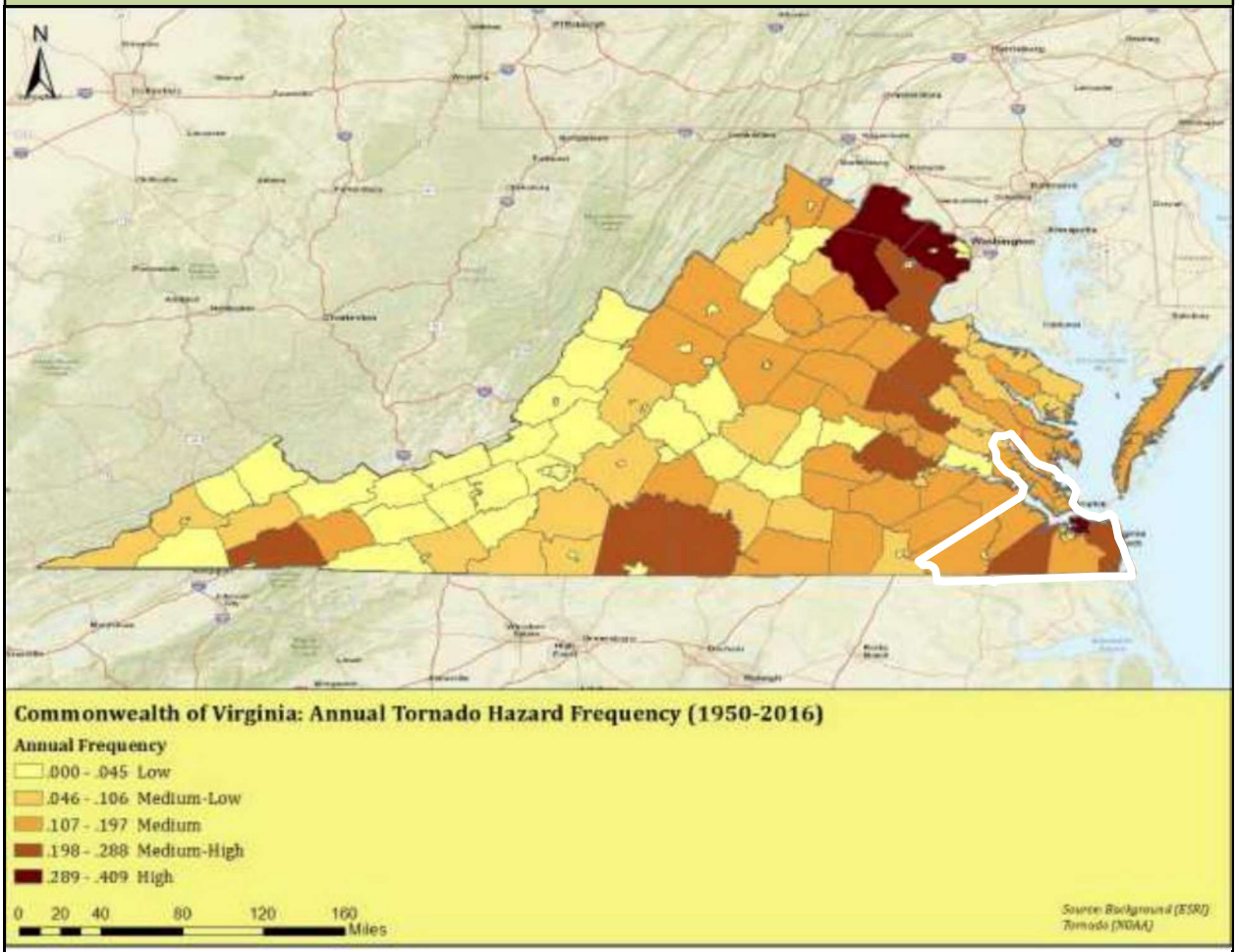
TABLE 4.11: TORNADOES IN HAMPTON ROADS, 1995 THROUGH 2021					
LOCATION	DATE OF OCCURRENCE	MAGNITUDE	DEATHS/ INJURIES	PROPERTY DAMAGE	DETAILS
					Barrets Pointe, where numerous trees were snapped, shingles were blown off roofs, a garage door caved in and a brick gable collapsed. The tornado continued across two fairways of the golf course and entered an area of woods, snapping trees and limbs, before lifting along River Ridge Drive.
SOUTHAMPTON COUNTY	9/29/2020	EF0	0	$50,000	The tornado touched down one half mile west of Black Creek Road. It briefly tracked to the east northeast before lifting just northwest of Burdette. The tornado snapped and uprooted several trees along Black Creek Road. Three outbuildings were damaged and a large tree fell on a home.
ISLE OF WIGHT COUNTY	9/29/2020	EF0	0	$20,000	The tornado touched down near the intersection of Five Forks Road and Blue Ridge Trail. The tornado traveled northeast for several miles before lifting near Orbit Road. The tornado snapped or uprooted numerous trees along its path and a carport was destroyed.
SUFFOLK	12/24/2020	EF1	0	$100,000	Damage began on the south side of Corinth Chapel Road and ended just west of the intersection of Corinth Chapel Road and Gates Road. Tornado caused significant damage to at least one home, uprooted and snapped off several large trees, and flipped over a large pickup truck.
SUFFOLK	12/24/2020	EF1	0	$225,000	Damage began on the south side of Dutch Road and ended along Lummis Road just north of the intersection with Box Elder Road. Tornado caused significant damage to at least six homes along Dutch Road, with shingles torn off roofs, and also damage to large trailer. Several large trees were uprooted along the damage path.
TOTAL			**0/218**	**$63.09 million**	

Source: NCEI, May 2021

PROBABILITY OF FUTURE OCCURRENCES

Figure 4.18 presents the results of a tornado frequency analysis performed as part of the *2018 Commonwealth of Virginia Hazard Mitigation Plan*. The analysis suggests that relative to the entire Commonwealth of Virginia, the region is considered to be "Medium" to "High" in terms of tornado frequency. The State plan emphasizes that historical data may contain meteorological biases that should be considered when viewing the results of the probability analysis shown in Figure 4.18. Increased population and advanced technology have likely led to the vastly higher numbers of low intensity tornadoes reported in recent decades, and more tornadoes are reported in areas of higher population because people are more likely to see and report the resultant damage. This map is also specific to Virginia, and "high frequency" in the Commonwealth is still relatively low frequency in parts of the Midwest and southern United States.

FIGURE 4.18: HISTORICAL TORNADO HAZARD FREQUENCY

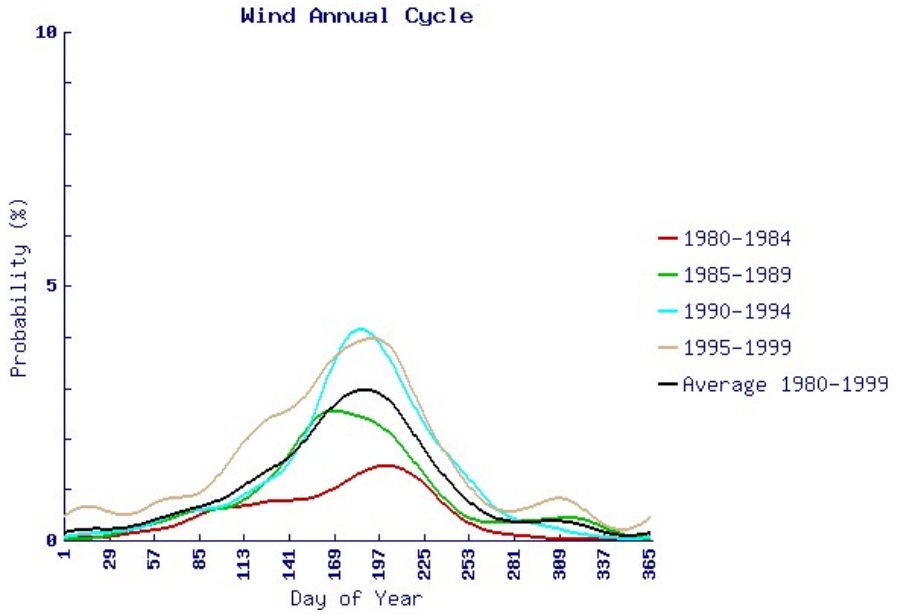


2018

Source: 2018 Commonwealth of Virginia Hazard Mitigation Plan

A tornado wind event could occur in Hampton Roads at any time of the year, but is most likely to occur from April to August, with peak probability in June, as can be seen in the Wind Annual Cycle for the region (**Figure 4.19**) below.

FIGURE 4.19: ANNUAL WIND CYCLE



Source: National Severe Storm Labs

WINTER STORMS

BACKGROUND

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Some winter storms may be large enough to affect several states, while others may affect only a single community. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility.

In Hampton Roads, winter storms typically include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Sleet—raindrops that freeze into ice pellets before reaching the ground—usually bounce when hitting a surface and do not stick to objects; however, sleet can accumulate like snow and cause a hazard to motorists. Freezing rain is rain that falls onto a surface with a temperature below freezing, forming a glaze of ice. Even small accumulations of ice can cause a significant hazard, especially on roads, power lines and trees. Ice storms have also occurred in the region, when freezing rain falls and freezes immediately upon impact.



A VDOT snowplow plows I-64 East.
Source: Photo by Tom Saunders, VDOT

Communications and power in the region can be disrupted for days, and even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Perhaps one of the most common impacts of winter storms in the region is vehicle accidents and stranded, disabled vehicles. Unaccustomed to driving in snow and ice much of the year, drivers attempt to drive at normal speeds despite deteriorated road conditions. Lacking the large fleets of snowplows of some counties and municipalities further north, the region's secondary roads are not cleared as often or as quickly, and roads may remain unplowed or untreated for many days. This impacts persons with disabilities and others who may become housebound by severe winter storms. Most of the airports in the region also shut down for some time until the runways can be cleared.

Recent winter storms in the region have caused severe economic disruption with lengthy school and business closures, damage to vehicles and reduced community services for extended periods. In agricultural portions of the study area such as Southampton County, freezing temperatures may affect agricultural production, depending on when the event occurs relative to the growing periods of certain crops. Nor'easters often cause winter storms in the region, so the impacts of coastal flooding and shoreline erosion are also associated with winter storm events.

NCEI is now producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two-thirds of the United States. The RSI is a regional snowfall impact scale that uses the area of snowfall, the amount of snowfall, and the number of people living within a snowstorm. Since the index uses population information, it attempts to quantify the societal impacts of a snowstorm. RSI has been calculated for large snowstorms back to 1900 and therefore the index puts a particular event into a century scale historical perspective (**Table 4.12**). A Category 5 snowstorm is a very rare event while Category 0 and 1 snowstorms are quite typical.

TABLE 4.12: REGIONAL SNOWFALL INDEX (RSI)			
CATEGORY	RSI RAW SCORE	APPROXIMATE PERCENT OF STORMS	DESCRIPTION
5	>18	1%	Extreme
4	10-18	2%	Crippling
3	6-10	5%	Major
2	3-6	13%	Significant
1	1-3	25%	Notable

Source: NCEI, 2021

RSI is calculated for specific regions. Only the snowfall within a particular region is used to calculate the index for that region. The Hampton Roads study area is within the Southeast study region for the RSI. The RSI differs from other indices because it includes population, which ties the index to societal impacts. Currently, the index uses population based on the 2000 Census.

Where available, the RSI value for specific storms is provided in the History section below.

SIGNIFICANT HISTORICAL EVENTS

According to the NCEI, Hampton Roads has experienced 23 significant winter storm events including snow and ice storms, since 1995 (**Table 4.13**). These events account for $20.15 million in reported property damages for the affected areas. The region received presidential disaster declarations from major winter storms in 1996 (the Blizzard of '96) and 2000. Some of the most significant winter storms to impact the region in the twentieth century are discussed below.

On **January 30-31, 1966**, a blizzard struck Virginia and the Northeast U.S. It was the second snowstorm to hit Virginia in a week. The first storm dumped nine inches in Norfolk. With fresh snow on the ground, arctic air settled in and temperatures dropped into the teens. The second storm dumped one to two feet of snow over a large part of the state. Intense winds and drifting snow continued and kept roads closed for several days after the storm. Temperatures dropped into the single digits with some falling below zero. Wind chill temperatures were dangerously low.

The **winter of 1976-1977** was the coldest winter on the East Coast of the past century. Storms across the state dropped a few more inches every few days to keep a fresh coating on the streets that were just clearing from the previous storms. The average temperature for the month of January in Norfolk was 29.2°F which was 12° below normal. The prolonged cold wave caused oil and natural gas shortages and President Carter asked people to turn thermostats down to conserve energy. The major elements of this winter were the cold temperatures. There was little snowfall associated with this winter in the region.

The "**Presidents Day Storm**" of February 1979 dropped seven inches on snow on Norfolk on February 18-19 and 13 inches of snow were recorded for the entire month. The following winter, 20 inches fell in Virginia Beach and a foot of snow fell in Norfolk in a storm that hit the region in February. On March 1, another foot of snow fell in Norfolk and the total snowfall amount of 41.9 inches for Norfolk was the snowiest winter ever recorded in eastern Virginia.

The "**Superstorm of March '93**," was also known as "**The Storm of the Century**" for the eastern United States, due to its large area of impact, all the way from Florida and Alabama through New England. Impacts in the Southside Hampton Roads region were not as severe, but this storm still caused major disruption across a large portion of the country.

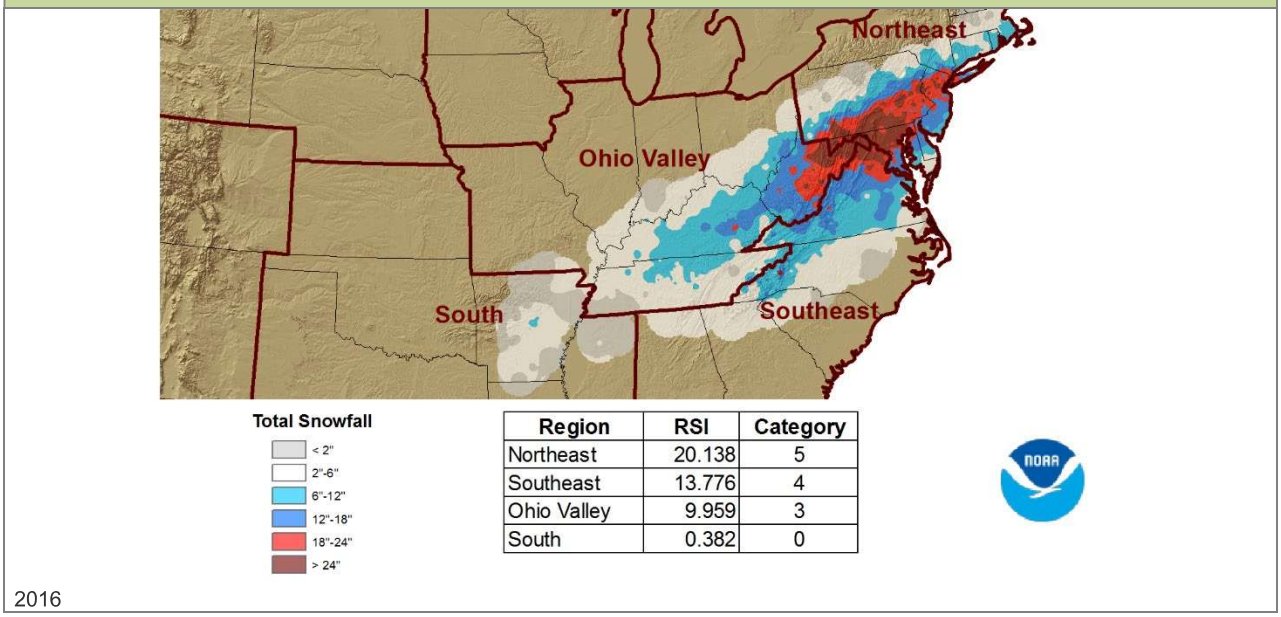
The "**1996 Blizzard**" from January 6 to January 13, 1996 affected much of the eastern seaboard. In Virginia, the winter storm left up to 36 inches of snow in portions of the state. In the Southside Hampton Roads region, most of the communities saw at least a foot of snow between January 6 and January 12.

A major ice storm at the end of **December 1998** resulted in approximately 400,000 customers being without power during the maximum outage period. Some customers were without power for about ten days during the holidays. Many accidents occurred due to slippery road conditions, especially bridges and overpasses and holiday travel. Many secondary roads were impassable due to fallen tree limbs or whole trees.

The **winter of 2010** was a memorable one for residents of Hampton Roads. The NWS winter climate data for 2010-2011 at Norfolk, indicate an average temperature of 38.9 degrees, or 3.2 degrees lower than the normal of 42.1 degrees. Total snowfall was 21.8 inches, which is remarkable when compared to the normal of 7.1 inches for an average winter. December 2010 was the 2nd-snowiest on record, at 17.8 inches, because most snow fell before January 1. There was 13.4 inches of snow for December 26, which is the fourth-biggest daily snowfall on record.[6] The December 26 winter storm created havoc on the roadways. Between midnight and 10 pm December 26, State Police recorded 421 traffic crashes, 296 disabled vehicles and 1,159 total calls for service in Hampton Roads, Eastern Shore, Williamsburg, Franklin and Emporia. The RSI ranking for the December, 2010 winter storm was a Category 2.

The **January 22-24, 2016 Winter Storm** was historic in its proportions across the northeastern United States and even in some parts of Virginia, with at least one reported death in Henry County, Virginia. From northern Virginia and into the panhandles of West Virginia and Maryland, and northeastward to the New York City area, historic amounts of snow fell, much of it blowing and drifting in the high winds. Power outages, storm damage and injuries were extreme in some areas. However, in Hampton Roads the storm's snowfall totals were merely noteworthy and not crippling, with the highest totals of 7.5 inches in James City County and 4 to 7 inches in Surry County. **Figure 4.20** shows the Regional Snowfall Index categories for the storm and how the categories varied across the various regions used in the indexing tool.

FIGURE 4.20: REGIONAL SNOWFALL INDEX, JANUARY 22-24, 2016



Region	RSI	Category
Northeast	20.138	5
Southeast	13.776	4
Ohio Valley	9.959	3
South	0.382	0

2016

Source: NOAA, 2021

Similarly, the snowstorm of **December 8-9, 2018** saw snowfall totals of almost two feet in parts of southwestern Virginia, but the accumulated snowfall in Hampton Roads ranged from virtually none in Virginia Beach and Chesapeake to 8.8 inches in Toano on the upper Virginia Peninsula.

[6] Source: *The Daily Press,* 3/11/2011, and NWS).

TABLE 4.13: WINTER STORM AND NOR'EASTER ACTIVITY (1995 - 2021)				
DATE OF OCCURRENCE	TYPE OF EVENT	PROPERTY DAMAGE	DETAILS	RSI CATEGORY
1/6/1996	Winter Storm	$25,000	No description available.	5
2/2/1996	Winter Storm	$0	A winter storm tracked northeast from the Gulf Coast states to off the Virginia coast. It spread a mixture of snow, sleet and some freezing rain from the lower Chesapeake Bay southwest into south central Virginia. Snow developed on the back side of the storm with snow accumulations across Tidewater ranging from 4 to 8 inches.	2
2/16/1996	Winter Storm	$0	A storm tracked northeast from western South Carolina Thursday night to off the North Carolina coast Friday morning. Then it moved off north and spread heavy snow across Virginia.	
3/7/1996	Winter Storm	$0	A low pressure area developed over the Carolinas and then tracked off Virginia coast. It spread light snow across central and eastern Virginia.	
12/23/1998	Ice Storm	$20,000,000	A major ice storm affected central and eastern Virginia from Wednesday into Friday. A prolonged period of freezing rain and some sleet resulted in ice accumulations of one half inch to one inch in many locations. The heavy ice accumulations on trees and power lines caused widespread power outages across the region. Approximately 400,000 customers were without power during the maximum outage period. Some customers were without power for about ten days. Many accidents occurred due to slippery road conditions, especially bridges and overpasses. Many secondary roads were impassable due to fallen tree limbs or whole trees.	
1/19/2000	Winter Storm	$0	Two to three inches of snow fell overnight as an area of low pressure passed south of the region. The highest amounts were measured along a line from Caroline county in the north, through the City of Richmond, then along the southern shore of the James River to near the Newport News area. Snow briefly fell heavily after midnight, creating hazardous driving conditions.	1
1/25/2000	Winter Storm	$70,000	A significant winter storm dropped 8 to 12 inches of snow across portions of eastern Virginia. There was blowing and drifting of snow from winds which gusted over 40 mph at times. The snow mixed with sleet and freezing rain occasionally during the late morning hours. In Isle of Wight County, strong winds pushed the Pagan River onto South Church Street. Isle of Wight County snowfall totaled 7 to 8 inches. Winds gusting over 50 mph created some blowing snow in the late afternoon and evening hours. Eighty-four automobile accidents were reported during the storm in Virginia Beach alone. Portions of Interstate 264 were closed. Moderate beach erosion was experienced, especially in the Sandbridge area. Blowing sand closed portions of Sandfiddler Road. The U.S. Coast Guard rescued four crew members of a vessel four miles west of Cape Charles when their craft was caught in dangerously rough seas.	3
12/3/2000	Winter Storm	$50,000	A winter storm struck parts of extreme southern and southeastern Virginia. The storm affected a relatively small area, but the areas that had snow received some hefty totals. Windsor reported 4 inches of snowfall. Local law enforcement agencies reported scores of accidents, several of which involved injuries. Schools were closed the following day in Suffolk, Franklin and Isle of Wight County.	

TABLE 4.13: WINTER STORM AND NOR'EASTER ACTIVITY (1995 - 2021)				
DATE OF OCCURRENCE	TYPE OF EVENT	PROPERTY DAMAGE	DETAILS	RSI CATEGORY
2/22/2001	Winter Storm	$0	A winter storm produced 1 to 4 inches of snow across south central and eastern Virginia. Local law enforcement agencies reported numerous accidents, some of which involved injuries. Many schools were dismissed early on the day of the storm, and several schools in the area were either closed or had a delayed opening the following day due to slippery road conditions.	
1/2/2002	Winter Storm	$0	A winter storm produced 8 to as much as 12 inches of snow across south central and southeast Virginia. Local law enforcement agencies reported numerous accidents. Most schools in the area were closed Thursday and Friday due to very slippery road conditions.	
12/4/2002	Winter Storm	$0	A winter storm produced 1 to 4 inches of snow along with 1/4 to 1/2 inch of ice from south central Virginia northeast through the middle peninsula and Virginia northern neck. Numerous trees and power lines were reported down due to ice accumulations, resulting in scattered power outages. Local law enforcement agencies also reported numerous accidents. Some schools in the area were closed Thursday due to slippery road conditions.	
1/16/2003	Winter Storm	$0	A winter storm produced 4 to 8 inches of snow across portions of central and eastern Virginia. Local law enforcement agencies reported numerous accidents. Most schools in the area were closed Friday due to very slippery road conditions.	
2/15/2003	Winter Storm	$0	A winter storm produced 1 to 3 inches of snow, along with sleet and 1/4 to 1/2 inch of ice accumulation, across central and eastern Virginia. Local law enforcement agencies reported numerous accidents. Most schools in the area were closed Monday due to very slippery road conditions.	3
1/9/2004	Winter Storm	$0	Two to as much as five inches of snow fell across portions of central, south central, and southeast Virginia. The snow produced very slippery roadways, which resulted in several accidents.	
1/25/2004	Winter Storm	$0	Two to as much as four inches of snow and sleet fell across portions of eastern and southeast Virginia. The snow and sleet produced very slippery roadways, which resulted in numerous accidents and school closings for a few days.	
2/15/2004	Winter Storm	$0	One to three inches of snow fell across portions of south central and southeast Virginia. The snow produced very slippery roadways, which resulted in several accidents and school closings for a few days.	
12/26/2004	Winter Storm	$0	A winter storm produced a narrow band of six to as much as fourteen inches of snow across the Virginia Eastern Shore, Hampton Roads, and interior southeast Virginia. The snow caused very hazardous driving conditions, which resulted in numerous accidents. Smithfield in Isle of Wight county reported 12 inches and Isle of Wight reported 11 inches.	
1/30/2010	Winter Storm	$0	Low pressure moving off the coastal Carolinas produced between five and fifteen inches of snow across central and eastern Virginia from Friday night, January 29th, into Saturday night January 30th.	2
12/25/2010	Winter Storm	$0	Low pressure moving north just off the Mid Atlantic Coast produced between five and sixteen inches of snow across central and eastern Virginia from Saturday afternoon, December 25th, into Sunday evening December 26th. Snowfall amounts were generally between nine and fourteen inches across the region. Chesapeake reported 13.0 inches of snow.	2

TABLE 4.13: WINTER STORM AND NOR'EASTER ACTIVITY (1995 - 2021)				
DATE OF OCCURRENCE	TYPE OF EVENT	PROPERTY DAMAGE	DETAILS	RSI CATEGORY
1/21/2014	Winter Storm	$0	Coastal low pressure intensifying off the Mid Atlantic Coast produced a widespread two to five inches of snowfall from the Virginia Piedmont to the Virginia Eastern Shore.	
1/28/2014	Winter Storm	$0	Coastal low pressure intensifying off the Mid Atlantic Coast produced widespread snowfall ranging from two to ten inches of snowfall from the Virginia Piedmont to the Virginia Eastern Shore. Highest snowfall amounts were over southeast Virginia.	1
2/16/2015	Winter Storm	$0	Low pressure moving from the Southern Plains east northeast and off the Mid Atlantic Coast produced between four inches and nine inches of snow across central, south central and eastern Virginia from Monday afternoon, February 16th through early Tuesday morning, February 17th.	1
2/26/2015	Winter Storm	$0	Intensifying low pressure tracking from the Gulf of Mexico northeast and off the southeast and Mid Atlantic coast produced between three inches and nine inches of snow across eastern and southeast Virginia from late Wednesday night, February 25th into midday Thursday, February 26th.	
1/22/2016	Winter Storm	$0	Strong Low Pressure moving from the Southeast United States northeast and off the Mid Atlantic Coast produced between two and seven inches of snow and strong winds across the Virginia Eastern Shore, Middle Peninsula, and Interior Southeast Virginia. Sedley reported 5.0 inches of snow. City of Franklin reported 5.0 inches of snow. Courtland reported 4.0 inches of snow. Lightfoot had 7.5 inches of snow.	4
1/3/2018	Winter Storm	$0	Strong low pressure tracking northward just off the East Coast produced between three inches and fourteen inches of snow across Eastern Virginia. Snowfall totals ranged between four inches and nine inches across the county. Newport News reported 7.5 inches of snow. Fort Eustis reported 5.0 inches of snow.	1
1/17/2018	Winter Storm	$0	Low pressure tracking from the southeast United States northeast and off the Mid Atlantic Coast produced between two inches and seven inches of snow across south central and southeast Virginia. Snowfall totals ranged between two inches and three inches across the county. Bowers Hill reported 3.1 inches of snow.	
12/9/2018	Winter Storm	$0	Low pressure tracking northeast just off the southeast and Mid Atlantic coasts produced snowfall totals between three inches and fourteen inches across central, south central, and eastern Virginia. Snowfall totals generally ranged between four inches and nine inches across the county. Toano reported 8.8 inches of snow. Five Forks reported 6.5 inches of snow. Norge reported 6.0 inches of snow.	3
2/20/2020	Winter Storm	$0	Low pressure tracking from the Gulf Coast States east northeast and off the Southeast Coast produced snowfall totals between two inches and five inches across south central and southeast Virginia. Snowfall totals ranged from two inches to five inches across the county. Downtown Suffolk reported 4.0 inches of snow.	
28 Events		**$20,145,000**		

Source: NCEI, May, 2021

PROBABILITY OF FUTURE OCCURRENCES

Winter storms remain a likely occurrence for the region. While storms will be more likely to produce small amounts of snow, sleet or freezing rain, larger storms, though less frequent in occurrence, could also impact the region.

Historical evidence indicates that the region has been impacted by varying degrees of snow storms and ice storms over the last century. In terms of receiving measurable snowfall, the NCEI estimates that there is between 83.3 and 89.8 percent probability that the Southside Hampton Roads region will receive measurable snowfall in any given year, **Table 4.14**.

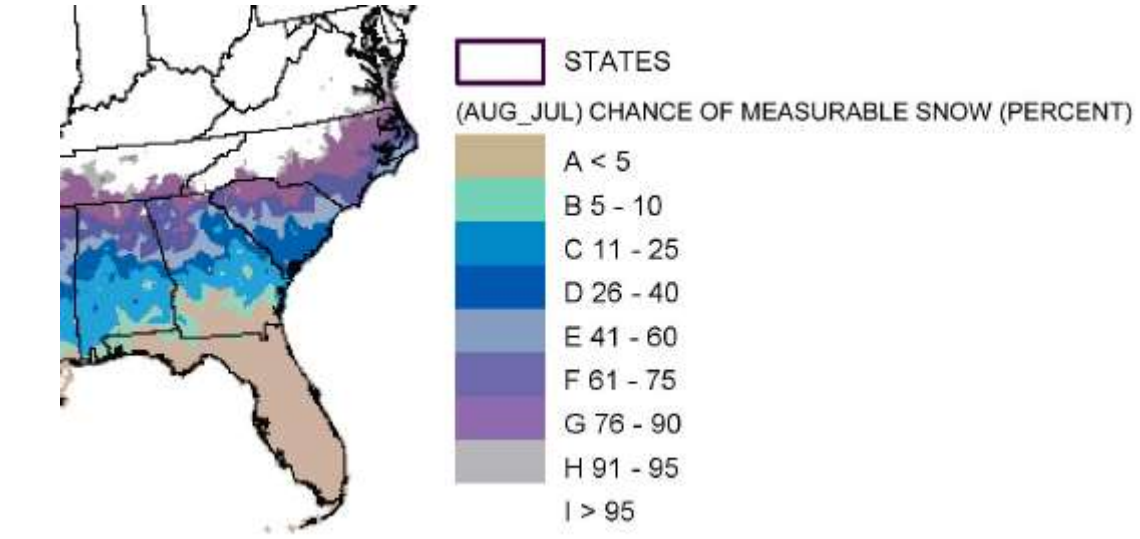
TABLE 4.14: PROBABILITY OF RECEIVING A MEASURABLE SNOWFALL

JURISDICTION	ANNUAL PROBABILITY	WINTER PROBABILITY	SPRING PROBABILITY	FALL PROBABILITY
Isle of Wight	83.3%	94.1%	25.0%	4.0%
Norfolk	89.8%	88.7%	36.4%	5.5%
Suffolk	No data	90.0%	63.6%	29.1%
Virginia Beach	84.0%	85.7%	23.5%	2.7%

Source: NOAA, (formerly) National Climatic Data Center, Snow Climatology Page, 2011

Figure 4.21 provides graphic evidence that the chance of snow annually is close to or equal to 100 percent in the rest of the study area.

FIGURE 4.21: CHANCE OF MEASURABLE SNOWFALL IN SOUTHEAST UNITED STATES (%)



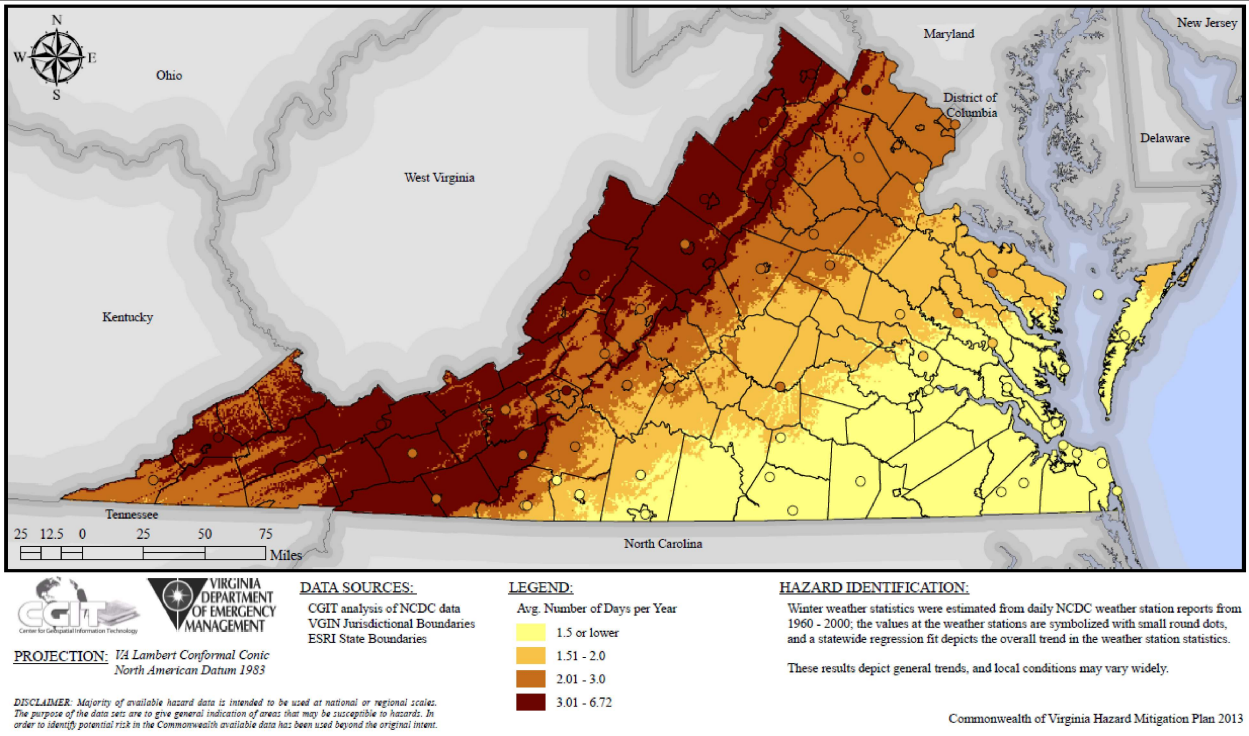
Source: NC State University, Climate Education web page: http://climate.ncsu.edu/edu/k12/.SEPrecip

Figure 4.22 indicates the average number of days the region will experience three or more days with at least three inches of snow. Data produced for the *2013 Commonwealth of Virginia Hazard Mitigation Plan* indicate the following frequency characteristics about winter storm characteristics for the region:

- 1.5 or fewer days per year with at least three inches of snow;
- 0.5 or fewer days per year with at least six inches of snow; and,

- three or fewer days per year entirely at or below 32°F.

FIGURE 4.22: AVERAGE NUMBER OF DAYS WITH AT LEAST THREE INCHES OF SNOW



2013

Source: 2013 Commonwealth of Virginia Hazard Mitigation Plan

EARTHQUAKE

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Naturally occurring earthquakes result from crustal strain, volcanism, landslides or the collapse of caverns but can also be triggered by mine blasts or collapse or nuclear testing. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site and regional geology.

Earthquakes are caused by the sudden release of accumulated energy, resulting in the rupture of rocks along fault planes in the Earth's lithosphere. The areas of greatest tectonic activity occur at the boundaries of the Earth's slowly moving tectonic plates, as these locations are subjected to the greatest strain from plates traveling in various directions and speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges, and disrupt utilities and critical lifelines. Death, injuries, and extensive property damage are possible from earthquakes. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure.

Smaller earthquakes occur much more frequently than larger earthquakes. These smaller earthquakes are generally not felt by people and cause little or no damage. Very large earthquakes can cause tremendous damage and may be followed by a series of aftershocks occurring in the region for weeks after the event. Aftershocks generally have a smaller magnitude than the main shock, but may still be powerful enough to cause additional damage.

Earthquakes are measured in terms of their magnitude or intensity. Magnitude is the amount of energy that is released by an earthquake. There are a number of ways that magnitude can be measured but probably the most familiar is the Richter scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of seismic wave amplitude (see **Table 4.15**). Each unit increase in magnitude on the Richter scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using Roman numerals, with a I corresponding to imperceptible (instrumental) events, IV corresponding to moderate (felt by people awake), to XII for catastrophic (total destruction).

Even though the original calculations developed by Richter to estimate earthquake magnitude have gone out of favor, newer formulae still retain the familiar Richter reporting methodology as shown in **Table 4.15**. Currently, the moment magnitude scale (MMS) is the primary reporting method used by the U.S. Geological Survey.[7]

[7] Source: https://energy.virginia.gov/geology/Earthquakes.shtml&sa=D&source=docs&ust=1641771610295397&usg=AOvVaw1u1SLzk6WWF7rtbguUKSjV

TABLE 4.15: RICHTER SCALE	
RICHTER MAGNITUDES	**EARTHQUAKE EFFECTS**
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: United States Geological Survey

The effect of an earthquake on people and structures on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally, total destruction. Although numerous intensity scales have been developed in the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli Intensity Scale. It was developed in 1931 by American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals as shown in **Table 4.16**. The scale does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects.[8] The lower numbers of the intensity scale indicate the manner in which people perceive the earthquake. The higher numbers of the scale are based on observed structural damage. Structural engineers usually contribute information for assigning intensity values of VIII or above.

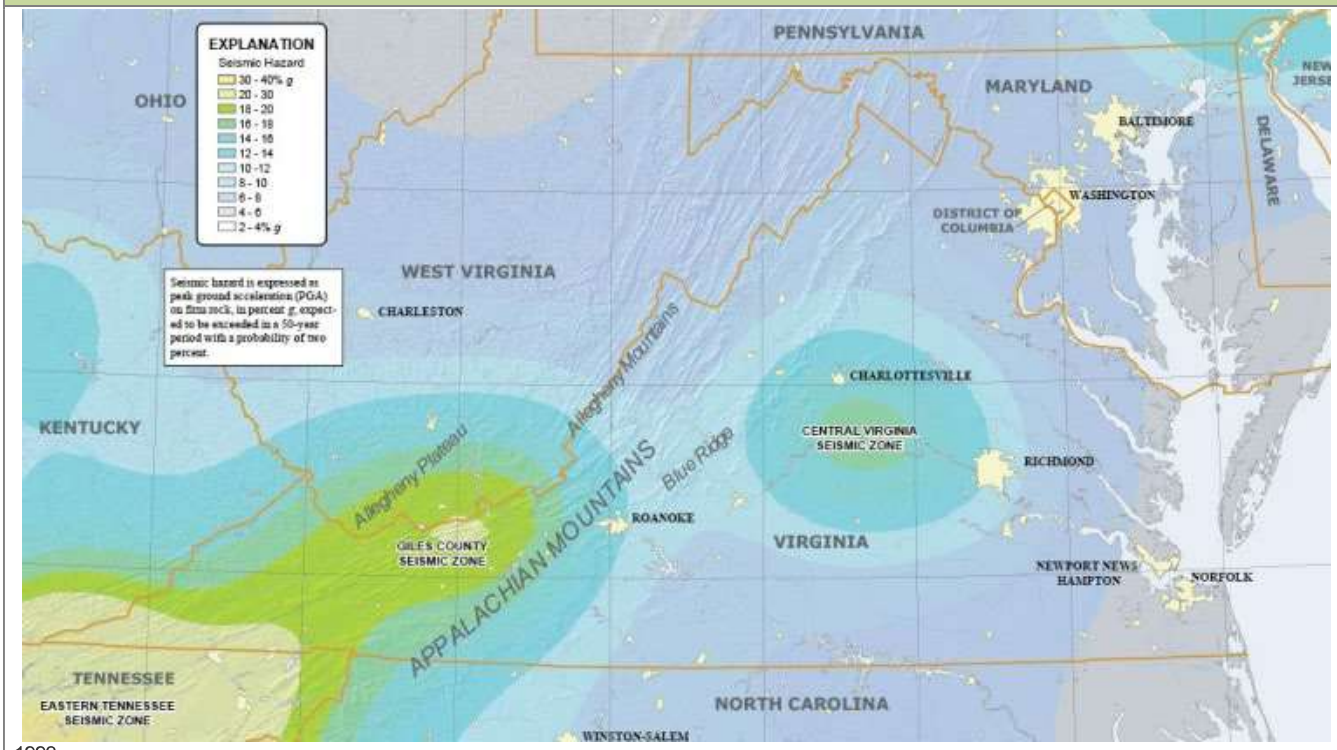
[8] Source: USGS online at: www.usgs.gov/natural-hazards/earthquake-hazards/science/modified-mercalli-intensity-scale?qt-science_center_objects=0#qt-science_center_objects

TABLE 4.16: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES			
SCALE	**INTENSITY**	**DESCRIPTION OF EFFECTS**	**CORRESPONDING RICHTER SCALE MAGNITUDE**
I	Instrumental	Detected only on seismographs	
II	Feeble	Some people feel it	<4.2
III	Slight	Felt by people resting; like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	<4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves	<5.4
VII	Very Strong	Mild Alarm; walls crack; plaster falls	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	<8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>8.1

Source: United States Geological Survey

Hampton Roads is in an area that could feel the effects of earthquakes in the Central Virginia Seismic Zone (see **Figure 4.23**), an area of frequent, yet very weak, earthquake activity located to the southwest of Charlottesville, at the New Madrid Fault in Missouri and at the Charleston Fault in South Carolina. During the last 200 years, both the New Madrid Fault and the Charleston Fault have generated earthquakes measuring greater than 8 on the Richter scale.

FIGURE 4.23: CENTRAL VIRGINIA SEISMIC ZONE



1993

Source: USGS

Earthquakes in the central and eastern U.S., although less frequent than in the western U.S., are typically felt over a much broader region. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically can be felt at many places as far as 60 miles from where it occurred, and it infrequently causes damage near its source.[9] A magnitude 5.5 eastern U.S. earthquake usually can be felt as far as 300 miles from where it occurred, and sometimes causes damage out to 25 miles.

Earthquakes everywhere occur on faults within bedrock, usually several miles deep. Most bedrock beneath central Virginia was assembled as continents collided to form a supercontinent about 500-300 million years ago, raising the Appalachian Mountains. Most of the rest of the bedrock formed when the supercontinent rifted apart about 200 million years ago to form what are now the northeastern U.S., the Atlantic Ocean, and Europe.[10]

At well-studied plate boundaries like the San Andreas fault system in California, often scientists can determine the name of the specific fault that is responsible for an earthquake. In contrast, east of the Rocky Mountains this is rarely the case. The Central Virginia Seismic Zone is far from the nearest plate boundaries, which are in the center of the Atlantic Ocean. The seismic zone is laced with known faults but numerous smaller or deeply buried faults remain undetected. Even the known faults are poorly located at earthquake depths. Accordingly, few, if any, earthquakes in the seismic zone can be linked to named faults. It is difficult to determine if a known fault is still active and could slip and cause an earthquake. As in most other areas

[9] Source: www.magma.geos.vt.edu/vtso/cvsz.html
[10] Source: www.magma.geos.vt.edu/vtso/cvsz.html

east of the Rockies, the best guide to earthquake hazards in the seismic zone is the earthquakes themselves.[11]

Earthquake activity in Virginia has generally been, with a few exceptions, low-magnitude but persistent. The first documented earthquake in Virginia took place in 1774 near Petersburg.[12] Historical data is supportive of the low risk assessment. Since 1774, there have been only three confirmed earthquake epicenters within 65 miles of Hampton Roads, one on the Delmarva Peninsula and two in the Hampton Roads area. Only minor structural damage as a result of these earthquakes has been reported in the region. Impacts of a severe, unlikely earthquake centered in Hampton Roads are unknown based on the historical record, but could be generalized from damage experienced in Louisa County during the August 2011 quake described below. Damage to local structures would likely be severe because buildings in the region are not typically designed to withstand high magnitude quakes. Underground infrastructure damage is also expected to be severe and could cause long-term power, water and sewer service interruptions in the region. Likewise, damage to bridges, tunnels and roads could disrupt transportation routes for much of the population.

On Tuesday afternoon, August 23, 2011, an earthquake with a moment magnitude of 5.8 occurred about 7 miles southwest of Mineral, Virginia, which is near Lake Anna in Louisa County. The earthquake was widely felt, with felt reports received from people as far away as Detroit, Atlanta, Boston, Toronto, and Montreal. Dozens of aftershocks up to magnitude 4.5 have been recorded, including a magnitude 4.2 aftershock approximately six hours after the main shock and a magnitude 4.5 aftershock about a day and a half later. The *Washington Post* reported that the two Dominion Virginia Power nuclear plants in North Anna, Va., 10 miles from the epicenter, shut down automatically when the quake hit. They lost power from the grid and switched to four diesel generators. Damage was greatest in Louisa County and several minor injuries occurred. Structural damage to buildings was significant in cities throughout central and eastern Virginia and Washington D.C., including damage to the Washington Monument and the Washington National Cathedral. Officials at Fort Monroe, in Hampton, Virginia, also reported some minor structural damage as a result of the quake.

The *Daily Press* and *Virginian-Pilot* newspapers reported a minor, but relatively rare, earthquake with its epicenter on the Peninsula August 3, 1995. According to the *Virginian-Pilot*, the quake measured 2.6 on the Richter scale. The Virginia Tech Seismological Observatory detected the quake with instrumentation in Goochland County west of Richmond, and in Blacksburg. The quake was centered under the York River near York River State Park. According to the *Daily Press*, people at Camp Peary in York County reported feeling the quake.

The Virginia Tech Seismological Observatory provides additional information on more recent events in Virginia, including a magnitude 4.0 shock that occurred on August 17, 1984. The epicenter was approximately 15 miles to the southeast of Charlottesville. The quake was felt from Washington, DC to the North Carolina border and from Staunton to Norfolk.

A magnitude 3.2 earthquake occurred Saturday, September 22, 2001, with the epicenter near Shadwell, just east of Charlottesville. The focal depth was within a few kilometers of the surface, and this produced a strong acoustic signal that local officials attributed to an aircraft in transonic flight. In fact, such explosive sounds are frequently associated with shallow earthquakes in eastern North America. Unlike the situation in California, the rocks in the upper few kilometers of the Earth's crust in the east are extremely efficient transmitters of high frequency seismic energy, and a proportion of this energy is converted to ordinary sound waves when the seismic waves reach the Earth's surface.

The USGS Earthquake Mapping Tool, online at https://earthquake.usgs177.gov/earthquakes/, does not indicate or show any earthquakes since 1774 with epicenters in the Hampton Roads area.

[11] Source: www.magma.geos.vt.edu/vtso/cvsz.html
[12] Source: www.energy.virginia.gov/geology/Earthquakes.shtml

Earthquakes of significant magnitude are unlikely occurrences for Hampton Roads, though the proximity of the region to the Charleston Fault could increase the possibility of feeling some impact of a large earthquake if it were to occur along that fault line.

WILDFIRES

BACKGROUND

A wildfire is any fire occurring in a wildland area (i.e., grassland, forest, brush land) except for fire under prescription.[13] Wildfires are part of the natural management of the Earth's ecosystems, but may also be caused by natural or human factors. Over 80% of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

There are three classes of wildland fires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildland fires are usually signaled by dense smoke that fills the area for miles around.



A 2008 fire sparked by logging equipment in the Great Dismal Swamp National Wildlife Refuge lasted 121 days and cost more than $10 million. It was the longest and most expensive wildfire in Virginia history.
Photo Source: U.S. Fish and Wildlife Service

Fire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and 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. Forest damage from hurricanes and tornadoes may block interior access roads and fire breaks, pull down overhead power lines, or damage pavement and underground utilities.

The impacts of wildfire in the Hampton Roads region are both economic and environmental. From an economic perspective, fires destroy most homes, businesses and infrastructure in their path. The population displacement and subsequent rebuilding consumes valuable resources of private and public entities. Communities in the region spend significant capital funds both fighting wildfires and training staff, and preparing equipment and infrastructure to fight wildfire. Wildfire also endangers the lives and safety of firefighters and citizens. Loss of life is a possible impact of severe wildfire in the region, although the lack of mountainous terrain makes escape somewhat easier.

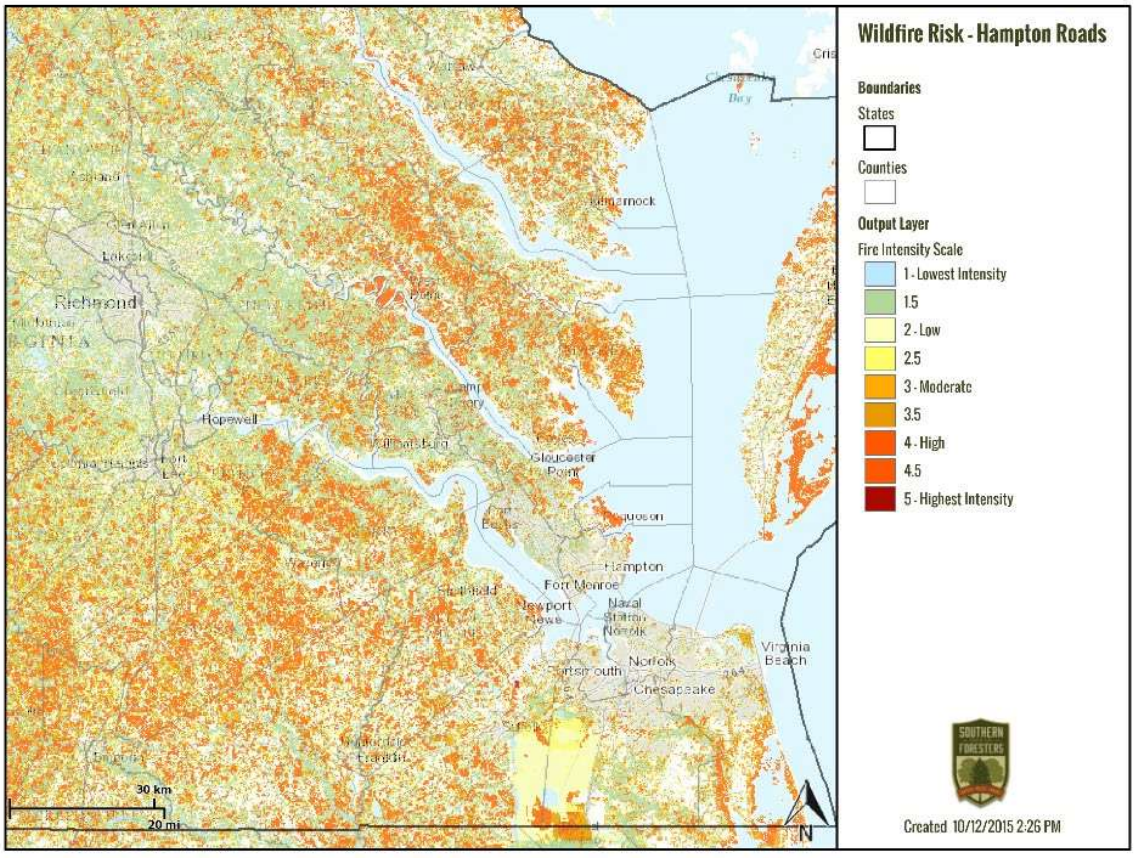
The region's air, water and soil environments are all altered by wildfire, and even wildfire in adjacent regions. Dense smoke and the fine particles and gases inside the smoke pose a risk to human health. Smoke irritates the eyes and respiratory system and can cause bronchitis or aggravate heart or lung disease even for residents hundreds of miles downwind. Wildfires raise the temperature of forest soils and potentially wipe away organic value of the soil. And although soils do eventually recover, the impact on watersheds in the interim can be detrimental to the region's water bodies. Burned organic matter in soils may negatively affect infiltration and percolation making soil surfaces water repellant. If water is unable to infiltrate, runoff quantity increases and infiltration to groundwater decreases. Both of these factors may negatively impact water quality downstream.

[13] Prescription burning, or "controlled burn," undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

LOCATION AND SPATIAL EXTENT

In July 2003, the Virginia Department of Forestry (VDOF) released a GIS-based wildfire risk assessment for the Commonwealth of Virginia. The data are now part of the Southern Foresters web site at www.southernwildfirerisk.com that serves as a portal for data from several southern states. While this assessment of wildfire risk is not recommended for site-specific determinations of wildfire vulnerability, the data were used in this plan as an indicator of general hazard exposure within the region, as shown in **Figure 4.24**. Risk assessment designation involved several inputs, including slope, aspect, land cover, distance to railroads, distance to roads, population density, and historical fire occurrence. Potential wildfire risk areas are presented in two categories indicating the relative level of threat to the area as high or moderate. Areas without a high or moderate designation are considered to be at low risk of wildfire.

FIGURE 4.24: WILDFIRE THREAT



Source: Southern Foresters, 2013

Aerial imagery indicates that the areas classified as high wildfire threat are lightly developed wooded areas, including some marshland and other forms of undeveloped land. The moderate wildfire threat areas include both undeveloped and developed land.

SIGNIFICANT HISTORICAL EVENTS

According to VDOF records, the agency responded to 190 events between 2010 and 2020, the most recent year for which data were available. These data were compiled from completed VDOF fire reports, and do not reflect every brush and woods fire occurrence in the region for this time period. Many more fires are likely to have occurred during this timeframe that local fire departments responded to and were able to contain quickly and efficiently. Because the documented events required state-level assistance from VDOF, they are considered significant events for the purposes of this plan. Only minor property damages have been recorded as resulting from wildfire events. **Table 4.17** shows damages from wildfire events in the region between 2002 and 2020. In the period between 2010 and 2020, the fire that caused the most property damage occurred on July 9, 2018 in Southampton County as a result of equipment malfunction. Damages totaled $250,000, but only .5 acre was burned. In that same time period, there were six wildfires that burned 50 acres or more and property damages from those fires combined totaled just $50,250. Sixteen wildfires in that time period were caused by lightning.

TABLE 4.17: HAMPTON ROADS WILDFIRE OCCURRENCES (2002-2020)

YEAR	FREQUENCY	ACRES DAMAGED	COST OF DAMAGE ($)	VALUE OF RESOURCES PROTECTED ($)
2002	72	592	$89,800	$4,718,200
2003	9	42	$1,600	$0
2004	19	26	$50	$500,000
2005	19	130	$750	$1,370,000
2006	41	298	$69,950	$7,315,000
2007	40	188	$600	$1,950,000
2008	31	141	$500	$0
2009	12	47	not provided	not provided
2010	40	381	$33,450	not provided
2011	18	199	$11,000	not provided
2012	12	91	$9,200	not provided
2013	13	31	$15,900	not provided
2014	17	61	$1,200	not provided
2015	18	146	$49,900	not provided
2016	10	78	$1,700	not provided
2017	21	60	$34,100	not provided
2018	19	149	$278,950	not provided
2019	10	21	$60,600	not provided
2020	12	77	$4,300	not provided
TOTALS	**433**	**2758**	**$663,550**	**n/a**

Source: VDOF, 2021

GREAT DISMAL SWAMP FIRE THREAT AND HISTORY

On the western edge of the City of Chesapeake's border lies the Great Dismal Swamp Wildlife Refuge, 111,000 acres of complete uninterrupted wilderness and swamp owned and managed by the U.S. Fish and Wildlife Service. While the City has very limited development in close proximity to the Refuge borders and does not actively manage fire or fire threats on federal lands, there are several unique factors which could present a large wildfire risk to the cities of Chesapeake and Suffolk:

- Limited road access means many thousands of acres are completely inaccessible for normal fire apparatuses. Most of the refuge is only accessible by canal.
- Dangerous soil conditions for fires. The soils within the refuge are primarily peat soils. Peat forms when plant material, usually in marshy areas, is inhibited from decaying fully by acidic and anaerobic conditions. Peat has high carbon content and can burn under low moisture conditions.

Once ignited by the presence of a heat source (e.g., a wildfire penetrating the subsurface), it smolders. These smoldering fires can burn undetected for very long periods of time (months, years and even centuries), propagating in a creeping fashion through the underground peat layer.

In 1923 a lightning strike within the Refuge ignited a fire that burn uncontrolled for three years. This fire became known as "The Great Conflagration" and burned over 150 square miles of the refuge. Yellow peat smoke filled the air around Hampton, Newport News, and Norfolk during this period. Since the mid-1940s, fire prevention and suppression techniques have reduced both the number and magnitude of fires within the refuge and adjacent areas. However, several notable fires during this period are summarized in **Table 4.18**.

On August 4, 2011, lighting struck and ignited much of the dead trees and brush that remained from the 2008 fire. Aided by a drought that had dried plants and the soil, the Lateral West fire steadily grew. This fire produced dense smoke as the peat soil burned (**Figure 4.25**). Shortly after the fire started, Hurricane Irene dumped 12 inches of rain in 24 hours, but that did not put out the fire which burned for another two and a half months.

FIGURE 4.25: GREAT DISMAL SWAMP LATERAL WEST FIRE, 2011



Source: NASA Satellite, 2011

An active fire management program is housed on the refuge. Seasonal activities include the planning and implementation of controlled burns, and wildfire suppression. The zone program conducts burns nine months a year, and averages 35 burn days a year. Burns are conducted in a wide range of habitat types, including marsh, grasslands, pocosins, and upland pine and hardwood forest.

TABLE 4.18: GREAT DISMAL SWAMP NOTABLE FIRES	
YEAR/FIRE NAME	**BRIEF DESCRIPTION**
1923-1926 Great Conflagration	Consumed nearly 100,000 acres; it was sparked by logging debris. (*Virginian Pilot* online)
1955 Easter Sunday Fire	Started along the railroad within the northern part of the current refuge and burned nearly 150 square miles, reaching the Portsmouth city line.
1967 South of Feeder Ditch	Someone burning debris ignited this fire that burned 1,350 acres.
1988 April Fools Fire	Escaped prescribed fire burned 640 acres along the state boundary south of Lake Drummond.
1993 Clay Hill Road Fire	Lightning caused fire that burned 150 acres of pine stands near the refuge's western boundary in Suffolk.
1993 Portsmouth Ditch Fire	Fire of unknown origin burned 75 acres adjacent the refuge in Chesapeake.
2004 Corapeake Road Fire	Lightning caused fire started on NC State Natural Area land and spilled over onto the refuge burning 286 acres.
2006 West Drummond Fire	Lightning strike caused fire that burned 535 acres of maple/gum stand north of Interior Ditch.
2008 South One Fire	The South One Fire was started when logging equipment working in fallen Atlantic White Cedar and logging slash caught fire. The fire grew to 4,884 acres before being contained three months later. The fire burned through slash on the surface of the ground and crept deep into the organic peat soils where it continued to smolder and spread ultimately igniting additional vegetation on the surface. The fire cost more than 10 million dollars to suppress.
2011 Lateral West Fire	Largest fire in recent history sparked by lightning on August 4. Burned for 111 days and consumed 6,300 acres.

Source: U.S. Fish & Wildlife Service, 2014



The 2008 South One Fire burns in the distance. Photo source: Salter's Creek Consulting, Inc.

Today, lightning is the cause of most wildfires at Great Dismal Swamp National Wildlife Refuge. A typical summer afternoon thunderstorm can often result in hundreds of lightning strikes on the refuge. Most of the time, the strikes do not create a wildfire, but surface and ground fires occur on average 2.6 times each year. In the spring, early season lightning events provide the best chance for large fire growth under dry, windy conditions. In the summer months, more frequent lightning brings more starts, but less chance of large fire growth due to higher humidity and greenness of vegetation.

PROBABILITY OF FUTURE OCCURRENCES

Wildfires remain a highly likely occurrence for the region, though most will likely continue to occur in less urban areas and be small in size before being contained and suppressed. Wildfire at Great Dismal Swamp National Wildlife Refuge is similarly a highly likely occurrence.

DROUGHT

BACKGROUND

Drought is a natural climatic condition caused by an extended period of limited rainfall beyond that which occurs naturally in a broad geographic area. High temperatures, high winds and low humidity can worsen drought conditions, and make areas more susceptible to wildfire. Human demands and actions can also hasten drought-related impacts.



A USGS streamflow gaging station at the Ogeechee River near Eden, Georgia in July 2000 illustrates the drought conditions that can severely affect water supplies, agriculture, stream water quality, recreation, navigation and forest resources.

Photo source: USGS

Droughts are frequently classified as one of the following four types: meteorological, agricultural, hydrological or socio-economic. Meteorological droughts are typically defined by the level of "dryness" when compared to an average or normal amount of precipitation over a given period of time. Agricultural droughts relate common characteristics of drought to their specific agricultural-related impacts. Emphasis tends to be placed on factors such as soil water deficits, water needs based on differing stages of crop development, and water reservoir levels. Hydrological drought is directly related to the effect of precipitation shortfalls on surface and groundwater supplies. Human factors, particularly changes in land use, can alter the hydrologic characteristics of a basin. Socio-economic drought is the result of water shortages that limit the ability to supply water-dependent products in the marketplace.

In Hampton Roads, droughts can have economic, environmental and social impacts. Economic impacts include loss of income for farmers dependent on crop harvests, especially in the western portion of the region, irrigation costs for farms and gardens, higher costs of feed and water for farm animals, and impacts to farm supply businesses such as tractor sales. Wildfire resulting from drought can impact timberland. Water utilities may have additional costs to treat and provide limited water supplies, and food prices in general may be driven higher. Environmental impacts in the region may include loss or destruction of fish and wildlife habitat, and lack of food or drinking water for wild animals and resultant disease in those populations, migration of wildlife, and poor soil quality which may lead to soil erosion. Social impacts may result from changes in lifestyle associated with chronic drought and associated water restrictions. Severe drought often causes anxiety or depression about economic effects of drought in farming communities, health problems related to poor water quality and fewer recreational activities if drought continues and water supplies are curtailed.

The drought severity classification table (**Table 4.19**), shows the ranges for Palmer Drought Severity Index (PDSI) for each dryness level. Other indicators are also used, such as USGS weekly streamflow data and a standardized precipitation index. Short-term drought indicator blends focus on 1-3 month precipitation. Long-term blends focus on 6-60 months.

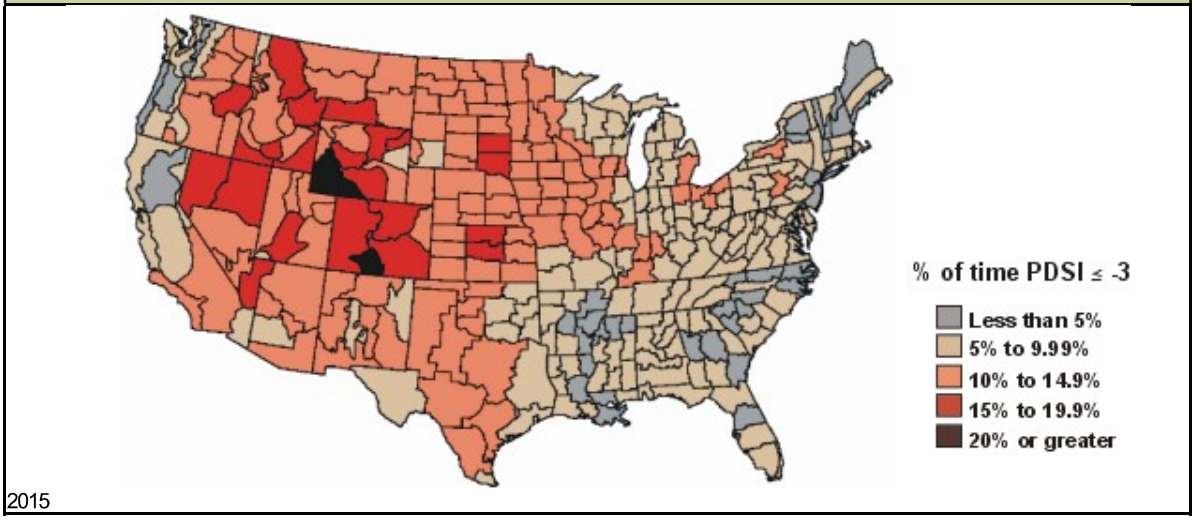
TABLE 4.19: DROUGHT CLASSIFICATION

Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested	-2.0 to -2.9
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less

Source: National Drought Mitigation Center

Figure 4.26 shows the PDSI summary map for the United States from 1895 to 1995. PDSI drought classifications are based on observed drought conditions and range from -0.5 (incipient dry spell) to -4.0 (extreme drought). As can be seen, the Eastern United States has historically not seen as many significant long-term droughts as the Central and Western regions of the country.

FIGURE 4.26: PALMER DROUGHT SEVERITY INDEX, 1895-1995, PERCENT OF TIME IN SEVERE AND EXTREME DROUGHT



Source: National Drought Mitigation Center

LOCATION AND SPATIAL EXTENT

Drought typically impacts a large area that cannot be confined to geographic boundaries; however, some regions of the United States are more susceptible to drought conditions than others. According to Figure 4.26, Virginia is in a zone representing 5 percent to 9.99 percent of the time with PDSI less than or equal to -3 (-3 indicating severe drought conditions), meaning that drought conditions are a relatively low to moderate risk for the Hampton Roads region. The region would be uniformly exposed to this hazard and the spatial extent of that impact could potentially be large. However, drought conditions typically do not cause significant damage to the built environment. Agricultural areas in Chesapeake, Isle of Wight County, James City County, York County and Southampton County are more likely to be impacted by drought, especially in the early stages. As water restrictions are put in place as a result of acute water shortages, impacts on urban consumers increase (use restrictions, drinking water supply effects and saltwater intrusion).

SIGNIFICANT HISTORICAL EVENTS

The drought of record for Virginia occurred in 1931 when the statewide average rainfall amount was 7.64 inches compared to an average mean rainfall amount of 17.89. This was during this period that also saw the Great Dust Bowl that helped lead to the Great Depression.

Since 1993, the NCEI has recorded only 2 instances of drought to impact the Southside Hampton Roads region (**Table 4.20**). Though instances are recorded on a monthly basis by the NCEI, events are usually part of ongoing drought conditions that last several months or years.

TABLE 4.20: OCCURRENCES OF DROUGHT, 1993 THROUGH 2016

LOCATION	DATE OF OCCURRENCE	DETAILS
17 jurisdictions, including Isle of Wight	10/31/1993	Unusually dry weather during the summer and early fall led to many communities in southeastern Virginia to place water conservation measures into effect in October 1993.
20 jurisdictions, including Isle of Wight, James City County, Williamsburg, and Suffolk	9/1/1997	A very dry period from May through September resulted in drought-like conditions across much of central and eastern Virginia. Monthly rainfall departures from normal for Norfolk included: -2.21 inches in May, -2.73 inches in June, -3.05 inches in August, and -1.93 inches in September. This caused significant crop damage throughout much of the area which was estimated to be around $63.8 million. Damages reported in the study area were $9.2 million.
Hampton Roads	10/1/2000	Although not technically a drought, much of eastern Virginia experienced extremely dry conditions during the month of October. Norfolk International Airport also received only .01 inches of precipitation during the month. This was the driest month ever recorded at Norfolk. A very wet summer prevented a more hazardous fire situation than would normally be experienced under such dry conditions. However, several small brush fires were reported over the region. Crops also were able to withstand the lack of rainfall due to a very wet summertime. No damages reported.

Source: NCEI

In addition to this official drought record, periods of drought-like conditions are also known to have impacted the region in 1997, 2002, 2003, 2005, 2007, 2008, and 2010. Water restrictions have been put into place as far back as 1997 and shallow wells have lost water in the region. Additional historical accounts were available for the most recent droughts in 2002, 2007, 2008 and 2010.

August, 2002: Drought

During the summer of 2002, Virginia experienced significant drought impacts due to precipitation deficits that dated to 1999 in most areas of the Commonwealth. While this drought did not reach the level of severity of the drought of record (1930-1932), increases in water demands when compared to the 1930's resulted in significant impacts to all sectors of Virginia's economy and society. The intensity of these drought impacts peaked in late August 2002. Wildfire indices were at levels previously unrecorded in Virginia, the vast majority of Virginia agricultural counties had applied for Federal drought disaster designation, stream flows reached periods of record lows, and thousands of individual private wells failed. During the third week of August several public water supply systems across the Commonwealth were on the brink of failure. Several large municipal systems, such as Charlottesville and Portsmouth, had less than sixty days of water supply capacity remaining in reservoirs. Several smaller rural systems that rely primarily on withdrawals from free-flowing streams, such as the towns of Farmville and Orange, had at most a few days of water supply available and were forced to severely curtail usage.

According to Commonwealth of Virginia records, a declaration of a State of Emergency Due to Extreme Drought Conditions was executed by the Governor of Virginia on August 30, 2002. The Executive Order was to be effective from August 30, 2002 through June 30, 2003. The 2002 drought resulted in several changes to the way Virginia predicts and responds to drought. In 2005, Isle of Wight County sought federal disaster drought aid because of drought conditions effecting crop production.

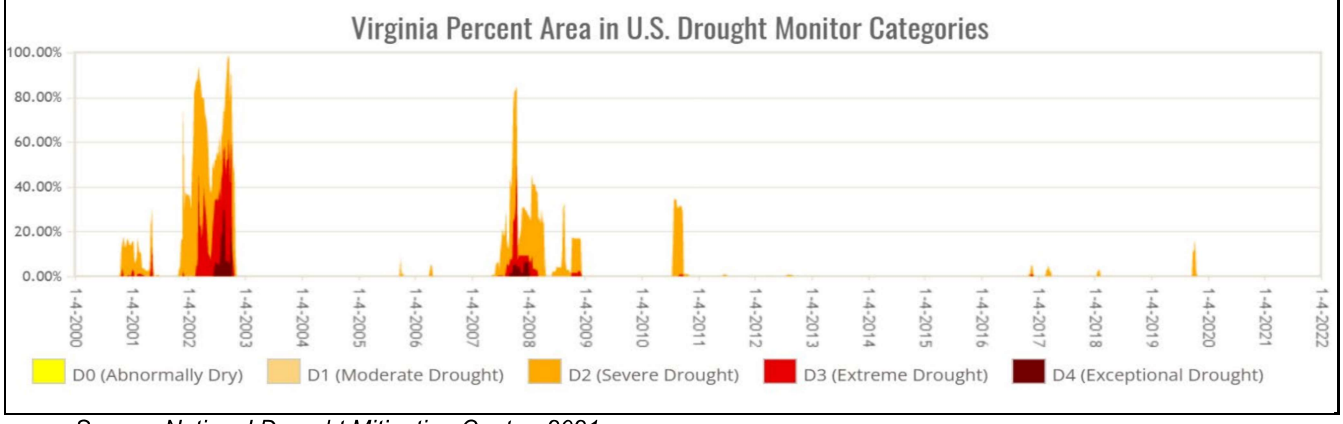
September, 2007: Drought
A statewide drought in late summer, early fall 2007 came very close to setting a 130-year statewide low precipitation record. Late October rainfall was helpful, but impacts to livestock, peanuts, hay and cotton were experienced and many crop insurance claims were made in Southeast Virginia.

Summer, 2008: Hydrologic Drought
Low stream flow in summer 2008 resulted in severe hydrologic drought.

Summer, 2010: Drought
Below average rainfall across much of the state resulted in 67 localities requesting the Governor's assistance in obtaining a Federal disaster designation due to drought. Crop yields were well below average with particular emphasis on corn and soybeans.

Figure 4.27 provides a time series of U.S. Drought Monitor Categories since 2000 for the Commonwealth of Virginia, highlighting times when Virginia was in Extreme, Severe or Exceptional drought categories.

FIGURE 4.27: VIRGINIA DROUGHT HISTORY, 2000 - 2021



Source: National Drought Mitigation Center, 2021

PROBABILITY OF FUTURE OCCURRENCES

Based on current and seasonal outlook drought maps available through the National Drought Mitigation Center, Hampton Roads is not currently in an area of abnormally dry conditions as of October 2021. Based on past events, the Hampton Roads region could possibly experience recurring drought conditions when precipitation falls below normal for extended periods of time.

EXTREME HEAT

BACKGROUND

A heat wave is defined as a prolonged period of excessive heat, often combined with excessive humidity. Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. A heat wave combined with a drought is particularly dangerous.

Extreme heat combined with high relative humidity slows evaporation, limiting the body's ability to efficiently cool itself. Overexposure may result in heat exhaustion or stroke, which could lead to death. The Centers for Disease Control and Prevention state that excessive heat exposure caused 8,015 deaths in the United States between 1979 and 1999.

In Hampton Roads, humid conditions resulting from maritime air masses may also add to the discomfort of high temperatures. Health risks to residents in the region exposed to extreme heat include dehydration, heat cramps, fainting, heat exhaustion and heat stroke. According to the NWS, heat is the leading weather-related killer in the United States, although no deaths have been reported for the historical events described below. The elderly and those with medical conditions such as diabetes are most at-risk, along with those who work outdoors in hot, humid weather.

The impact of excessive heat is most prevalent in urban areas, where urban heat-island effects prevent inner-city buildings from releasing heat built up during the daylight hours. Secondary impacts of excessive heat are severe strain on the electrical power system and potential brownouts or blackouts.

LOCATION AND SPATIAL EXTENT

For excessive heat, the NWS uses heat index thresholds as criteria for the issuance of heat advisories and excessive heat warnings. NWS heat advisory bulletins inform citizens of forecasted extreme heat conditions. The bulletins are based on projected or observed heat index values and include:

- Excessive Heat Outlook when there is a potential for an excessive heat event within three to seven days.
- Excessive Heat Watch when conditions are favorable for an excessive heat event within 12 to 48 hours but some uncertainty exists regarding occurrence and timing.
- Excessive Heat Warning/Advisory when an excessive heat event is expected within 36 hours.

These products are usually issued when confidence is high that the event will occur. A warning implies that conditions could pose a threat to life or property, while an advisory is issued for less serious conditions that may cause discomfort or inconvenience, but could still lead to threat to life and property if caution is not taken.

Extreme heat typically impacts a large area that is normally not confined to any geographic boundaries, although urban heat island effects can exacerbate effects in urbanized areas. Hampton Roads is uniformly exposed to this hazard and the spatial extent of that impact is potentially large. Extreme heat typically does not cause significant damage to the built environment, with the exception of road buckling. Summertime temperatures in Hampton Roads region can easily climb into the high 90 to low 100 degree Fahrenheit range with high humidity rates. Coastal areas may experience slightly (1 to 2 degrees) lower temperatures at some times as a result of late day sea breezes or lower water temperatures, depending on the season.

SIGNIFICANT HISTORICAL EVENTS

While temperature extremes occur fairly frequently in the region, the NCEI has only recorded three extreme temperature events recorded that have impacted the region as shown below. The committee acknowledges that there have been other, unrecorded extreme heat events during the period since 1950; however, records on these events are not available from the communities and were not reported through the NCEI or NWS.

August 1-31, 1995: Heat Wave
There were 22 injuries and $100 property damage associated with this heat wave that gripped the region.

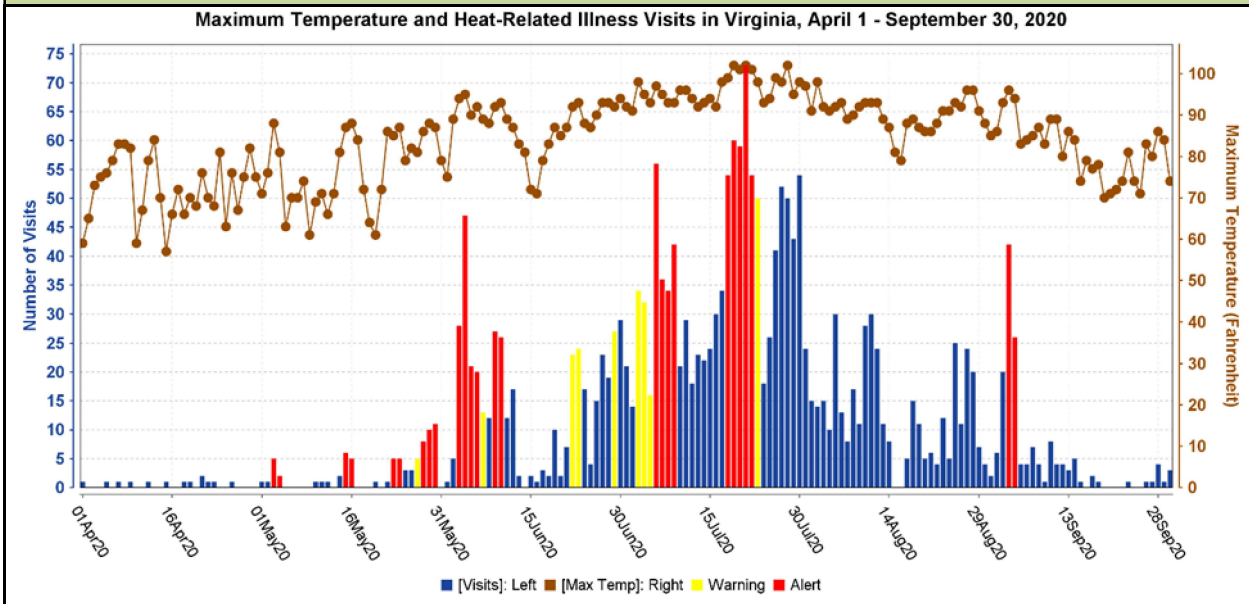
May 18–21, 1996: Extreme Heat
An early-season, four-day heat wave produced record or near record high temperatures across central and eastern Virginia. High temperatures were in the 80s and low 90s across the region on May 18. Then, on May 19, May 20 and May 21, high temperatures were in the 90s throughout the area. May 20 was the hottest of the four days as readings climbed into the mid- to upper-90s. Norfolk International Airport set a record with 98 degrees. The heat wave was responsible for numerous reports of heat exhaustion and forced many non-air conditioned schools to close or have early dismissals. There were no reported property damages, fatalities, or injuries.

The NWS reported that the summer of 2010 (June - August) had an average temperature of 81.1 degrees Fahrenheit, ranking it as the warmest on record. Previously, the warmest summer on record had averaged 80.0 degrees Fahrenheit in 1994.

July 21–23, 2011: Excessive Heat
An extended period of excessive heat and humidity occurred across most of central and eastern Virginia from July 21st to July 23rd. High temperatures ranged from 96 to 103 degrees during the afternoons, with heat index values ranging from 110 to 119. Overnight lows only fell into the lower 70s to lower 80s.

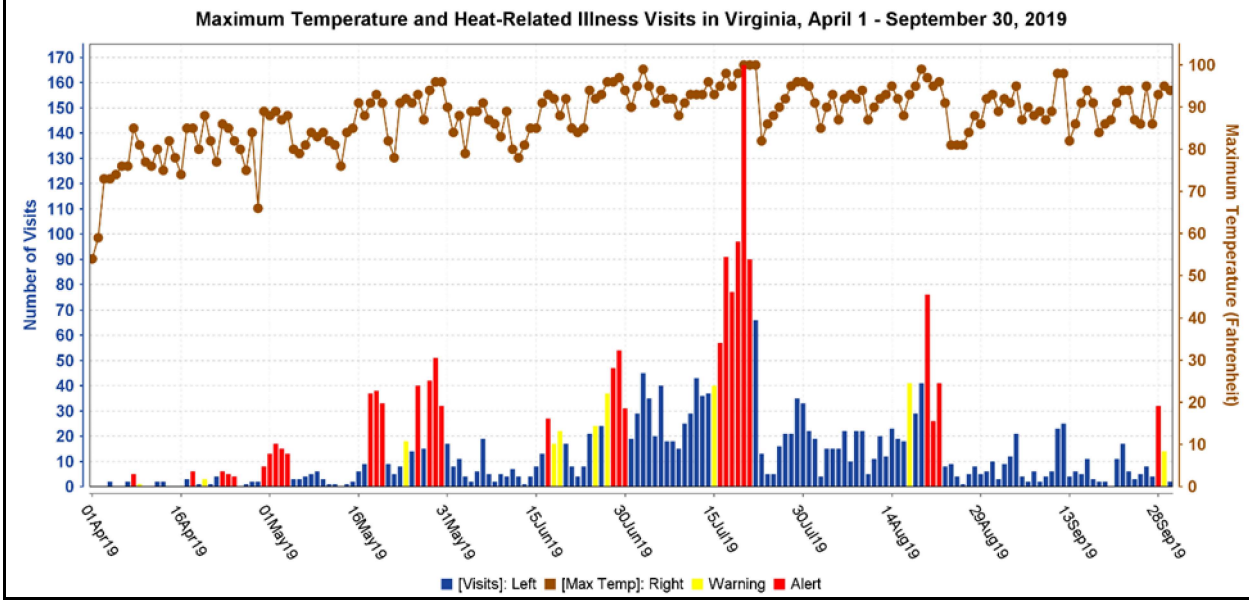
The VDH receives data on visits to emergency departments and urgent care centers in Virginia for purposes of public health surveillance. These data are analyzed through a syndromic surveillance system, known as ESSENCE, to monitor the health of the community and identify emerging trends of public health concern. In response to extreme heat, the Office of Epidemiology, Division of Surveillance and Investigation conducts surveillance for heat-related illness. While these data are not readily available by jurisdiction, the statewide data provide insights about significant extreme heat dates, the maximum temperatures and the number of hospital visits for heat-related illness, **Figures 4.28 through 4.32.**

FIGURE 4.28: MAXIMUM TEMPERATURE AND HEAT-RELATED ILLNESS VISITS IN VIRGINIA, 2020



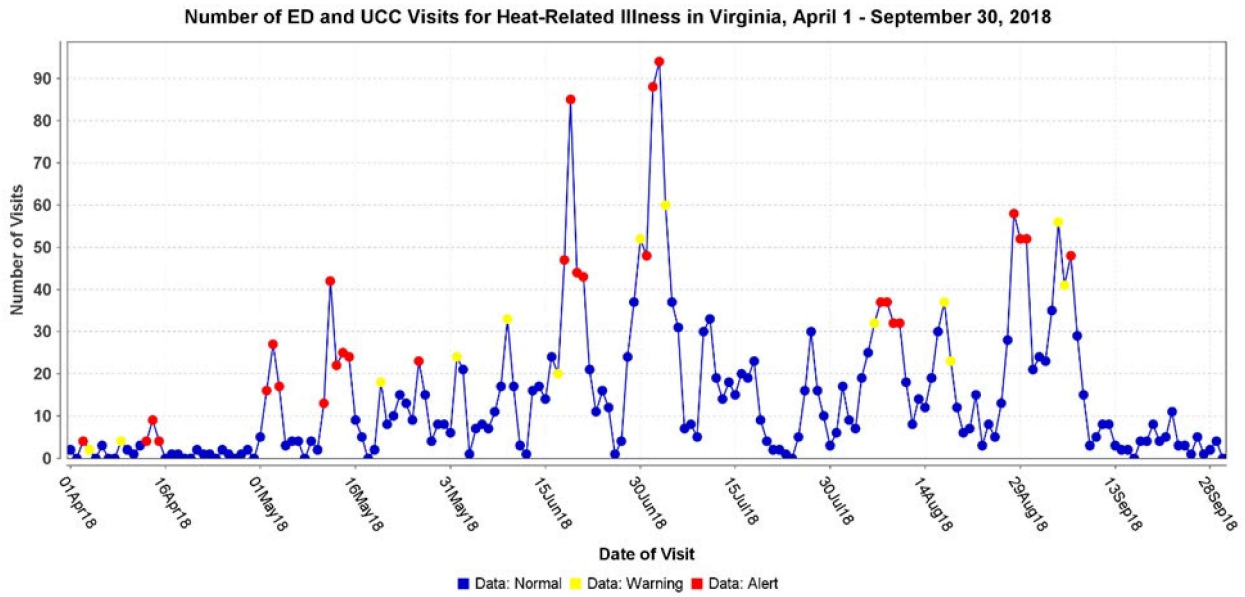
Source: VDH, accessed online 2021 https://www.vdh.virginia.gov/surveillance-and-investigation/syndromic-surveillance/weather-surveillance/.

FIGURE 4.29: MAXIMUM TEMPERATURE AND HEAT-RELATED ILLNESS VISITS IN VIRGINIA, 2019



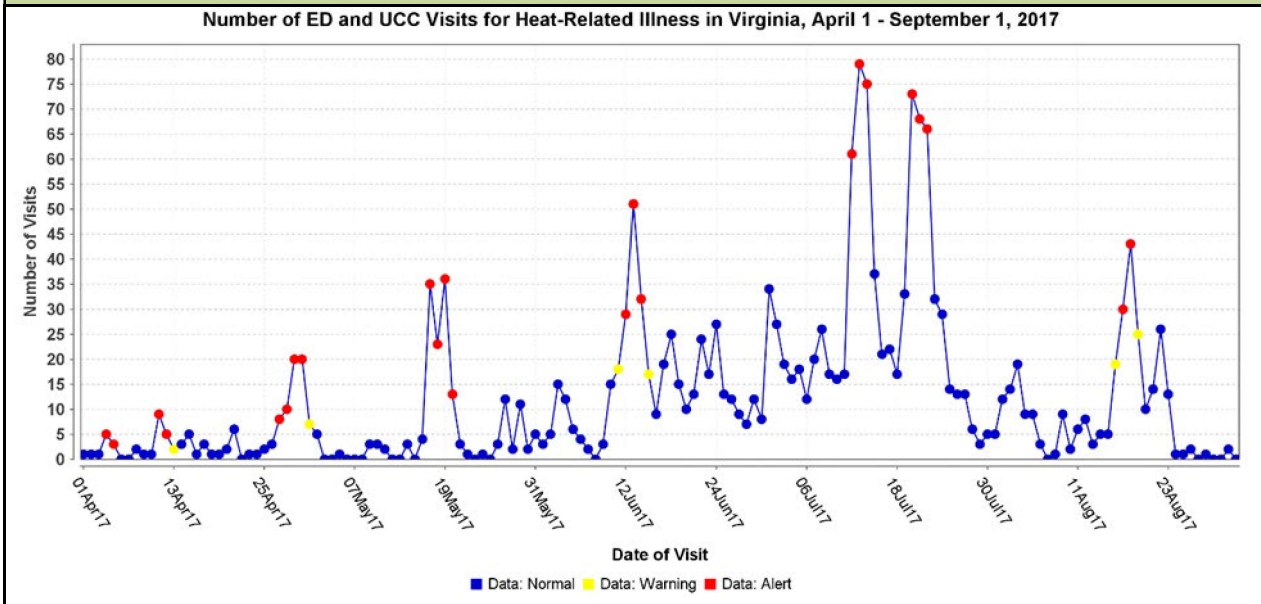
Source: VDH, accessed online 2021 https://www.vdh.virginia.gov/surveillance-and-investigation/syndromic-surveillance/weather-surveillance/.

FIGURE 4.30: MAXIMUM TEMPERATURE AND HEAT-RELATED ILLNESS VISITS IN VIRGINIA, 2018



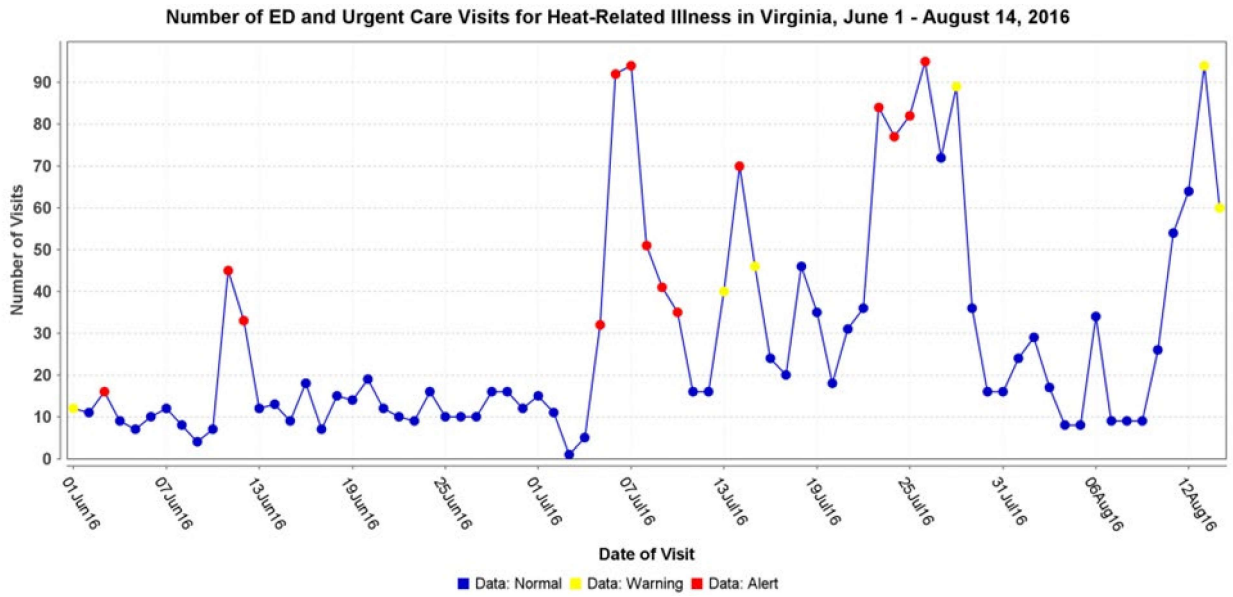
Source: VDH, accessed online https://www.vdh.virginia.gov/surveillance-and-investigation/syndromic-surveillance/weather-surveillance/.

FIGURE 4.31: MAXIMUM TEMPERATURE AND HEAT-RELATED ILLNESS VISITS IN VIRGINIA, 2017



Source: VDH, accessed online https://www.vdh.virginia.gov/surveillance-and-investigation/syndromic-surveillance/weather-surveillance/.

FIGURE 4.32: MAXIMUM TEMPERATURE AND HEAT-RELATED ILLNESS VISITS IN VIRGINIA, 2016



Source: VDH, accessed online https://www.vdh.virginia.gov/surveillance-and-investigation/syndromic-surveillance/weather-surveillance/.

PROBABILITY OF FUTURE OCCURRENCES

It is highly likely that the Hampton Roads region will experience periods of extreme heat in the future.

HAZARDOUS MATERIAL INCIDENTS

BACKGROUND

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the Nation's highways and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents and 266 are due to other causes (FEMA, 1997). In essence, HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design, as with a terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and wildlife.



City of Portsmouth Hazardous Materials Response Team.
Photo source: City of Portsmouth

HAZMAT incidents can also occur as a result of, or in tandem with natural hazard events, such as floods, hurricanes, tornadoes and earthquakes, which can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities in Eastern North Carolina were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills and a variety of other environmental pollutants that caused widespread toxicological concerns.

Hazardous material 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: (1) any release which results in exposure to poisons solely within the workplace; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

Hazardous material incidents may include chemical agents, or compounds with unique chemical properties that can produce lethal or damaging effects in humans, animals and plants. Chemical agents can exist as solids, liquids or gases depending on temperature and pressure. Most chemical agents are liquid and can be introduced into an unprotected population relatively easily using aerosol generators, explosive devices, breaking containers or other forms of covert dissemination. Dispersed as an aerosol, chemical agents have their greatest potential for inflicting mass casualties. Chemical agents can have an immediate effect or a delayed effect of several hours to several days, and are broadly categorized as lethal or incapacitating. Fortunately, the compounds are difficult to deliver in lethal concentrations, difficult to produce, and dissipate rapidly outdoors.

Shippers are relying more heavily on other types of transportation to move hazardous materials. The Department of Transportation reported that the use of trucks and water carriers had climbed sharply between 1997 and 2002. The volume of hazardous materials shipped by trucks increased 21 percent to 1.16 billion tons by 2002, while the amount carried by rail rose 7 percent to 109 million tons. During that period, the volume of hazardous material moving by water climbed 36 percent to 228 million tons, according to the department's Bureau of Transportation Statistics. Between 2002 and 2007, truck and rail shipments of hazardous materials again increased by 3 percent and 19 percent, respectively; but, water shipment volume decreased by 34 percent to 150 million tons, which is below the 1997 volume carried by water. Data for 2017 indicate that hazardous materials shipments of over 2.9 trillion tons were transported, in order

of highest to lowest volume, by truck (61%), by rail (3%), and by water (<1%). For comparison purposes, the Port of Virginia reports that in 2019, their cargo was moved 65% by truck, 34% by rail and 3% by barge.

In Hampton Roads, the negative impacts of hazardous materials incidents are dependent on the nature of the materials involved. While each chemical transported locally has unique qualities, there are generally three types of impacts: 1) economic, 2) environmental and 3) life/safety impacts to residents and first responders.

Economic impacts are likely greatest from potential large-scale incidents involving the port of Hampton Roads. Incidents that may result in port closure are unlikely, but even an event that blocks the port or a portion of the port for some period of time would have dire impacts on the port's ability to move commodities in or out of the entire region by train, ship or truck. Large spills or large fires have consequently high costs associated with response, control and cleanup. While local governments may only absorb some of those costs, economic costs to other industries would occur. Local emergency planners are especially aware of flammable crude oil transports in the York County portion of the planning area. Recent derailments involving this commodity, such as the one in Lynchburg in 2015, are high profile events as they often involve large spills and large fires.

Lesser, but still significant, economic impacts from HAZMAT incidents in the region could include the costs of litigation to resolve large spills, traffic control problems and lost time and wages for travelers impacted by roadway spills or incidents, as well as the impacts of corrosives such as sodium hydroxide on bridge and roadway infrastructure. In cases where evacuations are necessary to protect human life and safety, lost wages can be significant. For example, a natural gas leak in a downtown business district could result in evacuation of downtown businesses and shut down transportation routes. Derailment of a single train carrying hazardous materials shuts down the rail line to other trains for a long period of time, as well, which has economic consequences for numerous carriers, suppliers and buyers.

As intermodal transportation from overseas increases through the region, shipping through the port is growing and that increases highway traffic and rail traffic. The potential economic costs of hazardous materials incidents are, consequently, increasing in the region.

There are potential impacts to the health and safety of residents and travelers through Hampton Roads, as well. Response personnel are trained to respond in a variety of situations, but can nonetheless be exposed to harmful vapors or come into contact with hazardous chemicals. There is a potential for large-scale evacuations of businesses and residents if raw chemicals are released into the air or water under certain conditions that could endanger human health.

Environmental impacts of highest concern in Hampton Roads include the results of 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, and conduct regular training and exercises to prevent and then control further damage or secondary damage from fire or contaminant(s) spreading to sensitive environmental areas and critical infrastructure. However, a spill could still impact water quality, aquatic life and valuable wetlands along the shoreline. There is also a potential for hazardous materials incidents along roadways or railroads to impact groundwater with subsequent well water impacts for residents. Local emergency managers also noted the region's valuable migratory bird corridors, which could potentially be impacted by airborne contaminants, and the occurrence of illegal dumping which contributes hazardous materials to waterways, floodplains, wetlands, and forests without the benefit of appropriate response and cleanup.

LOCATION AND SPATIAL EXTENT

The Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) was created to increase public awareness of the existence of hazardous materials in the community. The Act is a freestanding title in the Superfund Amendments and Reauthorization Act of 1986 (SARA), and requires certain facility owners/operators to routinely report the presence, quantity, and releases of hazardous materials at their facility. The Act also provides an avenue in which this information can be disseminated to the public, as

well as requiring state and local governments to undertake planning measures to respond to emergencies involving those materials.

As a result, each community in Hampton Roads has identified a Local Emergency Planning Committee (LEPC) to take on the responsibilities of hazardous materials planning. These plans reside with the Emergency Coordinator of the community and provide detailed outlines of hazardous materials response and identification. Key components of the plans include the following that address the location and spatial extent of hazardous materials within the community:

- Identification of routes that are used for transportation of extremely hazardous materials, types of hazardous materials and facility locations of the materials; and,
- Identification of critical facilities which have additional risk due to proximity of transportation routes or fixed facilities.

HISTORICAL OCCURRENCES

The Federal Railroad Administration, Office of Safety Analysis, maintains accident reports for railroad accidents with damages greater than $8,500. In Hampton Roads, there have been 24 accidents involving hazardous material cars since 1998. The worst accident was in Suffolk in 2006, when one rail car suffered $18,212 of damage and 7 people had to be evacuated. Of the 24 accidents in the past decade, 6 rail cars carrying hazardous materials were damaged, and there was no record of hazardous materials being released.

There have been 596 documented HAZMAT events in Hampton Roads since 1998 (**Appendix I**), based on information from the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Materials Safety Incidents Report Database. There were no fatalities, and 15 injuries associated with these events, and a total of $1,238,922 damage. The worst event was in 2013 in Norfolk, when 4,500 gallons of ferric chloride spilled on the highway, causing $340,000 damages.

PROBABILITY OF FUTURE OCCURRENCES

Future occurrences of HAZMAT incidents, accidents or issues within Hampton Roads are considered to be highly likely.

PANDEMIC FLU OR COMMUNICABLE DISEASE

An influenza pandemic is an epidemic of an influenza virus that spreads on a worldwide scale and infects a large proportion of the human population. In contrast to the regular seasonal epidemics of influenza, these pandemics occur irregularly. Pandemics can cause high levels of mortality.

Influenza pandemics occur when a new strain of influenza virus is transmitted to humans from another animal species. Species that are thought to be important in the emergence of new human strains are pigs, chickens, and ducks. These novel strains are unaffected by any immunity people may have to older strains of human influenza and can therefore spread extremely rapidly and infect very large numbers of people.

The Centers for Disease Control and Prevention (CDC) uses a Pandemic Intervals Framework to describe the progression of an influenza pandemic, as shown in **Table 4.21**. This framework is used to guide influenza pandemic planning and provides recommendations for risk assessment, decision-making, and action in the United States. These intervals provide a common method to describe pandemic activity which can inform public health actions. The duration of each pandemic interval might vary depending on the characteristics of the virus and the public health response.

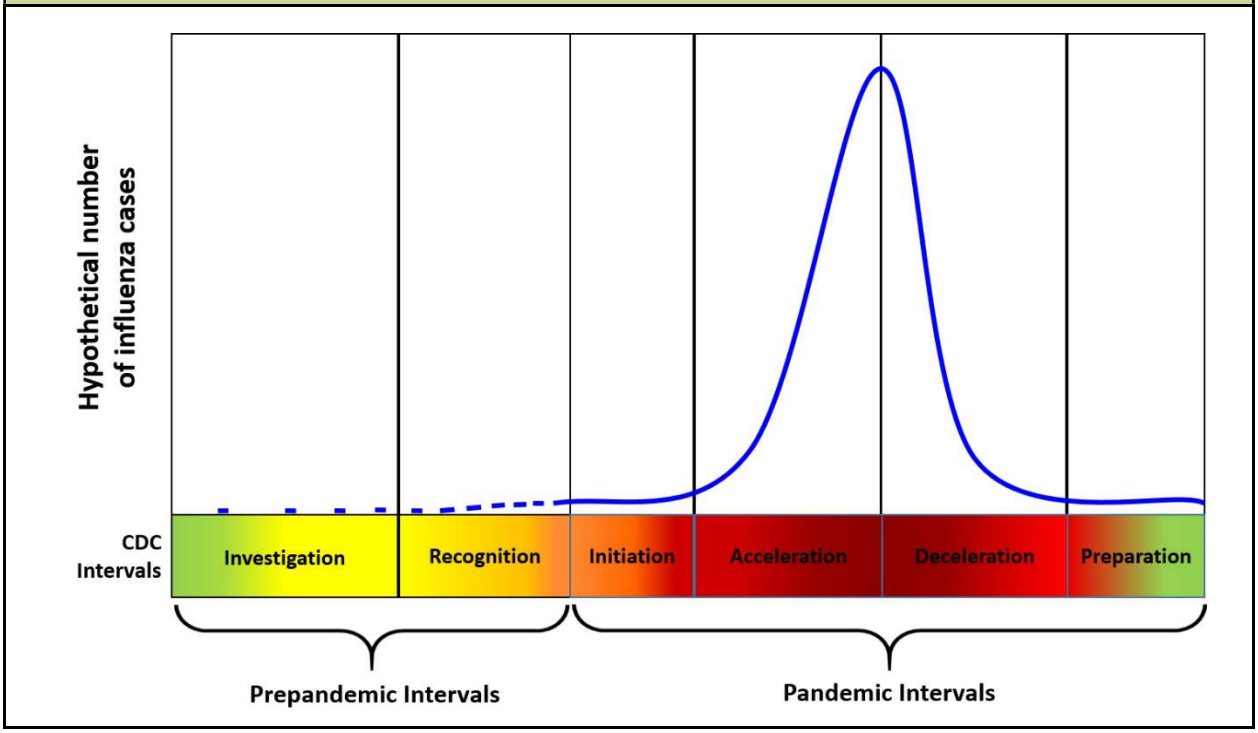
TABLE 4.21: CDC PANDEMIC INTERVALS FRAMEWORK

Interval	Description
1) Investigation of cases of novel influenza A virus infection in humans	When novel influenza A viruses are identified in people, public health actions focus on targeted monitoring and investigation. This can trigger a risk assessment of that virus
2) Recognition of increased potential for ongoing transmission of a novel influenza A virus	When increasing numbers of human cases of novel influenza A illness are identified and the virus has the potential to spread from person-to-person, public health actions focus on control of the outbreak, including treatment of sick persons.
3) Initiation of a pandemic wave	A pandemic occurs when people are easily infected with a novel influenza A virus that has the ability to spread in a sustained manner from person-to-person.
4) Acceleration of a pandemic wave	The acceleration (or "speeding up") is the upward epidemiological curve as the new virus infects susceptible people. Public health actions at this time may focus on the use of appropriate non-pharmaceutical interventions in the community (e.g., school and child-care facility closures, social distancing), as well the use of medications (e.g., antivirals) and vaccines, if available. These actions combined can reduce the spread of the disease, and prevent illness or death.
5) Deceleration of a pandemic wave	The deceleration (or "slowing down") happens when pandemic influenza cases consistently decrease in the United States. Public health actions include continued vaccination, monitoring of pandemic influenza A virus circulation and illness, and reducing the use of non-pharmaceutical interventions in the community (e.g., school closures).
6) Preparation for future pandemic waves	When pandemic influenza has subsided, public health actions include continued monitoring of pandemic influenza A virus activity and preparing for potential additional waves of infection. It is possible that a 2nd pandemic wave could have higher severity than the initial wave. An influenza pandemic is declared ended when enough data shows that the influenza virus, worldwide, is similar to a seasonal influenza virus in how it spreads and the severity of the illness it can cause.

Source: CDC 2021, accessed online at: https://www.cdc.gov/flu/pandemic-resources/national-strategy/intervals-framework.html

Figure 4.33 provides a graphical illustration of the intervals for a hypothetical virus pandemic.

FIGURE 4.33: PANDEMIC INTERVAL FRAMEWORK



Source: CDC 2021, accessed online at: https://www.cdc.gov/flu/pandemic-resources/national-strategy/intervals-framework.html

Communicable diseases are illnesses spread by bacteria or viruses that are spread from one person to another through contact with bodily fluids, blood products, contaminated surfaces, insect bites or through the air. Examples include HIV, hepatitis A, B, and C, Salmonella, measles, and blood-borne illnesses. Mitigation of spread may include testing, vaccination, and educating the public on methods of transmission.

LOCATION AND SPATIAL EXTENT

A pandemic is characterized by human-to-human spread of the virus over a very wide area, crossing international boundaries and affecting a large number of people. While many countries may not be affected early on in a pandemic, the CDC collaborates with the World Health Organization (WHO) and other international agencies to monitor and assess influenza viruses and illness. These organizations send strong signals to the public when research indicates a pandemic is imminent in their country, region, state or locality, and that the time to finalize the communication and implementation of planned mitigation measures is short.

Previous pandemics have been characterized by waves of activity spread over months and separated by oceans. Once the level of disease activity drops, a critical communications task is balancing this information with the possibility of another wave. Pandemic waves can be separated by months and an immediate "at-ease" signal may be premature. Pandemic waves can also be specific to a country or a subregion or state within a country, making local messaging a critical component in controlling the spread of the virus.

In our modern global economy that is focused on international trade and shipping, business and leisure travel to other countries can help spread an early-phase pandemic across the globe far more quickly than

in past centuries. While quarantines and travel restrictions may help restrict the spread in later intervals, the damage wrought by virus carriers early on is irreversible.

In the Eastern Virginia Health District, the VDH indicates that Hepatitis B and C, Salmonella and Campylobacteriosis are the most commonly reported communicable diseases during the period 2013 to 2018, the most recent data available. **Table 4.22** summarizes the VDH data for the region during this period. Hepatitis B and C are viruses that cause an infection that attacks the liver and leads to inflammation. The infection is spread by blood products such as unclean needles, and most people have no symptoms. Campylobacteriosis is an infection by the Campylobacter bacterium, a common bacterial infection of humans, often a foodborne illness. The bacteria produce an inflammatory diarrhea or dysentery syndrome, mostly including cramps, fever and pain. Salmonella bacteria have a similar food-related source and cause upset stomach, diarrhea, fever, and pain and cramping in the belly.

TABLE 4.22: COMMUNICABLE DISEASE IN VIRGINIA'S EASTERN HEALTH DISTRICT

Year	Top Four Diseases	Number of Cases
2013	Campylobacteriosis	119
	Hepatitis B, chronic	291
	Hepatitis C, chronic	1295
	Salmonellosis	266
2014	Campylobacteriosis	104
	Hepatitis B, chronic	285
	Hepatitis C, chronic	1486
	Salmonellosis	268
2015	Campylobacteriosis	194
	Hepatitis B, chronic	332
	Hepatitis C, chronic	1764
	Salmonellosis	279
2016	Campylobacteriosis	222
	Hepatitis B, chronic	309
	Hepatitis C, chronic	2643
	Salmonellosis	267
2017	Campylobacteriosis	209
	Hepatitis B, chronic	371
	Hepatitis C, chronic	2751
	Salmonellosis	284
2018	Campylobacteriosis	226
	Hepatitis B, chronic	387
	Hepatitis C, chronic	2424
	Salmonellosis	302

Source: VDH, October 2021, accessed at: https://www.vdh.virginia.gov/data/communicable-diseases/

SIGNIFICANT HISTORICAL EVENTS

Flu pandemics have occurred throughout history. There have been about three influenza pandemics in each century for the last 300 years. Since 1918, five significant events stand out, each with different characteristics.

1918 – 1919: H1N1 Pandemic
Illness from the 1918 flu pandemic, also known as the Spanish flu, came on quickly. Some people felt fine in the morning but died by nightfall. People who caught the Spanish Flu but did not die from it often died from complications caused by bacteria, such as pneumonia. Approximately 20% to 40% of the worldwide population became ill, and an estimated 50 million people died, including early 675,000 people in the United States. Unlike earlier pandemics and seasonal flu outbreaks, the 1918 pandemic flu saw high mortality rates among healthy adults. In fact, the illness and mortality rates were highest among adults 20 to 50 years old. The reasons for this remain unknown.

1957 – 1958: H2N2 Pandemic
In February 1957, a new flu virus was identified in the Far East. Immunity to this strain was rare in people younger than 65. A pandemic was predicted. To prepare, health officials closely monitored flu outbreaks. Vaccine production began in late May 1957 and was available in limited supply by August 1957.
In the summer of 1957, the virus came to the United States quietly with a series of small outbreaks. When children returned to school in the fall, they spread the disease in classrooms and brought it home to their families. Infection rates peaked among school children, young adults, and pregnant women in October 1957. By December 1957, the worst seemed to be over. However, a dangerous "second wave" of illness came in January and February of 1958. Most influenza–and pneumonia–related deaths occurred between September 1957 and March 1958. Although the 1957 pandemic was not as devastating as the 1918 pandemic, about 69,800 people in the United States died. The elderly had the highest rates of death.

1968 – 1969: H3N2 Pandemic
In early 1968, a new flu virus was detected in Hong Kong. The first cases in the United States were detected as early as September 1968. Illness was not widespread in the United States until December 1968. Deaths from this virus peaked in December 1968 and January 1969. Those over the age of 65 were most likely to die. The number of deaths between September 1968 and March 1969 was 33,800, making it the mildest flu pandemic in the 20th century. The same virus returned in 1970 and 1972.
Several reasons may explain why fewer people in the United States died as a result of this virus:

- The virus was similar in some ways to the 1957 pandemic flu virus. This might have provided some immunity.
- The virus hit in December of 1968, when school children were on vacation. This caused a decline in flu cases because children were not at school to infect one another. This also prevented it from spreading into their homes.
- Improved medical care and antibiotics that are more effective for secondary bacterial infections were available for those who became ill.

2009 – 2010: H1N1 Pandemic
In the spring of 2009, a new flu virus spread quickly across the United States and the world. The first U.S. case of H1N1 (swine flu) was diagnosed on April 15, 2009. By April 21, the CDC was working to develop a vaccine for this new virus. On April 26, the U.S. government declared H1N1 a public health emergency. By June, 18,000 cases of H1N1 had been reported in the United States. A total of 74 countries were affected by the pandemic. H1N1 vaccine supply was limited in the beginning. People at the highest risk of complications got the vaccine first.

By November 2009, 48 states had reported cases of H1N1, mostly in young people. That same month, over 61 million vaccine doses were ready. Reports of flu activity began to decline in parts of the country,

which gave the medical community a chance to vaccinate more people. An estimated 80 million people were vaccinated against H1N1, which minimized the impact of the illness. The CDC estimates that 43 million to 89 million people had H1N1 between April 2009 and April 2010. They estimate between 8,870 and 18,300 H1N1 related deaths. On August 10, 2010 the WHO declared an end to the global H1N1 flu pandemic.

March 2020 - 2021: SARS-CoV-2 or COVID-19

In early 2020, a novel, infectious respiratory disease began to spread worldwide and eventually impacted all aspects of life throughout the world for over a year. Scientists determined that COVID-19 spread by droplets or aerosols from the nose and mouth when an infected person coughed, sneezed or exhaled. Airborne transmission also happened in indoor spaces without good ventilation, especially with infected people breathing heavily, like when singing or exercising. Infected people were able to spread the disease before having symptoms or feeling sick, and asymptomatic people could also spread the disease without ever exhibiting a single symptom. Several variants circulated globally as the virus mutated over time. In the case of COVID-19, the variants were determined to be more contagious.

Symptoms of COVID-19 could appear 2 to 14 days after exposure and included fever, cough, shortness of breath, chills, headache, muscle pain, sore throat, fatigue, congestion, or loss of taste or smell. Other less common symptoms included gastrointestinal symptoms like nausea, vomiting, or diarrhea. Even after recovering from the virus, many people experienced lingering symptoms such as fatigue, cough or joint pain. The elderly, those living in group settings (*e.g.,* nursing homes, jails) and people of any age with serious underlying medical conditions such as lung disease or diabetes, were at highest risk for developing complications from COVID-19. Fully effective and dependable treatments for the virus were limited.

Mitigation of COVID-19 depended on wearing protective masks, distancing from others who were able to transmit disease, washing hands to prevent disease spread, contact tracing to warn those who may have had exposure, and rapid development of testing measures to determine COVID-positive populations. Despite public health campaigns to prevent spread, the disease sickened millions and killed over 884,000 in the United States alone by February 2022.[14] The virus also impacted the Hampton Roads region as shown in **Table 4.23**.

[14] CDC web site, February, 2022, accessed online at: https://covid.cdc.gov/covid-data-tracker/#datatracker-home

TABLE 4.23: COVID-19 CUMULATIVE RATES PER 100,000 BY VIRGINIA LOCALITIES				
SUBREGION	**JURISDICTION**	**CASE RATE**	**HOSPITALIZATION RATE**	**FATALITY RATE**
Peninsula	Hampton	19,315	675	194
	Newport News	19,323	577	182
	Poquoson	18,063	392	196
	Williamsburg	10,322	550	85
	James City County	17,743	450	129
	York County	13,270	247	127
Southside	Norfolk	16,450	812	159
	Portsmouth	20,937	1,151	276
	Suffolk	19,116	1,051	275
	Virginia Beach	18,980	833	145
	Chesapeake	19,246	611	158
Western Tidewater	Isle of Wight County	18,465	811	247
	Franklin	30,525	1,060	549
	Southampton County	17,912	584	425
	Surry County	15,865	846	219

Source: VDH web site, February 2022 accessed online at: /www.vdh.virginia.gov/coronavirus/covid-19-in-virginia/

In addition to the pandemic history described above, several pandemic flu threats have occurred that did not prove as dangerous as the events described above. When the 1976 swine flu was identified at Fort Dix, New Jersey it was called the "killer flu." Experts were concerned because they thought the virus was similar to the 1918 Spanish flu. To prevent a major pandemic, the United States launched a vaccination campaign. In fact, the virus—later named "swine flu"—never moved outside the Fort Dix area. Later, research on the virus showed that it would not have been as deadly as the 1918 flu if it had spread.
In 1997, at least a few hundred people caught H5N1 (avian flu) in Hong Kong. Like the 1918 pandemic, most severe illness affected young adults. Eighteen people were hospitalized. Six of those people died. This avian flu was unlike other viruses because it passed directly from chickens to people. Avian flu viruses usually spread from chickens to pigs before passing to humans. To prevent the virus from spreading, all chickens in Hong Kong—approximately 1.5 million— were slaughtered. Because this flu did not spread easily from person to person, no human infections were found after the chickens were killed.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical experience and the fact that at the time of this planning process an ongoing pandemic threatens public health, the region is expected to experience waves of pandemic flu and communicable disease outbreak in the future.

RADON EXPOSURE

Radon is a colorless, odorless naturally-occurring gas that forms by the radioactive decay of uranium, thorium, or radium, found in certain types of rocks, soil, and groundwater. Radon is found naturally in the atmosphere in trace amounts, where it disperses rapidly and is generally not a health issue. Radon exposure becomes dangerous in confined areas, where the gas can accumulate, and the inert gas can be inhaled into the lungs where it adheres to lung tissue.

Under the earth's surface, radon may be transported as a soil gas or dissolved in ground water. It can enter a building via cracks in solid floors, construction joints, cracks in walls, gaps in suspended floors, gaps around service pipes and drains, cavities inside walls or through the water supply. Well water used for bathing or washing can potentially carry radon, especially if faucets are aerated. Due to less ventilation, radon concentrations in buildings are typically higher in the winter. Any home, school or workplace may have a radon problem, whether it is new or old, well-sealed or drafty, or with or without a basement. The U.S. Environmental Protection Agency (EPA) estimates that nearly one out of every 15 homes in the U.S. is estimated to have elevated annual average levels of indoor radon,[15] and that nearly one in five schoolrooms has a short-term radon level above the actionable level.[16]

The concentration of radon in buildings is highly variable and is based on the underlying rocks or sediments, weather and construction methods. The amount of radon emitted by a particular soil is controlled by the underlying rock type, the concentration of uranium, thorium, or radium in the rock or sediment, and the permeability of the rock, sediment and soil. [17]

The EPA recommends taking action to reduce radon in homes, schools or other buildings that have a radon level at or above 4 picocuries per liter (pCi/L) of air (a "picocurie" is a common unit for measuring the amount of radioactivity). That level of risk is more than 10 times the average outdoor level, more than receiving the equivalent radiation of 200 chest x-rays per year, and almost five times the average non-smoker's risk. A radon level of 40 pCi/L is more than the risk of a 2 pack-a-day smoker.

IMPACTS

The EPA indicates that radon is estimated to cause about 21,000 lung cancer deaths per year in the United States.[18] When a person breathes in radon, radioactive particles from radon gas can get trapped in the lungs, emitting radiation. Over time, these radioactive particles increase the risk of lung cancer. People who smoke and are exposed to radon are at a greater risk of developing lung cancer. Damage may be undetected for years before health problems appear.
The chances of getting lung cancer from radon depend primarily on:

- How much radon is in one's home–the location where you spend most of your time (e.g., the main living and sleeping areas);
- The amount of time spent in the home;
- Whether one is a smoker or has ever smoked;
- Whether one burns wood, coal, or other substances that add particles to the indoor air; and
- Combinations of these factors that multiply the impacts.

Lung cancer may start with a nagging cough, shortness of breath or wheezing. Other symptoms such as coughing up blood, chest pain or weight loss may also present. There are no medical tests to test the

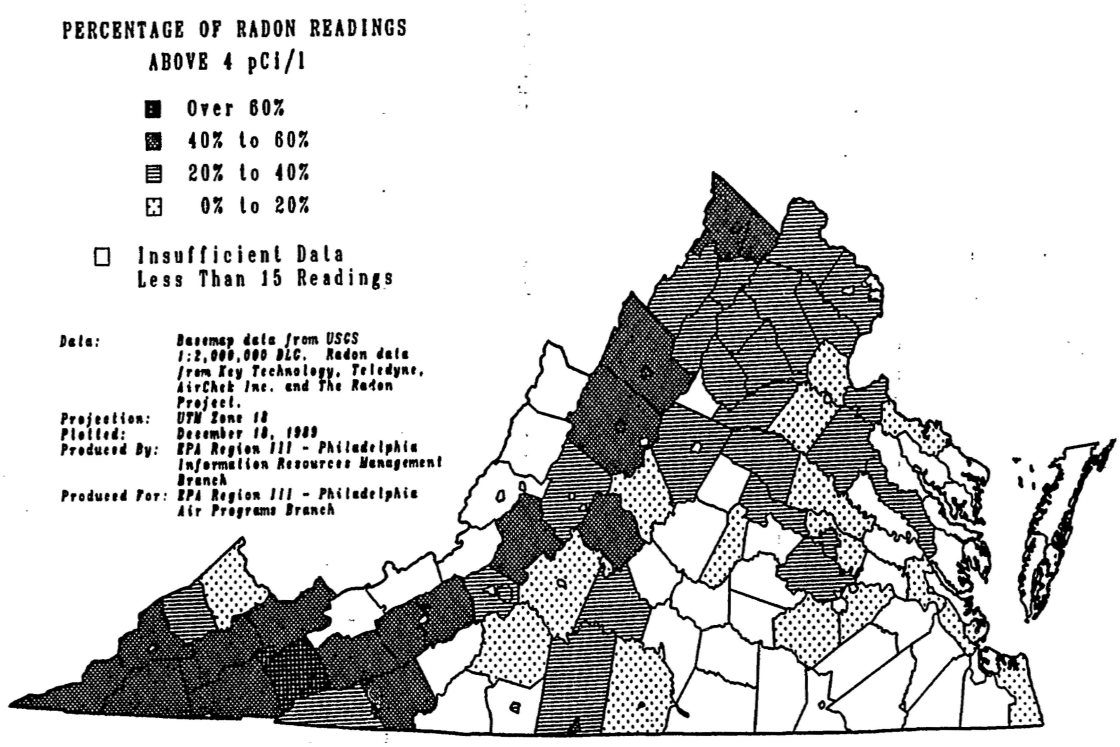
[15] *EPA's Map of Radon Zones, Virginia.* Radon Division, Office of Radiation and Indoor Air, September, 1993.
[16] EPA Radon in Schools, accessed 4/23/21 online at: https://www.epa.gov/radon/radon-schools
[17] Born, Rebecca Skye. *Radon in Yorktown Formation Sediments and Petersburg Granite, Eastern Virginia.* Undergraduate Thesis, College of William & Mary, April 1994.
[18] EPA, *A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon,* EPA 402/K-12/002, 2016.

body for radon exposure, but doctors can check for signs of lung cancer and homes can be easily tested for radon levels.

SIGNIFICANT HISTORICAL EVENTS

Radon exposure from ground sources happens over a long period of time, often remaining undetected, thus historical "events" are rarely quantifiable. Section 307 and 209 of the 1988 Indoor Radon Abatement Act directed the EPA to identify areas of the United States that have the potential to produce elevated levels of radon. As part of this study, two data sources were analyzed in Virginia: 1) indoor radon data from 1,156 random homes were sampled in the winter of 1991-1992 (results shown in **Table 4.24**); and 2) non-random commercial data compiled by EPA Region 3 were examined as shown in **Figure 4.34**.

FIGURE 4.34: VENDOR SCREENING, INDOOR RADON DATA FOR VIRGINIA



1993

Source: EPA's Map of Radon Zones, Virginia. Radon Division, Office of Radiation and Indoor Air, September, 1993.

TABLE 4.24: SCREENING INDOOR RADON DATA

	EPA 1991-1992, Residential				Alpha Energy Laboratories January 2001 to June 2020			
Jurisdiction	Number of Tests	Mean (pCi/L)	% >4 pCi/L	%>20 pCi/L	Number of Tests	Mean (pCi/L)	% >4 pCi/L	%>10 pCi/L
Hampton	7	0.3	0	0	38	1.97	10.5	5.2
Newport News	13	0.7	0	0	153	1.32	3.9	0
Poquoson	1	0.4	0	0	6	1.00	0	0
Williamsburg	1	1.0	0	0	30	2.29	10.0	3.3
James City County	1	1.0	0	0	614	3.59	27.0	5.2
York County	3	0.6	0	0	55	1.32	1.8	1.8
Norfolk	14	0.8	0	0	136	1.24	1.5	1.5
Portsmouth	6	0.4	0	0	35	0.97	0	0
Suffolk	3	0.1	0	0	58	0.99	0	0
Virginia Beach	39	0.5	3	0	236	1.22	2.1	1.3
Chesapeake	23	0.3	0	0	106	0.96	0.9	0
Isle of Wight County	1	0.9	0	0	20	1.56	10.0	0
Franklin	No data	No data	No data	No data	6	0.83	0	0
Southampton County	2	0.5	0	0	14	0.99	0	0
Surry County	1	0.6	0	0	5	1.00	0	0

Source: EPA's Map of Radon Zones, Virginia. Radon Division, Office of Radiation and Indoor Air, September, 1993.

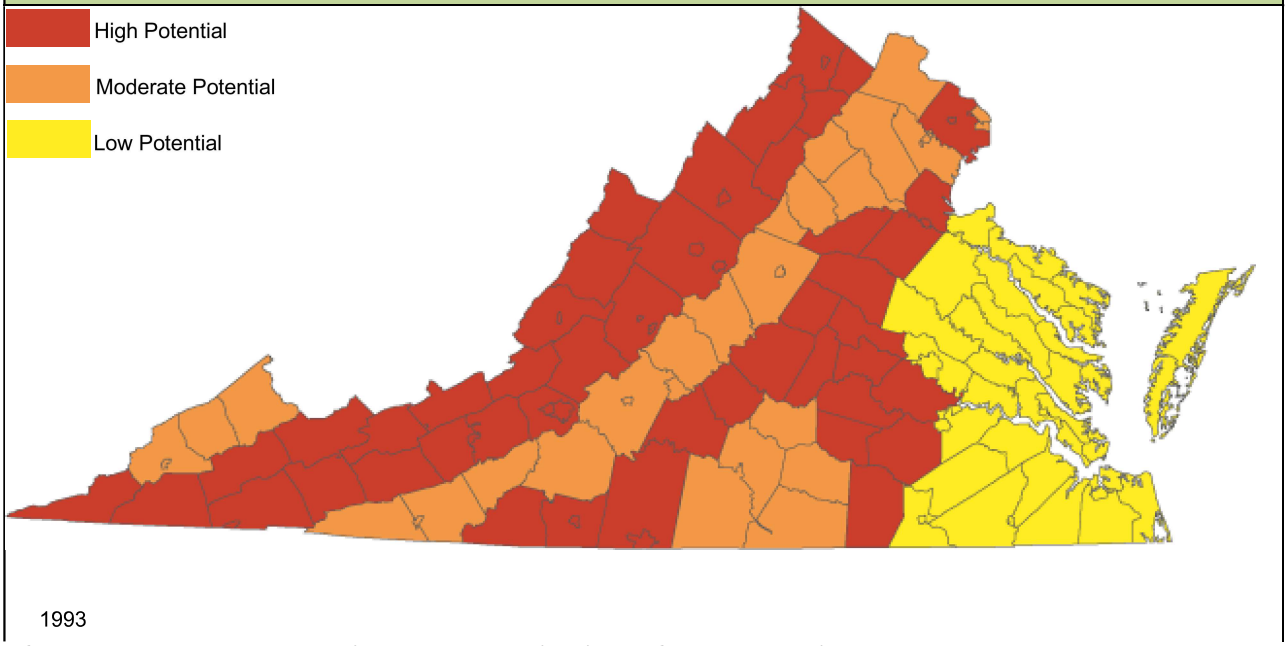
Source: Non-random test results by private business, accessed 2021 online: https://getresults.doctorhomeair.com/fmi/webd/Alpha_ResultsInArea

LOCATION AND SPATIAL EXTENT

The types and distribution of lithologic units and other geologic features in an assessment area are of primary importance in determining radon potential. Rock types that are most likely to cause indoor radon problems include carbonaceous black shales, glauconite bearing sandstones, certain kinds of fluvial sandstones and fluvial sediments, phosphorites, chalk, karst-producing carbonate rocks, certain kinds of glacial deposits, bauxite, uranium-rich granitic rocks, metamorphic rocks of granitic composition, silica-rich volcanic rocks, many sheared or faulted rocks, some coals, and certain kinds of contact metamorphosed rocks. Rock types least likely to cause radon problems include marine quartz sands, non carbonaceous shales and siltstones, certain kinds of clays, silica-poor metamorphic and igneous rocks, and basalts. Uranium and radium are commonly found in heavy minerals, iron-oxide coatings on rock and soil grains, and organic materials in soils and sediments. Less common are uranium associated with phosphate and carbonate complexes in rocks and soils, and uranium minerals.

Figure 4.35 provides the EPA's map of Radon Zones for Virginia, released in 1993. The map is based on an assessment of five factors that are known to be important indicators of radon potential: indoor radon measurements, geology, aerial radioactivity, soil parameters and foundation types.

FIGURE 4.35: U.S. EPA MAP OF RADON ZONES IN VIRGINIA

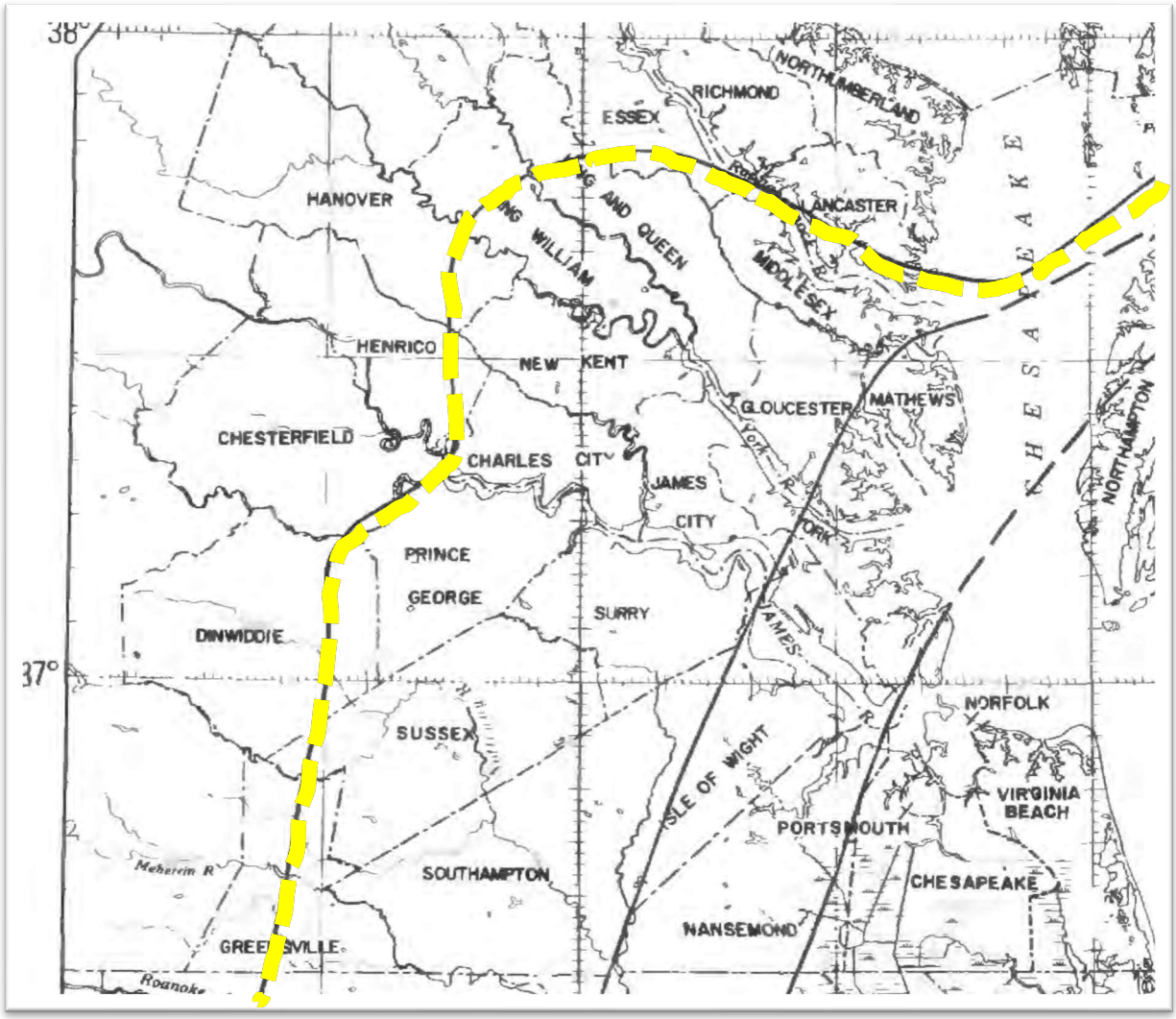


Source: Virginia Department of Energy, as modified from US EPA's Map of Radon Zones, Virginia. Radon Division, Office of Radiation and Indoor Air, September, 1993.

The Coastal Plain of Virginia (see Figure 3.2), includes all of the communities in Hampton Roads and is ranked low in geologic radon potential. In general, the upper Tertiary to Quaternary-aged sediments of the Coastal Plain have low radon potential. However, recent studies of radon potential in the sediments and marine fossils of the Yorktown Formation, a 4 to 5 million-year-old widespread geological unit in the Coastal Plain, could be a source for elevated levels of indoor radon. The Yorktown Formation is a marine unit, meaning the sediments that it is made of were once deposited underwater when sea-level was much higher than it is today (see **Figure 4.36**). It is characterized by shelly, sometimes diatomaceous, locally phosphatic, quartz sand, silt and clay.[19] As a marine unit, it holds whale bones, in particular, that are mixed into the sand/clays. The bones that accumulate in the Yorktown Formation are perhaps able to enrich themselves under certain geochemical conditions with heavy metals that might be in the water. And the high permeability of the sediments allows for radon movement and dispersion. These hypotheses are part of ongoing research at the College of William and Mary.[20] Future updates to this plan should include results of such research, particularly if the findings point to changes in the relative vulnerability presented in Figure 4.35 above.

[19] *US EPA's Map of Radon Zones, Virginia.* Radon Division, Office of Radiation and Indoor Air, September, 1993.
[20] Email exchanges with Anne Witt, Geohazards Specialist, Virginia Department of Mines, Minerals and Energy, Spring 2021.

FIGURE 4.36: WESTERNMOST EXTENT OF THE YORKTOWN FORMATION (YELLOW LINE)



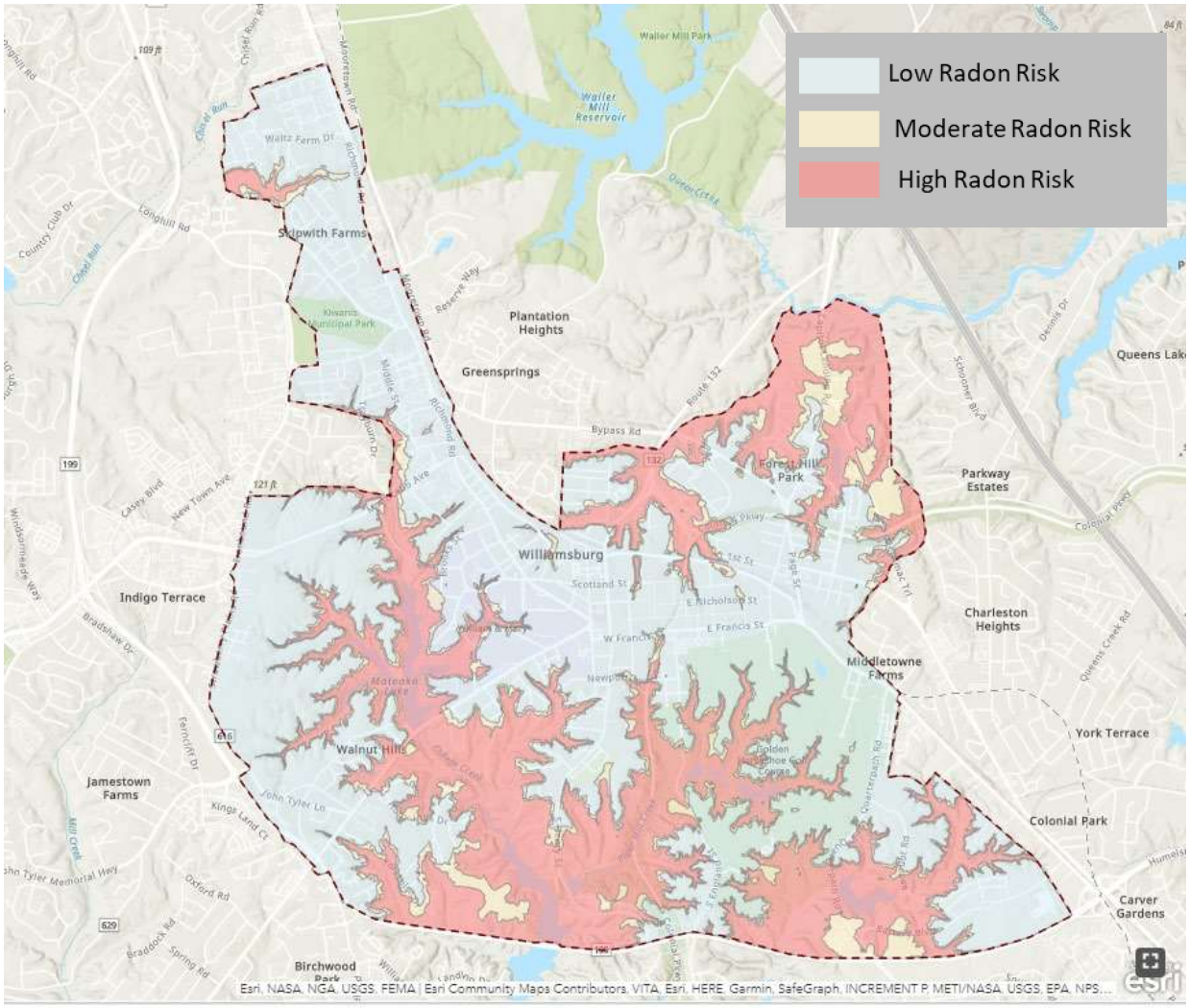
1980

Source: Ward, Lauck W. and Blake W. Blackwelder. Stratigraphic Revision of Upper Miocene and Lower Pliocene Beds of the Chesapeake Group, Middle Atlantic Coastal Plain. Geological Survey Bulletin 1482-D, U.S. Department of the Interior, 1980.

Further analysis by researchers in the Department of Geology at William & Mary has led to the creation of a more detailed map of Williamsburg and the relative radon risk for that community. According to their research, homes built within and slightly above Yorktown sediments may have higher radon levels. In Williamsburg, homes built on ground with adjacent elevations less than 58 feet are predicted to have the highest risk.[21] **Figure 4.37** shows the relative radon risk in Williamsburg.

[21] Berquist, Rick, Jim Kaste, Dorian Miller. ArcGIS Storymap online at: https://storymaps.arcgis.com/stories/10f6d3d7c0014a1087fe3ef14f306520

FIGURE 4.37: RADON RISK IN WILLIAMSBURG



2021

Source: Berquist, Rick, Jim Kaste, Dorian Miller. ArcGIS Storymap online at: https://storymaps.arcgis.com/stories/10f6d3d7c0014a1087fe3ef14f306520

In 1994, an undergraduate student at the College of William & Mary studied radon emittance from the Yorktown Formation[22]. The Yorktown Formation was selected for her study as a possible source of radon because the fossilized bones in the sediments contain uranium-238, a radioactive element that decays to form radon gas. The researcher installed alpha-track radon detectors to determine concentrations of the gas being emitted as a decay product at two sites in the College Woods neighborhood. While the purpose of the study was statistical analysis of the results against previous tests of radon in the Yorktown Formation, the student found that the radon concentrations remained high and are statistically equivalent to other research.

[22] Born, Rebecca Skye. *Radon in Yorktown Formation Sediments and Petersburg Granite, Eastern Virginia.* Undergraduate Thesis, College of William & Mary, April 1994.

VULNERABILITY ASSESSMENT

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2022 UPDATE

Each of the hazards was reviewed and updated to reflect both the revised information obtained for the updated *Hazard Identification and Analysis* section and the most recent modeling and data collection, primarily for flood. Discussion of vulnerability to Sea Level Rise and Land Subsidence has been updated using the region's most well-regarded sources. All hazard names were edited to provide consistency with the *Hazard Identification and Analysis*. Tables were updated to include new data, where available. The hazards were reranked according to new feedback from the committee and to reflect the new color-coded, matrix-based ranking system that graphically demonstrates likelihood versus consequence. The tables at the end of the section regarding Conclusions on Hazard Risk were all updated. Figures were updated to reflect current conditions. In addition, each hazard was assessed for two new components of risk: social vulnerability and the impacts of climate change.

INTRODUCTION

The *Vulnerability Assessment* section builds on the information provided in the *Hazard Identification and Analysis* section by identifying community assets and development trends in the region, then assessing the potential impact and amount of damage (loss of life and/or property) that could be caused by each hazard event addressed in the risk assessment. The primary objective of this level of vulnerability assessment is to prioritize hazards of concern to the region, adding to the foundation for mitigation strategy and policy development. Consistent with the preceding sections, the following hazards are addressed in this assessment:

- FLOODING
- FLOODING DUE TO IMPOUNDMENT FAILURE/HIGH HAZARD DAM
- SEA LEVEL RISE AND LAND SUBSIDENCE
- TROPICAL/COASTAL STORM
- LANDSLIDE/COASTAL EROSION
- TORNADO
- WINTER STORM
- EARTHQUAKE
- WILDFIRE
- DROUGHT
- EXTREME HEAT
- HAZARDOUS MATERIALS INCIDENT
- PANDEMIC FLU OR COMMUNICABLE DISEASE
- RADON EXPOSURE

To complete the vulnerability assessment, best available data were collected from a variety of sources, including local, state and federal agencies, and multiple analyses were applied through qualitative and quantitative means (further described below). Additional work will be done on an ongoing basis to enhance, expand, and further improve the accuracy of the baseline results, and it is expected that this vulnerability assessment will continue to be refined through future plan updates as new data and loss estimation methods become available.

The findings presented in this section with regard to vulnerability were developed using best available data, and the methods applied have resulted in an approximation of risk. These estimates should be used to understand relative hazard risk and the potential losses that may be incurred; however, uncertainties are inherent in any loss estimation methodology, arising from incomplete knowledge concerning specific hazards and their effect on the built environment, as well as incomplete data sets and from approximations and simplifications that are necessary in order to provide a meaningful analysis. Further, most data sets contain relatively short periods of record which increases the uncertainty of any statistically-based analysis.

METHODOLOGIES USED

Two distinct risk assessment methodologies were used in the formation of this vulnerability assessment. The first consists of a ***quantitative*** analysis that relies upon best available data and technology, while the second approach consists of a somewhat ***qualitative*** analysis that relies on the local knowledge and rational decision making skills of local officials. Upon completion, the methods are combined to create a

"hybrid" approach for assessing hazard vulnerability for the region that allows for some degree of quality control and assurance. The methodologies are briefly described and introduced here and are further illustrated throughout this section.

QUANTITATIVE METHODOLOGY

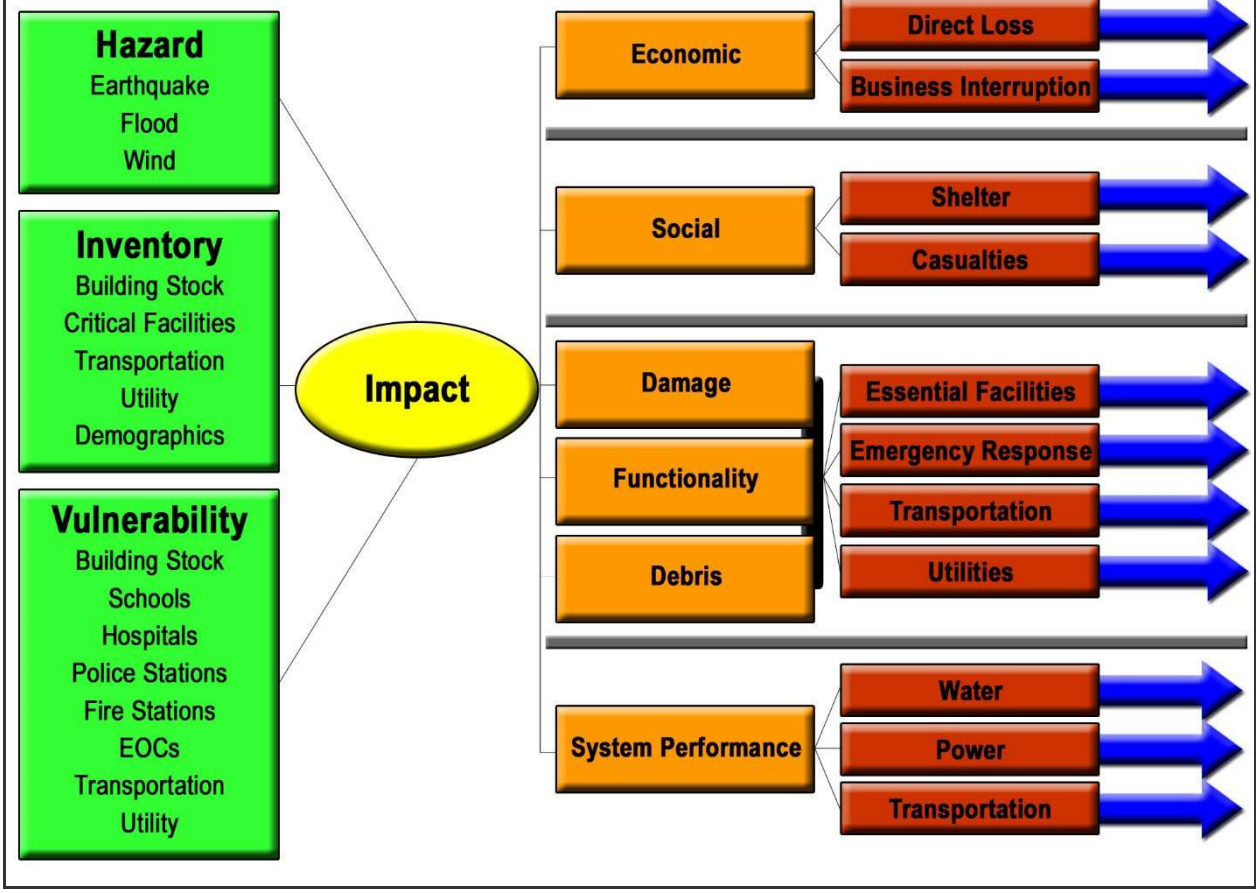
The quantitative assessment involved the use of the most recent version of Hazards U.S. Multi-Hazard (Hazus) software, a geographic information system (GIS)-based loss estimation tool available from FEMA, along with a statistical risk assessment methodology for hazards outside the scope of Hazus. For the flood hazard, the quantitative assessment incorporates a detailed GIS-based approach. When combined, the results of these vulnerability studies are used to form an assessment of potential hazard losses (in dollars) along with the identification of specific community assets that are deemed at-risk.

Explanation of Hazus and Statistical Risk Assessment Methodology

Hazus is FEMA's standardized loss estimation software package, built on an integrated GIS platform using a national inventory of baseline geographic data (including information on the region's general building stock and dollar exposure). Originally designed for the analysis of earthquake risks, FEMA expanded the program in 2003 to allow for the analysis of multiple hazards: namely the flood and wind (hurricane wind) hazards. By providing estimates on potential losses, Hazus facilitates quantitative comparisons between hazards and assists in the prioritization of hazard mitigation activities.

Hazus uses a statistical approach and mathematical modeling of risk to predict a hazard's frequency of occurrence and estimated impacts based on recorded or historic damage information. The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters—such as wind speed and building type—were modeled using the Hazus software to determine the impact on the built environment. **Figure 5.1** shows a conceptual model of Hazus methodology. More information on Hazus loss estimation methodology is available through FEMA at www.fema.gov/hazus.

FIGURE 5.1: CONCEPTUAL MODEL OF HAZUS METHODOLOGY



Source: FEMA

This risk assessment used Hazus to produce regional profiles and estimated losses for three of the hazards addressed in this section: flooding, tropical/coastal storm winds, and earthquake. For each of these hazards, Hazus was used to generate probabilistic "worst case scenario" events to show the extent of potential damages. Both earthquake and wind were modeled using Hazus Level 1 and flood was modeled using Hazus Level 2.

Explanation of GIS-based (Non-HAZUSMH) Risk Assessment Methodology

For hazards outside the scope of Hazus, a statistical risk assessment methodology was designed and in previous plans, this method was applied to generate potential loss estimates. The approach was based on the same principles as Hazus, but did not rely on readily available automated software. Historical data were compiled for each hazard to relate occurrence patterns with existing hazard models. Statistical evaluations were then applied to generate annualized losses.

The use of the statistical risk assessment methodology was used in previous plans to provide a determination of estimated annualized loss[1] for several hazards. However, in recent years, the historical data from which these conclusions were made have become less reliable. For example, damages for wildfire were not reported for two recent reporting periods, and the communities reviewing the historical damage data from the NCEI expressed concern that the damages were severely underestimated. Until

[1] By annualizing estimated losses, the historic patterns of frequent smaller events are coupled with infrequent but larger events to provide a balanced presentation of the long-term risk.

more reliable historical damage data can be provided, planners determined that a qualitative methodology for examining historical losses and making conclusions about future risk was needed as shown below to supplement the quantitative analysis.

Despite the shortcomings of certain historical data, this analysis included collection of and updates to relevant GIS data from local, state and national sources. These sources include each community's GIS department, FEMA, VDOF, and NOAA. Once all data were acquired, GIS was used to demonstrate and spatially analyze risks to people, public buildings and infrastructure. Primary data layers included geo-referenced point locations for public buildings, critical facilities, and infrastructure elements. Using these data layers, risk was assessed and described by determining the parcels and/or point locations that intersected with the delineated hazard areas.

QUALITATIVE METHODOLOGY

The qualitative assessment relies less on technology and more on historical and anecdotal data, community input, and professional judgment regarding expected hazard impacts. The group used a scoring matrix to summarize risk by placing each hazard in a color-coded graph that ranks hazards individually by consequence on the y-axis and likelihood on the x-axis. Risk level ranking was based on historical and anecdotal data, as well as input from committee members. This ranking was done collaboratively in Workshop #1 for each hazard; results are found at the end of this section.

While the quantitative assessment focuses on using best available data, computer models and GIS technology, this qualitative ranking system relies more on historical data, local knowledge, and the general consensus of the planning committee. The results allow identified hazards to be ranked against one another.

SOCIAL VULNERABILITY ANALYSIS

The National Risk Index (NRI) is a relatively new dataset and online application from FEMA that identifies communities most at risk to various natural hazards. For each of the 18 natural hazards explored in the NRI, risk is calculated by multiplying each hazard's expected annual losses by social vulnerability (a consequence enhancing component of risk that measures the susceptibility of social groups to the adverse impacts of natural hazards) and dividing by community resilience (a consequence reduction component of risk that measures the ability of a community to plan for, absorb, recover from and adapt to the impacts of hazards). In other words:

Risk = Expected Annual Loss x Social Vulnerability x (1/Community Resilience)

In the risk equation, each component is represented by a unitless index score that depicts a community's score relative to all other communities at the same level. The Risk Index score is a unitless index and represents a community's relative risk in comparison to all other communities at the same level. All calculations are performed separately at two levels—County and Census tract—so scores are relative only within their level. It must be stressed that scores are relative, representing a community's relative position among all other communities for a given component and level. Scores are not absolute measurements and should be expected to change over time either by their own changing measurements or changes in other communities.

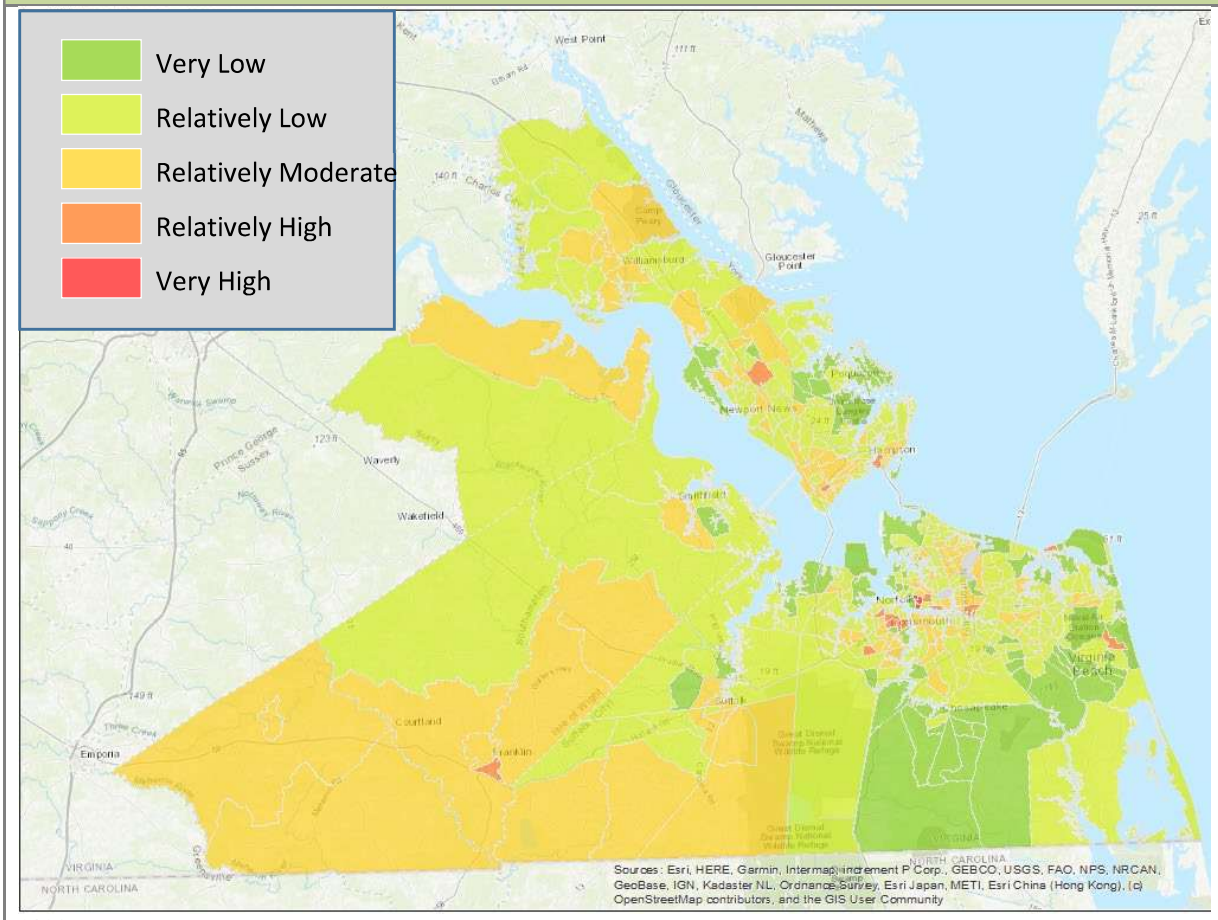
For every score, there is also a qualitative rating that describes the nature of a community's score in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Because all ratings are relative, there are no specific numeric values that determine the rating. For example, a community's Risk Index score for a single hazard could be 8.9 with a rating of "Relatively Low," but its Social Vulnerability score may be 11.3 with a rating of "Very Low." The rating is intended to classify a community for a specific component in relation to all other communities at the same level.

Source data for the social vulnerability component are derived from the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI) Social Vulnerability Index (SoVI). SoVI is a location-specific assessment of social vulnerability that utilizes 29 socioeconomic variables that contribute to a community's reduced ability to prepare for, respond to, and recover from hazards:

Median gross rent for renter-occupied housing units
Median age
Median dollar value of owner-occupied housing units
Per capita income
Average number of people per household
% population under 5 years or age 65 and over
% civilian labor force unemployed
% population over 25 with <12 years of education
% children living in married couple families
% female
% female participation in the labor force
% households receiving Social Security benefits
% unoccupied housing units
% families with female-headed households with no spouse present
% population speaking English as second language (with limited English proficiency)
% Asian population
% African American (Black) population
% Hispanic population
% population living in mobile homes
% Native American population
% housing units with no car available
% population living in nursing facilities
% persons living in poverty
% renter-occupied housing units
% families earning more than $200,000 income per year
% employment in service occupations
% employment in extractive industries (e.g., farming)
% population without health insurance (County SoVI only)
Community hospitals per capita (County SoVI only)

Figure 5.2 maps the foundational social vulnerability using the factors above, without analysis of resilience or loss data for a particular hazard. This map is used to interpret social vulnerability for hazards not specifically addressed in the NRI such as Flooding Due to Impoundment Failure/High Hazard Dam. The map data are also used to rate mitigation actions for those hazards. This plan uses the full NRI dataset to produce maps of relative social vulnerability to several of the prominent natural hazards, including: flooding, tropical/coastal storms, and tornadoes.

FIGURE 5.2: RELATIVE SOCIAL VULNERABILITY IN THE STUDY AREA



2021

Source: FEMA and SoVI, 2021

SUMMARY

Using both the qualitative and quantitative analyses to evaluate the hazards that impact the region provided planning committee members with a dual-faceted review of the hazards. This allowed officials to recognize those hazards that may potentially be costly, but also to plan and prepare for hazards that may not cause much monetary damage, but could put a strain on the local resources needed to recover.

All conclusions of the vulnerability assessment completed for the region are presented in "Conclusions on Hazard Risk" at the end of this section. Qualitative findings for each hazard are detailed in the hazard-by-hazard vulnerability assessment that follows, beginning with an overview of general asset inventory and exposure data for each jurisdiction.

OVERVIEW OF VULNERABILITY

GENERAL ASSET INVENTORY

The total dollar exposure of buildings within the study area is estimated to be over $204 billion. This figure is based on an estimated 560,000 buildings located throughout the region based on the HAZUS default inventory (**Table 5.1**). The data provide an estimate of the aggregated replacement value for the region's assets and indicate that at least 60 percent of the structures are of wood construction.

TABLE 5.1: EXPOSURE OF THE BUILT ENVIRONMENT

SUBREGION	COMMUNITY	BUILDING INVENTORY BY TYPE OF CONSTRUCTION			
		WOOD	MANUFACTURED HOMES	MASONRY, CONCRETE, STEEL	TOTAL
Peninsula	Hampton	$9,758,587,000	$40,526,000	$6,003,186,000	$15,802,299,000
	Newport News	$12,425,313,000	$109,107,000	$8,710,073,000	$21,244,493,000
	Poquoson	$1,220,563,000	$8,625,000	$527,619,000	$1,756,807,000
	Williamsburg	$975,728,000	$0	$1,044,932,000	$2,020,660,000
	James City County	$7,292,959,000	$71,375,000	$3,881,678,000	$11,246,012,000
	York County	$6,449,455,000	$18,669,000	$3,220,222,000	$9,688,346,000
Southside	Norfolk	$14,517,438,000	$33,010,000	$14,710,171,000	$29,260,619,000
	Portsmouth	$6,019,526,000	$16,861,000	$3,927,817,000	$9,964,204,000
	Suffolk	$6,570,498,000	$55,335,000	$3,526,244,000	$10,152,077,000
	Virginia Beach	$36,520,390,000	$89,026,000	$20,584,308,000	$57,193,724,000
	Chesapeake	$17,861,554,000	$106,931,000	$9,915,247,000	$27,883,732,000
Western Tidewater	Isle of Wight County	$2,857,414,000	$95,999,000	$1,611,477,000	$4,564,890,000
	Franklin	$525,235,000	$0	$422,564,000	$947,799,000
	Southampton County	$1,138,139,000	$57,923,000	$687,433,000	$1,883,495,000
	Surry County	$509,304,000	$26,917,000	$259,858,000	$796,079,000
TOTAL		**$124,642,103,000**	**$730,304,000**	**$79,032,829,000**	**$204,405,236,000**

Source: Hazus

ESSENTIAL FACILITIES

There is no universally accepted definition of what constitutes essential facilities and infrastructure, nor is one associated with FEMA and DMA 2000 planning requirements. However, for purposes of this Plan, essential facilities and infrastructure are identified as "*those facilities or systems whose incapacity or destruction would present an immediate threat to life, public health, and safety or have a debilitating effect on the economic security of the region.*" The data source for this update was Hazus, which provides a consistent set of facility types across the study area, and is publicly accessible. This typically includes the following facilities and systems based on their high relative importance for the delivery of vital services, the protection of special populations, and other important functions in the region:

- Emergency Operations Center (EOC)
- Hospital and medical care facilities
- Police stations and fire stations
- Public schools designated as shelters
- Hazardous materials facilities
- Water (and wastewater) facilities
- Energy facilities (electric, oil and natural gas)
- Communication facilities

Table 5.2 shows the results of an overlay analysis of the essential facilities that are located in the 100-year floodplain, 500-year floodplain, and the Storm Surge Zone for a Category 3 hurricane. Many of these facilities are addressed in the Mitigation Action Plan, through targeted mitigation actions, or more generalized actions calling for additional study and analysis of the building plans and future vulnerability of these facilities.

TABLE 5.2: CRITICAL FACILITIES LOCATED IN HAZARD AREAS

SUBREGION	COMMUNITY	FLOOD WAY	100-YEAR FLOODPLAIN	500-YEAR FLOODPLAIN	STORM SURGE ZONE
Peninsula	Hampton		4 fire (inc. 2 LAFB), 5 schools	EOC, 3 fire (inc. 1 FMA), 1 police, 8 schools	17 hazmat, 2 EOCs, 14 fire (inc. LAFB & FMA), 3 medical, 6 police, 54 schools (inc. LAFB)
	Newport News		2 hazmat, 1 fire (Eustis)	2 medical, 1 school	16 hazmat, 4 fire (inc. Eustis), 2 medical, 2 police, 17 schools
	Poquoson		EOC, 1 fire, 1 police, 1 school	1 fire, 1 school	EOC, 2 fire, 1 police, 4 schools
	York County		1 fire		28 hazmat, 2 fire, 1 school
Southside	Norfolk		10 hazmat, 2 fire, 6 schools	4 fire, 2 medical, 4 police, 14 schools	30 hazmat, EOC, 20 fire, 8 medical, 9 police, 103 schools
	Portsmouth		EOC, 14 hazmat, 2 fire, 2 police	1 hazmat, 1 fire, 1 medical, 4 schools	15 hazmat, EOC, 9 fire, 2 medical, 2 police, 39 schools
	Suffolk				9 hazmat, 1 fire, 1 medical, 8 schools
	Virginia Beach		2 fire	4 schools	3 hazmat, EOC, 21 fire (inc. Ft Story), 1 medical, 4 police, 117 schools
	Chesapeake		29 hazmat, 3 fire, 4 schools	4 hazmat, 5 schools	59 hazmat, EOC, 10 fire, 5 police, 52 schools
	Franklin	22 hazmat	34 hazmat, 1 fire		
	Southampton County	EOC, 1 police			
	Town of Courtland		EOC, 1 police	4 hazmat, 1 police, 1 school	
REGION TOTAL		**24**	**129**	**68**	**537**

FLOODING

The vulnerability assessment for the flood hazard includes the findings of the qualitative assessment conducted, an overview of NFIP statistics, repetitive loss properties (as defined and identified by the NFIP), estimates of potential losses, and future vulnerability.

As described in detail in the *Hazard Identification and Analysis* section, the NCEI has records for 87 significant flood events in the past 25 years (1995 to 2020) for the region, amounting to approximately $190 million in reported property damage. Also discussed in the *Hazard Identification and Analysis* are historic storms such as Hurricanes Isabel, Floyd and the 1933 hurricane that each caused notable flooding in the region. Historically, Hampton Roads is vulnerable to the flood hazard and flood events, which occur on a frequent basis.

NFIP STATISTICS AND REPETITIVE LOSS PROPERTIES

Table 5.3 provides basic background information regarding the communities in the study area that participate in the NFIP. As shown in Table 5.3, the communities in the Hampton Roads region joined the NFIP throughout the 1970s, 1980s and into the 1990s. In order to join the NFIP, each participating jurisdiction is required to adopt and enforce its own floodplain management ordinance. As a result, structures built after joining the NFIP are assumed to be less vulnerable to flood hazards than those built prior to joining, assuming other environmental conditions remain constant.

The towns of Capron, Dendron and Newsoms do not participate in the NFIP. The Town of Capron, in Southampton County, is located approximately 2 miles from the nearest SFHA of Three Creek. The southern and eastern parts of the Town of Dendron in Surry County are mapped SFHA; however, the town was suspended from the NFIP in December, 1992. Upon closer examination in the VFRIS, there do not appear to be any structures in the SFHA of Dendron. Although a very small portion of Newsoms is mapped in the SFHA, town leadership has chosen not to participate in the NFIP despite numerous entreaties from State officials since the original Flood Hazard Boundary Map for the area was issued in 1977. Using VFRIS, there appears to be one structure in the SFHA of Darden Mill Run, near Old Chapel Road.

TABLE 5.3: NFIP DATA FOR PARTICIPATING COMMUNITIES

SUBREGION	COMMUNITY	NFIP ENTRY DATE	CURRENT EFFECTIVE FIRM DATE
Peninsula	Hampton	1/15/1971	5/16/16
	Newport News	5/2/1977	12/9/2014
	Poquoson	5/16/1977	12/16/2014
	Williamsburg	11/20/1981	12/16/15
	James City County	2/6/1991	12/16/2015
	York County	12/16/1988	1/16/2015
Southside	Norfolk	8/1/1979	12/17/17
	Portsmouth	7/2/1971	8/3/2015
	Suffolk	11/16/1990	8/3/2015
	Virginia Beach	4/23/1971	1/16/2015
	Chesapeake	2/2/1977	12/16/2014
Western Tidewater	Isle of Wight County	8/19/1991	12/2/2015
	Smithfield	12/5/1990	12/2/2015
	Windsor	8/1/1990	12/2/15
	Franklin	8/15/1980	9/4/2002
	Southampton County	12/15/1982	9/4/2002
	Boykins	4/1/1982	9/4/2002
	Branchville	3/30/1979	9/4/2002
	Courtland	7/5/1982	9/4/2002
	Ivor	11/4/2002	No special flood hazard area identified
	Surry County	11/02/1990	05/04/2015
	Claremont	10/16/1990	05/04/2015

Source: NFIP Community Status Book, May 19, 2021

Table 5.4 provides more detailed information on the number of flood insurance policies and the value of those policies for NFIP-participating communities in the study area, as well as the change in policy number and coverage since 2015.

TABLE 5.4: NFIP POLICY DATA FOR PARTICIPATING COMMUNITIES

SUBREGION	COMMUNITY	POLICIES IN FORCE 2015	POLICIES IN FORCE 2021 (PERCENT CHANGE)	INSURANCE IN FORCE 2015	INSURANCE IN FORCE 2021 (PERCENT CHANGE)	TOTAL CLAIMS 1978-2021	TOTAL CLAIM PAYMENTS 1978-2021
Peninsula	Hampton	11,076	9,972 (-10%)	$2,752,401,900	$2,646,416,900 (-4%)	5,775	$74,750,291
	Newport News	2,515	1,853 (-26%)	$627,732,100	$518,802,300 (-17%)	1,026	$23,139,496
	Poquoson	3,310	3,168 (-4%)	$877,069,600	$886,785,200 (1%)	4,217	$71,678,445
	Williamsburg	47	41 (-13%)	$11,971,100	$12,761,400 (7%)	18	$118,850
	James City County	1,006	960 (-5%)	$275,598,300	$282,972,600 (3%)	359	$6,310,238
	York County	3,394	3,134 (-8%)	$980,284,400	$945,982,400 (-3%)	1,567	$33,851,809
Southside	Norfolk	12,324	11,804 (-4%)	$3,203,123,000	$3,282,155,900 (2%)	5,962	$68,344,791
	Portsmouth	3,618	3,935 (9%)	$884,828,100	$999,844,500 (13%)	1,704	$19,769,707
	Suffolk	943	1,002 (6%)	$280,794,800	$316,318,300 (13%)	223	$5,069,727
	Virginia Beach	24,200	23,636 (-2%)	$6,453,533,800	$6,776,920,000 (5%)	6,182	$103,426,658
	Chesapeake	8,841	8,714 (-1%)	$2,383,084,100	$2,511,538,200 (5%)	2,570	$27,028,316
Western Tidewater	Isle of Wight County	397	323 (-19%)	$116,904,100	$100,242,300 (-14%)	149	$4,724,311
	Smithfield	108	85 (-21%)	$32,979,900	$26,319,200 (-20%)	42	$608,217
	Windsor	6	6 (0%)	$1,204,000	$1,715,000 (42%)	0	$0
	Franklin	148	106 (-28%)	$39,465,400	$31,938,100 (-19%)	103	$5,312,419
	Southampton County	127	126 (-1%)	$26,582,600	$27,916,700 (5%)	78	$2,974,777
	Boykins	7	6 (-14%)	$1,901,500	$1,723,800 (-9%)	0	$0
	Branchville	0	0 (0%)	$0	$0 (0%)	0	$0
	Courtland	20	23 (15%)	$5,822,600	$7,828, 800 (34%)	5	$39,366
	Ivor	1	0 (-100%)	$350,000	$0 (-100%)	0	$0
	Surry County	25	27 (8%)	$7,135,400	$7,651,000 (7%)	45	$1,488,980
	Claremont	16	18 (13%)	$4,319,800	$4,279,900 (-1)%	38	$1,273,693

Source: NFIP data dated April 30, 2015 and April 13, 2021.

Reducing the number of repetitive loss (RL) properties insured by the NFIP is a nationwide emphasis of FEMA. The NFIP defines an RL as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978.[2] A repetitive loss property may or may not be currently insured by the NFIP. Per NFIP data provided by the Virginia Department of Conservation and Recreation in June 2015 and some additional data provided by FEMA for some communities, a total of 4,832 RL properties as defined by the NFIP have been identified within the study area communities. These properties have experienced a total of $148 million individual insured losses for the structure and contents combined. The average payment for each qualifying claim was $10,900. In 2015, there were 4,408 residential properties (98 percent) and 106 non-residential properties on the list; that ratio is presumed to be applicable now but the data were not available to verify.

The NFIP also designates severe repetitive losses (SRL) in a community. As defined by the Flood Insurance Reform Act of 2004, SRLs are 1- to 4-family residences that have had four or more claims of more than $5,000 or at least two claims that cumulatively exceed the building's value. The Act created new funding mechanisms to help mitigate flood damage for these properties. The study area communities have 502 SRL properties identified by the NFIP, with a total of 1,621 losses. Total payments for these 502 properties were over $39 million. **Table 5.5a** provides summary details for the communities with regard to each community's repetitive losses. The number of residential versus commercial repetitive loss properties is similar to those ratios in the previous hazard mitigation plan.

TABLE 5.5a: NFIP REPETITIVE LOSS PROPERTIES

REGION	COMMUNITY	REPETITIVE FLOOD LOSSES			
		NUMBER OF PROPERTIES	VALUE OF LOSSES	NUMBER OF LOSSES	AVERAGE PAYMENT PER CLAIM
Peninsula	Hampton (2015)	936	$48,166,174	2,541	$18,956
		SEVERE REPETITIVE FLOOD LOSSES			
		70	$10,407,881	365	$28,515
	Newport News (2015)	121	$13,037,268	294	$44,344
		SEVERE REPETITIVE FLOOD LOSSES			
		3	$189,943	11	$17,268
	Poquoson (2021)	795	Not provided	2,466	Not provided
		SEVERE REPETITIVE FLOOD LOSSES			
		204	Not provided	Not provided	Not provided
	Williamsburg (2015)	4*	$104,271	9	$11,586
	James City County	35	$2,345,563	95	$24,690
		SEVERE REPETITIVE FLOOD LOSSES			
		2	$146,768	8	$18,346
	York County (2015)	236	$15,330,549	560	$27,376
		SEVERE REPETITIVE FLOOD LOSSES			
		11	$1,772,861	50	$35,457
Southside	Norfolk (2020)	942	$32,321,814	2,217	$14,440
		SEVERE REPETITIVE FLOOD LOSSES			
		95	$11,988,043	533	$22,949
	Portsmouth (2015)	229	$10,009,951	631	$15,864
		SEVERE REPETITIVE FLOOD LOSSES			
		16	$2,070,120	86	$24,071

[2] The FEMA Hazard Mitigation Assistance Program defines RL as having incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and, at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

TABLE 5.5a: NFIP REPETITIVE LOSS PROPERTIES					
REGION	COMMUNITY	REPETITIVE FLOOD LOSSES			
		NUMBER OF PROPERTIES	VALUE OF LOSSES	NUMBER OF LOSSES	AVERAGE PAYMENT PER CLAIM
	Suffolk (2015)	17	$2,285,818	50	$45,716
	Virginia Beach (2015)	574	$34,205,856	1,768	$19,347
		SEVERE REPETITIVE FLOOD LOSSES			
		62	$8,673,919	361	$24,027
	Chesapeake (2015)	395	$19,611,525	1,214	$16,154
		SEVERE REPETITIVE FLOOD LOSSES			
		37	$3,523,288	199	$17,705
Western Tidewater	Isle of Wight County (2015)	23	$1,584,416	60	$26,407
	Smithfield (2015)	3	$71,418	7	$10,203
	Franklin (2015)	6	$686,165	12	$57,180
	Southampton County (2015)	9	$557,595	19	$29,347
	Surry County (2021)	5	$578,071	14	$41,291
		SEVERE REPETITIVE FLOOD LOSSES			
		2	$297,572	8	$34,947
Totals		4,832	$148,165,583	13,578	$626,186

** Williamsburg officials have conducted additional research into these data and contend the data do not represent a pattern of repetitive overland flooding.*
Sources: FEMA and NFIP

In May 2022, FEMA provided additional data regarding repetitive losses in the study area. These data are not reflected in the planning process or the repetitive loss area mapping below, but may prove useful for the region's communities in future repetitive loss planning. The data are shown in **Table 5.5b**.

TABLE 5.5b: 2022 NFIP REPETITIVE FLOOD LOSSES			
SUBREGION	**COMMUNITY**	**REPETITIVE FLOOD LOSS PROPERTIES**	**SEVERE REPETITIVE FLOOD LOSS PROPERTIES**
Peninsula	Hampton	956	109
	Newport News	129	10
	Poquoson	983	50
	Williamsburg	3	0
	James City County	37	4
	York County	245	15
Southside	Norfolk	977	125
	Portsmouth	255	27
	Suffolk	24	3
	Virginia Beach	676	128
	Chesapeake	420	78
Western Tidewater	Isle of Wight County	23	5
	Smithfield	6	1
	Windsor	0	0
	Franklin	7	1
	Southampton County	8	2
	Boykins	0	0
	Branchville	0	0
	Capron	0	0
	Courtland	0	0
	Ivor	0	0
	Newsoms	0	0
	Surry County	6	2
	Claremont	4	3
	Dendron	0	0
Total		4,759	563

Figures 5.3 through 5.11 contain maps of the region's repetitive loss areas. Each designated area was identified by referencing maps of all historical NFIP flood claims, NFIP RL lists, the SRL list, a Digital Elevation Model (DEM)-based depth grid of the 100-year floodplain, and the HAZUS results regarding predicted flood damages from a 100-year flood for individual structures. As shown in Table 5.5, there are 4,514 properties on FEMA's repetitive loss list and an additional 55,179 parcels identified as being within those repetitive loss areas. Other structures near the ones listed by the NFIP may have been uninsured during the floods, may have had single flood insurance claims, or may have had multiple claims under different policies that the claims system did not recognize as being the same repetitively flooded address. **Table 5.6** provides additional detail regarding the repetitive loss areas identified for each community.

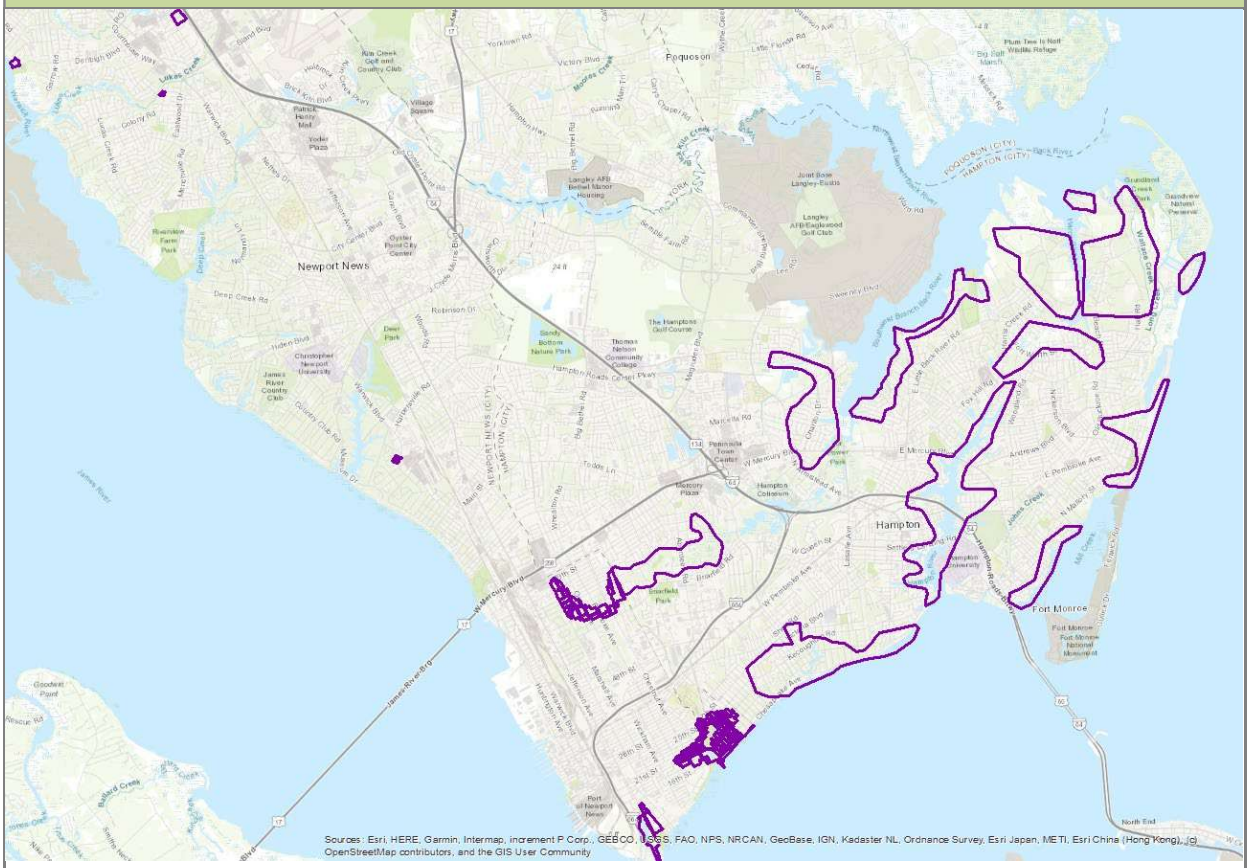
TABLE 5.6: REPETITIVE FLOOD LOSS AREA DETAILS

REGION	COMMUNITY	REPETITIVE FLOOD LOSS AREAS		
		NUMBER OF RL AREAS	NUMBER OF PROPERTIES OR BUILDINGS	SOURCES OF FLOODING
Peninsula	Hampton	12	7,736	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms. Newmarket Creek overflows banks during coastal storms and heavy rains. Wind driven storm tides drive water into smaller tributaries and flood low-lying areas. Along Chesapeake Bay, wind and wave velocity, coastal flooding and overwash during coastal storms causes damage.
	Newport News	8	1,662	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms. Newmarket Creek overflows banks during coastal storms and heavy rains. Wind driven storm tides drive water into smaller tributaries and flood low-lying areas. Along James River, wind and wave velocity, coastal flooding and overwash during coastal storms causes damage.
	Poquoson	1	4,810	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms.
	James City County	10	643	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms. Stormwater drainage from heavy rains cause flooding in some riverine watersheds.
	York County	20	1,681	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms.
Southside	Norfolk	114	8,764	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms. Stormwater drainage from heavy rains cause flooding in some riverine watersheds. Tidal inundation of stormwater system increases flooding in some neighborhoods.
	Portsmouth	25 maps	1,974	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms. Stormwater drainage from heavy rains cause flooding in some riverine watersheds. Tidal inundation of stormwater system increases flooding in some neighborhoods. Seawall damaged.
	Suffolk	12	81	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms.

TABLE 5.6: REPETITIVE FLOOD LOSS AREA DETAILS

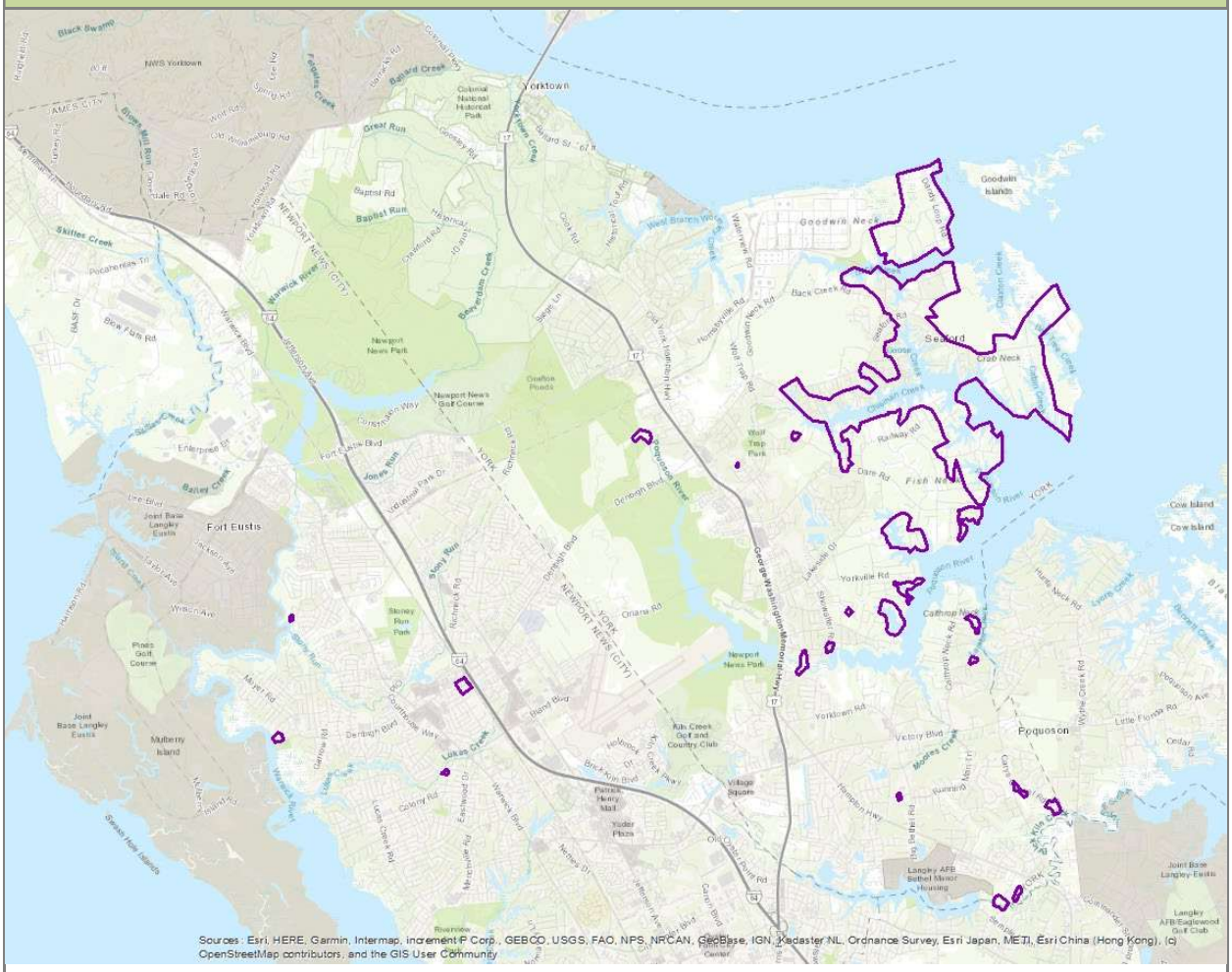
REGION	COMMUNITY	REPETITIVE FLOOD LOSS AREAS		
		NUMBER OF RL AREAS	NUMBER OF PROPERTIES OR BUILDINGS	SOURCES OF FLOODING
	Virginia Beach	156	3,888	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms. Stormwater drainage from heavy rains cause flooding in some riverine watersheds. Tidal inundation of stormwater system increases flooding in some neighborhoods.
	Chesapeake	62	3,869	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms. Flat terrain hinders stormwater
Western Tidewater	Isle of Wight County	13	151	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms.
	Smithfield	1	45	Low-lying land along the banks of tidal rivers and creeks are regularly inundated by nor'easters and tropical storms.
	Franklin	2	462	Blackwater River overflows its banks and tributary banks as a result of heavy rain in the upper parts of the watershed causing severe flooding in the downtown area.
	Southampton County	4	74	The Blackwater and Nottoway River systems overflow their banks as a result of heavy rain in the watershed, causing pockets of flooding especially where tributaries flow into main rivers.
	Surry County	4	89	Low-lying land along the banks of the James River cause much of the repetitive flooding near Pleasant Point and the Jamestown-Scotland Ferry Terminal. A low-lying area near Claremont is outside the SFHA, but experiences urban flooding when infrastructure cannot carry stormwater away from structures. Another area near Dendron experiences flooding within and beyond the SFHA of the nearby Cypress Swamp.
Totals		419	39,098	

FIGURE 5.3: NFIP REPETITIVE FLOOD LOSS AREAS, LOWER PENINSULA



**Poquoson designated entire SFHA as repetitive loss area. See Figure 4.1.*

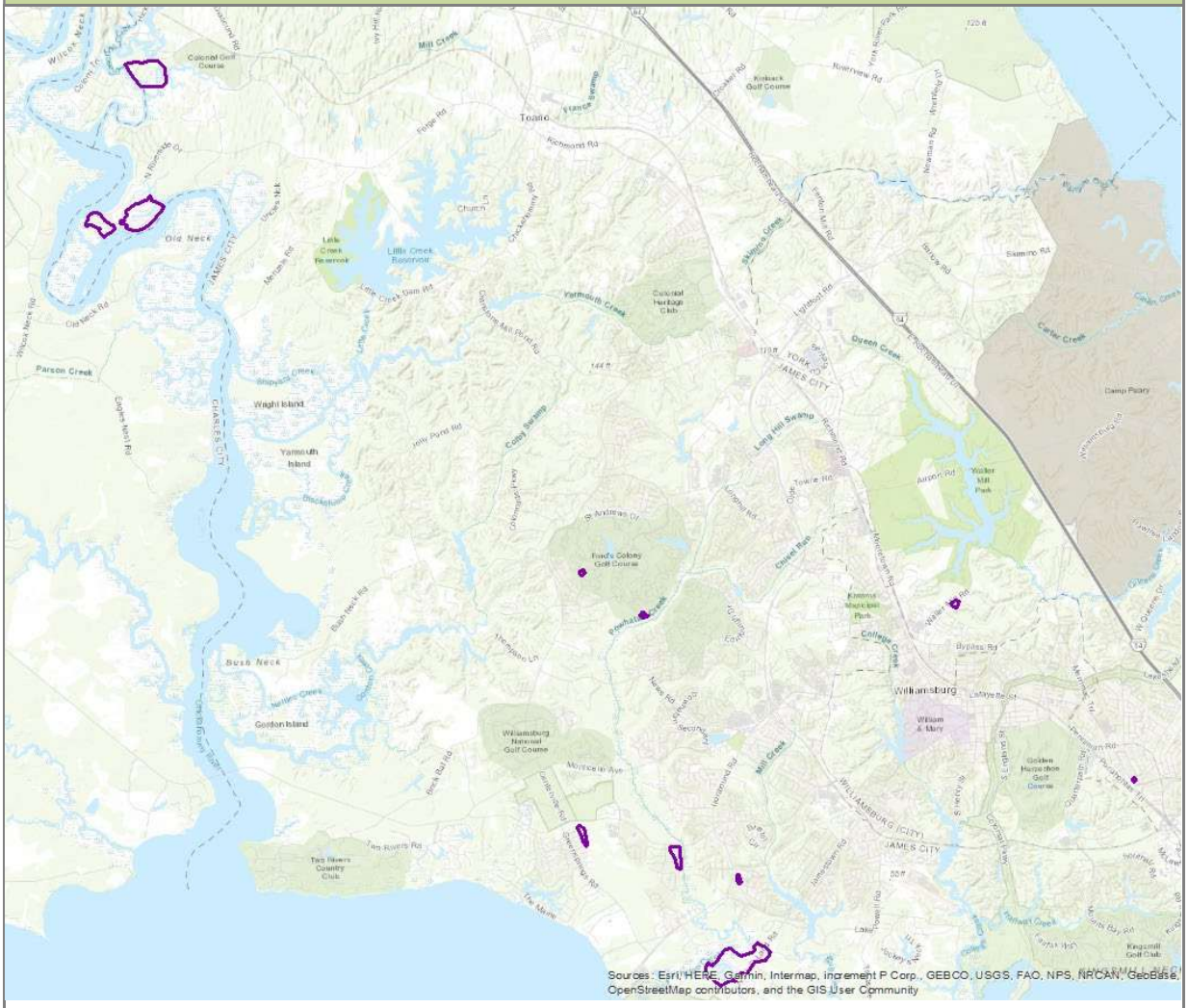
FIGURE 5.4: NFIP REPETITIVE FLOOD LOSS AREAS, MIDDLE PENINSULA



Repetitive Loss Areas

2021

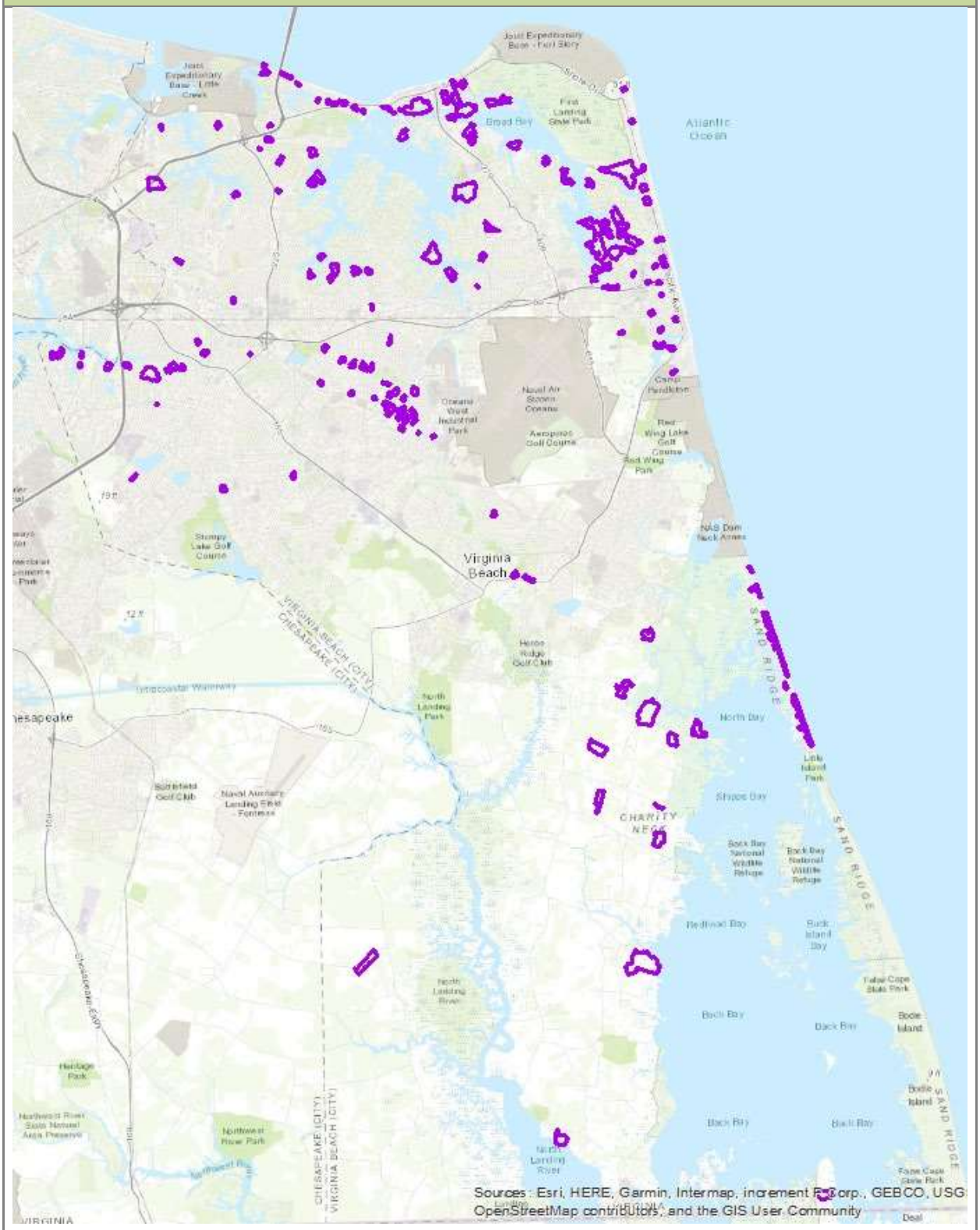
FIGURE 5.5: NFIP REPETITIVE FLOOD LOSS AREAS, UPPER PENINSULA



Repetitive Loss Areas

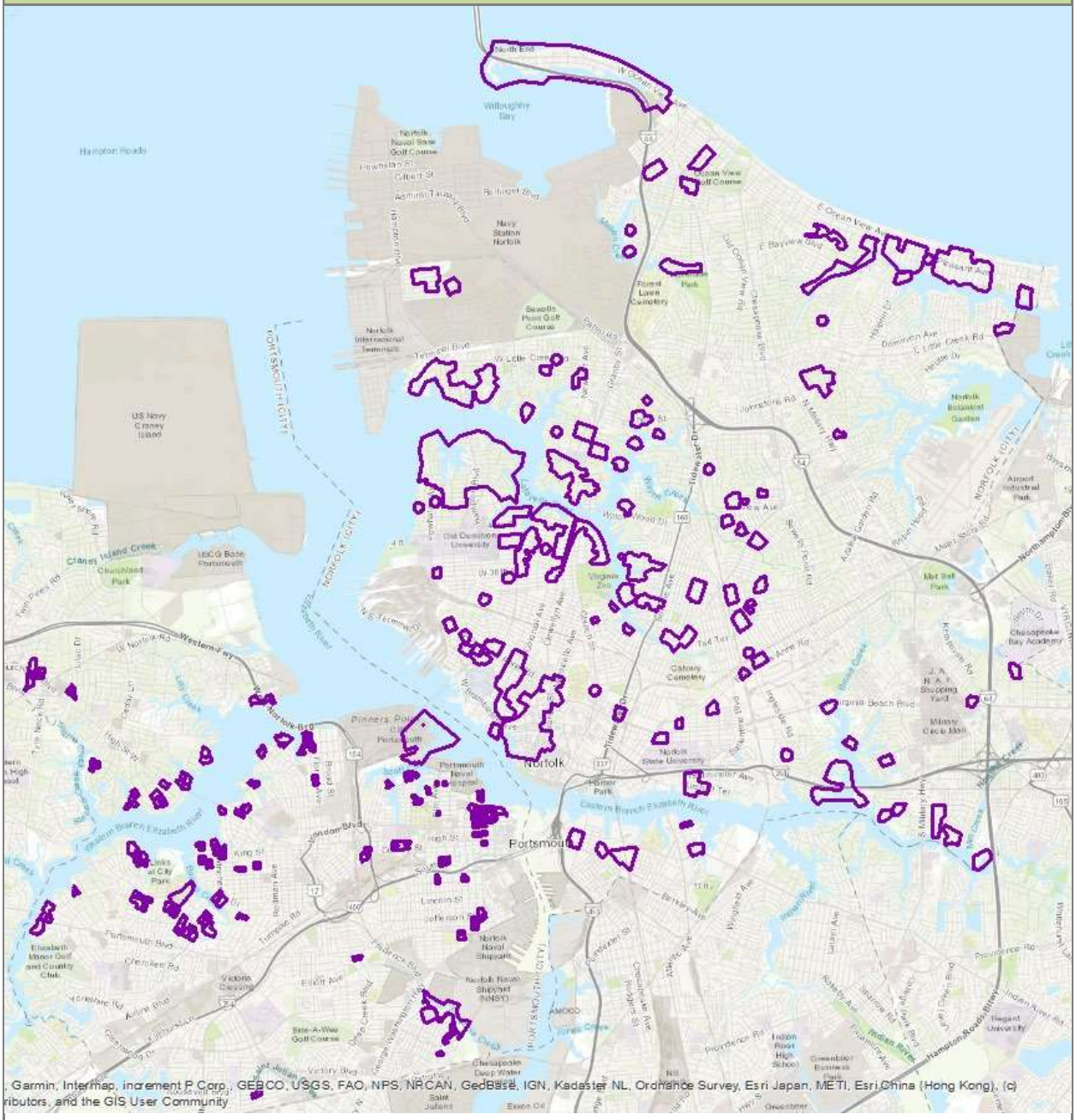
2021

FIGURE 5.6: NFIP REPETITIVE FLOOD LOSS AREAS, VIRGINIA BEACH



2021

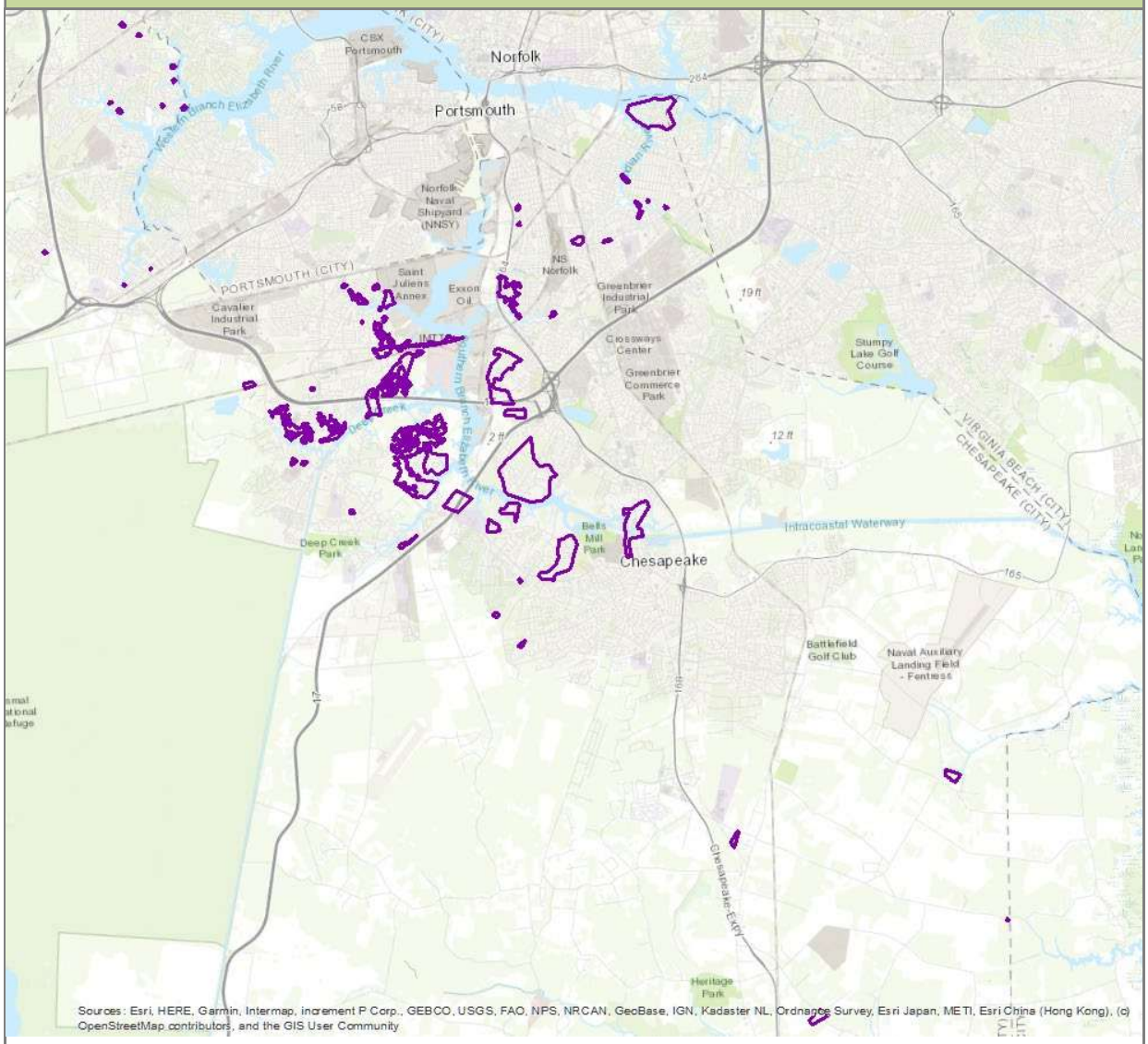
FIGURE 5.7: NFIP REPETITIVE FLOOD LOSS AREAS, NORFOLK, PORTSMOUTH



Repetitive Loss Areas

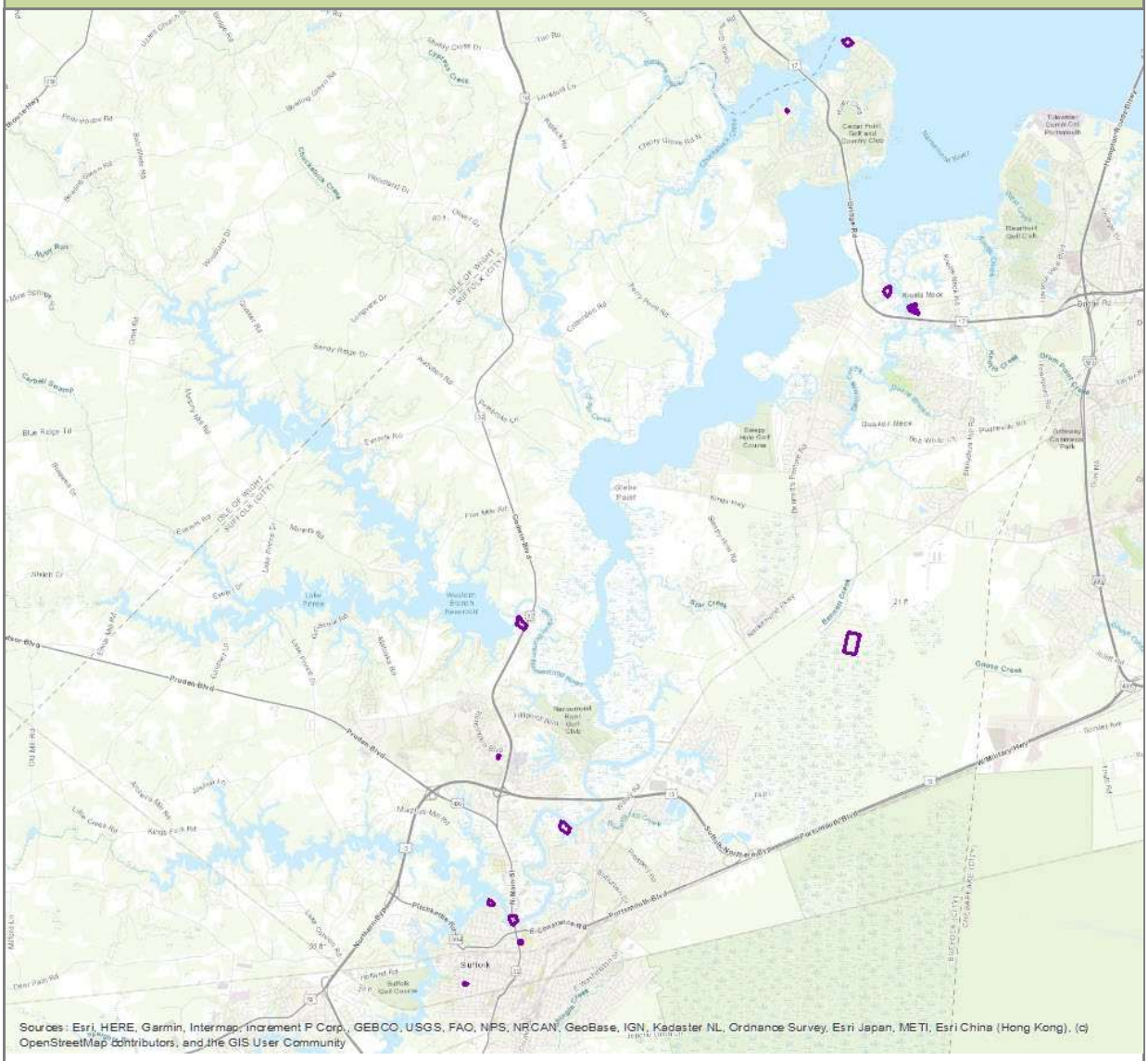
2021

FIGURE 5.8: NFIP REPETITIVE FLOOD LOSS AREAS, CHESAPEAKE



2021

FIGURE 5.9: NFIP REPETITIVE FLOOD LOSS AREAS, SUFFOLK



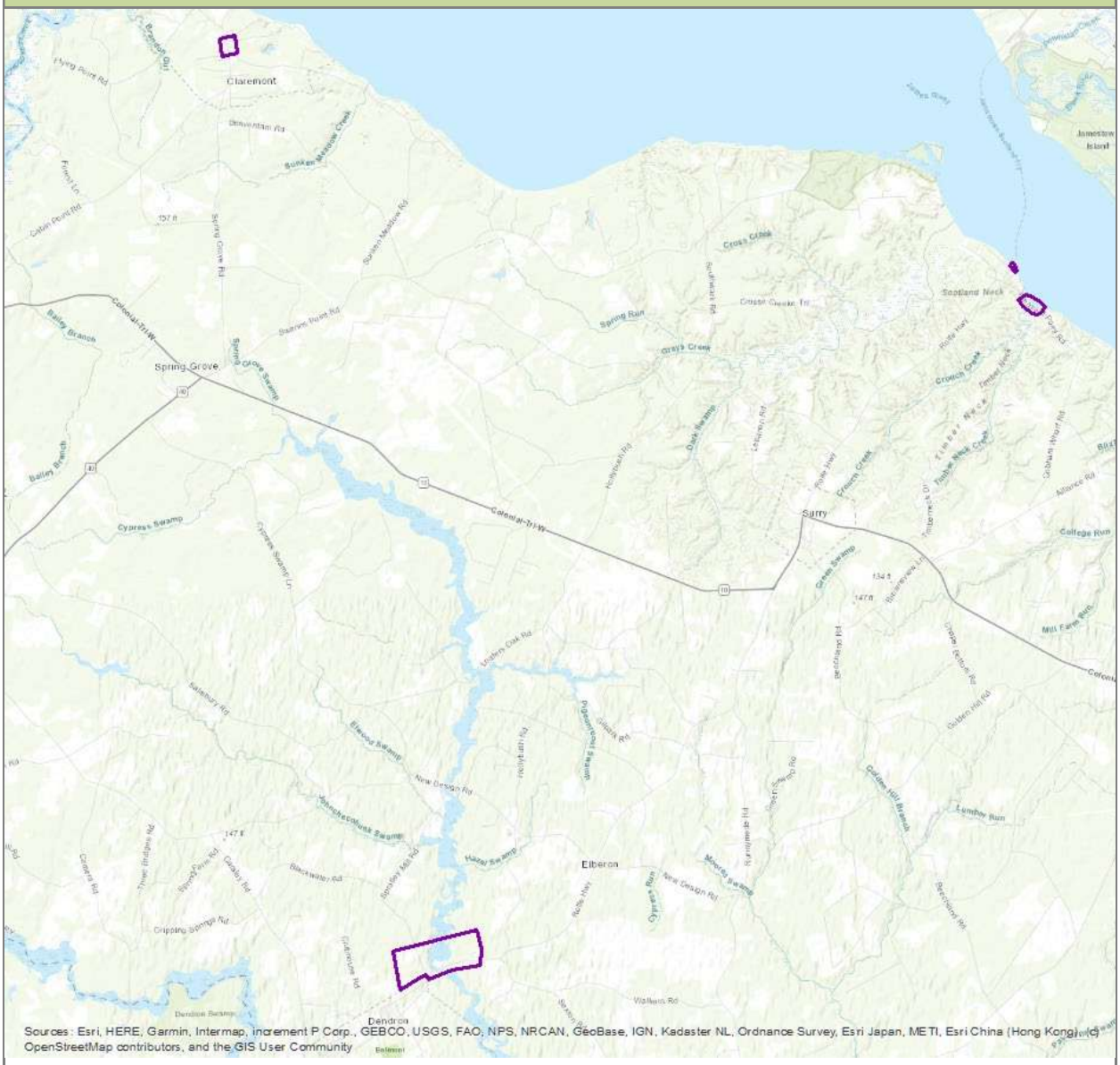
Repetitive Loss Areas

2021

FIGURE 5.10: NFIP REPETITIVE FLOOD LOSS AREAS, ISLE OF WIGHT, SMITHFIELD, SOUTHAMPTON COUNTY, FRANKLIN



FIGURE 5.11: NFIP REPETITIVE FLOOD LOSS AREAS, SURRY COUNTY



ESTIMATES OF POTENTIAL LOSSES

For the updated flood vulnerability analysis, participating communities were asked to share as much information as possible about individual structures in their communities, including:

- Elevation Certificate data or lowest floor elevation;
- address;
- year built;
- number of stories;
- building cost;
- content cost;
- building type;
- square footage;
- construction class;

- foundation type; and/or
- occupancy/use code.

A majority of the communities in this Plan had flood hazard vulnerability assessments performed at the individual structure level (Level 2 Hazus analysis) using flood depth raster data generated external to Hazus. Due to the nature of the FEMA FIRMs level of detail, Franklin and Southampton County were modeled using Hazus Flood Level 1 analysis, which generated flood depth rasters internal to Hazus making use of 30 meter digital elevation data from the USGS. Williamsburg was not modeled because previous studies had found no single family residential structures in the SFHA. For all of the other communities in the study area, an individual structure level analysis, also known as a User-Defined Facilities (UDF) analysis within Hazus Level 2, was performed for flood hazards as shown on the FIRM, including coastal and riverine flooding.

The following highlights the data source and processing methodology for each of the input datasets required by Hazus for the UDF analysis:

User Defined Facilities (Building Data, including First Floor Elevations)
HRPDC provided Hazus UDF building data for 11 of the 12 cities and counties where the UDF analysis was performed. These data were only for single family residential structures (RES1 specific occupancy type in Hazus), which typically make up 70-90% of all structures in the mapped floodplain. The City of Virginia Beach directly provided UDF building data for all structure types.

These UDF datasets had been previously developed based on approaches documented in the following three HRPDC reports:

Phase 1 Report: Developing First Floor Elevation Data for Coastal Resilience Planning in Hampton Roads, February 2019 (available at https://www.hrpdcva.gov/library/view/932/developing-first-floor-elevation-data-for-coastal-resilience-planning-in-hampton-roads)

Phase 2 Report: Applying First Floor Elevation Data to Flooding Vulnerability Assessments in Hampton Roads, February 2020 (available at https://www.hrpdcva.gov/library/view/1124/applying-first-floor-elevation-data-to-flooding-vulnerability-assessments-in-hampton-roads)

Phase 3 Report: A Regional Approach to Applying First Floor Elevation Data to Coastal Flooding Vulnerability Assessments in Hampton Roads, November 2020 (available at https://www.hrpdcva.gov/library/view/1386/a-regional-approach-to-applying-first-floor-elevation-data-to-coastal-flooding-vulnerability-assessments-in-hampton-roads)

These reports detail the data sources and approaches used to establish structure location and characteristic data, such as square footage and number of stories, from local assessor's parcel data. These reports also give a detailed description of how first floor elevations were derived for the structures, using a mix of actual surveyed first floor elevations from completed FEMA Elevation Certificates and modeling approaches to assign typical height above grade of first floors based on structure characteristics such as foundation types.

Flood Hazard Data and Depth Rasters
Geospatial analysts obtained the most recent effective Digital Flood Insurance Rate Map databases from the FEMA Map Service Center for the region. This included newly developed flood depth rasters (required inputs for Hazus flood UDF analysis) for the 100-year frequency flood event in all 12 cities and counties modeled using UDF analysis.

While this single flood depth raster allowed loss modeling for the 100-year event, HRPDC was interested in exploring ways to estimate average annual damages (AAD), as well. Estimating AAD requires having flood rasters for at least four additional flood frequency events (such as the 10-year, 25-year, 50-year, and 500-year events). The existing Flood Insurance Studies (FIS) in each of the communities includes multi-return period information that provides most or all of these additional return periods. Therefore, four

additional flood depth rasters were derived for the 12 cities and counties modeled with UDF analysis using the following approach:

1. The flood profiles and transect tables of each city and county were reviewed and an "average" flood profile was selected for each jurisdiction, represented as a specific category of FEMA Probability of Elevation or PELV Curve values. PELV Curves for flood A zones range from A1 to A30 and flood V zones range from V1 to V30, where each curve represents a specific offset between the 10-year and 100-year elevation. For example, the A5 curve represents a flood profile with 2.5 feet between the 10-year and 100-year flood elevation. Each curve has a best-fit line to derive the relative flood elevation offsets to any other return periods, including the 25-year, 50-year, and 500-year required for the Hazus AAD calculations.
2. Once the PELV curve was established for each jurisdiction, new flood depth rasters were derived by subtracting the offset value for that return period from the official FEMA 100-year flood depth raster. For example, for a jurisdiction assigned the A5 PELV curve, the 10-year flood depth raster was estimated by subtracting 2.5 feet from each raster cell in the 100-year flood depth raster. This resulted in some raster cells with zero or negative values, which Hazus ignores in the flood UDF analysis.
3. The following shows the PELV Curve assumptions for the jurisdictions modeled using this approach:
    - Chesapeake, Norfolk, Portsmouth, Virginia Beach - A4 (2 foot offset between 10-year and 100-year)
    - Isle of Wight County, James City County, Newport News, Poquoson, Suffolk, Surry County - A5 (2.5 foot offset between 10-year and 100-year)
    - Hampton, York County - A7 (3.5 foot offset between 10-year and 100-year)

Using the five flood depth rasters and UDF building data listed above, a building level flood vulnerability analysis was conducted for each flood-prone community. Because of the large number of analyses that needed to be conducted (5 return periods for 12 jurisdictions), the newly developed Hazus FAST Tool was used. The FAST Tool uses a Python script-based approach to automate running a Hazus flood UDF analysis with the simple selection of an input UDF database and the selection of one or more flood depth rasters. The FAST tool outputs a text file with the analysis results for each structure determining the building and content damage percentage and dollar losses for each structure.

One final set of refinements was needed after running the FAST tool for the five return periods in each community. The HRPDC detailed structure data only included lowest floors and other characteristics for single-family residential structures. In order to estimate losses for all structure types, a companion Hazus Level 1 analysis was conducted for each of the 11 jurisdictions with only RES1 data using the 100-year FEMA flood depth raster as an input. The aggregated loss estimates from these Level 1 analyses were used to develop multiplication factors to apply to the building and contents losses in each community to account for non-residential structures. In addition, the final AAD value was derived using the standard Hazus calculation for the five return periods modeled.

Table 5.7a provides a detailed listing of the number of residential structures expected to be damaged by flooding (coastal storm surge and riverine flooding), and the total dollar losses predicted for all structures for the 100-year event, and Average Annual Damages.

TABLE 5.7A: HAZUS FLOOD DAMAGE VULNERABILITY RESULTS						
SUBREGION	**COMMUNITY**	**NUMBER OF SINGLE FAMILY RESIDENTIAL BUILDINGS DAMAGED (100-YR EVENT)**	**TOTAL ALL BUILDING TYPE LOSSES (100-YR EVENT)**	**TOTAL CONTENT LOSSES (100-YR EVENT)**	**TOTAL LOSSES (100-YR EVENT)**	**AVERAGE ANNUAL DAMAGES**
Peninsula	Hampton	4,012	$93,763,321	$70,335,791	$164,099,112	$6,813,410
	Newport News	435	$6,045,697	$4,586,632	$10,632,329	$486,054
	Poquoson	1,405	$43,631,875	$31,715,660	$75,347,535	$3,715,393
	Williamsburg	Not modeled; there are no single family residential structures in mapped floodplain				
	James City County	64	$1,762,201	$1,000,658	$2,762,858	$156,374
	York County	266	$4,716,520	$3,376,412	$8,092,932	$687,866
Southside	Norfolk	2684	$163,342,598	$177,157,526	$340,500,124	$19,264,918
	Portsmouth	658	$8,197,586	$8,921,847	$17,119,433	$982,084
	Suffolk	40	$1,997,698	$1,421,059	$3,418,757	$190,613
	Virginia Beach	2322	$149,052,336	$65,543,442	$214,595,778	$9,524,586
	Chesapeake	1382	$17,411,115	$14,887,712	$32,298,827	$1,795,921
Western Tidewater	Isle of Wight County	47	$3,278,669	$2,844,448	$6,123,118	$410,568
	Franklin*	NA*	$109,000	$91,000	$200,000	$11,000
	Southampton County*	NA*	$854,000	$929,000	$1,783,000	$111,446
	Surry County	23	$1,052,801	$906,209	$1,959,011	$111,192
Totals		**13,338**	**$495,215,418**	**$383,717,396**	**$878,932,814**	**$44,261,424**

*Modeled using Hazus Level 1 Flood analysis
Source: Hazus

In an effort to ensure that this plan reflects the latest analyses available for the region, the planning team also examined the results of the *Virginia Coastal Resilience Master Plan – Phase One, December 2021.* Although this plan was released after the planning process for this plan was substantially complete, the team felt it was important to include the results of the later coastal study as a companion to the Hazus results for all flood types. Using a separate methodology as explained in detail in the new document's Appendix C, the *Virginia Coastal Resilience Master Plan – Phase One, December 2021*, showsaverage annual loss results that provide additional insights regarding the impacts of coastal flooding in Hampton Roads. The analysis in the *Coastal Resilience Master Plan* does not address riverine flooding not caused by storm surge.

TABLE 5.7B: COASTAL STORM SURGE IMPACTS, 2020						
SUBREGION	COMMUNITY	EXPOSED POPULATION	AAL RESIDENTIAL	AAL COMMERCIAL	AAL AGRICULTURAL	# PUBLIC STRUCTURES IMPACTED, 100-YEAR FLOOD
Peninsula	Hampton	6,849	$25,279,708	$6,750,368	$30,295	135
	Newport News	350	$1,551,702	$276,989	-	137
	Poquoson	1,114	$26,598,367	$1,259,621	-	25
	Williamsburg	-	-	-	-	-
	James City County	80	$2,001,233	$178,023	$17,550	1
	York County	868	$11,034,534	$1,051,836	$67,686	79
Southside	Norfolk	9,458	$89,208,351	$86,403,233	-	143
	Portsmouth	4,615	$9,336,570	$3,283,350	-	218
	Suffolk	194	$983,209	$605,126	$2,237	5
	Virginia Beach	10,906	$40,107,944	$20,975,453	$426,353	120
	Chesapeake	5,145	$24,316,555	$9,135,644	$55,650	209
Western Tidewater	Isle of Wight County	60	$ 637,785	$1,191,561	$6,791	-
	Franklin	-	-	-	-	-
	Southampton County	10	$38,625	$23,932	-	-
	Surry County	-	$1,550,375	$46,113	$32,335	-
Totals		39,649	$232,644,958	$131,181,249	$638,897	1,072

Source: Virginia Coastal Resilience Master Plan – Phase One, December 2021

Vulnerability to stormwater flooding caused by precipitation and/or stormwater management infrastructure issues was not directly evaluated due to insufficient and inconsistent data across the study area. Although some municipalities have made progress in evaluating this specific type of flooding and have started collecting data to reflect historic occurrences and future vulnerabilities, data are not available to express quantitative risk in a meaningful way for the whole region.

Clearly, much of the Hampton Roads region is susceptible to costly damage resulting from flood events and Figure 4.1 indicates where the flood risk is highest. The lower Peninsula (Hampton and Poquoson) and developed areas of Southside (Norfolk, Virginia Beach, Chesapeake and Portsmouth) have the highest numbers of repetitive losses and highest predicted number of structures expected to be damaged in a 100-year flood event based on the HAZUS data. Hampton, Poquoson, Norfolk and Chesapeake all have more than 1,000 structures that are highly vulnerable to the 100-year flood event, and these areas are likely the most vulnerable in the region. York County has fewer structures susceptible, but the value of those structures is higher, so the vulnerability is consequently higher. The repetitive flood loss areas shown in Figures 5.3 through 5.11 indicate where within each community the flood damage has historically been highest and can be expected to continue into the future without large-scale mitigation measures to reduce flood vulnerability.

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

Future vulnerability will be determined, in part, by local officials. Flood hazard and SLOSH maps are available to indicate what areas of the region are most vulnerable to these hazards. These planning tools are used to help guide development away from hazardous areas. Local officials are responsible for

enforcing local floodplain management regulations, flood damage prevention ordinances, and other forms of development policies that restrict new development in flood hazard areas. Additional discussion of actions these communities have taken to reduce future flood vulnerability is provided in Section 6, the Capability Assessment.

In its June 2021 report entitled *The Impact of Climate Change on Virginia's Coastal Areas*, the Virginia Academy of Science, Engineering, and Medicine (VASEM), laid out the consequences of climate change for Virginians. VASEM is a nonprofit organization consisting of members of the National Academies of Science, Engineering, and Medicine who reside or work in Virginia as well as other Virginians who are leaders in these fields. The most immediate consequence of climate change is sea level rise, caused primarily by melting ice and glaciers and thermal expansion. Additional consequences related to flooding include more recurrent flooding (higher frequency of occurrence for damaging floods), extreme rainfall and inundation of septic systems. The report projects that, particularly in urban areas, recurrent flooding will have a disproportional impact on racial and ethnic minorities, the poor, the elderly, renters, non-native English speakers, and those with mobility challenges. Exposure to a growing number of flood-prone facilities regulated for toxic and hazardous substances as sea levels rise is another concern, particularly on the James River, between Richmond and Hampton Roads. Impacts in rural areas are more likely to be centered around soil quality, such as water-logged soils in flood-prone areas, increased salinity due to saltwater intrusion and septic system failures that affect public health.[3]

Increased levels of precipitation from storm events sometimes overwhelm existing municipal stormwater management systems in the Hampton Roads region, which can result in roadway flooding, safety and access concerns, and issues with water quality and treatment capacity. As sea levels rise, the ability of the existing stormwater management systems to collect, convey, treat, and discharge flow will be further reduced by higher water levels at outfall locations.
The average annual number of days with heavy precipitation is expected to increase in the future as a result of climate change. This increased precipitation will have an impact on the frequency of regional flooding, especially riverine flooding, but may also impact coastal flooding unless municipal stormwater systems are redesigned. Heavy precipitation events can easily overwhelm existing infrastructure, causing failure of stormwater culverts, bridge scour, and overland flooding affecting areas and structures that do not normally flood. Increased heavy precipitation can impact dams and, over time, influence flood frequency curves that are used for a variety of insurance, building safety and planning purposes.

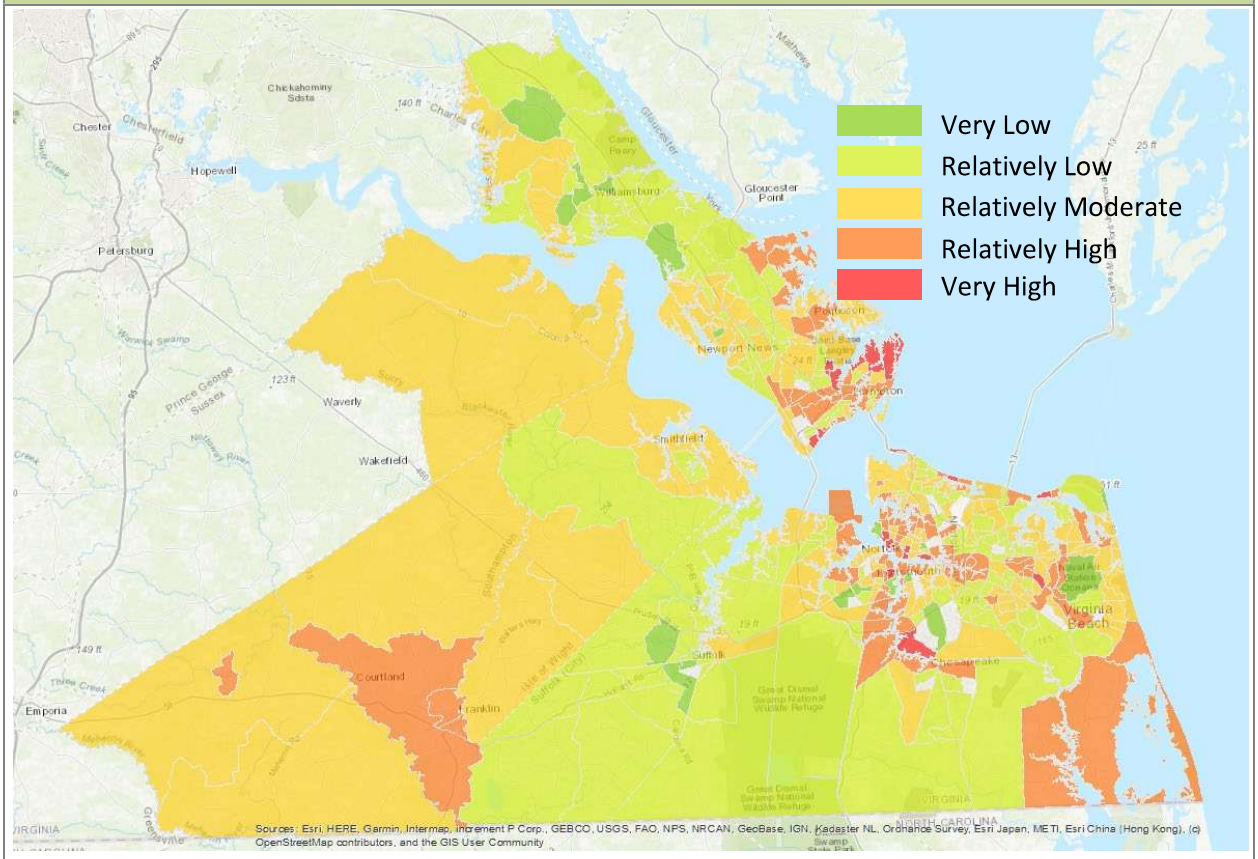
According to 2022 data from the Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA)[4], under a moderate emissions scenario, Portsmouth can expect that for the period 2066 to 2095, the average number of days per year with rainfall greater than 1 inch will be 9.5 days, which is 20% more than in the period between 1976 and 2005. The same percentage increase is expected across the region. On the other hand, the number of days with rainfall greater than 3 inches is 0.4, 56% more than in 1976-2005 for Portsmouth. The predictions for days with this severe rainfall are not uniform across the region and range from a low of 35-percent increase in parts of Virginia Beach, to an 84-percent increase in western Isle of Wight County.

SOCIAL VULNERABILITY

Social vulnerability to both coastal and riverine flood (combined) for the Hampton Roads region is represented in **Figure 5.12**, categorized by Census tract. The map shows the NRI rating for flood risk is highest in the Franklin/Southampton County area, the lower Peninsula, Census tracts bordering the Elizabeth River in Portsmouth and Norfolk, and portions of central and southern Virginia Beach.

[3] *The Impact of Climate Change on Virginia's Coastal Areas*, the Virginia Academy of Science, Engineering, and Medicine, June 2021. Available online at: http://www.vasem.org/wp-content/uploads/2021/08/VASEM_VirginiasCoastalAreasReport_FINAL.pdf
[4] Mid-Atlantic Regional Integrated Sciences and Assessments: https://public.tableau.com/views/Climate_summary_rainfall_20181112_PUBS/3b?:embed=y&:toolbar=n&:embed_code_version=3&:loadOrderID=0&:display_count=y&:origin=viz_share_link

FIGURE 5.12: RIVERINE FLOODING, NRI RISK RATING



2021

Source: National Risk Index, 2021

FLOODING DUE TO IMPOUNDMENT FAILURE/HIGH HAZARD DAM

ESTIMATES OF POTENTIAL LOSSES

Table 4.4 summarizes possible impacts to downstream structures and infrastructure in the event of dam failure. In the downstream inundation areas for all of Hampton Roads high hazard potential dams, the following impacts are possible:

2,798 homes;
136 roadways;
8 businesses;
3 schools;
4 parks;
4 utilities;
6 railroad segments; and,
9 downstream dams.

Potential damages from inundation of these structures and infrastructure have not been further quantified, but is an area of expected future study in the region.

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

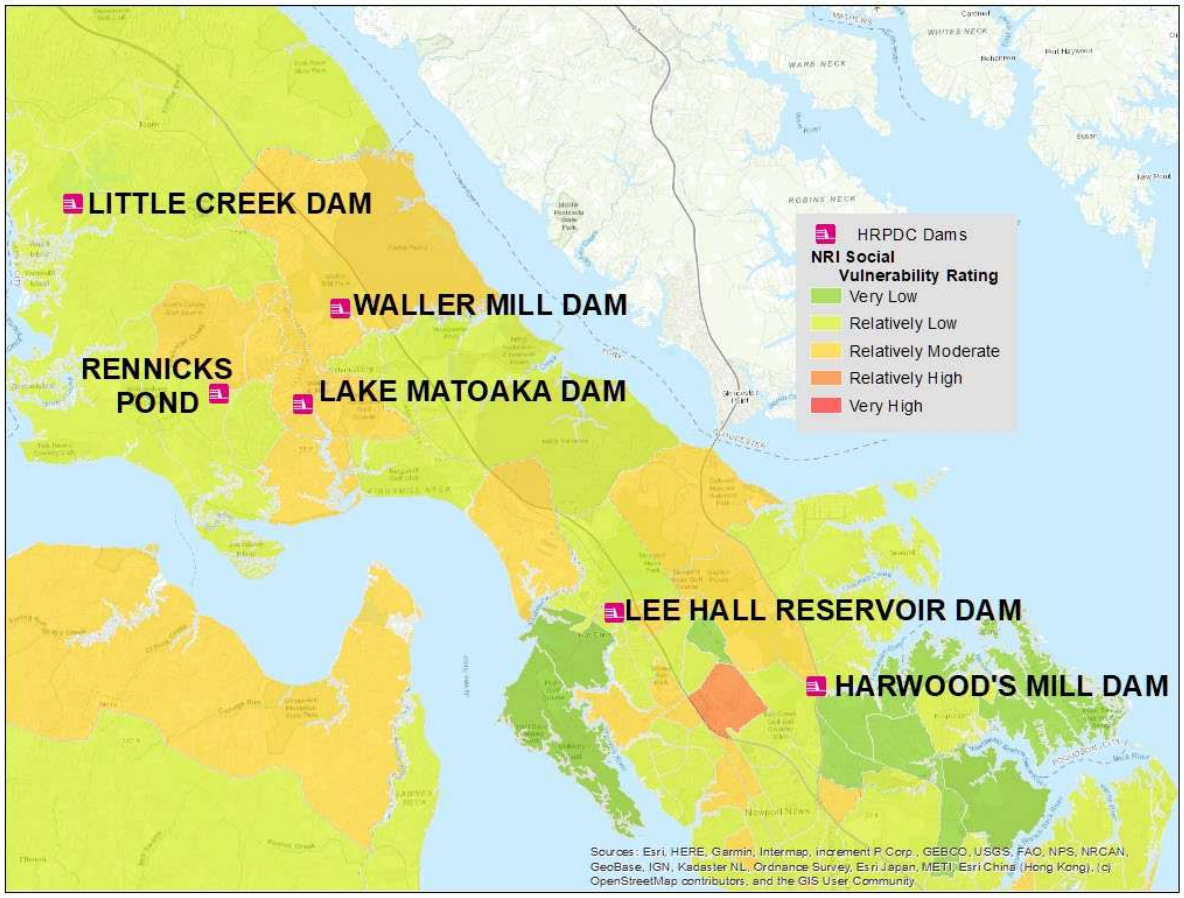
Based on historical experience and the fact that the dams in the study area are aging, precipitation patterns are increasingly more frequent and severe as a result of climate change, and the dams are categorized as High Hazard, there is a moderate probability of a future event involving a dam or levee failure in the study area. As climate change alters precipitation patterns, including frequency and quantity, the adequacy, safety and protection levels of all dams (not just high hazard potential dams) will need continuous evaluation.

SOCIAL VULNERABILITY

The locations of the study area high hazard potential dams were overlaid on the foundational social vulnerability map from the NRI. The analysis, as shown in **Figures 5.13 and 5.14**, indicates that 7 dams are located in areas of Relatively Moderate social vulnerability (no dams were in areas of Very High or Relatively High social vulnerability): Waller Mill Dam, Lake Matoaka Dam, Harwood's Mill Dam, B-1 Pond Dam, B-2 Pond Dam, ASB Pond Dam and C-Pond Dam. All other dams are in Relatively Low or Very Low areas of social vulnerability.

According to DCR, social vulnerability is a factor in assessing grant applications prepared by dam owners in Hampton Roads. Project engineers are also responsible for addressing impacts on historical and cultural impacts in accordance with state and federal regulations.

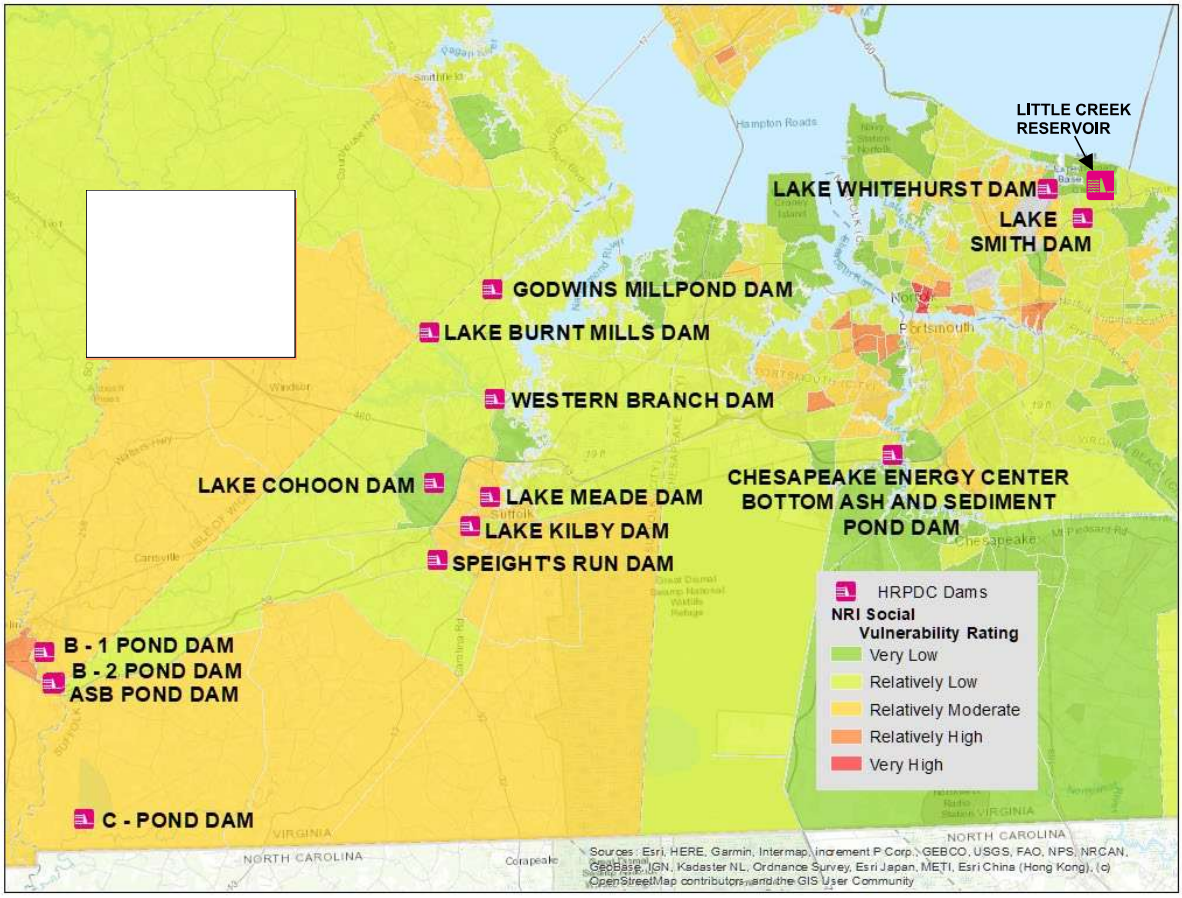
FIGURE 5.13: HIGH HAZARD POTENTIAL DAMS, PENINSULA



2021

Source: DCR, 2021

FIGURE 5.14: HIGH HAZARD POTENTIAL DAMS, SOUTHSIDE



2021

Source: DCR, 2021

SEA LEVEL RISE AND LAND SUBSIDENCE

Historical evidence shows that much of the Hampton Roads region is already experiencing some degree of sea level rise and land subsidence. As discussed in the *Hazard Identification and Analysis* section, data from Sewells Point at the Norfolk Naval Base indicate that sea level in the past 93 years has risen at a rate of approximately 4.73 millimeters per year and sea level rise at that rate is expected to continue and possibly accelerate. Vulnerability to sea level rise can be looked at in terms of economic losses resulting from future flood event damages, and by examining expectations for future land use and development patterns and highlighting what infrastructure and real estate will potentially be affected by rising tides. In both cases, this analysis assumes somewhat static conditions with regard to flood mitigation capabilities. A changing regulatory climate, development pressure, large-scale mitigation or resiliency projects, and changes in economic conditions or financial capabilities, for example, could dramatically affect the impact of sea level rise in the region. Additionally, HRSD's SWIFT program is an innovative water treatment project in eastern Virginia that is taking highly treated water that would otherwise be discharged into the region's waterways, and putting it through additional rounds of advanced water treatment. The SWIFT water is then added to the Potomac Aquifer and helping to slow or even revers the sinking of land due to groundwater withdrawals.

HRPDC has compiled a list of sea level rise viewing tools, some of which include data to help visualize the various types of risk posed by sea level rise and land subsidence:
Vulnerable Infrastructure - Buildings, roads, and critical facilities;
Societal Exposure - Demographic data summaries and socially vulnerable communities; or
Environmental Change - Marsh migration and shoreline condition.

ONLINE TOOLS	SEA LEVEL RISE SCENARIOS	INFRASTRUCTURE IMPACTS	SOCIETAL IMPACTS	ENVIRONMENTAL IMPACTS
ADAPT VIRGINIA INTERACTIVE MAP	Low, intermediate, and extreme scenarios for 2020-2100	✓	✓	✓
CCRFR SEA LEVEL RISE TOOL	NOAA Intermediate High Scenario for 2040, 2060, and 2080	✓	✗	✗
CLIMATE CENTRAL'S COASTAL RISK SCREENING TOOL	Map sea level rise by year (2030-2100) or water level.	✗	✗	✗
CLIMATE CENTRAL'S SURGING SEAS RISK FINDER	Map by water level for a specific city. Summary fact sheets and graphs available.	✓	✓	✗
NOAA COASTAL FLOOD EXPOSURE MAPPER	Map by water level. User can save and export maps.	✓	✓	✓
NOAA'S SEA LEVEL RISE VIEWER	Map by water level or local scenarios (2020-2100).	✗	✓	✓

Adapt Virginia Interactive Map (Virginia only)

CCRFR Sea Level Rise Tool (Virginia only)

Climate Central's Coastal Risk Screening Tool

Climate Central's Surging Seas Risk Finder

NOAA Coastal Flood Exposure Mapper

NOAA Sea Level Rise Viewer

ESTIMATES OF POTENTIAL LOSSES

Detailed economic loss estimates for long-term sea level rise and land subsidence are difficult to develop because the response of individual property owners and governmental entities to sea level rise is inherently unpredictable and variable over both time and space. Regional experience over the past 50 years indicates that shoreline protection measures will be reinforced to protect threatened structures, hindering the ability of wetlands and shorelines to adjust naturally as the water level rises. Therefore, models based on permanent inundation of developed areas, and which assume inundation means destruction of the built environment, can dramatically overstate losses.

In 2020, the City of Virginia Beach conducted a detailed analysis of annual average flood-related losses for current conditions, 1.5 feet of sea level rise in the 2040s, and 3 feet of sea level rise in the 2070s primarily using lowest floor elevations, HAZUS and depth-damage curves. Average annual losses today are estimated to be $26 million, and expected to be $77 million in the 2040s. In the 2070s, that loss estimate balloons to 12 times current conditions, at $329 million average annual losses.[5] Applying these ratios to Hampton Roads has some relevance due to similarities in the flood risks and growth patterns faced by the coastal communities, especially on the lower Peninsula and Southside areas. The current estimate of average annual flood losses in Hampton Roads as a result of this study is $44.2 million, which would translate into $130.8 million by the 2040s, and over $558.6 million annually by the 2070s. This is the average annual damage figure chosen as a basis for this plan analysis.

Different methodologies have produced additional predictions of the annualized flood damages in the future caused by sea level rise. The *Virginia Coastal Resilience Plan, Phase I, 2021*, estimates that statewide between 2020 and 2080, "the number of residential, public, and commercial buildings exposed to an extreme coastal flood is projected to increase by almost 150% from 140,000 to 340,000, while annualized flood damages increase by 1,300% from $0.4 to $5.1 billion."[6]

Another methodology for estimating average annual losses expected from sea level rise was supported by FEMA many years ago. The agency issued a report to Congress documenting the estimated impact of relative sea level rise on the Flood Insurance Rate Maps, *Projected Impact of Relative Sea Level Rise on the National Flood Insurance Program*, FEMA, October 1991, http://papers.risingsea.net/Flood-Insurance.html. The agency estimates that existing development in the coastal zone would experience a 36% to 58% increase in annual damages for a 1-foot rise in sea level by 2100, and a 102% to 200% increase resulting from a 3-foot rise by 2100. Applying these [albeit outdated] ratios to the current average annual flood losses, the result is $60-70 million from 1 foot sea level rise, increasing to $89-133 million with the expected 3-foot increase.

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[5] *Coastal Flooding and Economic Loss Analysis: City of Virginia Beach, Virginia*. March 30, 2020. Available online at: https://www.vbgov.com/government/departments/public-works/comp-sea-level-rise/Documents/20200330_FloodRiskAnalysis_Final_(2).pdf

[6] *Virginia Coastal Resilience Master Plan, Phase One,* December 2021. Summary available online at: https://www.dcr.virginia.gov/crmp/plan.

The lack of detailed elevation information for the existing pre-FIRM and post-FIRM building inventory in much of Hampton Roads further hinders efforts to calculate detailed future average annual flood damages using increasing 100-year flood elevations, especially outside of the current SFHA. For example, calculations of sea level rise losses may be supported by the argument that areas below a certain elevation will be permanently inundated and evacuated. The FEMA study assumes that the current elevation distribution of post-FIRM construction relative to the 100-year flood elevation holds steady for future construction, when in fact many communities in the region have already implemented and are enforcing freeboard requirements, and many base flood elevations recently changed as a result of a restudy of coastal areas. The obsolescence of buildings is not accounted for in the FEMA predictions; presumably, the number of pre-FIRM and post-FIRM buildings built to outmoded floodplain management standards should decline with time. Replacement structures must be in compliance with NFIP regulations in effect at the time of their construction, and are thus better protected from flood (and wind) damage. Some communities, such as Hampton, are also adopting requirements for freeboard outside of the SFHA.

Recent research in other regions is estimating the negative impact from flooding and sea level rise on gross domestic product. In other words, this research is attempting to estimate overall impacts to the economy rather than just accumulating damage or losses to affected structures, families and businesses. There may be applications for this research in the Hampton Roads region in the future.

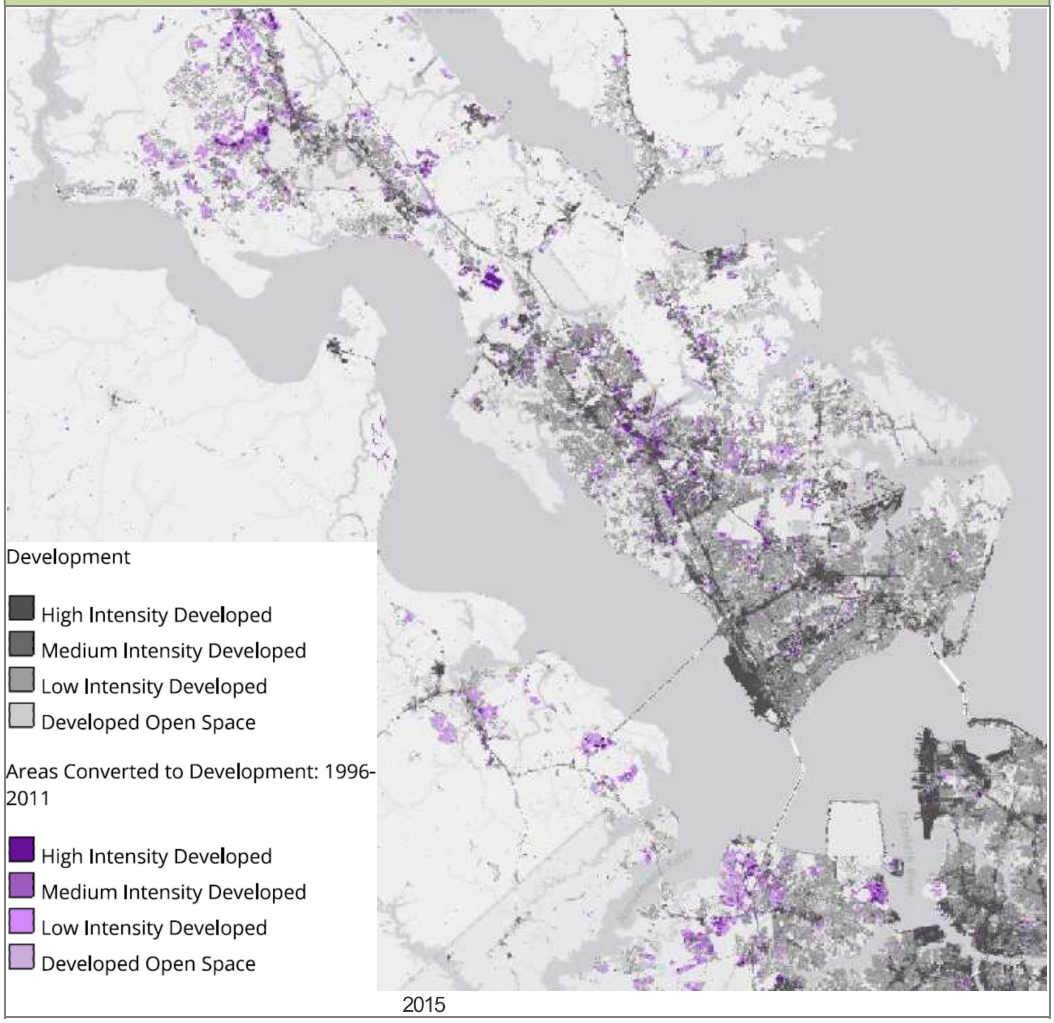
Communities in need of more detailed annualized estimates for the economic impacts of sea level rise in future scenarios, to include impacts to infrastructure and individual structures, must address three primary data needs:

1. Lowest floor elevations for all structures in and near the existing SFHA;
2. HAZUS Level 2 or Level 3 analysis for multi-frequency flood events and flood depths, with various scenarios for sea level rise, to provide sufficient results for annualization; and,
3. The functional, physical or economic obsolescence of existing development, and the variable requirements for flood-safe design for new construction.

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

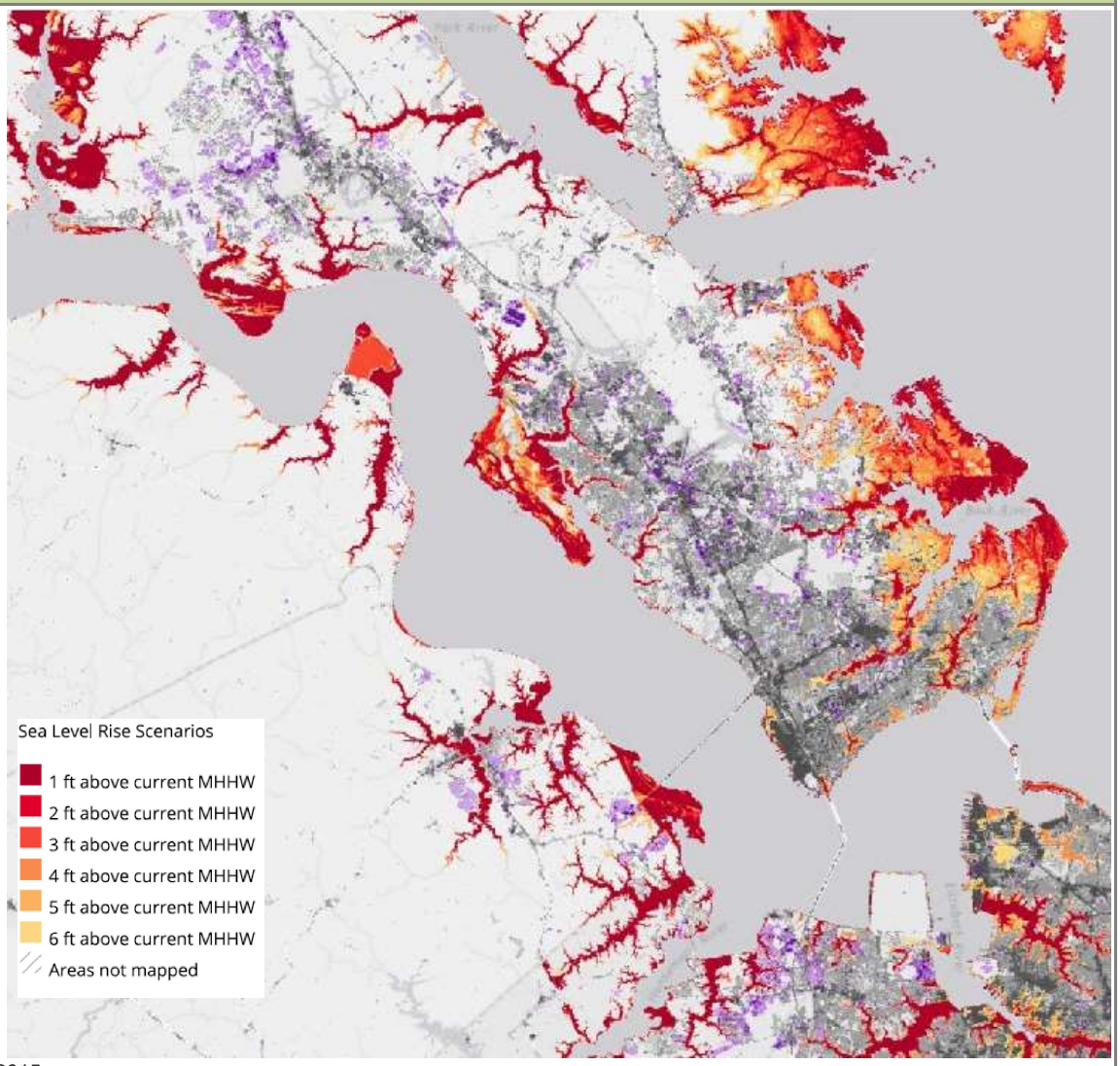
The NOAA Coastal Flood Exposure Mapper tool (http://www.coast.noaa.gov/floodexposure/#/map) uses recent land cover data to show where areas being developed may be impacted by varying levels of sea level rise. This tool can help provide planners with information needed to focus sea level rise mitigation efforts geographically. Summary maps are shown for each Hampton Roads subregion in **Figures 5.15 through 5.20**.

FIGURE 5.15: DEVELOPMENT PATTERNS, PENINSULA



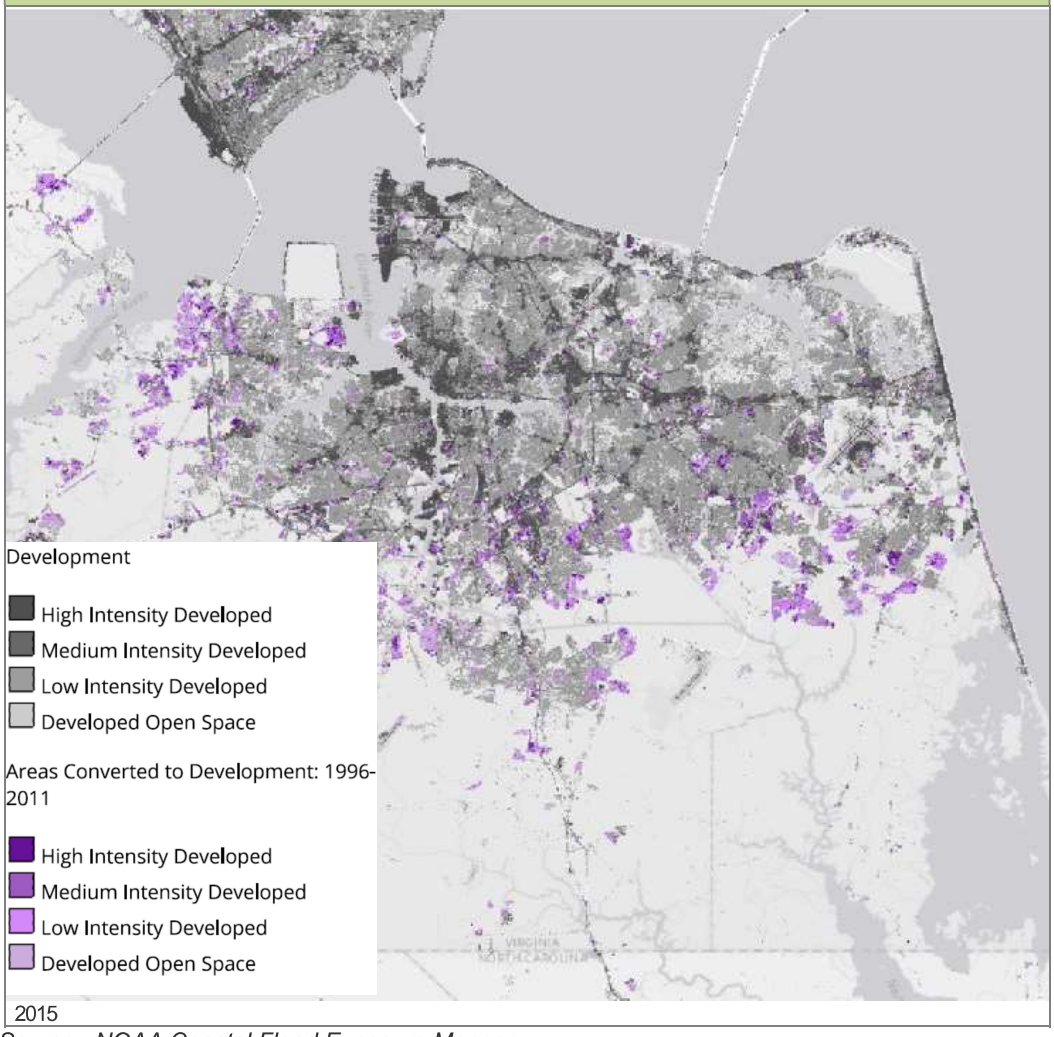
Source: NOAA Coastal Flood Exposure Mapper

FIGURE 5.16: SEA LEVEL RISE SCENARIOS, PENINSULA



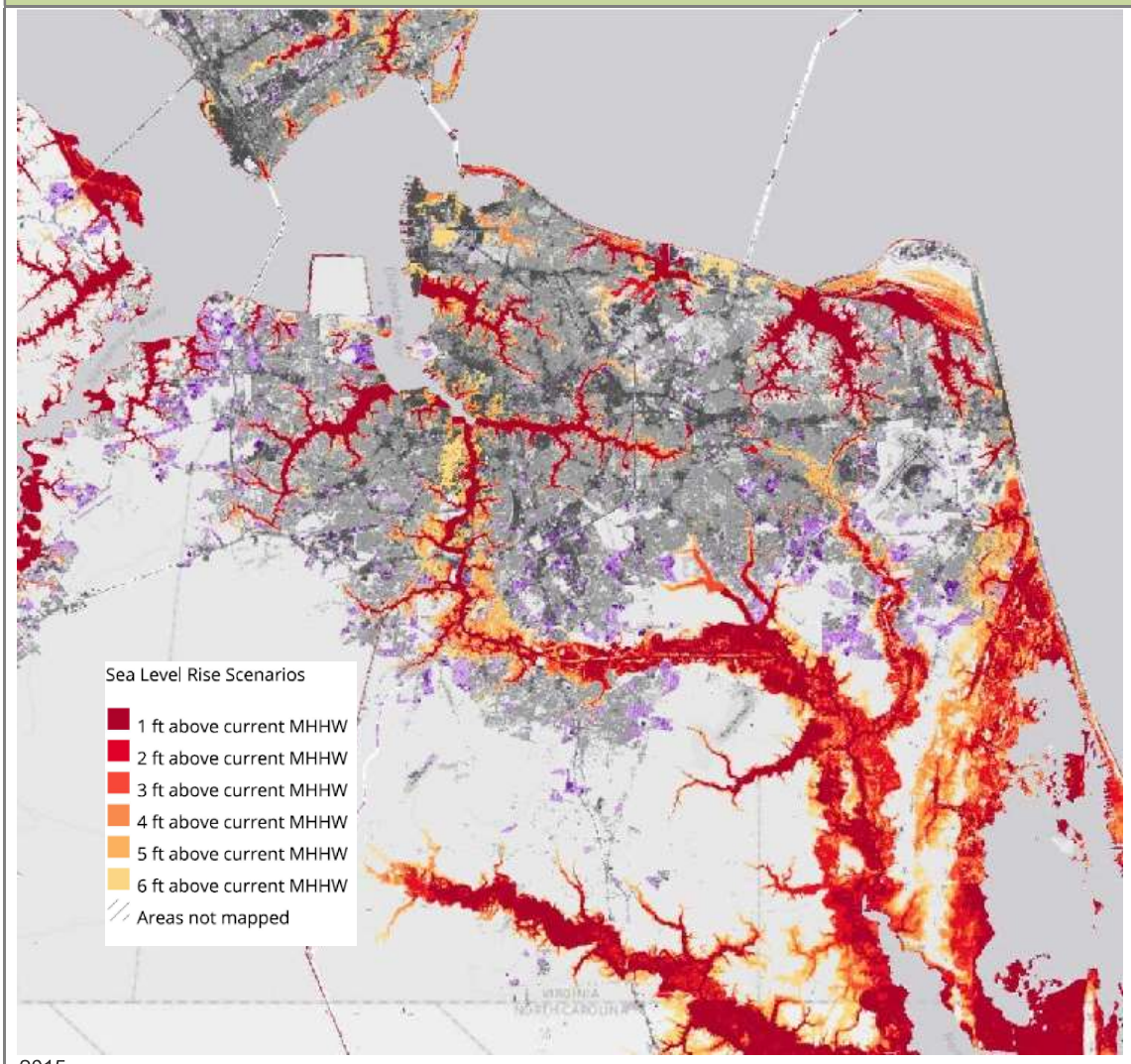
Source: NOAA Coastal Flood Exposure Mapper

FIGURE 5.17: DEVELOPMENT PATTERNS, SOUTHSIDE



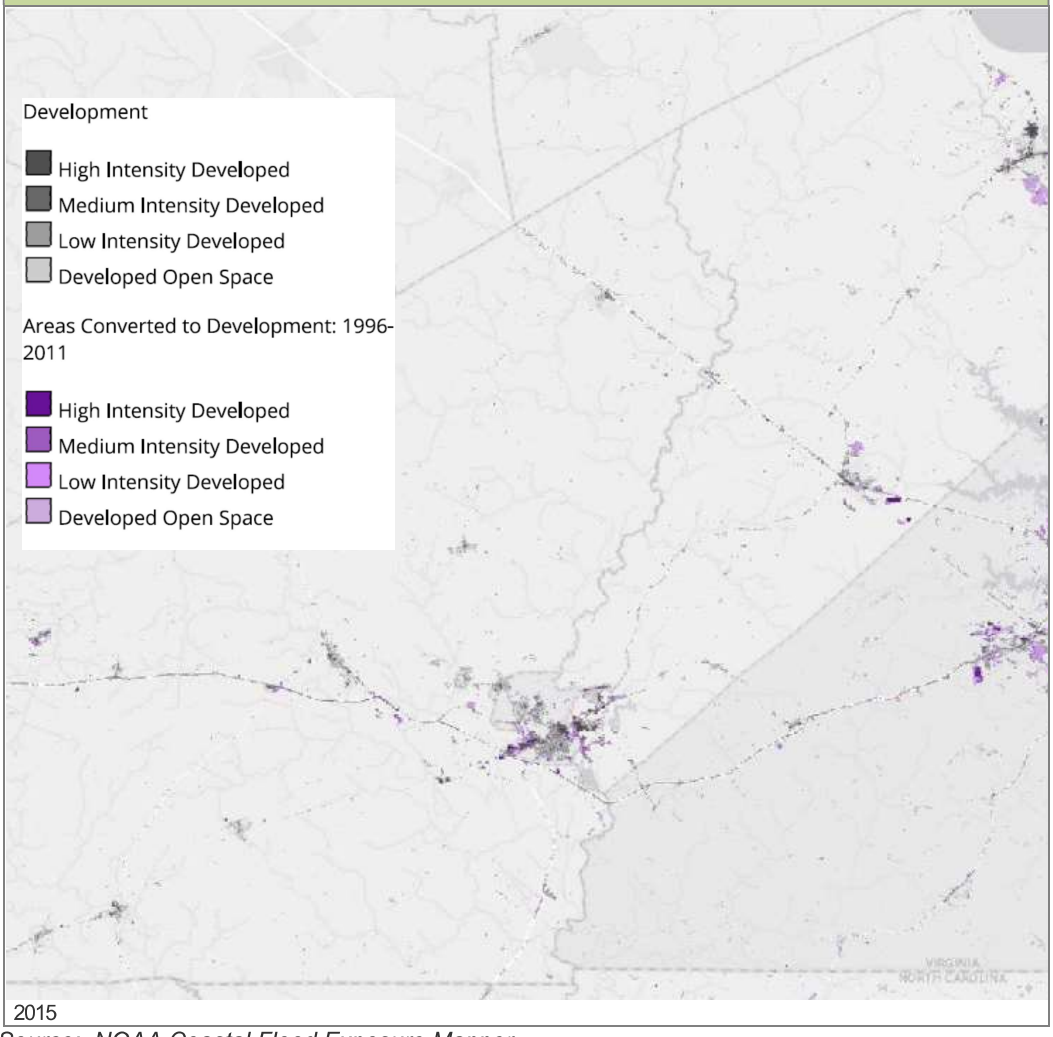
Source: NOAA Coastal Flood Exposure Mapper

FIGURE 5.18: SEA LEVEL RISE SCENARIOS, SOUTHSIDE



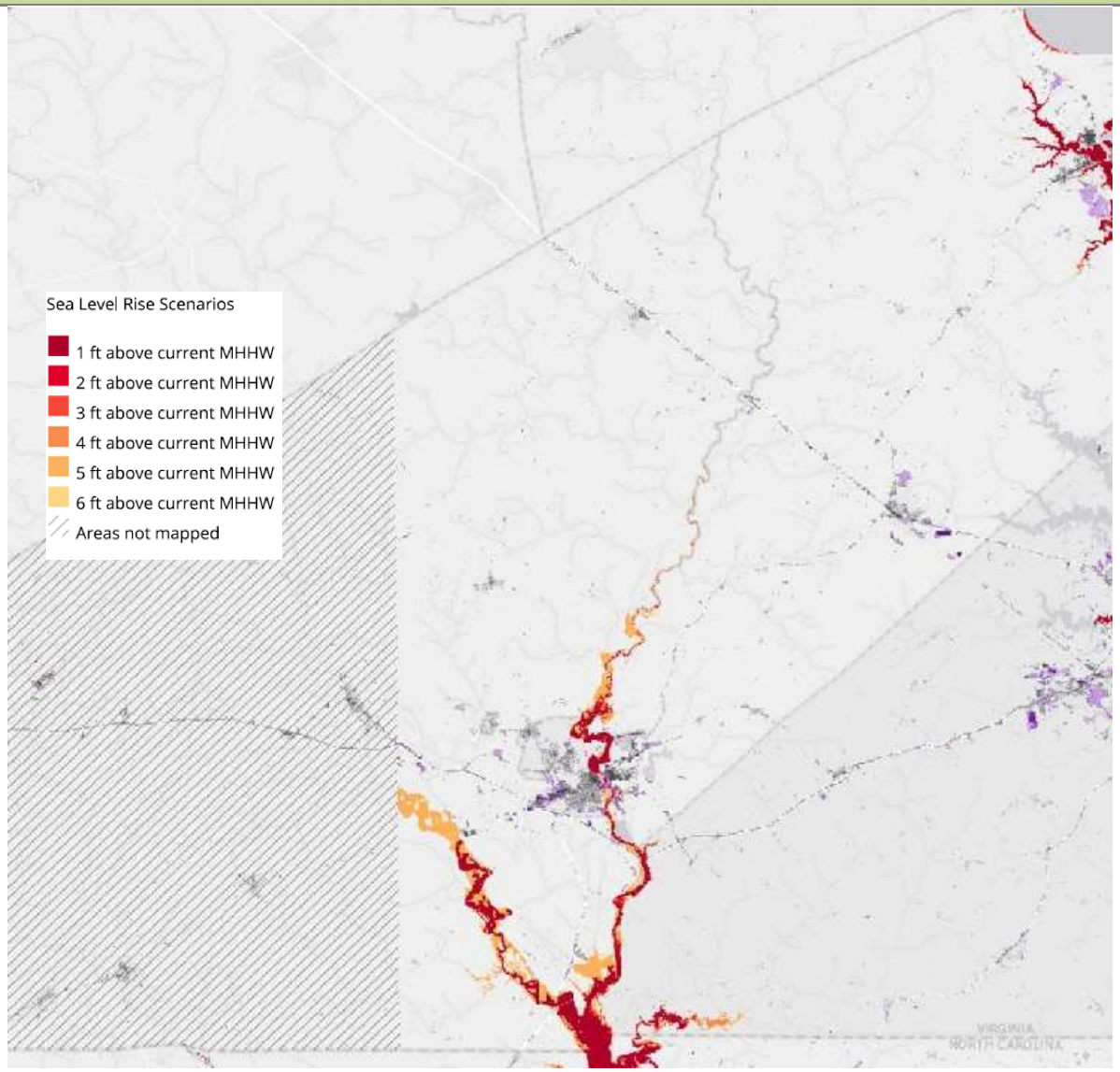
Source: NOAA Coastal Flood Exposure Mapper

FIGURE 5.19: DEVELOPMENT PATTERNS, WESTERN TIDEWATER



Source: NOAA Coastal Flood Exposure Mapper

FIGURE 5.20: SEA LEVEL RISE SCENARIOS, WESTERN TIDEWATER



Source: NOAA Coastal Flood Exposure Mapper

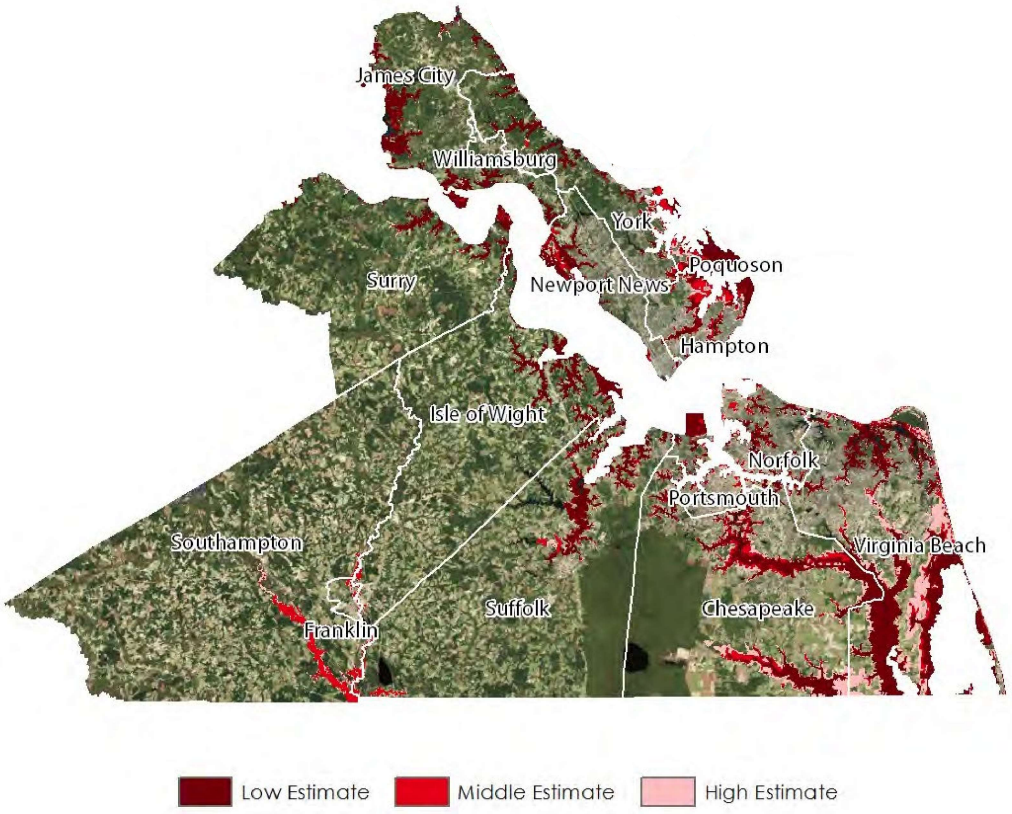
In a 2012 report entitled *Climate Change in Hampton Roads, Phase III: Sea Level Rise in Hampton Roads, Virginia,* HRPDC compiled maps and data to document those areas of the region that are exposed to one meter of sea level rise above spring high tide **(Figure 5.21)**. **Table 5.8** summarizes the report's findings, which highlight over $8.7 billion of vulnerability or exposure in the built environment. Norfolk, Virginia Beach and Chesapeake are the Hampton Roads communities with the highest population exposed to sea level rise. Hampton is fourth on the list and even has a larger number of housing units exposed than Chesapeake. Poquoson is a smaller community, but with a very high percentage of its land area and population exposed, the City must deal with the increasing vulnerability as frequency of damaging flooding increases. The exposure to sea level rise is lowest in the western part of the study area, including Southampton County and Franklin, where sea level rise may cause some moderate changes in river levels, but is not expected to have the dramatic impacts on homes, roads and businesses that it will in the eastern portion of the study area.

TABLE 5.8: EXPOSURE TO ONE METER SEA LEVEL RISE ABOVE SPRING HIGH TIDE (MIDDLE ESTIMATE)

SUBREGION	COMMUNITY	LAND AREA (square miles)	POPULATION	HOUSING UNITS	ROADS (total miles)	BUSINESSES
Peninsula	Hampton	12.6	14,066	6,011	97.0	263
	Newport News	9.5	4,321	1,896	8.3	28
	Poquoson	11.8	6,770	2,597	38.7	115
	Williamsburg	0.2	275	137	0.1	0
	James City County	14.9	1,796	835	4.5	12
	York County	11.0	5,483	2,195	34.6	64
Southside	Norfolk	6.5	24,715	8,955	75.5	532
	Portsmouth	7.0	4,655	2,089	17.5	127
	Suffolk	14.4	4,691	1,715	4.7	21
	Virginia Beach	58.0	21,160	10,051	66.9	389
	Chesapeake	32.4	15,983	5,731	65.2	380
Western Tidewater	Isle of Wight County	13.4	3,046	1,263	2.0	16
	Franklin	0.6	74	33	0.1	0
	Southampton County	7.8	149	64	2.0	1
	Surry County	5.4	107	59	1.3	0
TOTALS		**206**	**107,291**	**43,631**	**418**	**1,948**

Source: *Climate Change in Hampton Roads, Phase III: Sea Level Rise in Hampton Roads, Virginia.* HRPDC, July 2012.

FIGURE 5.21: AREAS EXPOSED TO ONE METER OF SEA LEVEL RISE ABOVE SPRING HIGH TIDE



Disclaimer: This map is for informational purposes only. Areas depicted as vulnerable are based on estimates only and should not be construed as being in imminent danger of inundation. The analysis depicted does not account for flood protection or control infrastructure. This map should not be used in place of official FEMA flood insurance rate maps. Users agree to hold harmless and blameless the Hampton Roads Planning District Commission and its representatives and its agents for any liability associated with the use of this map.

2012

Source: Climate Change in Hampton Roads, Phase III: Sea Level Rise in Hampton Roads, Virginia. HRPDC, July 2012.

SOCIAL VULNERABILITY

The National Risk Index does not include a risk or vulnerability analysis specific to sea level rise or land subsidence. In 2018, Virginia Beach conducted a very detailed analysis of socially vulnerable demographic groups using 2010 Census data, population projections, population distribution, as well as current and future 100-year floodplains, to more accurately assess the number of people at risk under current and future sea level rise scenarios. The conclusion was that the elderly population of Virginia Beach experiences a marginally disproportionate risk to coastal flood hazards, and that for every 1.5 feet of sea level rise, the percentage of people at risk to coastal flooding will double from present conditions. Currently, 6.5% of the population is at risk; with 1.5 feet of sea level rise, 12.5% of the population will be at risk; and with 3 feet of sea level rise, approximately 26-percent of the population will be at risk. Other demographic groups were not shown to have a disproportionate risk to coastal flood hazards.[7] The detailed study methodology used in Virginia Beach represents a possible methodology for additional study of social vulnerability to sea level

[7] *Demographic and Population Vulnerability Analysis: City of Virginia Beach, Virginia*, September 13, 2018. Accessed online at: https://www.vbgov.com/government/departments/public-works/comp-sea-level-rise/Documents/new%20PWCN-15-0014_WO12B_SocialVulnerability_Final_20180913.pdf

rise in all of Hampton Roads. Study of patterns of flood insurance coverage and other mitigation techniques could be incorporated into the analysis. The Virginia Beach results and conclusions may not necessarily apply broadly across the region due to variation in development patterns and population change; however, the disproportionate impact on the elderly compared to other vulnerable groups included in the analysis (people of color, children under five years old, institutionalized people, people with limited English proficiency, people with limited income, and people with disabilities) is noteworthy for mitigation planning purposes.

TROPICAL/COASTAL STORM

Historical evidence shows that Hampton Roads is vulnerable to damaging storm-force winds, whether associated with coastal storms like nor'easters, or tropical storms such as hurricanes. As discussed in detail in the *Hazard Identification and Analysis* section, 76 hurricanes and tropical storms have passed within 75 miles of the region since 1851. This equates to a 45-percent annual chance that a storm will similarly impact the region.

ESTIMATES OF POTENTIAL LOSSES

Detailed loss estimates for the wind damage associated with the tropical storm hazard were developed based on probabilistic scenarios using Hazus (Level 1 analysis). **Table 5.9** shows estimates of potential building damage for the 100-year return period, and annualized total losses. In summary, the region may be susceptible to an estimated total of approximately $1.65 billion in building damages from a 100-year wind event.

TABLE 5.9: ESTIMATES OF POTENTIAL BUILDING DAMAGE – WIND ONLY

SUBREGION	COMMUNITY	BUILDING DAMAGE	CONTENTS & INVENTORY DAMAGE	TOTAL*	ANNUALIZED TOTAL LOSSES
Peninsula	Hampton	$91,781,000	$42,021,000	$138,514,000	$7,265,000
	Newport News	$53,985,000	$10,663,000	$68,841,000	$5,035,000
	Poquoson	$9,575,000	$3,971,000	$13,874,000	$670,000
	Williamsburg	$1,366,000	$392,000	$1,766,000	$236,000
	James City County	$10,477,000	$3,944,000	$14,428,000	$1,841,000
	York County	$35,966,000	$18,024,000	$55,067,000	$2,997,000
Southside	Norfolk	$168,291,000	$28,515,000	$213,399,000	$10,494,000
	Portsmouth	$48,722,000	$8,960,000	$61,573,000	$3,824,000
	Suffolk	$23,969,000	$6,293,000	$31,191,000	$3,031,000
	Virginia Beach	$579,495,000	$190,242,000	$815,974,000	$37,078,000
	Chesapeake	$160,748,000	$55,549,000	$224,879,000	$12,459,000
Western Tidewater	Isle of Wight County	$8,008,000	$2,592,000	$10,789,000	$1,174,000
	Franklin	$381,000	$110,000	$491,000	$207,000
	Southampton County	$650,000	$268,000	$919,000	$437,000
	Surry County	$332,000	$142,000	$474,000	$165,000
Totals		**$1,193,746,000**	**$371,686,000**	**$1,652,179,000**	**$86,913,000**

* Also includes income losses from relocation, lost wages, and lost rental income.
Source: Hazus

Based on the data in Table 5.9, Virginia Beach, Chesapeake and Norfolk have the highest annualized total losses from wind associated with a 100-year wind event. These communities are also the most vulnerable for flood, so these 3 communities are considered the most vulnerable to the combined wind and flooding effects of Tropical Storms. Hampton and Newport News are also very vulnerable to wind effects from the 100-year wind event. Franklin, Williamsburg, Surry County and Southampton County are significantly further inland and are less likely to experience the devastating impacts of the remainder of Hampton Roads. Franklin has annualized wind-related damages of only $207,000; a small portion of the $37 million calculated for Virginia Beach.

Hazus was also used to produce building damage estimates based on percentage of damage (by damage state) for the 100-year return period (**Table 5.10**).

TABLE 5.10: NUMBER OF BUILDINGS DAMAGED, BY DAMAGE STATE[8], 100-YEAR WIND EVENT

OCCUPANCY TYPE	MINOR	MODERATE	SEVERE	DESTRUCTION
Residential	29,180	3,407	70	68
Commercial	1,214	204	20	0
Industrial	307	45	8	0
Other	287	36	5	1
TOTAL	**30,988**	**3,692**	**103**	**69**

Source: Hazus

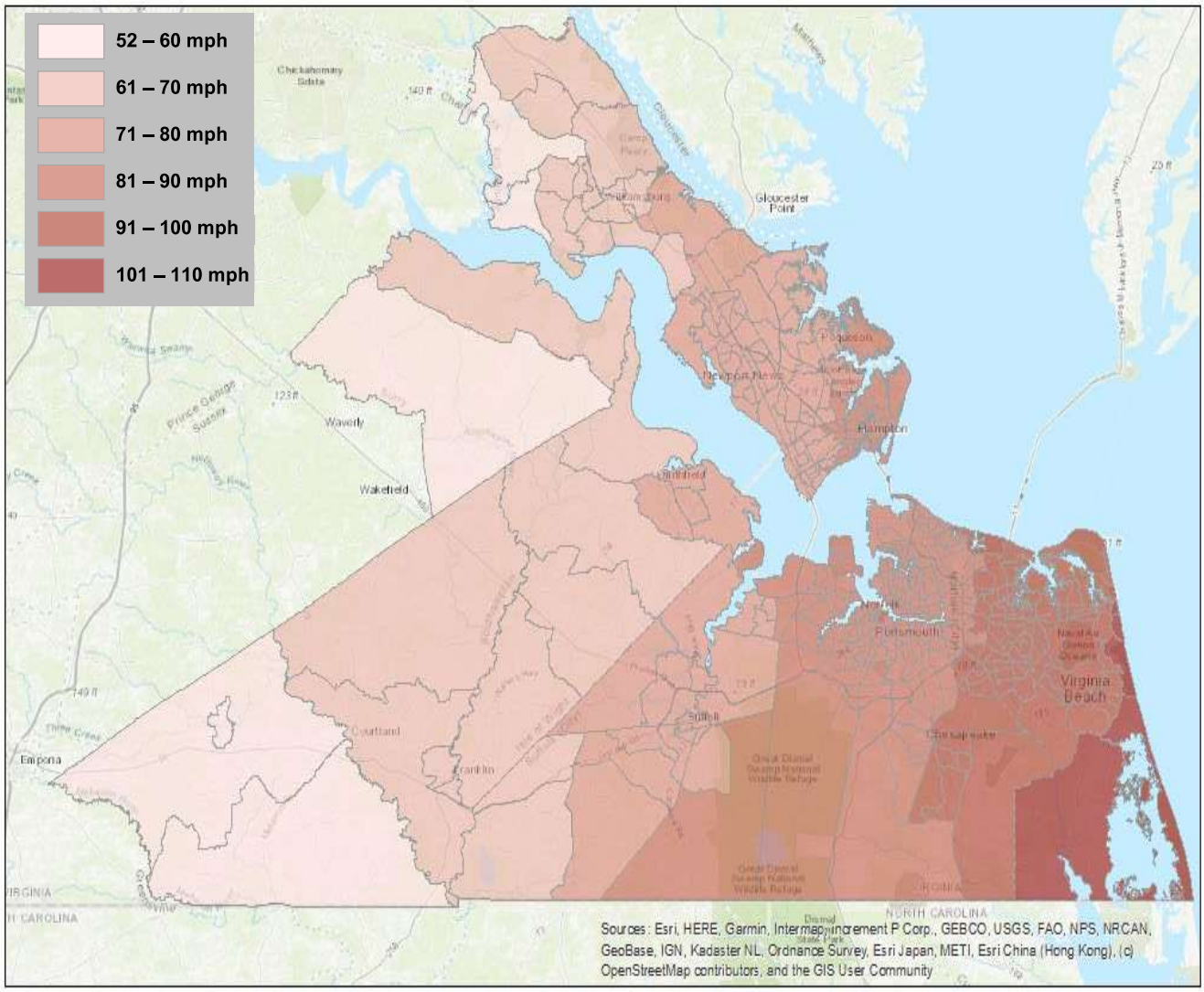
FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

The type of building construction has a significant impact on potential damages from high wind events in the future, as type of construction is also a key factor in determining the life of a structure. Basic building types in declining order of wind vulnerability are manufactured, non-engineered wood, non-engineered masonry, lightly engineered and fully engineered buildings. According to the HAZUS study, the primary construction type in the study area is wood framed (61 percent), varying from single story to multiple stories, although some masonry and steel properties are present as well. With the prevalence of non-engineered, wood-framed structures throughout the Hampton Roads region, a majority of structures in the area could be classified as having a high level of vulnerability to damages due to a high wind event in the future. Using HAZUS, an analysis of the damage caused by a 100-year frequency wind event indicates that 22,632 wood-framed structures would have minor, moderate, severe or destruction damage, while 10,346 masonry structures would have minor, moderate, severe or destruction damage.
All future structures built in the Hampton Roads region will likely be exposed to hurricane and tropical storm-force winds and may also experience damage not accounted for in the loss estimates presented in this section, with the highest vulnerability in structures near the Atlantic coast as shown in **Figure 5.22**, which show vulnerability to 100-year peak gusts by Census tract for the region. The State's Uniform Statewide Building Code continues to reduce vulnerability of newly constructed buildings to the wind hazard.

The VASEM 2021 report concludes that the research on climate change impacts in the study region is conflicted regarding increased frequency of Atlantic Coast hurricanes. However, the report indicates consensus among the researchers that there will be an increase in average cyclone intensity, precipitation rates, and the number of strong storms. Strong storms combined with sea level rise are particularly alarming for the eastern region of the study area. Even in rural areas in the western portion of the study area, increasing storm intensity can damage crops and soil in addition to vulnerable agricultural structures.

[8] For detailed definitions of the four damage states, please refer to the HAZUS-MH User Manual for the Hurricane Model.

FIGURE 5.22: 100-YEAR RETURN PERIOD PEAK GUST (MPH) BY CENSUS TRACT



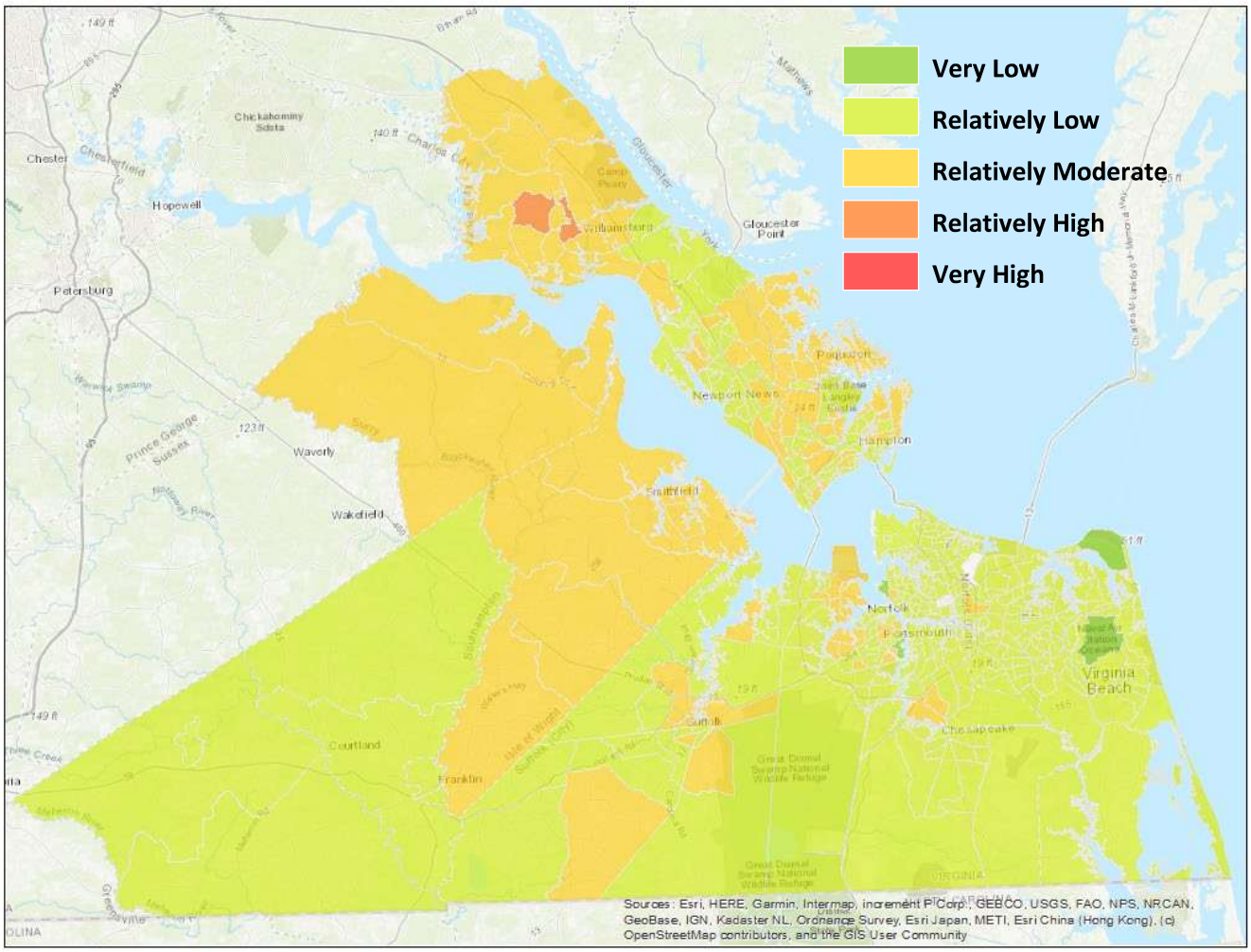
2021

Source: Hazus

SOCIAL VULNERABILITY

The NRI hurricane risk ratings by Census tract, which include a factor for social vulnerability, are shown in **Figure 5.23**. Most of the southern portion of the study area is shown as having low risk, while much of the Peninsula, Surry County and Isle of Wight County have relatively moderate risk. The Williamsburg area is shown as having relatively high social vulnerability to hurricane. This rating seems out of sync with local experience, and may be a result of the lower reported occurrences of hurricane damage in the NCEI database. When compared to the NRI hurricane risk ratings for North Carolina tracts just south of the state line, the Virginia ratings are remarkably lower.

FIGURE 5.23: NATIONAL RISK INDEX, HURRICANE RISK RATING



2021

Source: National Risk Index, 2021

LANDSLIDE/COASTAL EROSION

As documented in the *Hazard Identification and Analysis* section, the Hampton Roads region is vulnerable to the long term effects of both landslide and coastal erosion. Coastal erosion remains a significant hazard of concern that must continue to be addressed through sustained shoreline management practices. To date, existing strategies for shoreline hardening and the implementation of numerous replenishment projects have been successful in minimizing major coastal erosion losses within parts of the planning region.

ESTIMATES OF POTENTIAL LOSSES

It is difficult to determine the amount of property or the number of structures that are vulnerable to the erosion or landslide hazard. The jurisdictions in the region have demonstrated, through past projects such as the Virginia Beach Erosion Control and Hurricane Protection Project that they are willing to take on projects to protect coastal residences and commercial buildings in the hazard zone. Landslides are a much less frequent historical occurrence and are typically addressed by the landowner with little government involvement.

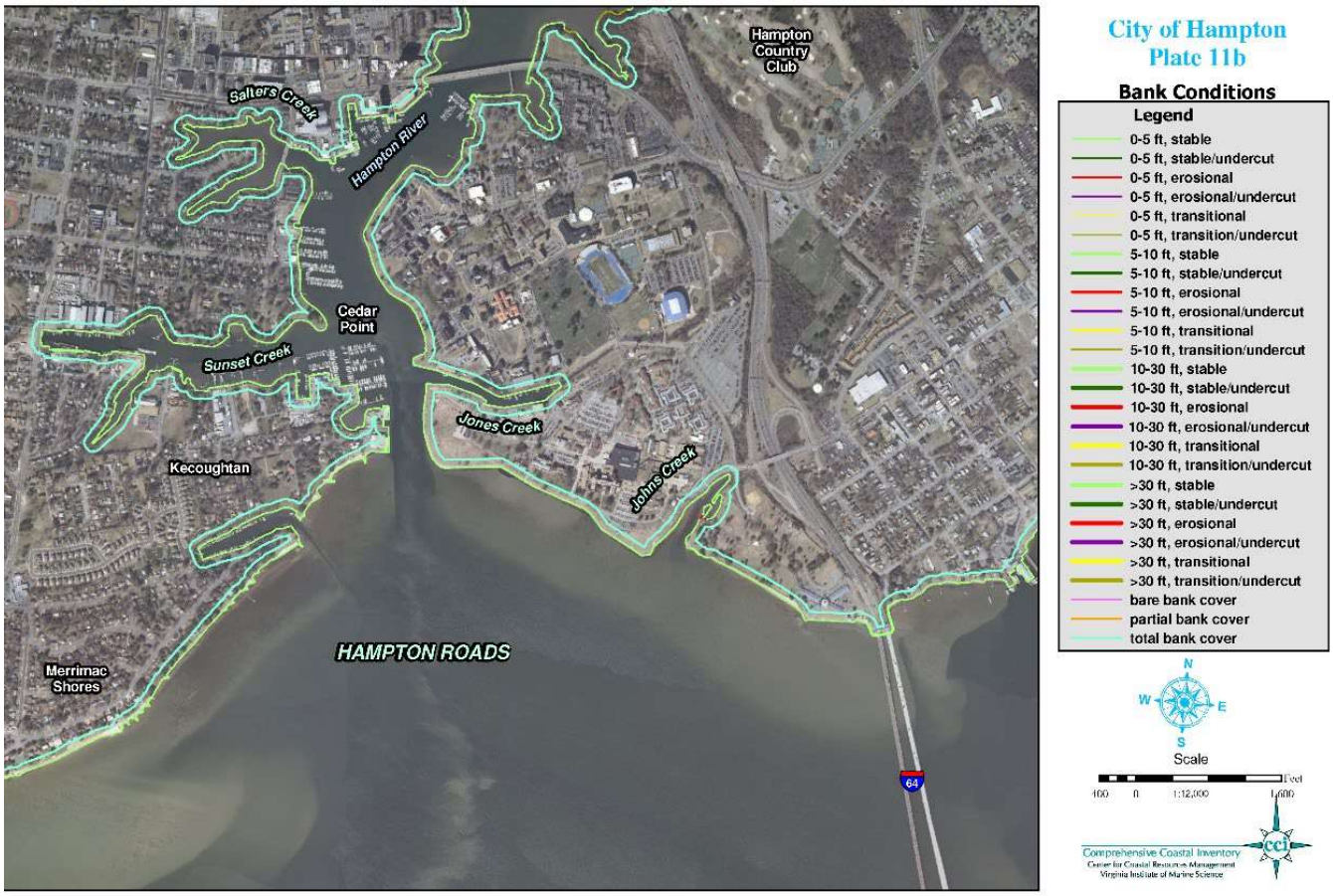
The Comprehensive Coastal Inventory Program (CCI) at VIMS has created a GIS shoreline database to develop revised Shoreline Situation Reports (SSR) for cities and counties in the region. SSRs were developed by VIMS in the 1970s, and are available online at: http://ccrm.vims.edu/gis_data_maps/index.html. These reports have been the foundation for shoreline management planning in the region for more than 30 years. CCI has developed new protocols for collecting, disseminating, and reporting data relevant to shoreline management issues today. New SSRs are currently available online at: http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/. Southampton County and Franklin are not included in the Chesapeake Bay Shoreline Inventory project.

The data inventory developed for the new SSRs is based on a three-tiered shoreline assessment approach. In most cases this assessment characterizes conditions that can be observed from high resolution imagery. A small boat navigating along the shoreline was used to verify the remotely sensed data and collect features that could not be ascertained from the imagery. The three tiered shoreline assessment approach divides the shore zone into three regions: 1) the immediate riparian zone, evaluated for land use; 2) the bank, evaluated for height, stability, cover and natural protection; and 3) the shoreline, describing the presence of shoreline structures for shore protection and recreational purposes. Final prepared maps are available online at the site noted above. Although the maps alone do not indicate potential loss from erosion, they provide areas for future study and indicate where shoreline structure protection is currently in place to protect against coastal erosion.

Figure 5.24 provides a sample of the maps available in the SSR for the City of Hampton.

The Atlantic Ocean shorelines in Virginia Beach and Norfolk are the most vulnerable areas of Hampton Roads with regard to coastal erosion. The fetch for tropical storms and nor'easters is sufficient to create wind-driven waves that cause significant damage on a regular basis. The Chesapeake Bay shorelines of Hampton, Poquoson and Norfolk are also susceptible to wind-driven wave action that causes coastal shoreline erosion. The James River and York River are deep and wide enough to cause some shoreline erosion in Suffolk, Isle of Wight County, Newport News, York County, Surry County and James City County. Riverine erosion in Franklin and Southampton County, while not as dangerous to people and homes, creates limited vulnerability to infrastructure and the built environment.

FIGURE 5.24: BANK CONDITIONS, HAMPTON RIVER

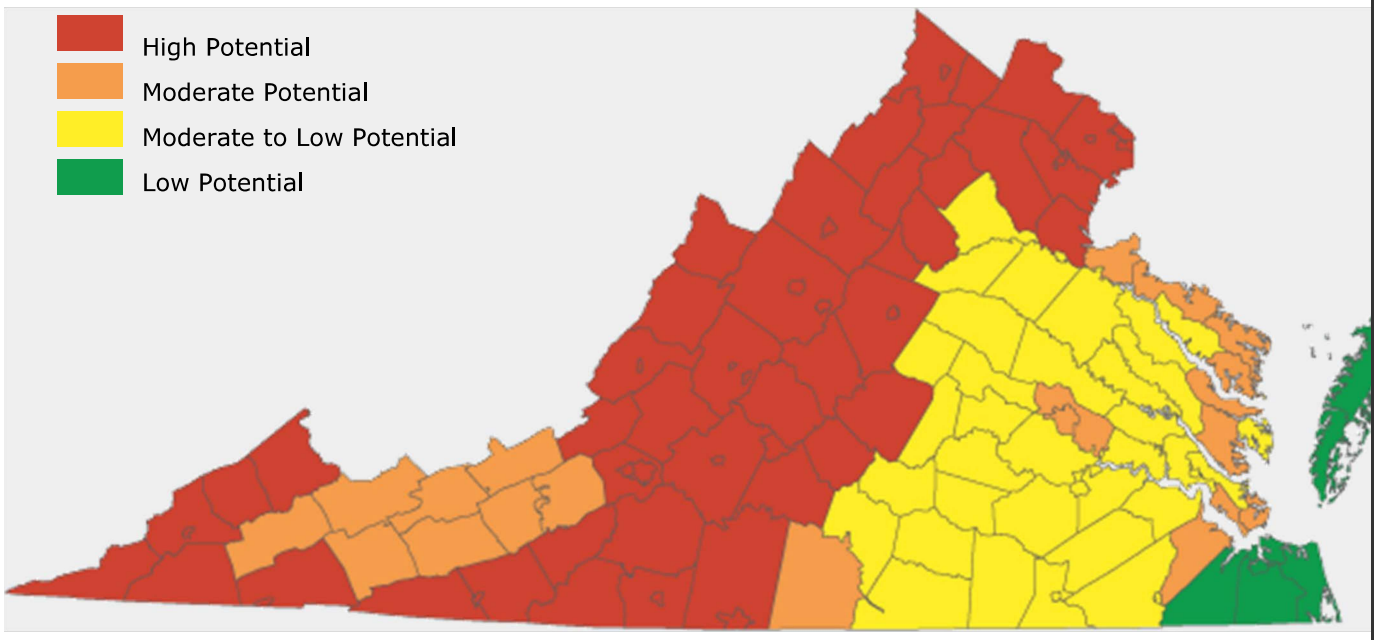


2021

Source: VIMS CCI

Landslide events in the region are considered a moderate- to low-probability event, with very localized impacts when and where they occur. Virginia Department of Energy provided the map in **Figure 5.25** that shows counties in Virginia and related susceptibility to landslides. Because damages are rarely quantified or are extremely limited in nature, average annual damages from landslides are not very useful. Occurrence intervals are similarly flawed because of the short period of record. Figure 5.25, however, indicates that the region's highest relative vulnerability is in in Isle of Wight, Newport News, Hampton, and Poquoson, perhaps due to the unconsolidated soils in the area.

FIGURE 5.25: SUSCEPTIBILITY TO LANDSLIDES BY VIRGINIA COUNTY/CITY



2021

Source: Virginia Department of Energy

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

Generally speaking, future vulnerability to both landslide and coastal erosion will depend greatly on appropriate local site planning and permitting, as well as each community's approach to sea level rise and associated flooding problems. Planned mapping regarding landslide risk, if appropriately shared with local land use planners and incorporated into site planning and stormwater regulations, may reduce the incidence of landslides that affect structures in the future.

The Commonwealth's Stormwater Management program and enabling statutes help to manage future land use, and reduce stream channel erosion, water pollution, depletion of groundwater resources and more frequent localized flooding to protect property value and natural resources throughout the region. While waves are the primary force in determining the prevailing shoreline processes in the short-term of months or individual storms, sea level rise is the primary driver of shoreline change over the long-term. Documented sea level rise in the study area is expected to accelerate and will continue to impact shoreline morphology in the future.

Current building code requirements restrict fill materials used to fill a building site prior to new construction. But homes built on debris fill, or on oversteepened slopes (such as along a river bluff) may be more vulnerable to landslides in the future, especially on or near slopes near the contact between the Yorktown and Eastover convergence. The Virginia Department of Energy is interested in identifying at-risk areas in the region.

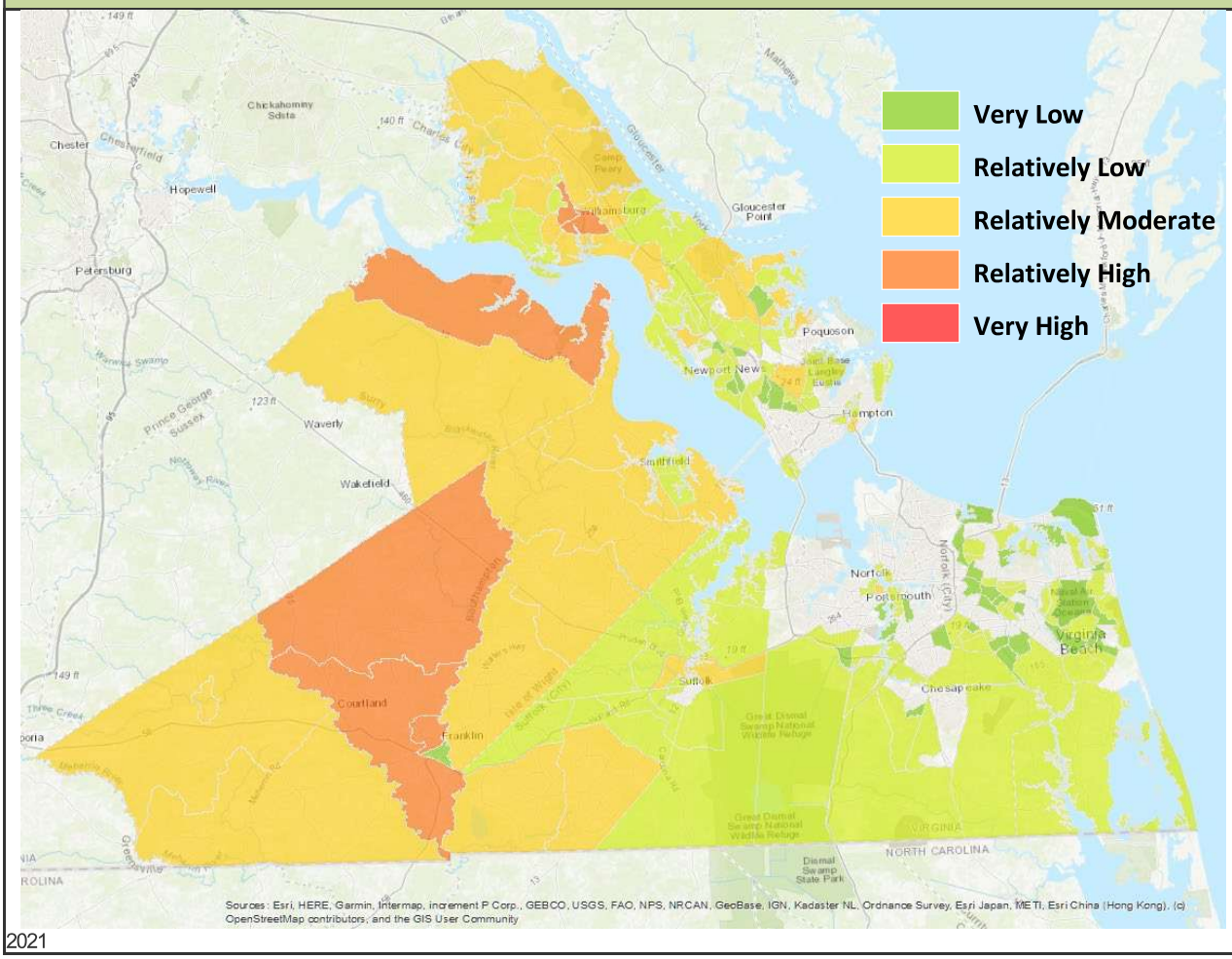
Climate change has the potential to worsen the risk associated with landslides in the study area. Precipitation patterns are expected to become more intense, prolonged and frequent as a result of a warming climate. There is a risk that these precipitation events could destabilize fragile slopes in the region, leading to more frequent and damaging landslides.

SOCIAL VULNERABILITY

Any measurement of social vulnerability to shoreline or coastal erosion requires considerably more knowledge about the location of vulnerable structures in each locality. Mitigation Action MH-4 in the *2018 Commonwealth of Virginia Hazard Mitigation Plan* proposes VDEM involvement in assisting localities, state agencies, and PDCs with identification of vulnerable structures and application for funding to implement soil stabilization projects to reduce risk to structures or infrastructure from erosion. Future revisions to the plan may be able to more precisely define socially vulnerable areas of the study region for shoreline or coastal erosion using information developed under this or a similar effort.

The region's NRI risk ratings for landslide are shown in **Figure 5.26**. The USGS Landslide Hazard Map was used as an input for hazard susceptibility, creating a raster that classified all of the conterminous United States as having either "some" or "negligible" landslide susceptibility based on slope and relief. This method may not adequately capture the unique geological conditions that are suspected as contributors to landslides in the study region. Nevertheless, the vulnerability shown in Figure 5.26 is a starting point for discussions regarding factors that could affect a household's vulnerability to landslide.

FIGURE 5.26: NATIONAL RISK INDEX RATING, LANDSLIDE



2021

Source: NRI, 2021

TORNADO

Historical evidence shows that the Hampton Roads region is vulnerable to tornado activity, which is often associated with other severe weather events such as thunderstorm or tropical cyclone activity.

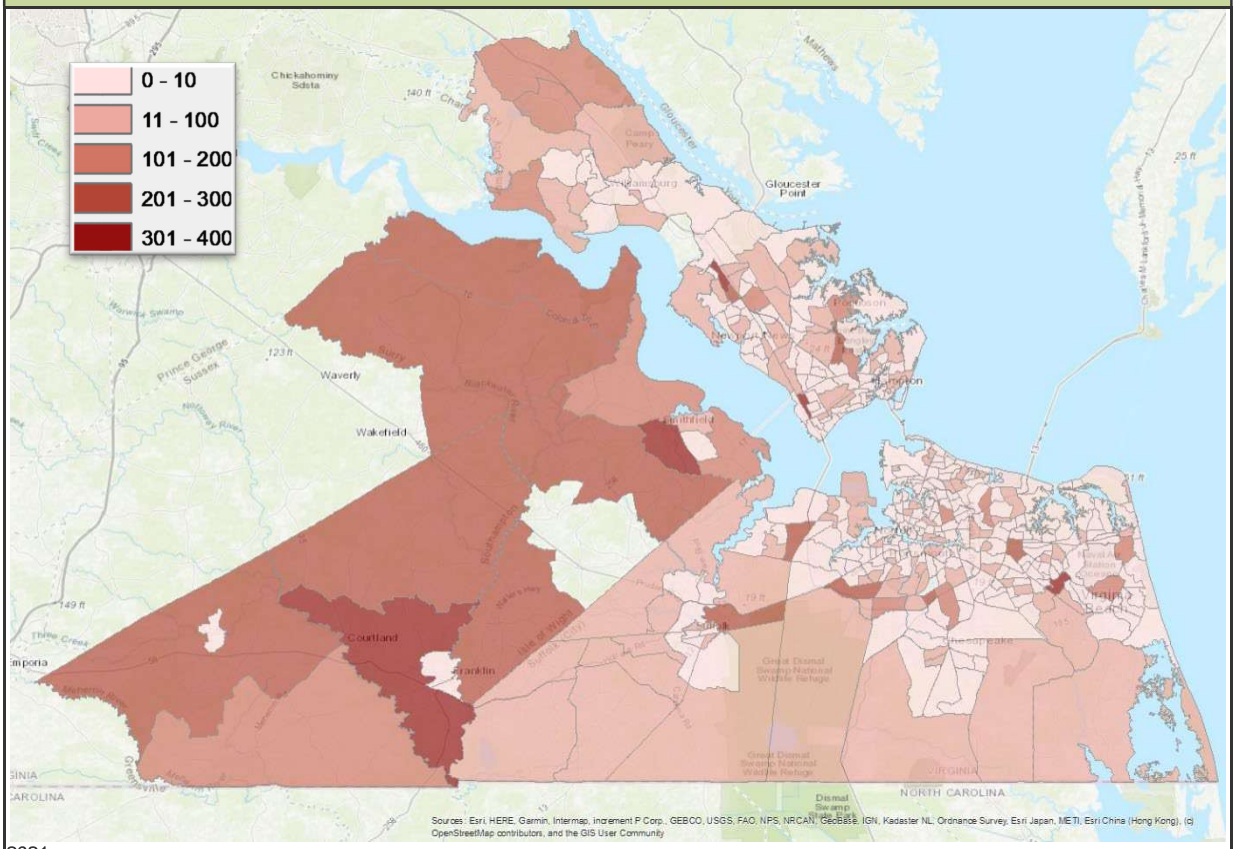
ESTIMATES OF POTENTIAL LOSSES

Because it cannot be predicted where a tornado may strike, it is not possible to map geographic boundaries for this hazard or produce detailed loss estimates. Therefore, the total dollar exposure figure of $204 billion for all buildings and contents within the region is considered to be exposed and could potentially be impacted on some level by the tornado hazard.

Low-intensity tornadoes may not completely destroy a well-constructed building, although even the most well-constructed buildings are vulnerable to the effects of a more intense (F2 or higher) tornado. The statewide building code provides a reasonable level of protection for newly constructed buildings, while structures built before the code went into effect are most vulnerable to damage.

Because manufactured homes are particularly vulnerable to damage from tornadoes, HAZUS was used to show geographic concentrations of manufactured homes in the study area. **Figure 5.27** is a map showing the number of manufactured homes by Census tract from the 2010 Census data generated by HAZUS.

FIGURE 5.27: NUMBER OF MANUFACTURED HOMES BY CENSUS TRACT



2021

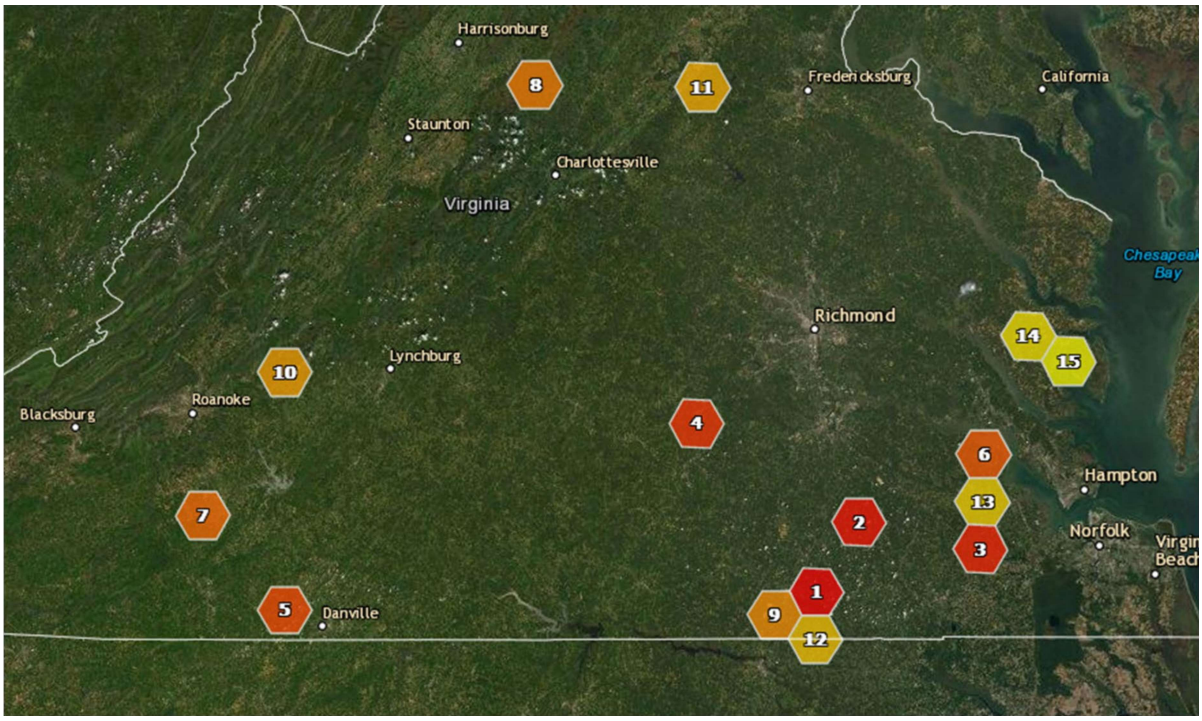
Source: Hazus and 2010 U.S. Census

Based on historic property damages for the 26-year period between 1995 and 2021 as shown in *Section 4, Hazard Identification and Risk Analysis*, there were 77 tornado events with an annualized loss estimate of $24.3 million and annual probability of 3.0% percent.

While Figure 4.18, Historical Tornado Hazard Frequency, and Figure 5.27, Number of Manufactured Homes by Census Tract, are useful for seeing where tornadoes have historically struck and where they could potentially damage a specific type of structure, the figures do not show measured differences in vulnerability among study area communities. Because tornadoes are driven by larger scale air masses and storm systems and these storm systems affect the Hampton Roads region uniformly, the region's vulnerability to tornadoes is quite uniform. The population concentrations in the urbanized areas of the Peninsula and Southside Hampton Roads may experience more damage as a result of a similar event in the more rural areas of Southampton County or Isle of Wight County, for example, but the vulnerability to tornado strike is uniform throughout the study area.

Researchers at Old Dominion University who have been researching spatial variability and trends in tornado occurrence in the Commonwealth, overlaid areas of increased tornado activity with the highest percentage of manufactured homes in the state, based on data from the 2014-2018 American Community Survey. Based on their analysis, there are several areas that have experienced an increased trend in number of tornadoes since 1950, and which have a high concentration of mobile homes, including specific areas in: Surry County and Isle of Wight County. **Figure 5.28** from the ODU study shows these areas in more detail.

FIGURE 5.28: VIRGINIA TORNADO MOBILE HOME RISK INDEX



Source: Old Dominion University web page, accessed online 2021 at: https://odu-gis.maps.arcgis.com/apps/Cascade/index.html?appid=723e660c2c09447fa8a57d3186dc8d2a

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

All future structures built in Hampton Roads are likely to be exposed to the tornado hazard. The link between changing climate and tornado severity and frequency is currently unclear. One problem is that long-term trends are difficult to determine, as records only go back to the 1950s. Another issue is that as population centers have grown and shifted over time, the reporting of tornadoes has been inconsistent.

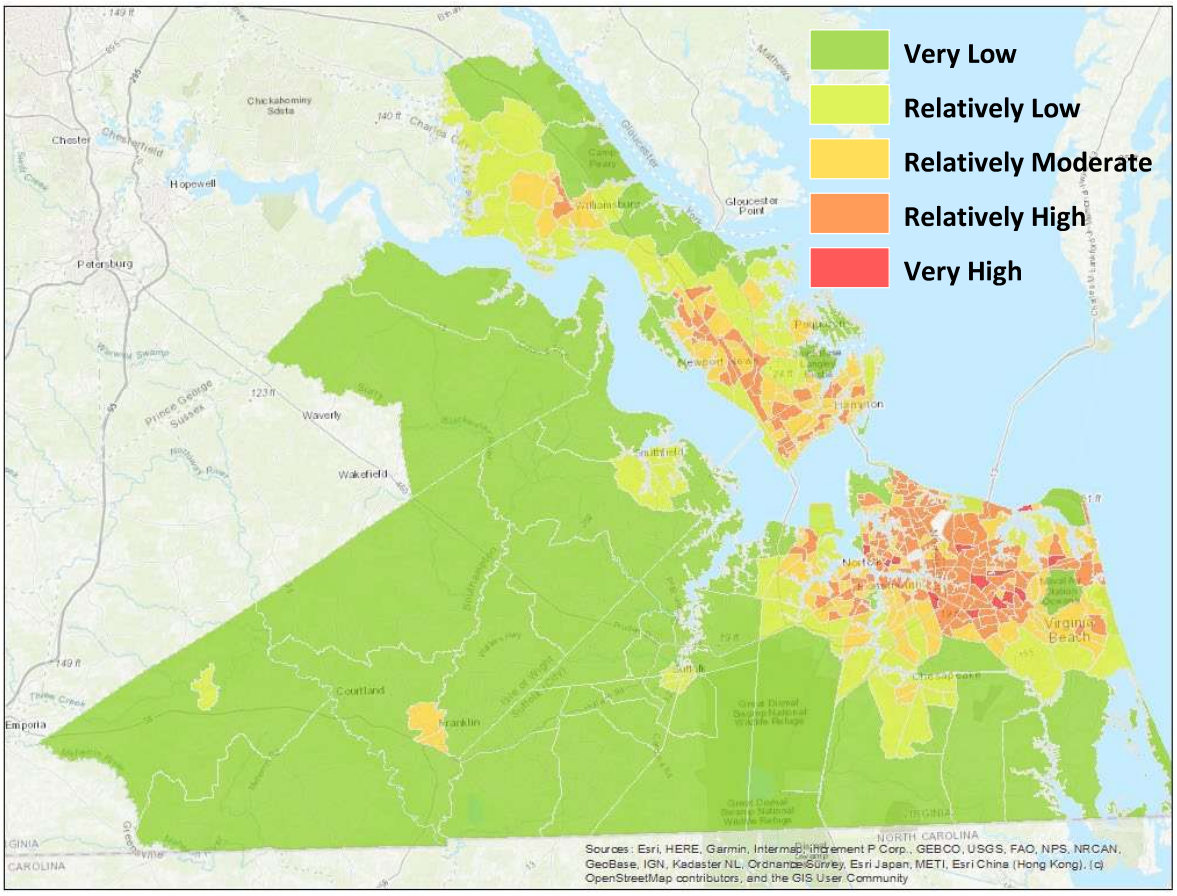
Also, improved observation technology (such a Doppler radar) allows for detection of events that was not possible in earlier years.

Researchers are working to better understand how the fundamental elements required for tornado formation – atmospheric instability and wind shear – interacts with changing climate conditions. Researchers expect that a warmer, wetter climate will allow for more frequent atmospheric instability. However, it is also possible that a warmer climate will dampen the probability of wind shear. Recent trends observed in the Midwest are inconclusive. A changing climate change could also shift the traditional timing or expected locations for tornadoes and have less impact on the total number of tornado occurrences.

SOCIAL VULNERABILITY

The NRI risk ratings for tornadoes are shown in **Figure 5.29** by Census tract. Despite the higher numbers of manufactured homes in the rural, southwestern portions of the study area, the damage history and built infrastructure exposure in the urbanized areas of the lower Peninsula and Southside are likely culprits in the rating disparity.

FIGURE 5.29: NATIONAL RISK INDEX RATING, TORNADO



2021

Source: National Risk Index, 2021

WINTER STORM

Historical evidence shows that the Hampton Roads region is vulnerable to winter storm activity and the wind-related impacts of nor'easters, including heavy snow, ice, extreme cold, freezing rain, and sleet.

ESTIMATES OF POTENTIAL LOSSES

Because winter storms typically affect large areas beyond county and municipal boundaries, it is not possible to map geographic locations at specific risk from this hazard or produce detailed loss estimates. Therefore, the total dollar exposure figure of $204 billion for all buildings and contents within the region is considered to be exposed and could potentially be impacted by the winter storm hazard. Based on historic property damages for the past 25 years (1996 to 2021), an annualized loss estimate of $805,800 and annual probability of 112% was generated for the winter storm hazard. Potential losses may be inflated by factors such as the costs associated with the removal of snow from roadways, debris clean-up, indirect losses from power outages, and the tendency of the NCEI data to combine metropolitan regional damages. Per the data in Table 4.13, no damages were reported for any of the NCEI database storms noted since the previous plan. Failure to report damages can significantly skew the data results.

Structures built prior to Virginia's statewide building code are somewhat more vulnerable to damage from severe winter storms where snow and ice may accumulate on rooftops, especially if snow loads were not accounted for in the original structure design. Because manufactured or mobile homes are also very susceptible to damage of roof collapse or additional damage due to their design features, HAZUS was used to show geographic concentrations of manufactured homes in the study area. **Figure 5.27** is a map showing manufactured homes by Census tract from the 2010 Census data generated by HAZUS.

Due to the consistency in the study area's basic geographic characteristics, winter storms can be expected to affect Hampton Roads' communities in a similar way. However, warm ocean currents offshore of Virginia Beach can occasionally diminish the effects of winter storms on the communities adjacent to larger bodies of water, including Virginia Beach, Norfolk, Hampton, and Poquoson. Temperature differences of a few degrees in these eastern communities can cause faster melting of snow and ice, and may result in a "snow line" that bisects the study area into areas of snow versus areas of rain associated with eastward moving systems. Such differences can result in dramatically different storm impacts in the study area.

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

Winter storms remain a likely occurrence for the region. Because of the geographic location, all future structures built in Hampton Roads are likely to be exposed to the winter storm hazard and may experience damage. The *2018 Commonwealth of Virginia Hazard Mitigation Plan* suggests that the southern and southeastern portions of the state are likely to receive significant winter weather approximately once a decade. Local zoning and comprehensive plans are not focused on winter storm planning in the study area, although Emergency Operations Plans typically contain appropriate response actions.

As the earth's climate changes, heavy seasonal snow years have begun to occur with greater frequency. According to NCEI, the frequency of extreme snowstorms in the eastern US has increased over the past century, with approximately twice as many extreme snowstorms occurring in the last half of the 20th century as in the first half. Conditions that influence snowstorm severity including warmer ocean surface temperatures in the Atlantic. These increased temperatures can lead to exceptionally high amounts of moisture feeding into a storm and contribute to storm intensification.

Global ocean surface temperatures have increased at a rate of +.18 degrees Fahrenheit each decade since 1950. Natural variability can affect surface ocean temperatures, but as global surface temperatures increase, the temperature is higher at any time than it would have been if the climate were not changing.

Some research has shown that increasing ocean surface temperature and reductions in Arctic sea ice may produce atmospheric circulation patterns that are favorable for winter storm development in the eastern United States. Notably, a greater prevalence of high pressure blocking patterns over the North Atlantic that result in cold outbreaks in the eastern U.S., along with slow moving systems can further exacerbate the longevity and severity of a snowstorm.

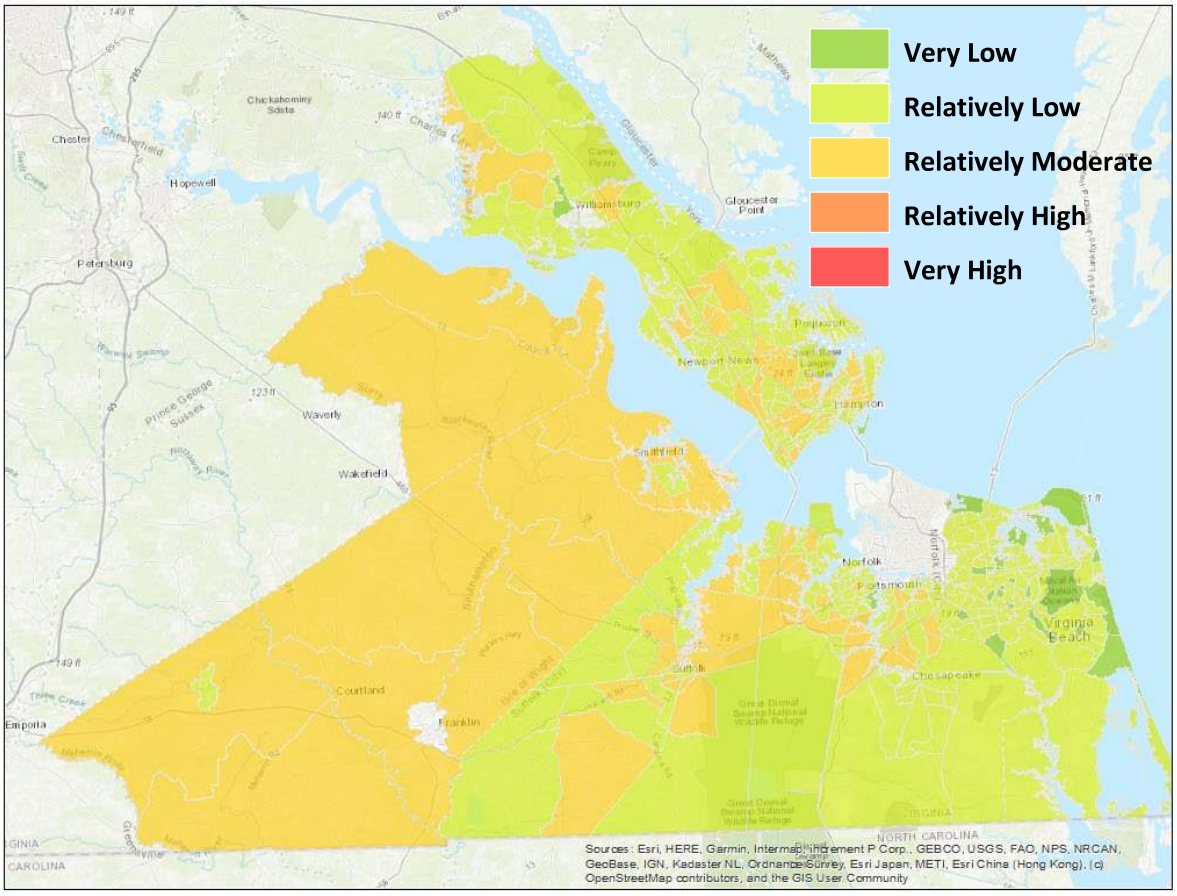
Studies have shown that natural variability associated with El Nino conditions has a strong relationship and influence on the incidence of severe snowstorms in the eastern U.S. An analysis of 100 storms in six regions east of the Rocky Mountains found that severe snowstorms are approximately twice as likely to occur in the eastern U.S. – north and south – during years when a moderate to strong El Nino is present as compared to years when more neutral conditions are present.

SOCIAL VULNERABILITY

The NRI risk ratings for winter weather are shown in **Figure 5.30** by Census tract. Most of the more populous regions of Hampton Roads are rated as Relatively Low, with some moderate areas found in Isle of Wight, Surry and Southampton counties, and portions of Suffolk. Technical documentation for the NRI indicates that the Iowa Environmental Mesonet data were used for tallying the number of historical occurrences; however, the historic loss ratios were derived from NCEI data which show relatively low dollar value losses for the region. Only four events in the past 25 years have associated damages in the NCEI database.

Severe winter weather can be problematic for socially vulnerable populations, especially people living in substandard housing or without alternative arrangements when power goes down. Transportation impacts are especially severe when vulnerable people rely on public transportation and those routes are interrupted by snow or ice accumulation. Populations with medical disabilities, many who require power to run oxygen supplies for example, are also vulnerable, as are elderly people who have less ability to adjust their living arrangements when winter storms affect the region.

FIGURE 5.30: NATIONAL RISK INDEX RATING, WINTER STORM



2021

Source: NRI 2021

EARTHQUAKE

The annual probability of an earthquake epicenter within 65 miles of Hampton Roads is estimated at less than 1% based on historical data. While the probability of an earthquake occurrence is relatively low, moderate losses, should a significant earthquake event occur, are possible.

ESTIMATES OF POTENTIAL LOSSES

Table 5.11 provides generalized building damage estimates by jurisdiction for the 1,000-year return period based on probabilistic scenarios using Hazus.

TABLE 5.11: ESTIMATES OF POTENTIAL BUILDING DAMAGE – EARTHQUAKE WITH 1,000-YEAR RETURN PERIOD

SUBREGION	COMMUNITY	BUILDING DAMAGE	NON-STRUCTURAL, CONTENTS & INVENTORY DAMAGE	TOTAL*
Peninsula	Hampton	$5,837,000	$14,560,000	$27,791,000
	Newport News	$7,525,000	$19,330,000	$37,344,000
	Poquoson	$643,000	$1,496,000	$2,695,000
	Williamsburg	$732,000	$2,019,000	$4,036,000
	James City County	$4,401,000	$11,077,000	$19,876,000
	York County	$3,446,000	$8,297,000	$15,185,000
Southside	Norfolk	$9,116,000	$21,526,000	$43,354,000
	Portsmouth	$2,851,000	$6,197,000	$13,391,000
	Suffolk	$3,451,000	$7,805,000	$14,954,000
	Virginia Beach	$16,885,000	$36,962,000	$73,951,000
	Chesapeake	$9,320,000	$20,815,000	$40,140,000
Western Tidewater	Isle of Wight County	$1,689,000	$3,932,000	$7,364,000
	Franklin	$325,000	$827,000	$1,701,000
	Southampton County	$825,000	$1,943,000	$3,676,000
	Surry County	$342,000	$843,000	$1,577,000
Totals		**$67,387,000**	**$15,7928,000**	**$307,034,000**

* Also includes income losses from relocation, lost wages, and lost rental income.
Source: Hazus

Hazus (Level 1 analysis) was also used to produce building damage estimates based on percentage of damage (by damage state) for the 1,000-year return period (**Table 5.12**). According to the Hazus model assumptions, there should be no building damage from the 100-year earthquake event.

TABLE 5.12: ESTIMATES OF POTENTIAL BUILDINGS DAMAGED BY DAMAGE STATE9– EARTHQUAKE WITH 1,000-YEAR RETURN PERIOD			
SLIGHT	MODERATE	EXTENSIVE	COMPLETE
11,994	3,487	428	39

Source: Hazus

Due to the relative consistency in the topography, geographic characteristics and soils of the study area, earthquakes are expected to affect the Hampton Roads region communities in a similar manner, with damages proportional to the inventory of structures and infrastructure.

Average Annual Losses from earthquake in Hampton Roads total an estimated $1.1 million, with Norfolk and Virginia Beach having the highest annual loss estimates. Average annual losses are equal to or less than $10,000 per year in Poquoson, Franklin, and Surry County.

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

All future structures built in Hampton Roads will be vulnerable to seismic events to a limited degree, and may also experience damage not accounted for in the estimated losses presented in this section.

While scientists have observed some correlation between climate change on rising temperatures, melting glaciers and isostatic rebound, a causal connection to subsequent earthquakes is less documented, especially for the eastern United States. Earthquakes and weather have a few possible correlations that are still under investigation and should be considered more theoretical than scientific:

1. glacier melt and isostatic rebound causing earthquakes;
2. changing surface stress loads from increased surface water causing microseismicity or tiny earthquakes with magnitudes less than zero, and changes in water quantity stored in large dams inducing seismicity;
3. longer duration droughts and/or groundwater withdrawals that change stress loads on the Earth's crust causing earthquakes; and,
4. injection wells that lubricate faults and induce seismicity.[10]

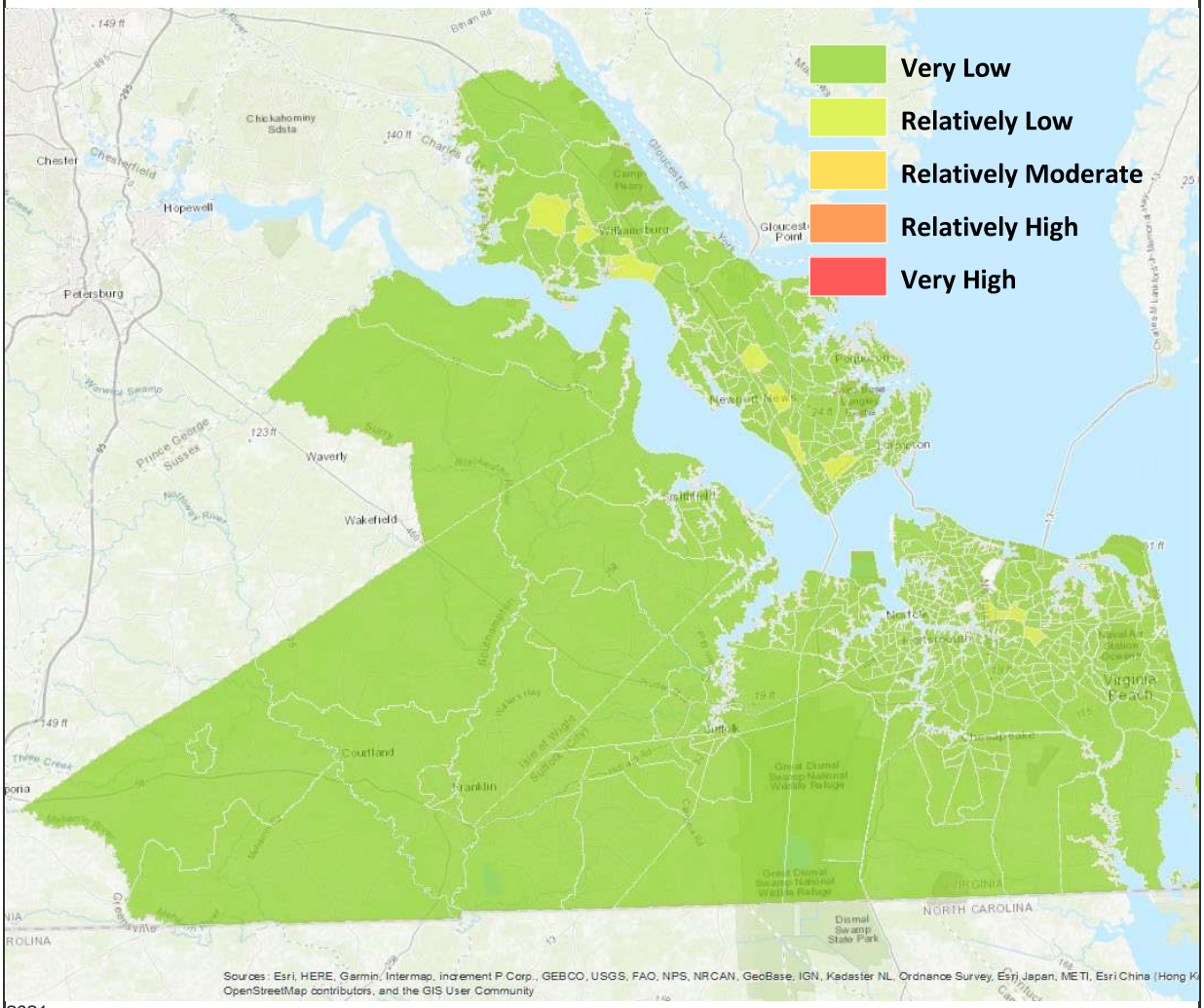
SOCIAL VULNERABILITY

The NRI risk ratings for earthquake are shown in **Figure 5.31** by Census tract. The map reflects the history of earthquakes in Virginia, with few damages and very low risk throughout the Hampton Roads region.

[9] For more detailed description of the four damage states, please refer to the *HAZUS-MH User Manual* for the Earthquake Model.

[10] Buis, Alan. NASA: Global Climate Change: Vital Signs of the Planet. *Can Climate Affect Earthquakes, or are the Connections Shaky?* Feature dated October 29, 2019, accessed online at: https://climate.nasa.gov/news/2926/can-climate-affect-earthquakes-or-are-the-connections-shaky/

FIGURE 5.31: NATIONAL RISK INDEX RATING, EARTHQUAKE



2021

Source: NRI 2021

WILDFIRE

Historical data indicate that the Hampton Roads region of Virginia is vulnerable to wildfire, particularly in the western portion of the study area. Figure 4.24 provides a graphical overview of wildfire vulnerability in the region.

ESTIMATES OF POTENTIAL LOSSES

As shown in the *Hazard Identification and Analysis* section, VDOF documented an average of 24 wildfire events per year between 2002 and 2020, with total property damages of $663,550 reported for the 433 events between 2002 and 2020. Average losses for state-response wildfires in the region are, therefore, estimated to be $36,860 each year.

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

In cities and counties throughout the U.S., population concentration increase has resulted in rapid development in the outlying metropolitan areas and in rural areas, both of which are areas already occupied by dense forests. Wildfire risk can increase when new developments are built in close proximity to large and dense stands of forest. Wildland Urban Interface (WUI) risk is not limited to new developments in large natural areas. Occasionally, forest and brushlands can grow up over time and engulf previously developed areas. Regardless of how the risk arises, the WUI creates an environment in which fire can move readily between structural and vegetative fuels. Expansion of the WUI over time has increased the likelihood that wildfires will threaten structures and people.

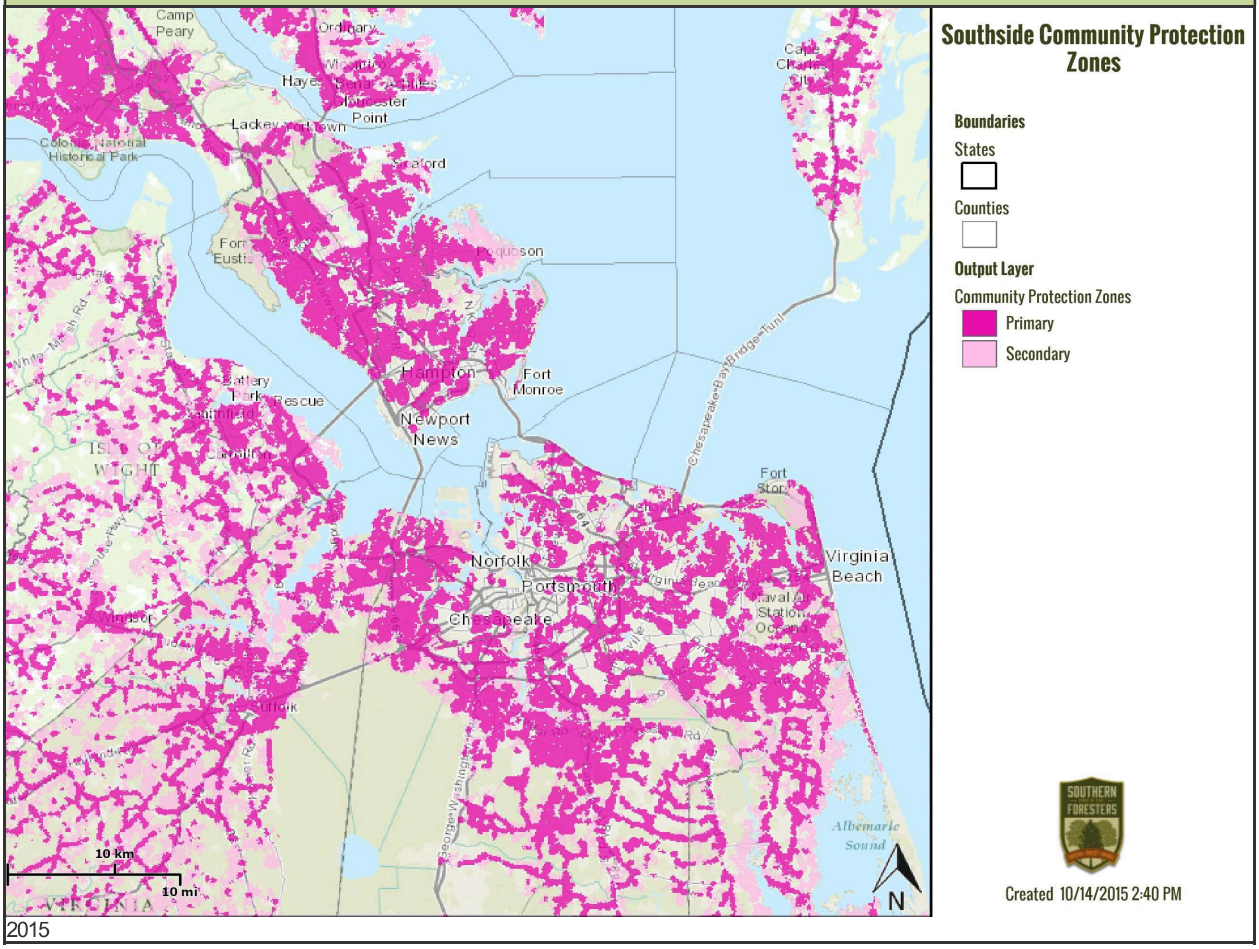
The Southern Group of State Foresters has created an online portal for wildfire risk assessment at http://www.southernwildfirerisk.com/map/index/public. The portal provides mapping to help determine future vulnerability to WUI fire in Hampton Roads and to provide planners a sense of where fire mitigation should be focused for the best reduction in vulnerability. Community Protection Zones (CPZs) with both primary and secondary levels of importance are depicted in **Figures 5.32 through 5.34**. The zones are based on an analysis of the "Where People Live" housing density data and surrounding fire behavior potential. Primary CPZs reflect areas with a predefined housing density appropriate to the region. Rate of Spread data is used to determine the areas of concern around populated areas that are within a 2-hour fire spread distance. This is referred to as the Secondary CPZ.

The online portal for wildfire risk assessment also allows users to highlight a neighborhood or street and determine the wildfire characteristics of that area, such as the Wildfire Urban Interface Risk Index, the wildfire ignition density and the fire intensity scale.

The CPZs in the Hampton Roads area, where wildfire vulnerability is highest, are clustered in the lower Peninsula (Hampton, Newport News and Poquoson), James City County, Suffolk, and north Chesapeake. There are sporadic pockets of vulnerability scattered through Surry County, eastern Isle of Wight County, parts of Virginia Beach, Norfolk and Portsmouth that make these areas perhaps slightly less vulnerable. The Great Dismal Swamp is not mapped as part of this effort as it is Federal land, but there is also high risk of wildfire in that region actively managed by the Great Dismal Swamp Fire Program.

The region is expected to continue to incur wildfires, particularly during extended periods of dry and windy weather. The region's zoning ordinances do not generally guide new development away from the Wildland Urban Interface, but the wildfire threat is not as severe as in the western United States.

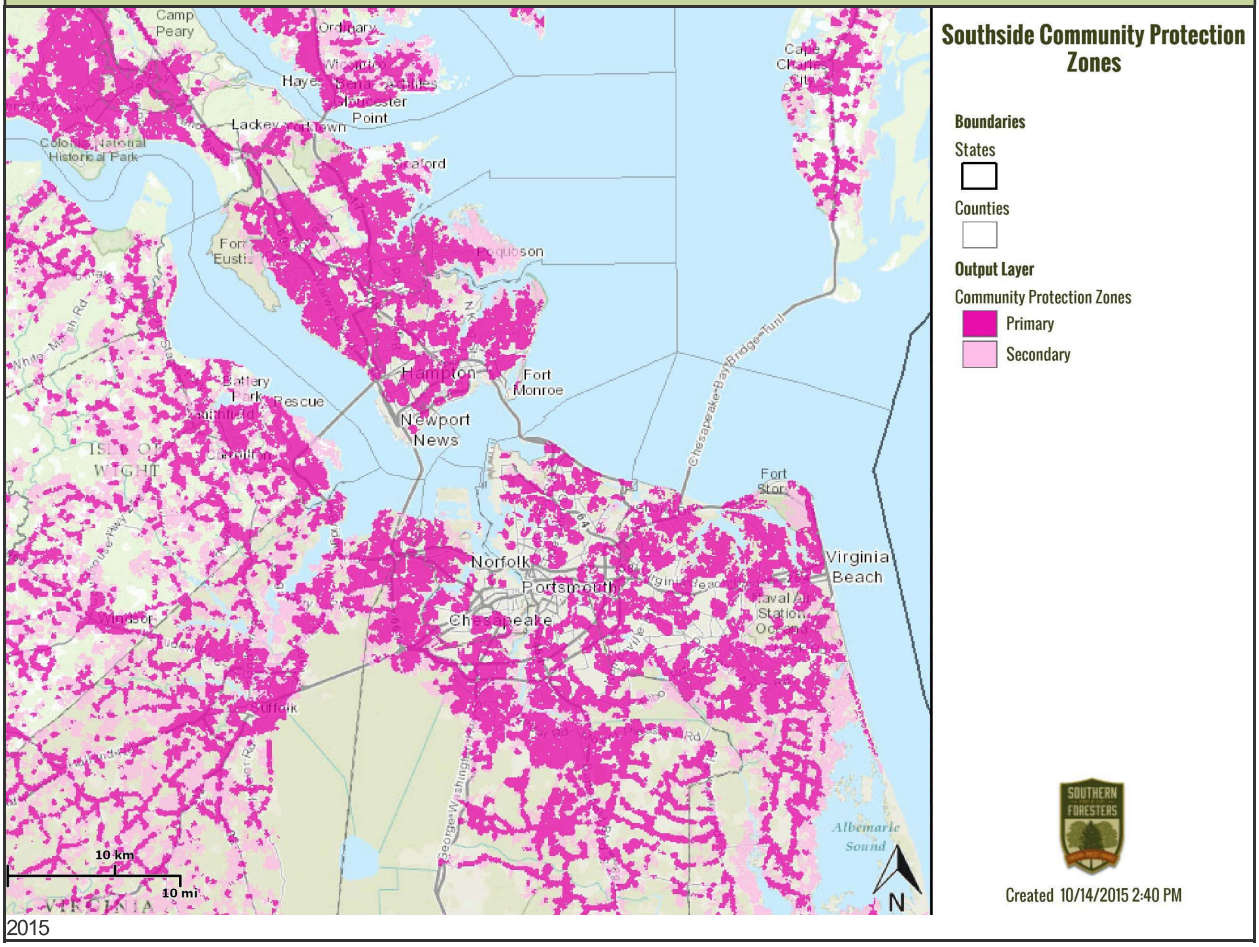
FIGURE 5.32: COMMUNITY PROTECTION ZONES FOR WILDFIRE, PENINSULA



2015

Source: Southern Group of State Foresters

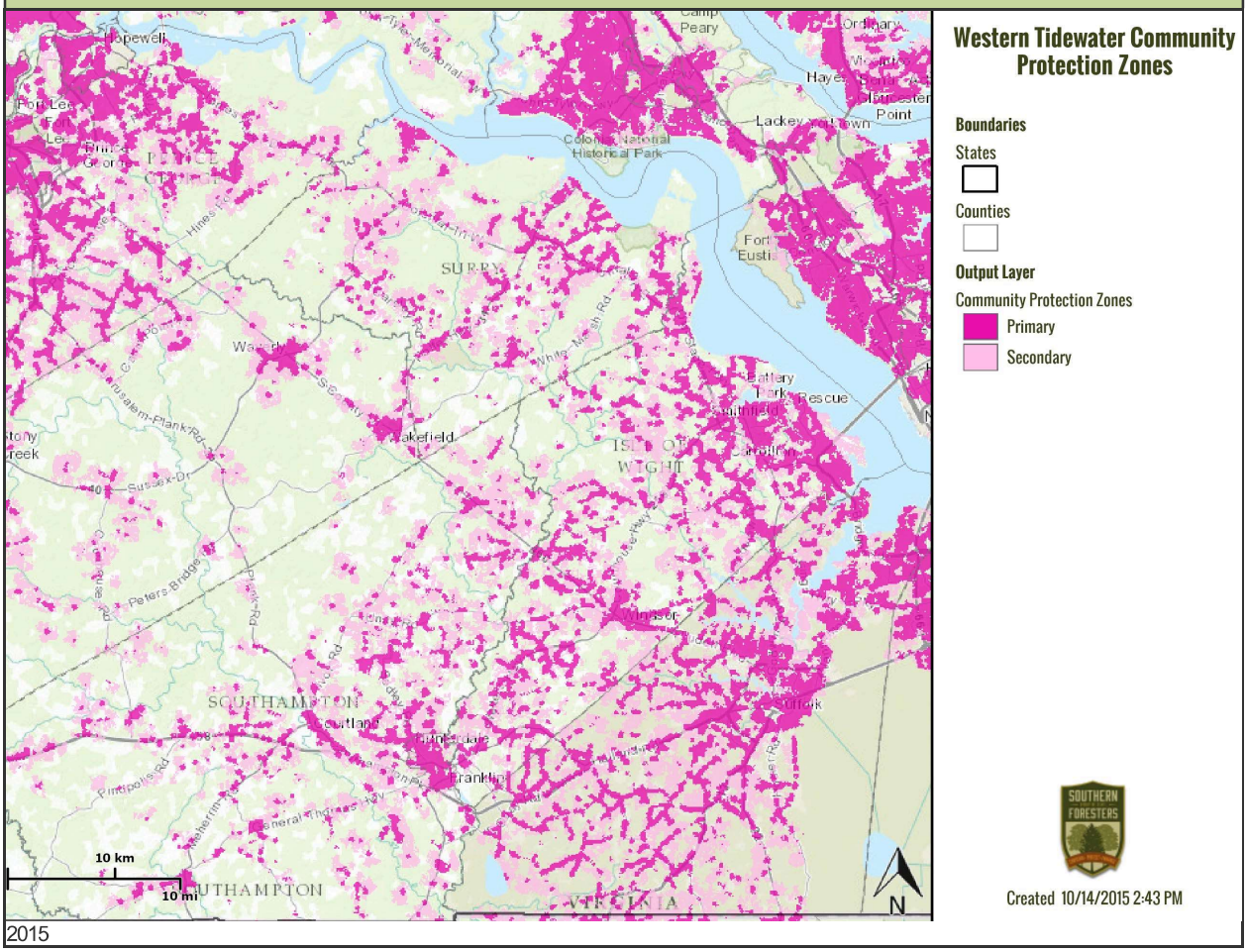
FIGURE 5.33: COMMUNITY PROTECTION ZONES FOR WILDFIRE, SOUTHSIDE



2015

Source: Southern Group of State Foresters

FIGURE 5.34: COMMUNITY PROTECTION ZONES FOR WILDFIRE, WESTERN TIDEWATER



2015

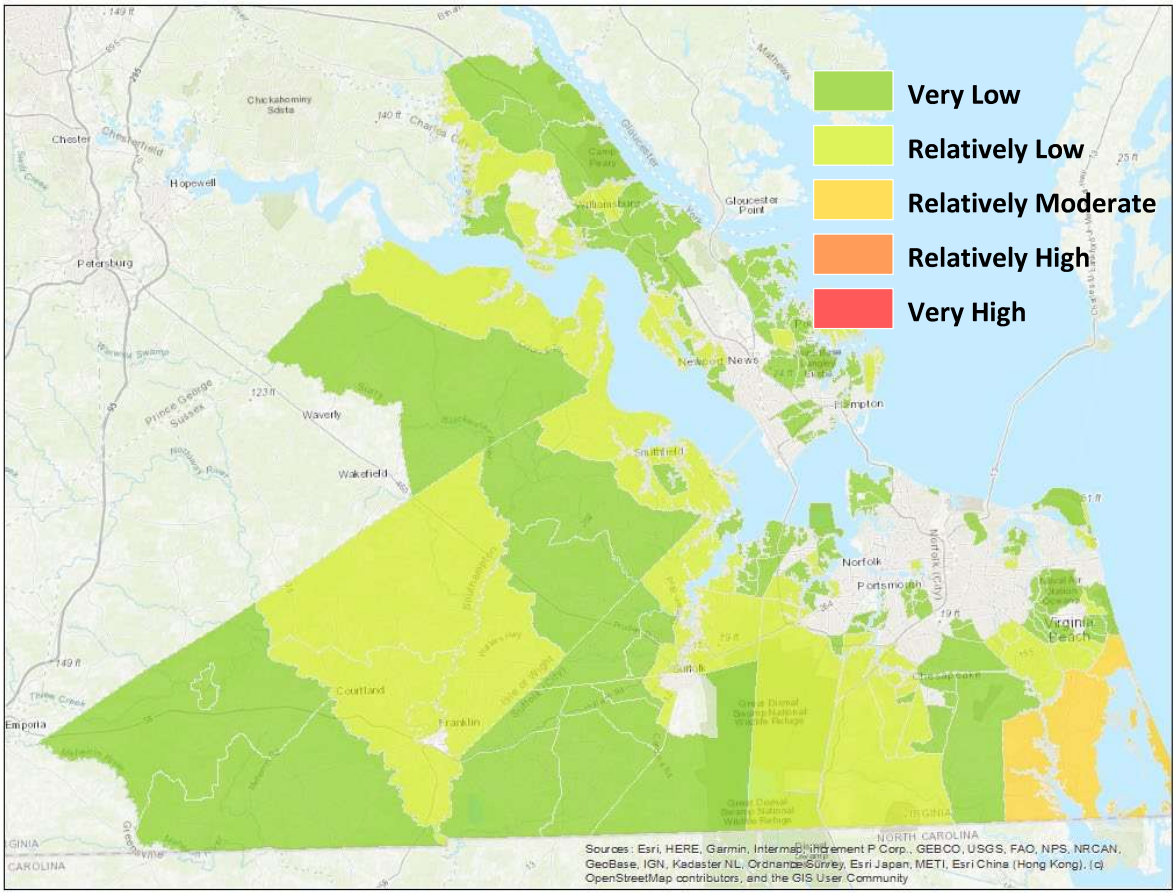
Source: Southern Group of State Foresters

Climate change increases the risk of the hot, dry weather that is likely to fuel wildfires. Also, because climate change is also a factor in higher intensity windstorms, there is a likelihood of increased fuel for wildfire when downed trees from storms are not removed. For site specific information on historic wildfire ignition density, property owners and planners can visit: www.southernwildfirerisk.com.

SOCIAL VULNERABILITY

The NRI risk ratings for wildfire are shown in **Figure 5.35**. The risk ratings are relative to the rest of the United States and the damage history upon which the ratings are built is simply not as substantial as many parts of the country. Although most of the region is rated low, there is one pocket of relatively moderate risk in the southeastern part of Virginia Beach.

FIGURE 5.35: NATIONAL RISK INDEX RATING, WILDFIRE



2021

Source: NRI 2021

DROUGHT

Droughts can impact natural systems and the ability of cities, towns and neighborhoods to function effectively. Specific impacts may include a reduction in the production of food grains and other crops, the size and quality of livestock and fish, available forage for livestock and wildlife, and the availability of water supplies needed by communities and industry. As evidenced by previous occurrences, the Hampton Roads region is vulnerable to the drought hazard.

ESTIMATES OF POTENTIAL LOSSES

While drought impacts agricultural, recreational, and manufacturing industries, estimating losses to the built environment is difficult because drought causes little documented physical damage to the built environment. In 2006, this plan included an annualized drought loss estimate of $2,215,839 for Isle of Wight County, Suffolk and Virginia Beach; however, the methodology regarding how this loss estimate was developed is not clear. Annualized damages appear to have been based on changes in total harvested cropland; however, losses in harvested cropland or the market value of crops cannot be attributed entirely to drought or other weather-related conditions, especially in rural parts of the planning area that are rapidly developing. Data on drought damages from the NCEI are incomplete and, when available, apply to a very large area including jurisdictions outside of the planning region. As a result, the estimation of annualized damages due to drought has been discontinued in plan updates.

Table 5.13 provides a time series of data regarding the total harvested cropland, irrigated land, market value of crops, and percent of non-irrigated land from 2002, 2007 and 2012. Due to a lack of agricultural information, data for many of the cities and towns are not provided.

TABLE 5.13: AGRICULTURAL DATA RELATED TO DROUGHT VULNERABILITY				
	2002	2007	2012	2017
JURISDICTION	TOTAL HARVESTED CROPLAND (acres)	TOTAL HARVESTED CROPLAND (acres)	TOTAL HARVESTED CROPLAND (acres)	TOTAL HARVESTED CROPLAND (acres)
James City County	5,258	2,367	2,698	318
York County	211	Withheld	Withheld	55
Suffolk	53,954	51,203	49,693	56,270
Virginia Beach	21,609	20,258	20,814	16,476
Chesapeake	53,188	41,391	36,269	31,592
Isle of Wight County	49,373	48,230	47,868	48,833
Southampton County	83,449	79,449	87,902	91,803
Surry County	35,265	26,526	30,238	23,844
TOTAL	**302,307**	**269,424**	**275,482**	**269,191**

Source: U.S. Department of Agriculture Census

The geography of the study area makes the Hampton Roads region uniformly vulnerable to the effects of drought. However, the impacts would vary across the region based on land use, with impacts to agriculture and the agricultural economy primarily in Surry and Southampton counties, as well as James City County, York County, Suffolk, Virginia Beach, Chesapeake, and Isle of Wight County. Social impacts to water utility customers in the cities of Hampton Roads would be more likely during a chronic, prolonged drought that results in water restrictions.

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

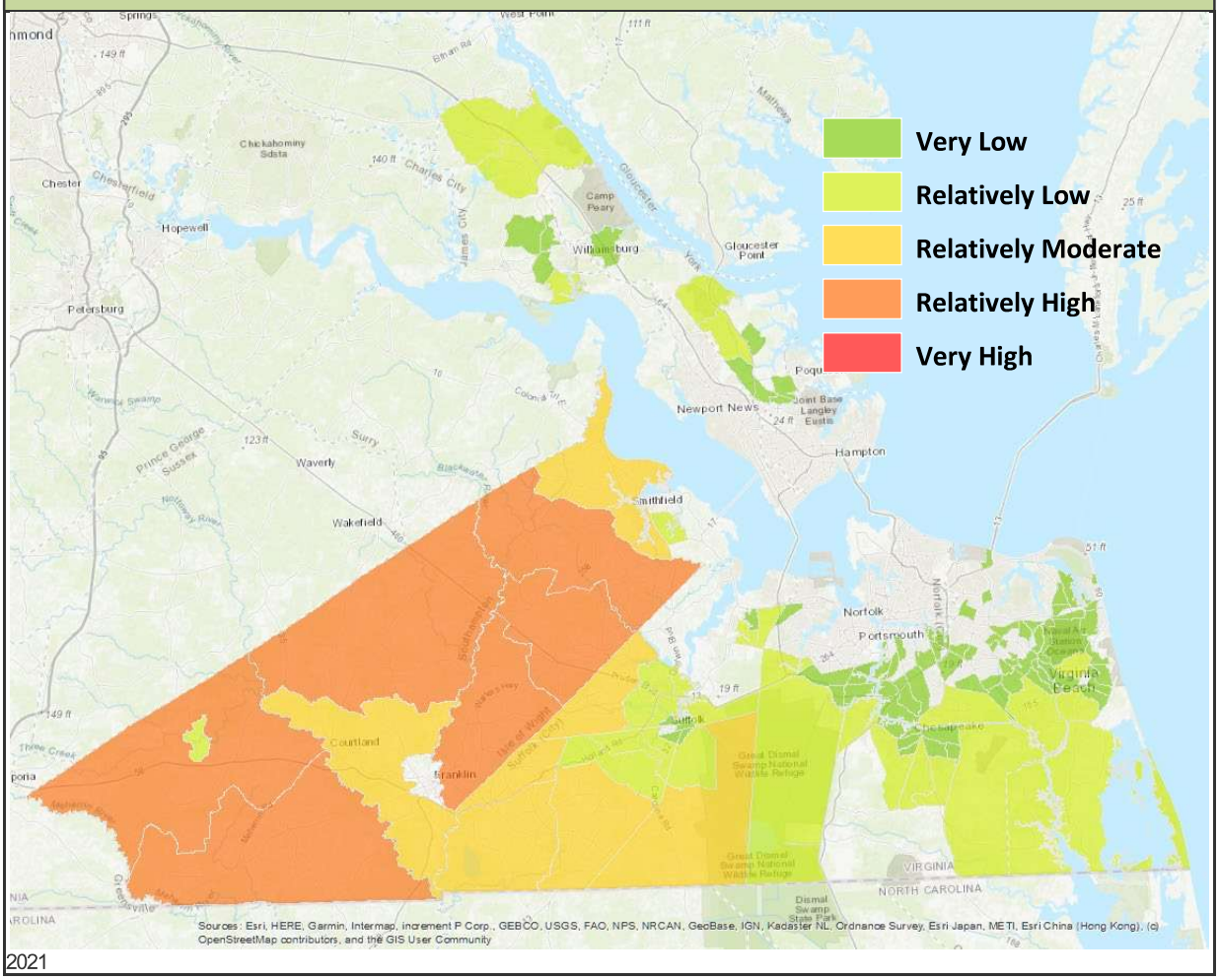
According to the USDA Agriculture Census data from 2002 through 2017, the total harvested cropland in Hampton Roads farming communities decreased 11-percent from 2002 to 2007, and then increased and held somewhat steady. This is consistent with the area's largest farming county, Southampton County, which experienced a decrease of 4-percent in the first period and an increase of 10-percent in the middle period, but has now increased to pre-2002 levels. These rates may be indicative of past and future changes in land use which may be peripherally related to long-term drought conditions, although the long period between data collection and relatively short period of record makes it difficult to draw useful conclusions.

The VASEM 2021 report predicts that as this century comes to a close, agriculture will be impacted by climate change with more intense precipitation and also longer periods of drought. The cumulative effect will particularly be bad for crops near the warm end of their geographic range.

SOCIAL VULNERABILITY

The NRI risk ratings for drought are shown in **Figure 5.36**. Historical occurrence data were taken from the University of Nebraska-Lincoln National Drought Mitigation Center, U.S. Drought Monitor. The period of record was January 2000 to December 2017. Large portions of Southampton County and Suffolk appear to be the most socially vulnerable to the impacts of drought.

FIGURE 5.36: NATIONAL RISK INDEX RATING, DROUGHT



2021

Source: NRI 2021

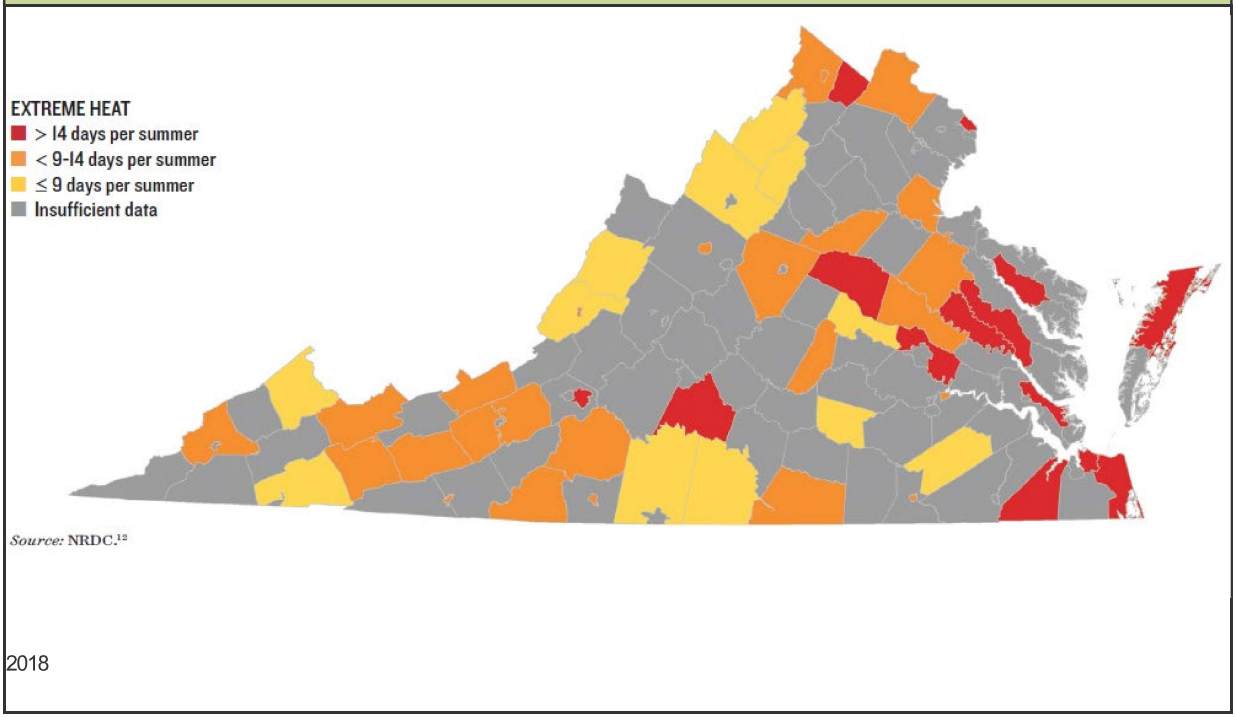
EXTREME HEAT

ESTIMATE OF POTENTIAL LOSSES

Based on the previous historical occurrences, annualized losses to the built environment are considered to be negligible (less than $1,000). Loss of human life or health impacts are a greater concern with extreme heat than is property damage, although extreme heat can exacerbate droughts, contribute to conditions that fuel wildfire, and cause road pavement to buckle.

An examination of vulnerability to extreme heat by jurisdiction necessitates the use of data other than NCEI data, which are incomplete. **Figure 5.37** shows the average number of extreme summer heat days per year in Virginia, by county, between 2007 and 2016, from an NRDC report on *Climate Change and Health in Virginia*. While the data are insufficient in much of the study area, a definite exposure to extreme heat for Virginia Beach, Suffolk and York County is evident.

FIGURE 5.37: AVERAGE NUMBER OF EXTREME SUMMER HEAT DAYS PER YEAR IN VIRGINIA

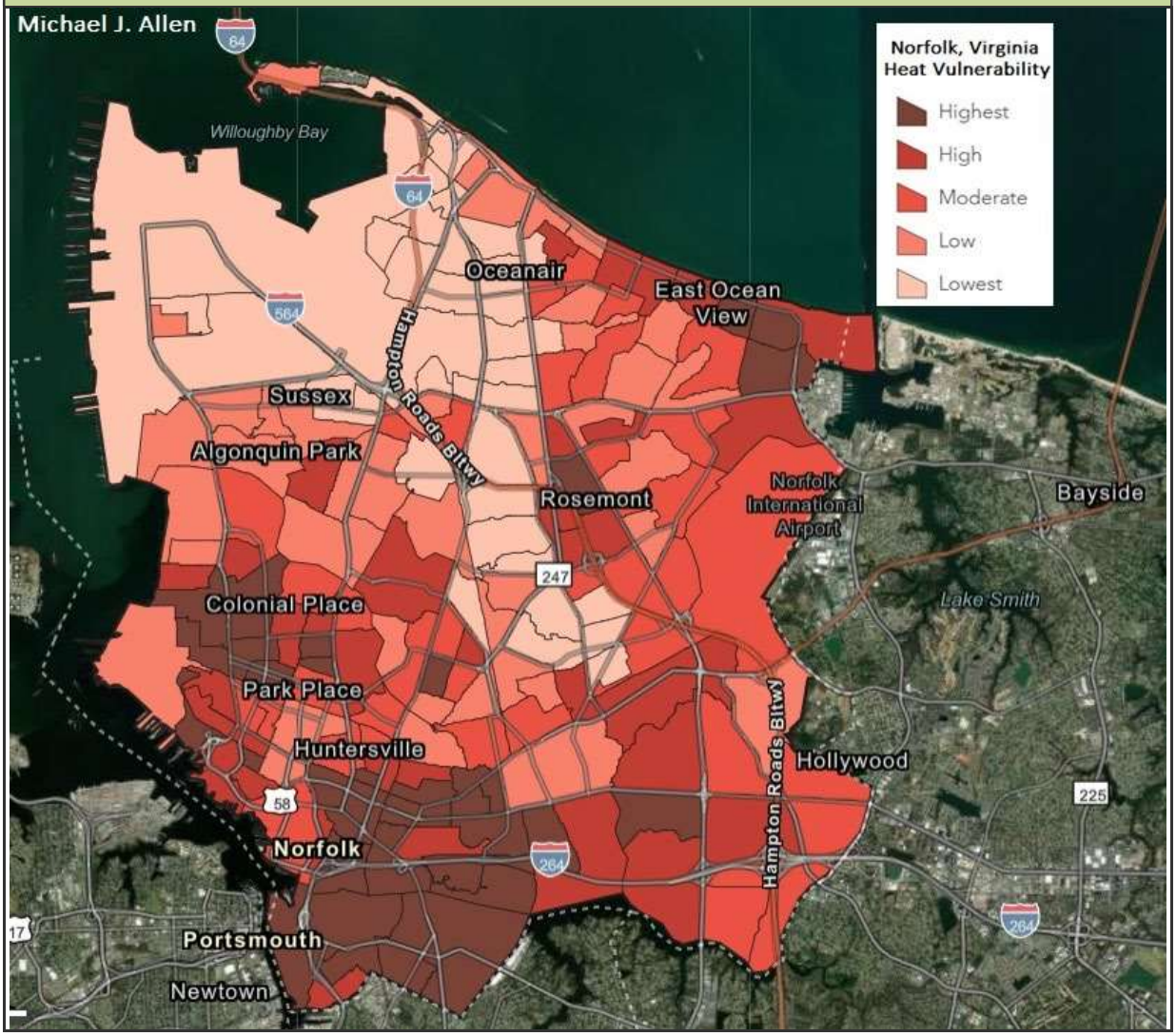


Source: NRDC: Climate Change and Health in Virginia, Issue Brief, April 2018. Accessed online: https://www.nrdc.org/sites/default/files/climate-change-health-impacts-virginia-ib.pdf

A heat mapping project in Norfolk in July, 2019, provides some insights to variability in risk to extreme heat for that particular city. By combining data on single day temperatures, land cover and poverty, researchers put together a far more detailed heat vulnerability map (**Figure 5.38**) that may be useful for future planning and research efforts on the geographic variability in risk to this hazard.[11] Land cover and tree cover at a neighborhood scale are important factors in determining vulnerability.

[11] Allen, Michael. *Norfolk Heat Vulnerability Story Map, 2021* accessed online at: https://storymaps.arcgis.com/stories/7cde13a422504a0682ec9c2deb18c4b6

FIGURE 5.38: NORFOLK HEAT VULNERABILITY



Source: Michael Allen, *Norfolk Heat Vulnerability Story Map* accessed 2021 online at: https://storymaps.arcgis.com/stories/7cde13a422504a0682ec9c2deb18c4b6

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

The risk of heat-related illnesses and deaths in Virginia will grow as climate change fuels more intense and frequent heat waves. While long-term trends at individual sites in Hampton Roads, such as airports, are useful for observing regional temperature change, students at Virginia Wesleyan in Virginia Beach are part of a statewide effort to more accurately map and distinguish urban heat islands and their evolving impact, similar to the Norfolk effort described above. On the hottest days of the year, students drive along predetermined routes at three different times of day to capture temperature and humidity data using sensors attached to car windows. The data will help link city planning decisions past and future, such as where trees and green spaces are required, to real results on the ground.

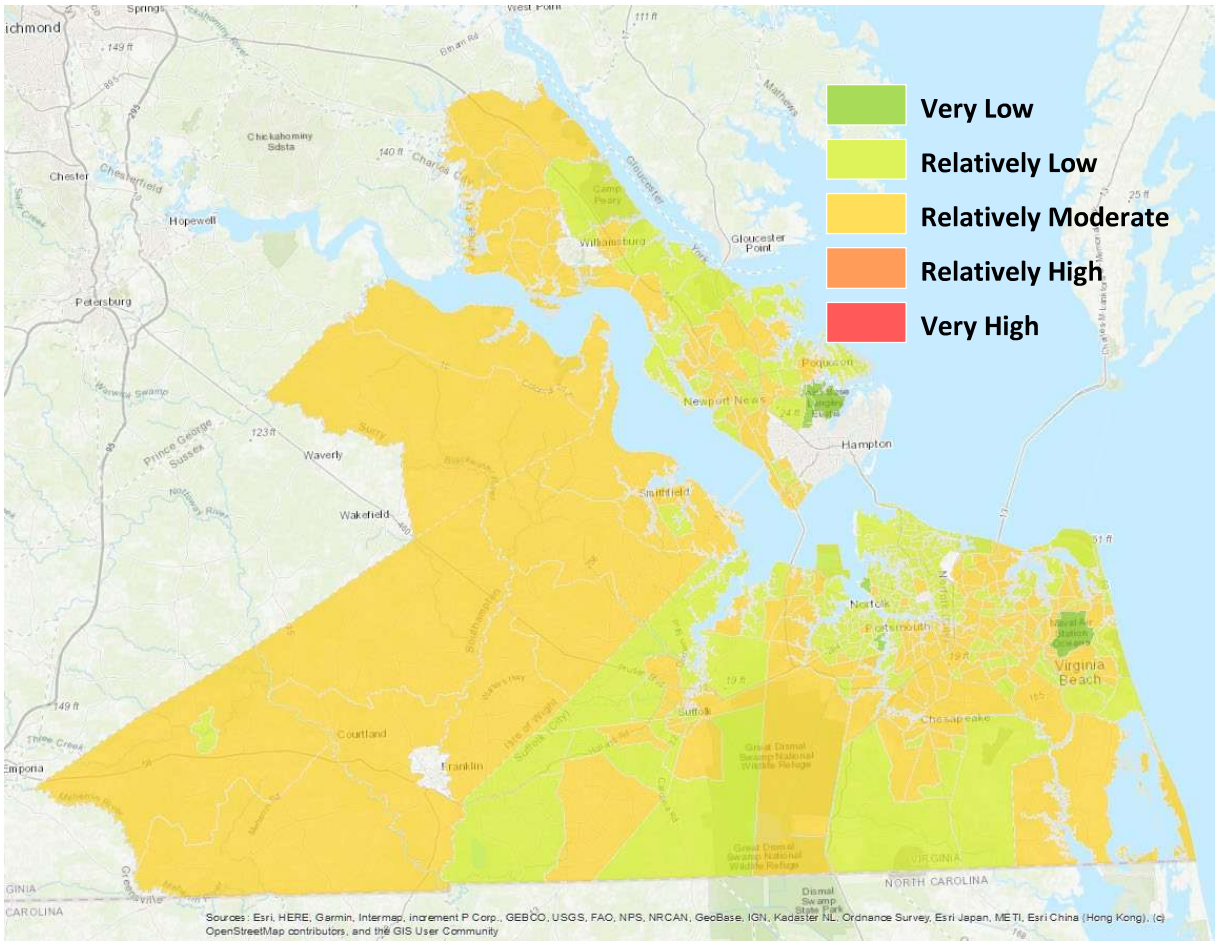
All future structures built in the Hampton Roads region will be exposed to extreme heat. Information gleaned from research such as the mapping in Norfolk and Virginia Beach will help inform future planning regulations and design guidelines, including passive cooling solutions for buildings and neighborhoods, that can improve energy efficiency, cooling and health outcomes from extreme heat events. Examples include

cool roofs and reflective cool walls for buildings, cool corridors in neighborhoods where trees and concrete rather than asphalt prevent heat buildup, and positioning buildings to shade common pedestrian routes.

SOCIAL VULNERABILITY

The main concern in periods of extreme heat is the potential public health impact, such as heat exhaustion or heat stroke. Individuals of concern include those living in residences without air conditioning, or in areas where electric service is unavailable due to system-wide blackouts. The elderly, small children, the chronically ill, livestock and pets are most vulnerable to extreme heat. **Figure 5.39** shows the relative risk from heat waves based on the National Risk Index data.

FIGURE 5.39: NATIONAL RISK INDEX RATING, HEAT WAVE



2021

Source: NRI 2021

HAZARDOUS MATERIALS INCIDENTS

ESTIMATES OF POTENTIAL LOSSES

Based on information provided in the *Hazard Identification and Analysis* section, the Hampton Roads region experiences an average of 26 hazardous materials incidents per year with only minor damages (generally less than $10,000 per year) reported. **Table 5.14** shows hazardous materials incidents from 1998 to 2021 in Hampton Roads region (according to the U.S. Department of Transportation) that contribute to an annualized loss estimate of $67,500 from highway incidents.

TABLE 5.14: ANNUALIZED LOSSES FOR HAZARDOUS MATERIALS INCIDENTS

SUBREGION	COMMUNITY	NUMBER OF EVENTS	PROPERTY DAMAGE	AVERAGE ANNUAL NUMBER OF EVENTS	ANNUALIZED LOSS
Peninsula	Hampton	26	$9,454	1.13	$411
	Newport News	44	$5,058	1.91	$220
	Poquoson	0	$0	0.00	$0
	Williamsburg	3	$6,845	0.13	$298
	James City County	0	$0	0.00	$0
	York County	2	$0	0.09	$0
Southside	Norfolk	118	$425,847	5.13	$18,515
	Portsmouth	52	$148,234	2.26	$6,445
	Suffolk	15	$343,678	0.65	$14,943
	Virginia Beach	210	$78,807	9.13	$3,426
	Chesapeake	113	$292,360	4.91	$12,711
Western Tidewater	Isle of Wight County	0	$0	0.00	$0
	Franklin	8	$3,688	0.35	$160
	Southampton County	2	$10,706	0.09	$465
	Surry County	2	$7,550	0.09	$328

U.S. Department of Transportation, 2021

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

Future land use and zoning of structural development as discussed in previous subsections are expected to have less impact on future vulnerability than mitigation. Protection of human life through administration of proper emergency notification and evacuation planning with regard to potential hazardous material incidents are critical elements in reducing real-time vulnerability before, during and after events.

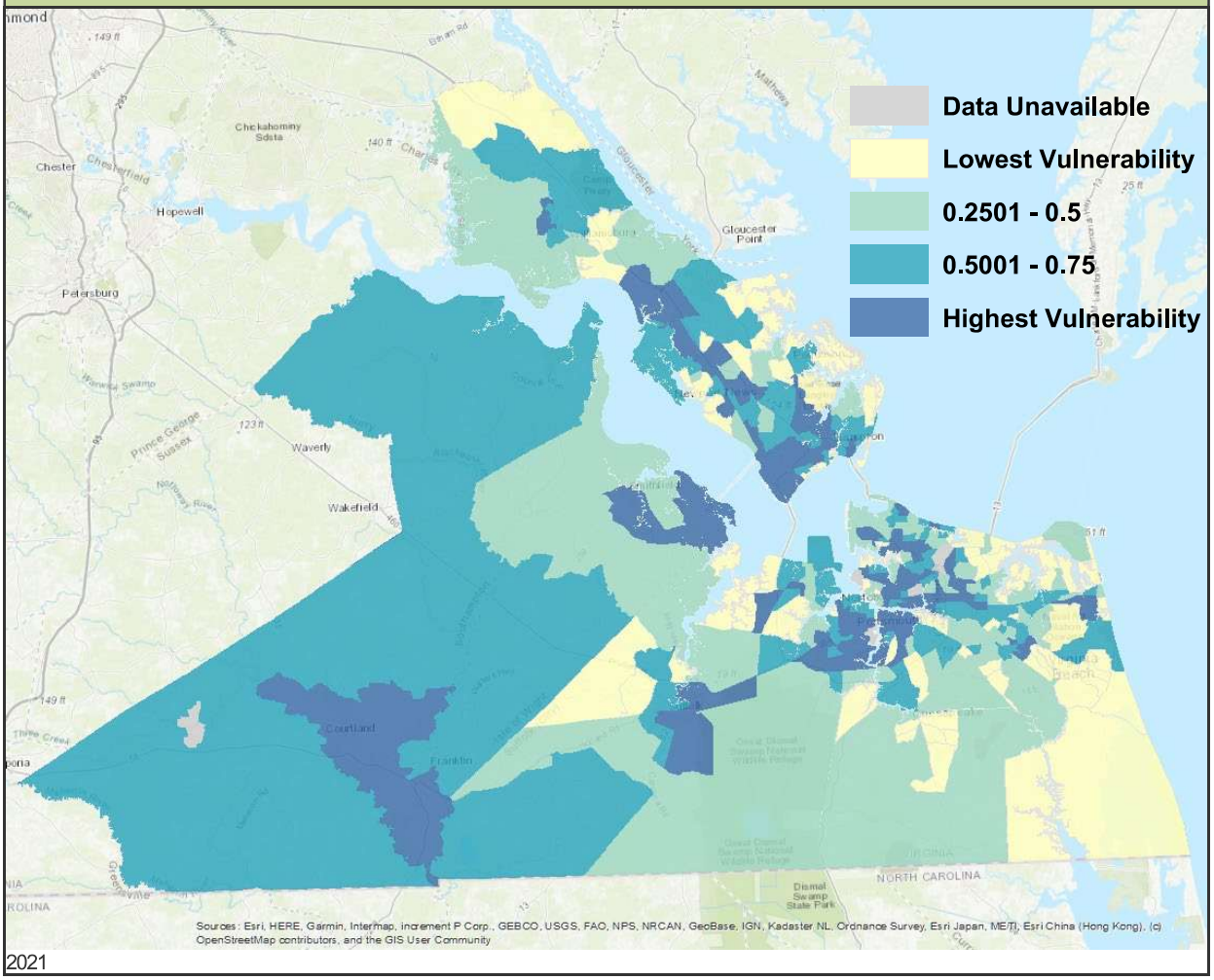
Climate change impacts are limited with hazardous materials incidents. Higher frequency of extreme weather events such as winter storms or tropical storms may increase the overall number of rail and highway accidents, which could naturally lead to an increase in events involving hazardous materials. Extreme heat and wildfire events brought about by higher temperatures could conceivably increase incidents involving flammable materials.

SOCIAL VULNERABILITY

The CDC Agency for Toxic Substances and Disease Registry (ATSDR) created a Social Vulnerability Index geared toward preparing for and responding to exposure to dangerous chemicals (and other natural hazards, as well). This index is better suited to examining the social vulnerability related to hazardous materials incidents, although many of the inputs are the same as the NRI. Overall vulnerability for this index is based on: socioeconomic status (below poverty, unemployed, income, no high school diploma); household composition and disability (aged 65 or older, aged 17 or younger, civilian with disability, single-parent households); minority status and language; and housing type and transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters).

The ATSDR map provided in **Figure 5.40** shows the highest social vulnerability to hazardous materials incidents, is in the east end of Newport News, eastern Surry County, a corridor in Southampton County, and pockets in Suffolk, Chesapeake, Portsmouth, Norfolk and Virginia Beach.

FIGURE 5.40: CENTERS FOR DISEASE AND PREVENTION, SOCIAL VULNERABILITY INDEX



Source: CDC/ATSDR Social Vulnerability Index 2018 Database, Virginia.

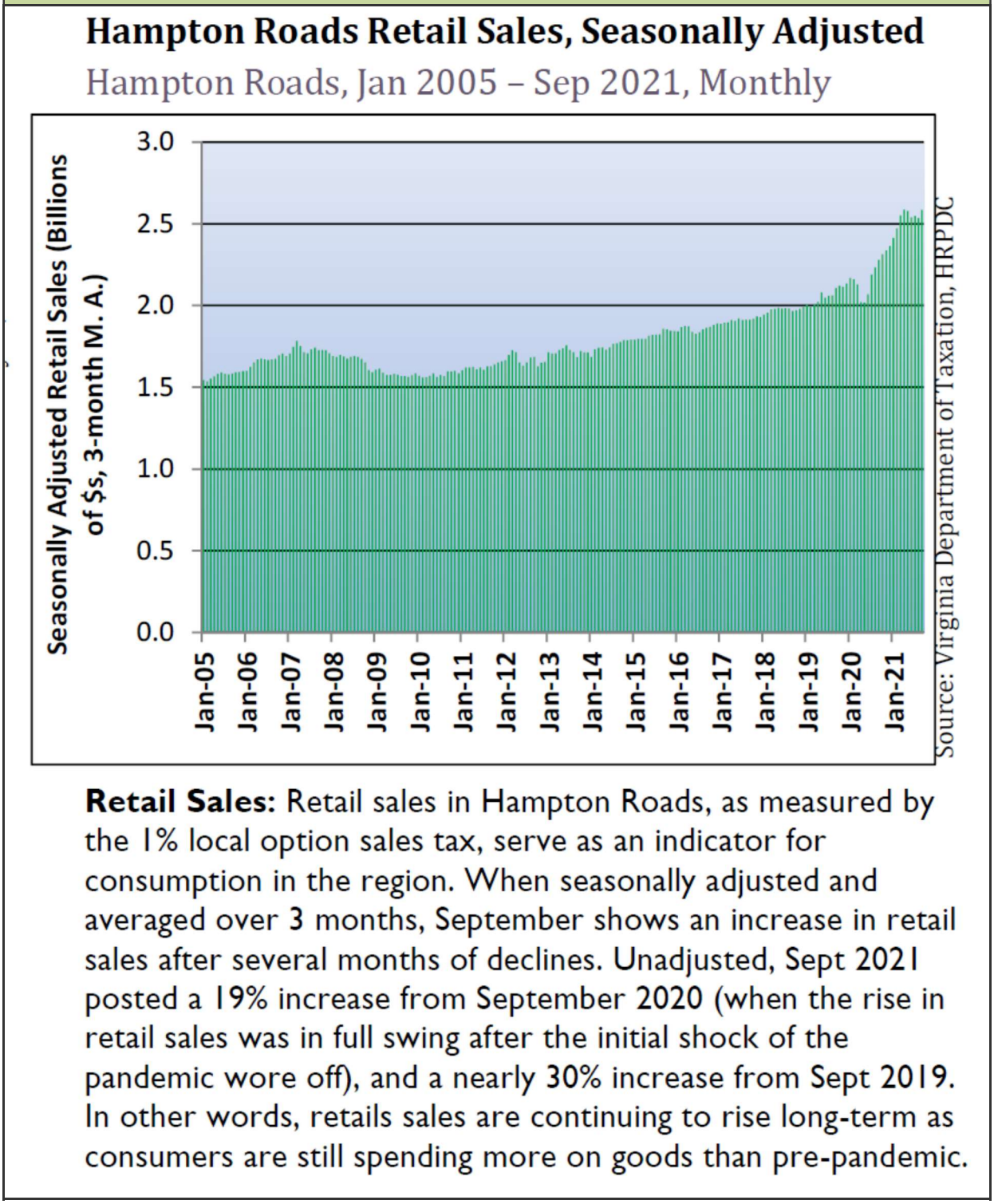
PANDEMIC FLU OR COMMUNICABLE DISEASE

ESTIMATES OF POTENTIAL LOSSES

An outbreak of widespread disease burdens local medical facilities in terms of capacity for treatment, the region's health departments, emergency responders and other essential workers with additional staff responsibilities, but would not be expected to damage the built environment or community infrastructure in any significant way. Experience with COVID-19 has shown that economic impacts and job losses may affect almost every aspect of the economy, and the number of people remaining at home for work and schooling can dramatically impact the demand for childcare services and other support service industries. These impacts are expected to be temporary, unique to COVID-19, and may be further ameliorated by Federal stimulus dollars distributed as a result of a public health disaster, and eviction prohibitions issued at various government levels.

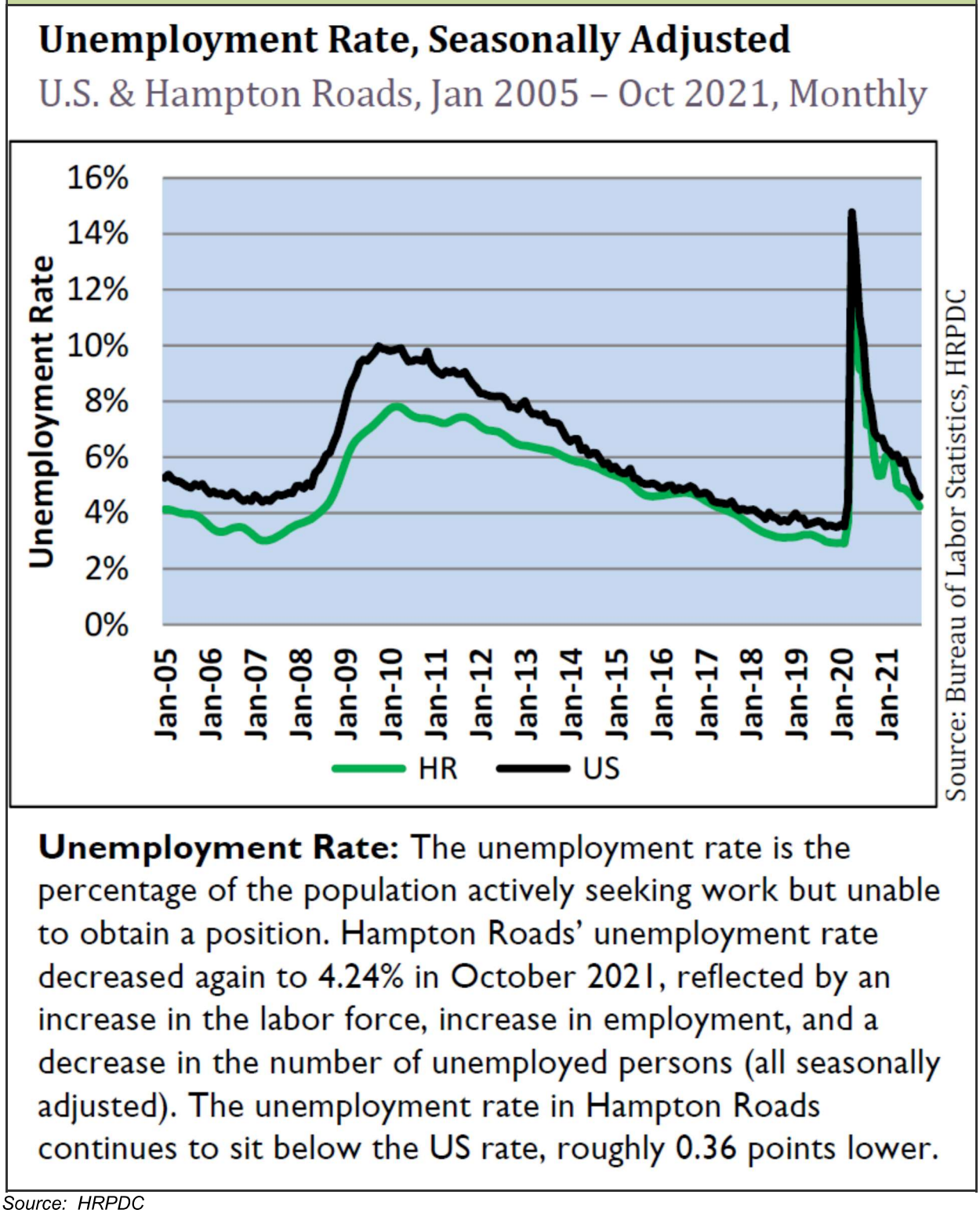
HRPDC has monitored how COVID-19 has impacted local transportation volume, employment, unemployment claims, retail sales, home prices and rent rates, and other economic indicators throughout the pandemic. A full writeup is prepared each month in the *Hampton Roads Economic Monthly*, gaging various metrics of the economy; these reports are available at: https://www.hrpdcva.gov/departments/economics. **Figures 5.41** through **5.43** graphically show the most recent impacts to Hampton Roads retail sales, unemployment rate and the number of homes sold, representing just a snapshot of the potential losses and the local recovery. Additional analysis once conditions return to a more normal, pre-pandemic status may be able to quantify the losses due to pandemic.

FIGURE 5.41: HAMPTON ROADS RETAIL SALES



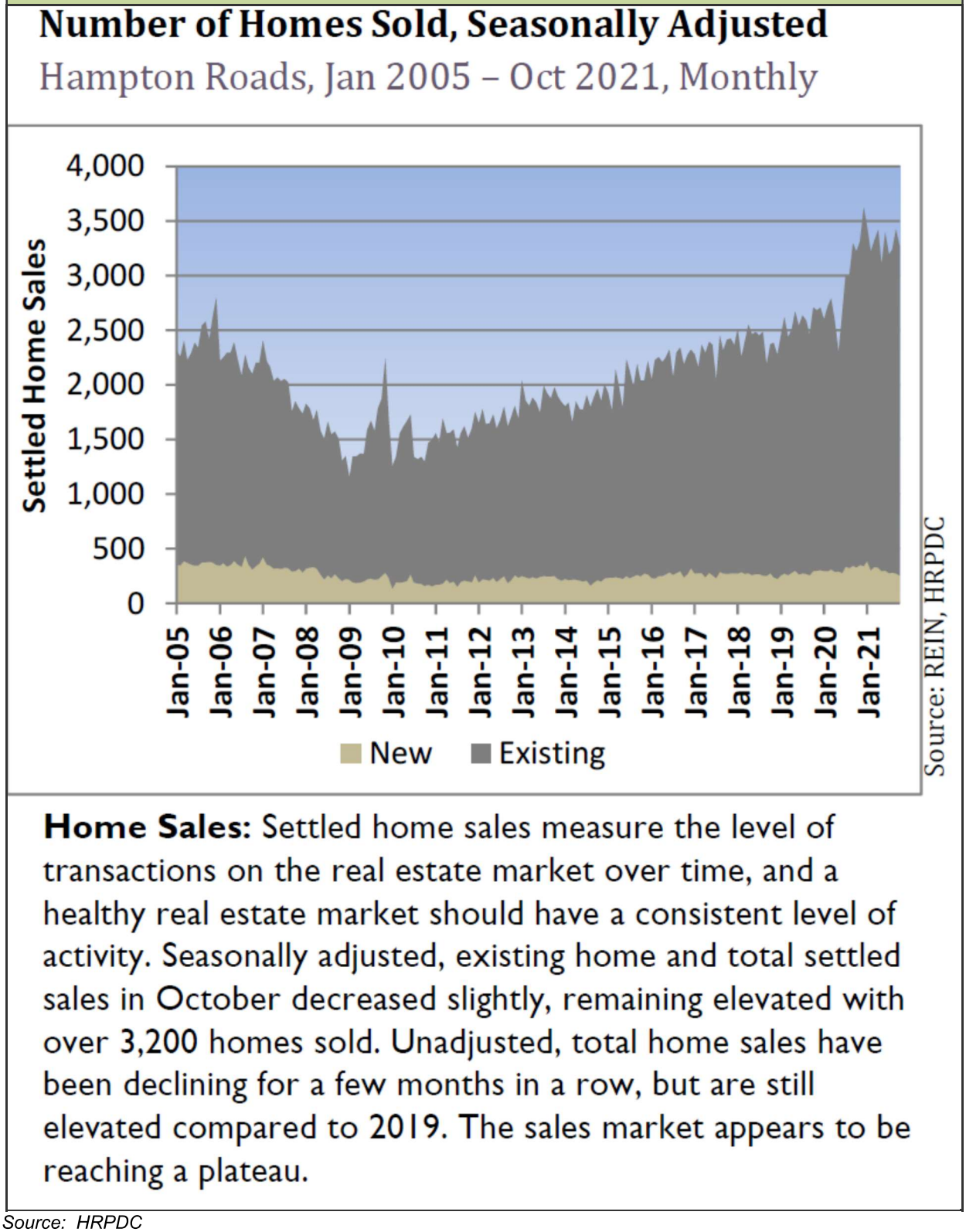
Source: HRPDC

FIGURE 5.42: HAMPTON ROADS UNEMPLOYMENT RATE



Source: HRPDC

FIGURE 5.43: HAMPTON ROADS NUMBER OF HOMES SOLD



Source: HRPDC

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

Future land use is expected to have less impact on future vulnerability to pandemic flu or communicable disease than the protection of public health through dissemination of proper individual protection measures, emergency notification with regard to flu or disease outbreak and effective vaccines.

Many causes of climate change also increase risk of pandemic, including deforestation, loss of habitat and loss of species. Warming temperatures and increasingly severe rainfall patterns make conditions better for Lyme disease, waterborne diseases and mosquito-borne diseases.

SOCIAL VULNERABILITY

Analysis of the impacts of COVID-19 on populations of varying economic, social and ethnic backgrounds is ongoing at the time of this study. Understanding how the virus spread requires examination of the specific geographic circumstances of where people are *required* to travel. Social isolation was quickly recognized as a critical element in managing the spread, but isolation is not an option for many essential workers who are critical to the healthcare system, food supply chain and transportation systems. There are clear divides in the region's communities regarding who can work from home and who is required to go out in public. COVID-19 clearly did not affect everyone equally. The Virginia Center for Inclusive Communities (https://inclusiveva.org/covid19/) noted the following disparities:

- older adults were more susceptible to the virus itself, leading to large numbers of socially isolated seniors;
- school closures led to food insecurity, disparities in technology and internet access, and a need for special services for students with disabilities and students learning English;
- persons with pre-existing conditions but less access to high quality, preventive healthcare were more susceptible to the virus;
- small businesses with existing banking relationships had better access to State and Federal financial assistance, especially during the early part of 2020;
- inequities related to transportation access impacted how the virus affected individuals;
- and violence against intimate partners, Asians, Islamics and others increased during the pandemic.

Fortunately, as of February 2021, at least seven different vaccines were being administered to the most vulnerable populations throughout the world. Three primary vaccines were being used in Virginia, and by January 31, 2022, over 6.7 million Virginians had received at least one dose, 5.87 million were fully vaccinated, and over 2.4 million had also received a third booster dose.[12]

As COVID-19 demonstrated, the nature and characteristics of a virus, such as how it is transmitted and who is most likely to suffer from severe symptoms, affects the populations most likely to be impacted. Social vulnerability can be influenced by financial health, physical health, mental health and other aspects of where and how a person lives. Similarly, access to virus testing, healthcare for those who contract the virus, and access to medications and vaccinations are all components in an assessment of social vulnerability to each virus and such assessment is difficult to manage while resources are committed to managing an ongoing virus. Communication and outreach to socially vulnerable groups is a key mitigation measure for lessening the impact of viruses that unequally impact demographic groups.

[12] Virginia Department of Health COVID-19 Vaccine Dashboard accessed online at: https://www.vdh.virginia.gov/coronavirus/covid-19-vaccine-summary/

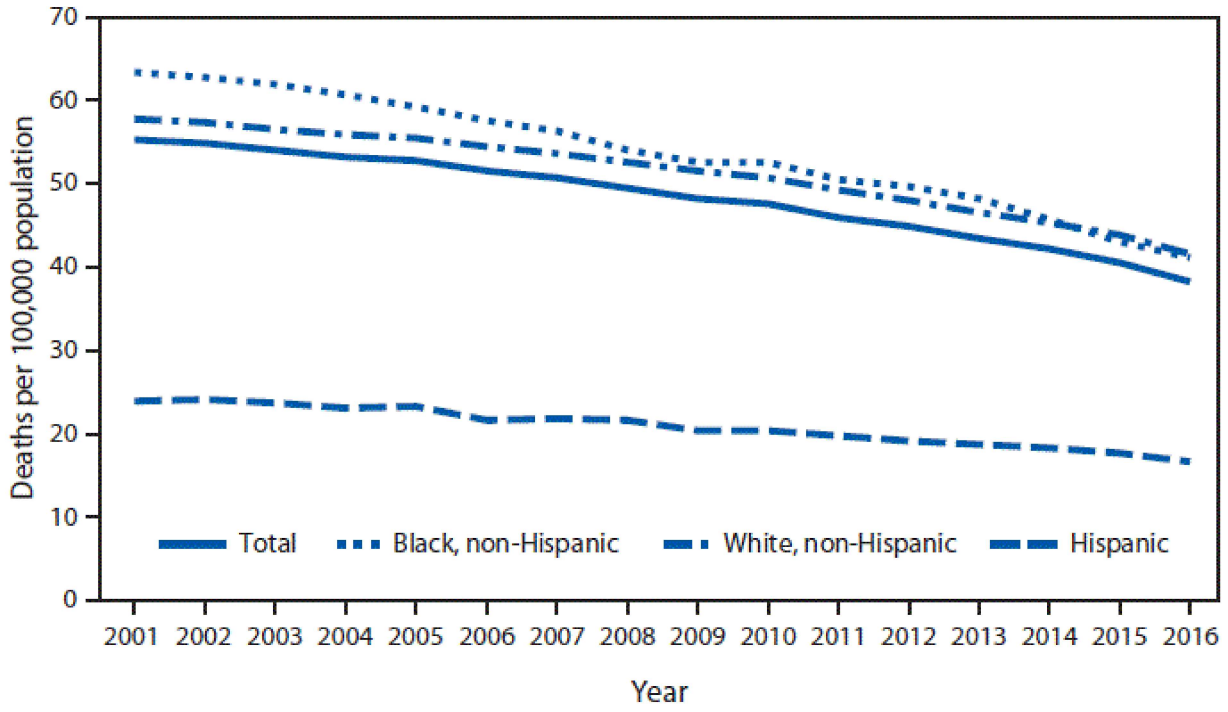
RADON EXPOSURE

ESTIMATES OF POTENTIAL LOSSES

Radon testing in Virginia has been sporadic and not necessarily reported to any single data repository. Thus, the only way to know if any structure or group of structures has a radon problem is to test. Testing of residential structures is easy and inexpensive. Low-cost test kits are available through the mail and at home improvement stores. Qualified testers can also do long-term residential testing and set up systems for testing larger non-residential buildings. Mitigation or treatment of structures with high radon concentrations is also possible, relatively inexpensive and can be very effective if done properly. Testing is most important for structures in the red or orange zones indicated in Figure 4.35, and especially important for structures in which inhabitants spend their time in parts of the structure below ground or in contact with the ground. Future updates to this plan may include identification of specific structure types, for example structures with basements, in any higher radon potential areas to further define vulnerability, especially if the EPA's 1993 map of radon zones is updated based on more testing or other new scientific information.

Unlike many other hazards in this plan, structures are not physically damaged by radon exposure; instead, human lives are directly at risk. CDC QuickStats show that death rates from lung cancer declined between 2001 and 2016. While this stand-alone graph does not attribute the decline in lung cancer deaths to a specific cause, nor does it show the percentage of deaths attributed to radon exposure, the death rates by race/ethnicity provide evidence that there are racial/ethnic disparities in death from lung cancer (see **Figure 5.44**). During this period, the lung cancer death rates for the total population (deaths per 100,000 population) declined from 55.3 to 38.3, as well as for each racial/ethnic group shown. The death rate for the non-Hispanic Black population decreased from 63.3 to 41.2, for the non-Hispanic white population from 57.7 to 41.5, and for the Hispanic population from 23.9 to 16.6. Throughout this period, the Hispanic population had the lowest death rate.

FIGURE 5.44: AGE-ADJUSTED DEATH RATES FROM LUNG CANCER, BY RACE/ETHNICITY, UNITED STATES, 2001-2016



* Deaths per 100,000 population age-adjusted to the 2000 U.S. standard population.

Source: Centers for Disease Control and Prevention, accessed online 4/22/22 at: https://www.cdc.gov/mmwr/volumes/67/wr/mm6730a8.htm

FUTURE VULNERABILITY, LAND USE AND CLIMATE CHANGE IMPACTS

According to Memorial Sloan Kettering Cancer Center, major scientific organizations believe that radon contributes to approximately 12% of lung cancers annually in the United States. It is the second leading cause of lung cancer. With 5,820 new cases of lung and bronchus cancer expected in Virginia in 2021, this translates into approximately 700 of those new cases being caused by radon exposure.

Radon levels are very localized and additional testing is needed to verify EPA zones for the study area. There are no federal or state laws that require radon testing prior to a real estate transaction, but some contracts do include radon testing or mitigation contingency clauses, typically at the request of the buyer.

Virginia Code at Section 15.2-2280 gives all red zone (Zone 1) counties and cities the option of requiring passive radon resistant construction features; however, there are no Zone 1 communities in the study area for this plan.

In 1993 the Virginia General Assembly passed legislation that requires all schools in the Commonwealth to be tested for radon after July 1, 1994, and includes any new school buildings and additions built after that date. Each school is required to maintain files of their radon test results.

In the early 1990s the Virginia Department of Education purchased long-term radon test kits that were used to test all Virginia public school K-12 classrooms that were in contact with the ground at that time. Long-term tests are generally more accurate than short term tests because they sample anywhere from 90 to 365 days. Short term tests usually sample for only 2 to 7 days. Since radon levels can fluctuate over time, the longer the test duration, the more accurate the results will be. The EPA school testing protocol recommends testing during the heating season which runs roughly from late October through the end of March. A VDH review of the original testing data from the long-term tests done at that time indicated that some of these test results were not valid or usable due to:

- School classrooms not being identified on the test report;
- Testing periods that were outside of the preferred heating season; and
- Improper testing of unoccupied areas such as boiler and storage rooms.

In general, radon test results for the vast majority of school classrooms in Virginia are below the EPA action level of 4.0 pCi/L for indoor air. For the few classrooms that have shown elevated radon levels, the problem was usually solved by making adjustments to the school's HVAC system. However, in some cases the HVAC adjustments did not work and a radon mitigation system was installed to reduce the radon to acceptable levels. Future updates to this plan may include evaluation of school data for study area schools, as available. Calls to VDH regarding availability of the data for the purposes of this plan were not returned.

With regard to future climate change, changes in the environment and human behavior may alter the risks associated with radon for individual buildings. According to the EPA, the primary factors that influence radon entry into buildings include: 1) radon content of the soil; 2) pressure differential between the interior of a structure and the soil; 3) air exchange rate for the building; 4) moisture content surrounding the structure; and 5) presence and size of entry pathways. Climate change can affect these same factors and, therefore, may cause direct or indirect changes in indoor air quality within a structure. In addition, certain changing human behavioral factors driven by climate change may further impact air quality. Examples of how climate change may impact indoor air quality include:

- Increased Air Conditioning and Decreased Fan Usage: air conditioning used as a result of rising temperatures contributes to "closed house conditions" and reduced stratification of radon between floors;

- Activity Patterns and Spatial Radon Variation: rising outdoor temperatures may result in increased use of basements where radon concentrations are generally higher;

- Weatherization and Energy Efficiency: although undetermined, tightening structures for energy efficiency may increase radon concentrations for structures with indoor radon sources;

- Weather-Related Influences: increased wind can change pressure differentials between structure levels and the outside, and increased precipitation rates or totals may change hydrologic conditions causing a rise in the water table and force vapors from the vadose zone, or unsaturated zone, into a less dense media, such as a basement.

- High Density Housing: concrete construction used in high density housing (constructed to reduce greenhouse emissions) may be an increasing source of elevated radon exposure for some occupants.

SOCIAL VULNERABILITY

The CDC ATSDR created a Social Vulnerability Index geared toward preparing for and responding to exposure to dangerous chemicals (and other natural hazards, as well). This index is better suited to examining the social vulnerability related to hazardous materials incidents, although many of the inputs are the same as the NRI. Overall vulnerability for this index is based on: socioeconomic status (below poverty, unemployed, income, no high school diploma); household composition and disability (aged 65 or older,

aged 17 or younger, civilian with disability, single-parent households); minority status and language; and housing type and transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters).

The ATSDR map provided above in **Figure 5.40** shows the highest social vulnerability to radon exposure, is in the east end of Newport News, eastern Surry County, a corridor in Southampton County, and pockets in Suffolk, Chesapeake, Portsmouth, Norfolk and Virginia Beach. Perhaps once more information is collected regarding the underlying geology of the region and the relationship to radon, this map can be further refined in the future to more accurately isolate the social vulnerability to radon. Structure-specific data regarding age and existence of basements could also be incorporated to further enhance the analysis.

CONCLUSIONS ON HAZARD RISK

The risk and vulnerability assessment performed for the Hampton Roads region provides significant findings that allow committee members to prioritize hazard risks and proposed hazard mitigation strategies and actions. Prior to assigning conclusive risk levels for each hazard, the committee reviewed the results of the assessments shown in the following tables.

Damages and frequency information from the risk and vulnerability assessments are summarized in **Table 5.15**. This table provides a quantitative assessment of existing data for the hazards, recognizing that some hazards are not readily assessed, nor are the assessments truly comparable.

TABLE 5.15: SUMMARY OF QUANTITATIVE ASSESSMENT

HAZARD	AVERAGE ANNUAL ESTIMATED LOSSES
Sea Level Rise and Land Subsidence	$130.8 million by 2040
Tropical/Coastal Storm	$86,913,000
Flooding	$44,261,400
Tornado	$24,265,000
Earthquake	$1,119,000
Winter Storm	$805,000
Hazardous Materials Incident	$67,500
Wildfire	$36,900
Extreme Heat	Negligible*
Flooding Due to Impoundment/High Hazard Dam	Not quantified
Landslide/Coastal Erosion	Not quantified
Radon Exposure	Not quantified
Pandemic Flu or Communicable Disease	Not quantified
Drought	Not quantified

*Extreme heat event impacts are believed underreported by NCEI data.

Risk level ranking was based on historical and anecdotal data, as well as input from committee members. This ranking was done collaboratively in Workshop #1 for each hazard, using the matrix shown in **Figure 5.45**. Each hazard was discussed and analyzed based on the participants' knowledge about consequences and likelihood. This risk scoring approach is a simplified method for estimating risk that is easy to understand, based on a method developed for the Australian Institute for Disaster Resilience (AIDR)[13]. Scores from likelihood and consequence are then multiplied to provide a risk score, as shown in **Table 5.16**. Flooding and Impoundment Failure/High Hazard Dam were grouped for simplicity's sake.

[13] AIDR. (2015). *Handbook 10: National Emergency Risk Assessment Guidelines*. 2nd Edition. Australian Institute for Disaster Resilience, Australian Government Attorney-General's Department.

FIGURE 5.45: AIDR RISK RANKING FOR EACH HAZARD

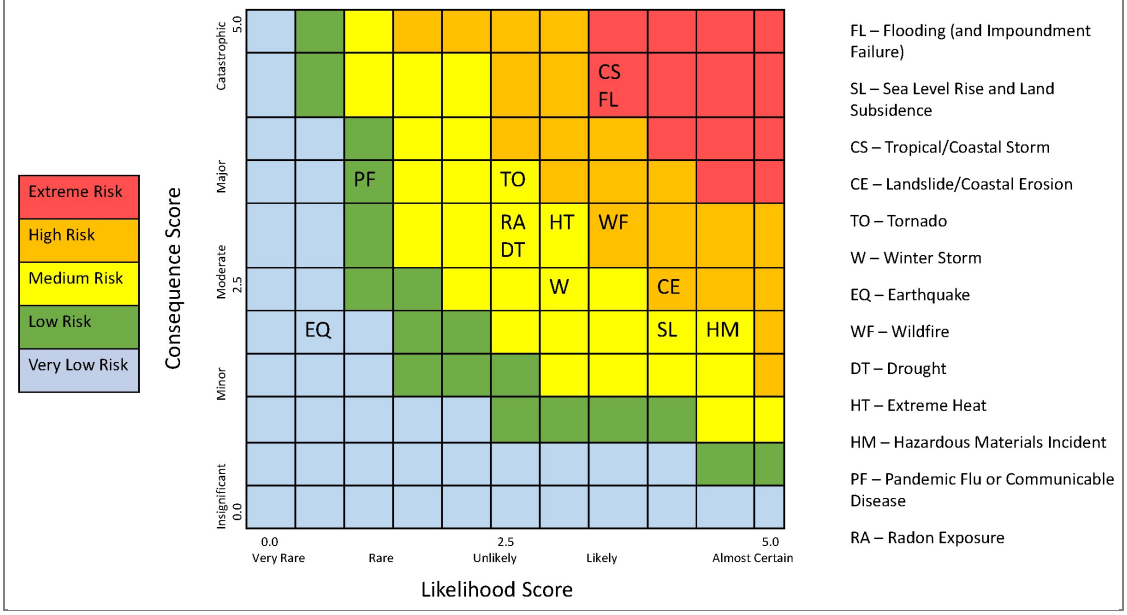


TABLE 5.16: AIDR RISK SCORES FOR EACH HAZARD

Hazard	Risk Score	Risk Description
Flooding	15.75	Extreme
Coastal/Tropical Storm	15.75	Extreme
Wildfire	10.5	High
Landslide/Coastal Erosion	10	High
Hazardous Materials Incident	9	Medium
Tornado	8.75	Medium
Extreme Heat	9	Medium
Sea Level Rise	8	Medium
Radon Exposure	7.5	Medium
Drought	7.5	Medium
Winter Storm	7.5	Medium
Pandemic Flu or Communicable Disease	3.5	Low
Earthquake	1	Very Low

The conclusions drawn from the assessments, combined with an examination of the rankings in the 2017 plan, as well as final determinations and discussion with committee members, were inserted into three categories for a final summary of hazard risk for the region based on High, Moderate, Low, or Negligible designations (**Table 5.17**). Although some hazards are classified as posing Low or Negligible risk and the impacts to infrastructure are limited, their occurrence and damages are still possible in the region.

TABLE 5.17: CONCLUSIONS ON HAZARD RISK FOR HAMPTON ROADS	
CRITICAL HAZARD - HIGH RISK	FLOODING TROPICAL/COASTAL STORM SEA LEVEL RISE AND LAND SUBSIDENCE
CRITICAL HAZARD - MODERATE RISK	WINTER STORM TORNADO HAZARDOUS MATERIALS INCIDENT
NONCRITICAL HAZARD - LOW RISK	EARTHQUAKE WILDFIRE FLOODING DUE TO IMPOUNDMENT FAILURE/HIGH HAZARD DAM PANDEMIC FLU/COMMUNICABLE DISEASE RADON EXPOSURE
NEGLIGIBLE	EXTREME HEAT LANDSLIDE/SHORELINE EROSION DROUGHT

CAPABILITY ASSESSMENT

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2022 UPDATE

Section 6 was updated to combine capabilities of all communities based on the existing plans and updated information collected from interviews, phone calls, and committee work during the update process. The following major changes were incorporated:

1) All tables were updated to reflect new information;
2) Mitigation actions completed by communities and their methods of integrating hazard mitigation principles across plans and departments was updated and summarized;
3) Surry County and towns were appended to the section where necessary, and,
4) A brief section detailing regional capabilities and the Commonwealth's resiliency efforts was updated.

INTRODUCTION

This section of the Plan discusses the capability of Hampton Roads communities with regard to hazard mitigation activities, and consists of the following four subsections:

- WHAT IS A CAPABILITY ASSESSMENT?
- CONDUCTING THE CAPABILITY ASSESSMENT
- CAPABILITY ASSESSMENT FINDINGS
- INTEGRATING MITIGATION INTO COMMUNITY LIFE

WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to confirm that the community's resulting mitigation strategy is based on the principles found in (or missing from) existing authorities, policies, programs, and resources, and based on the community's ability to expand and improve these existing tools. This planning process strives to establish goals, objectives, and actions that are feasible, based on an understanding of the organizational capacity of the departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical and likely to be

implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, level of fiscal resources, and current political climate.

Careful examination of local capabilities helps detect existing gaps, shortfalls, or weaknesses within ongoing government activities that could hinder proposed mitigation activities or exacerbate hazard vulnerability. A capability assessment highlights positive mitigation measures already in place or being implemented at the local and regional levels, which should continue to be supported and enhanced through future mitigation efforts.

CONDUCTING THE CAPABILITY ASSESSMENT

In order to inventory and analyze Hampton Roads' community capabilities, the planning committee and consultant requested information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that may reduce, or in some circumstances, increase the community's hazard vulnerability. The matrix of capability indicators has been built by the consultant over several years of gathering capability information, and on review of numerous documents relating to factors that impact community capability. Other indicators included information related to each community's fiscal, administrative and technical capabilities such as access to local budgetary and personnel resources necessary to implement mitigation measures. Identified gaps, weaknesses, or conflicts can be recast as opportunities to implement specific mitigation actions.

For the 2022 update, the planning committee was asked to review and provide feedback on: the existing plan's capability assessment, and a presentation at the second meeting of the planning subcommittee. The presentation included information on possible new mitigation actions, and other relevant regional and state capabilities. This section has been updated based on feedback from these reviews and discussions during the Committee meetings as well as in person meetings conducted with many of the communities toward the end of the planning process.

CAPABILITY ASSESSMENT FINDINGS

PLANNING AND REGULATORY CAPABILITY

Planning and regulatory capability is based on the implementation of plans, ordinances and programs that demonstrate each local jurisdiction's commitment to guiding and managing growth, including reconstruction following a disaster. Examples include emergency response, mitigation and recovery planning, comprehensive land use planning, transportation planning, and capital improvements planning. Additional examples include the enforcement of zoning or subdivision ordinances and building codes. These planning initiatives present significant opportunities to integrate hazard mitigation principles and practices into the local decision making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools in place or under development in Hampton Roads, along with their potential effect on hazard loss reduction. This information will help identify opportunities to address existing gaps, weaknesses or conflicts in the hazard mitigation strategy.

Table 6.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development. A checkmark (✓) indicates that the item is currently in place and being implemented. A "C" indicates that the item is in place for a town but is maintained and administered by the County.

TABLE 6.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

COMMUNITY	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Program	Emergency Operations Plan	SARA Title III Plan	Radiological Emergency Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Program	Historic Preservation Plan	Flood Damage Prevention Ordinance (feet freeboard)	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-disaster Redevelopment Plan	Building and Fire Code	NFIP	NFIP Community Rating System
PENINSULA																						
Hampton	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓		✓(3)	✓	✓			✓	✓	✓
Newport News	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓(2)	✓	✓			✓	✓	✓
Poquoson	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓			✓(3)	✓	✓			✓	✓	✓
Williamsburg	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓			✓	✓	
James City County	✓	✓			✓	✓	✓	✓	✓	✓		✓			✓(2)	✓	✓			✓	✓	✓
York County	✓	✓			✓	✓	✓	✓	✓	✓		✓			✓(3)	✓	✓			✓	✓	✓
SOUTHSIDE																						
Norfolk	✓	✓			✓	✓	✓	✓		✓		✓		✓	✓(3)	✓	✓			✓	✓	✓
Portsmouth	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓(3)	✓	✓			✓	✓	✓
Suffolk	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓			✓	✓	
Virginia Beach	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓(2)	✓	✓			✓	✓	✓
Chesapeake	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓(1.5)	✓	✓			✓	✓	✓
WESTERN TIDEWATER																						
Isle of Wight County	✓	✓			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓(1.5)	✓	✓			✓	✓	
Smithfield	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	
Windsor	✓	✓			✓		✓	✓		✓		✓			✓	✓	✓			✓	✓	
Franklin	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓(2)	✓	✓		✓	✓	✓	✓
Southampton County	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓			✓(1.5)	✓	✓			✓	✓	
Boykins	✓	✓			✓	C	C	C	C	✓			✓		✓	✓	✓			✓	✓	
Branchville	✓	✓			✓	C	C	C	C	✓			✓		✓	✓	✓			✓	✓	
Capron	✓	✓			✓	C	C	C	C	✓			✓			✓	✓			✓		
Courtland	✓	✓			✓	C	C	C	C	✓			✓		✓	✓	✓			✓	✓	
Ivor	✓	✓			✓	C	C	C	C	✓			✓		✓	✓	✓			✓	✓	
Newsoms	✓	✓			✓	C	C	C	C	✓			✓			✓	✓			✓		
Surry County	✓	✓			✓	✓		✓		✓		✓	✓	✓	✓	✓	✓			✓	✓	
Claremont	✓	✓			✓	C		C		✓					✓	✓	✓			✓	✓	
Dendron	✓	✓			✓	C		C		✓						✓	✓			✓		

Emergency Management

Hazard mitigation is one of four primary phases of emergency management. The three other phases include preparedness, response, and recovery. Each phase is interconnected with hazard mitigation as **Figure 6.1** suggests. Opportunities to reduce potential losses through mitigation practices are ideally implemented before a disaster strikes. Examples include the acquisition or elevation of flood-prone structures or the enforcement of regulatory policies that limit or prevent construction in known hazard areas. The post-disaster environment provides an important "window of opportunity" to implement hazard mitigation projects and policies. During this time period, federal disaster assistance, such as the Hazard Mitigation Grant Program (HMGP), may be available. In addition, elected officials and disaster victims may be more willing to implement mitigation measures in order to avoid similar events in the future.

FIGURE 6.1: FOUR PHASES OF EMERGENCY MANAGEMENT



Source: Federal Emergency Management Agency

Planning for each phase is a critical part of a comprehensive emergency management program and key to the successful implementation of hazard mitigation actions.

Hazard Mitigation Plan: A hazard mitigation plan represents a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment and mitigation strategy.

Disaster Recovery Plan: A disaster recovery plan guides the physical, social, environmental, and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing

on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

Emergency Operations Plan: An emergency operations plan outlines responsibilities and the means by which resources are deployed during and following an emergency or disaster.

- Virginia Department of Emergency Management (VDEM) assists local governments with plan development and revisions by offering the following services:
  - Issuing update notification at both 1 year and 6 months;
  - Conducting a plan review, as requested;
  - Facilitating plan review meetings; and,
  - Developing plan templates through collaboration with local partners.
- In December 2015, VDEM released *2015 Report on the Status of Emergency Response Plans and Preparedness Efforts in the Commonwealth*. According to the report, 98-percent of Virginia localities have current local emergency operations plans. Virginia was accredited for the third time in a row by the Emergency Management Assessment Program. Recommendations from the report included implementing statewide disaster planning software to digitize all EOPs to increase efficiency and coordination between agencies and localities and using common operating picture tools to provide situational awareness to state leaders in real-time.
- Emergency Managers for each city and county were included in preparation of the MAP because their knowledge of their jurisdiction's EOP and its strengths and weaknesses is a valuable component of this planning process.

Continuity of Operations Plan (COOP): A continuity of operations plan establishes a clear chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster. Many Emergency Managers in communities without comprehensive COOPs for all internal agencies were interested in supplementing their existing EOP or existing COOP with additional planning and this insight was included in the MAP planning process.

Radiological Emergency Plan: A radiological emergency plan delineates roles and responsibilities for assigned personnel and the means to deploy resources in the event of a radiological accident.

- The Virginia plan for radiological emergencies is available online at: https://www.nrc.gov/docs/ML0834/ML083470907.pdf.

SARA Title III Emergency Response Plan: A SARA Title III Emergency Response Plan outlines the procedures to be followed in the event of a chemical emergency such as the accidental release of toxic substances. These plans are required by federal law under Title III of the Superfund Amendments and Re-authorization Act (SARA), and the Emergency Planning and Community Right-to-Know Act (EPCRA).

General Planning

The implementation of hazard mitigation activities involves departments and individuals in a broad range of professions. Stakeholders may include local planners, public works officials, economic development specialists, and others. Concurrent local planning efforts can complement hazard mitigation goals even though they are not designed as such.

Comprehensive Land Use Plan: A comprehensive land use plan establishes the overall vision for what a community wants to be and serves as a guide to future governmental decision making. Typically, a comprehensive plan is comprised of demographic conditions, land use patterns, transportation elements and proposed community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can serve as a far reaching, long-term risk reduction tool.

- Virginia law requires that all communities have a comprehensive land use plan and that it be updated every five years.
- As indicated in Sections 2 and 3, the comprehensive plans for each of the counties and cities involved in this planning process were relied upon for three planning stages: 1) updating the community profile; 2) comprehensive plan goals and objectives were reviewed during the updating of this plan's goals and objectives; and 3) each comprehensive plan was reviewed by the consultant prior to the in-person meetings to identify mitigation plan conflicts or areas of potential integration/coordination. This process helps make sure that the comprehensive plans and the hazard mitigation plan are in parallel.

Capital Improvements Plan (CIP): A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism to guide future development away from identified hazard areas, or to fix infrastructure problems that contribute to hazard-related damage. Limiting public investment in hazardous areas is one of the most effective long-term mitigation actions available to local governments. Jurisdictions with CIPs were able to pull projects from the CIP that reflect the goals and objectives of mitigation planning, and vice versa. CIPs often include more detail on projects costs, allowing the hazard mitigation plan actions to be described in more detail. In this way, the community CIPs and hazard mitigation plan share similar projects.

Historic Preservation Plan: A historic preservation plan is intended to preserve historic structures or districts within a community. An often overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards to include the identification of the most effective way to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot be easily relocated out of harm's way.

Zoning Ordinances: Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety and welfare. Since zoning regulations enable municipal governments to limit the type and density of development, it can serve as a powerful tool when applied in identified hazard areas.

- The Virginia General Assembly enacted the Chesapeake Bay Preservation Act in 1988, requiring local governments statewide to include water quality protection measures in their zoning and subdivision ordinances and in their comprehensive plans. Although the Act was developed with the intent of improving water quality throughout Virginia, the regulations have the additional benefit of controlling or restricting development in floodplain areas. The CBPA Overlay District consists of three components: Resource Protection Area (RPA) that includes a 100 foot RPA buffer, a Resource Management Area (RMA), and the Intensely Developed Areas (IDA). The lands that make up Chesapeake Bay Preservation Areas are those that have the potential to impact floodplains and water quality most directly. Generally, there are two main types of land features: those that protect and benefit water quality (RPAs); and those that, without proper management, have the potential to damage water quality (RMAs). Areas with intensive waterfront industrial land uses and activities are categorized as IDAs.
- Floodplain management ordinances in Virginia communities are commonly administered as zoning overlay districts in the community zoning ordinance.
- Zoning ordinance floodplain management overlay district regulations were reviewed by the consultant prior to in person meetings with the jurisdictions. The review helped identify areas of potential improvement to the ordinances.

Subdivision Ordinances: A subdivision ordinance regulates development of housing, commercial, industrial or other uses, including associated public infrastructure, as land is subdivided into buildable lots. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development. For the 2017 update to this plan, the consultant reviewed subdivision ordinances and recommended potential areas of improvement related to hazard mitigation.

Building Codes, Permitting and Inspections: Building codes regulate design and construction standards. Permits are issued and work is inspected on new construction and building alterations. Permitting and inspection processes both before and after a disaster can affect the level of hazard risk faced by a community.

- Under Virginia Law the Department of Housing and Community Development (DHCD) has authority to promulgate building regulations and a regulatory process for development and adoption of a statewide mandatory mini/maxi construction code that all 167 units of local government (counties and incorporated cities) must adopt and implement. The Virginia Uniform Statewide Building Code (USBC) is administered by the Virginia Board of Housing and Community Development and regulates construction and maintenance of buildings and structures. Effective July 1, 2021, Virginia adopted the 2018 I-codes as referenced in the Virginia Construction Code Part 1, the 2018 Statewide Fire Prevention Code; and the 2017 National Electrical Code. Implementation for state colleges and universities is the responsibility of the Virginia General Services Department. The State Fire Marshal within DHCD is responsible for statewide implementation of the Fire Code unless localities elect to adopt this code at the local level. Localities can and do adopt the Property Maintenance Code, which is within the scope of the statewide code. Enforcement of the USBC is the responsibility of the local government's building inspections department. Many of the towns in the study area rely upon the county building department for code-related functions.
- The consultant for this plan update reviewed Appendix F of the International Codes related to radon control. This appendix was discussed with the communities for this update to determine if any communities were interested in enforcing Appendix F in view of the HIRA information regarding Radon Exposure risk.

Resiliency Planning: In 2021, the Commonwealth worked with 2,000 stakeholders to build the *Coastal Resilience Master Plan*. This plan documents which land is exposed to coastal flooding hazards now and into the future, as well as the impacts of future flooding scenarios on coastal Virginia's community resources and manmade and natural infrastructure.

The Master Plan concluded that between 2020 and 2080:

- the number of residents living in homes exposed to extreme coastal flooding is projected to grow from approximately 360,000 to 943,000, an increase of 160%;
- the number of residential, public, and commercial buildings exposed to an extreme coastal flood is projected to increase by almost 150%, from 140,000 to 340,000, while annualized flood damages increase by 1,300% from $0.4 to $5.1 billion;
- the number of miles of roadways exposed to chronic coastal flooding is projected to increase from 1,000 to nearly 3,800 miles, an increase of nearly 280%; and
- an estimated 170,000 acres, or 89%, of existing tidal wetlands and 3,800 acres, or 38%, of existing dunes and beaches may be permanently inundated, effectively lost to open water.

The Commonwealth intends to develop successive updates of the Master Plan on at least a five-year cycle, managed by the Department of Conservation and Recreation in consultation with the Chief Resilience Officer, the Special Assistant to the Governor for Coastal Adaptation and Protection, and the Technical Advisory Committee.

The next phase of the Master Plan anticipated by 2024, will aim to address recommendations of the Technical Advisory Committee to broaden the analysis of natural hazards by including rainfall-driven, riverine, and compound flooding, expand and improve the inventory of resilience projects by continuing to add efforts and working with project owners to better understand the benefits of projects, and extend this critical work beyond the coastal region to encompass statewide resilience needs.

Projects identified in the Master Plan must go through a specified resiliency planning process to be funded through the Community Flood Preparedness Fund (CFPF), also launched in 2021. Many communities in Hampton Roads have begun the planning process, and consequently, those communities were able to incorporate many of their projects into the hazard mitigation plan, as well. CFPF is a

statewide program maintained by the Department of Conservation and Recreation that fills pressing needs by prioritizing low-income communities and provides a permanent funding stream to finance flooding resilience projects, studies, and capacity building initiatives. The Regional Greenhouse Gas Initiative (RGGI) is an initiative made up of eleven states that aims to reduce greenhouse gas emissions. RGGI holds carbon dioxide auctions, which will fund the Virginia CFPF.

Radon Exposure Remediation:
The Code of Virginia requires that Radon testers and mitigators be currently certified by either the National Radon Proficiency Program or the National Radon Safety Board. The program is administered by Virginia Department of Health, Office of Radiological Health, Indoor Radon Program.

- In 1993 the Virginia General Assembly passed legislation that requires all schools in the Commonwealth to be tested for radon after July 1, 1994, and also any new school buildings or additions built after that date. Each school is required to maintain files of their radon test results.
- Upon request, the Department's Radon Coordinator can present a course on radon for real estate transactions in Virginia. This information was reviewed and incorporated into the HIRA and the public meeting presentations on radon provided during this update process.
- The department has a limited supply of radon test devices that are distributed annually, free upon request.

Floodplain Management

The NFIP contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary but is promoted by FEMA as a crucial means to implement and sustain an effective hazard mitigation program.

In order to join the NFIP, a community must adopt flood damage prevention ordinance development standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings be protected from damage by the 100-year flood, and that new floodplain development does not aggravate existing flood problems or increase damage to other properties.

Another key service provided by the NFIP is the identification of flood hazard areas. FIRMs are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

Detailed information on each community's NFIP participation history and current map status is provided in Sections 5 and 6; **Table 5.3** summarizes NFIP participation for Hampton Roads communities, along with general NFIP policy data, while **Tables 5.4** and **5.5** provide the repetitive flood losses; and **Table 6.1** provides information on freeboard requirements. Each of the communities that participates in the NFIP has designated a floodplain manager in their floodplain management ordinance and each community in the NFIP has created a very specific Mitigation Action in the Mitigation Action Plan in Section 7 that addresses actions they will consider in the near-term to address their commitment to continuing their participation in the NFIP. Noteworthy accomplishments in floodplain management are also found at the end of this section, broken out by community. **Table 6.2** provides additional summary information on how the NFIP is managed in each of the participating communities in Hampton Roads and notes specific actions or programs of interest in each community, especially with regard to their flood ordinances.

Effective January 1, 2022, a new flood disclosure requirement of Virginia Code Section 55.1-708.2, requires that an owner of residential real property who knows that the dwelling unit is a repetitive risk loss structure must disclose such fact to the purchaser. A "repetitive risk loss structure" is defined as a property for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program within any rolling 10-year period since 1978. The law further requires that the owner of a property subject to the disclosure requirement must provide notification to the purchaser of any disclosure before the ratification of a contract.

TABLE 6.2: NFIP MANAGEMENT IN PARTICIPATING COMMUNITIES

SUBREGION	COMMUNITY	Designated Floodplain Manager/Agency	CFM on Staff?	Notes on Floodplain Management Ordinance and Administration
Peninsula	Hampton	Zoning Administrator	Yes	The city last updated their ordinance in 2016 and included 3 feet of freeboard in the SFHA and 1.5 feet of freeboard outside the SFHA. Most ordinance administration is by Community Development or Public Works. ECs are maintained in digital format.
	Newport News	City Manager	Yes	Ordinance was updated in 2014 and requires 2 feet freeboard. Codes Compliance maintains ECs and performs inspections of floodplain construction. City recently joined the CRS.
	Poquoson	Building Official	Yes	Last updated in 2014, the city's ordinance has many higher standards, including coastal A Zone, and freeboard of 3 feet. The ordinance is administered by the Building Official within the Permit Office.
	Williamsburg	Zoning Administrator	No	The city last updated their ordinance in 2015, adopting the State's model ordinance, with 2 feet of freeboard for nonresidential structures and 18 inches for residential structures. The narrow floodplains of Williamsburg do not lend themselves to development pressure.
	James City County	Zoning Administrator	Yes	The ordinance was last updated in 2018 and includes 2 feet of freeboard, and many prohibited uses in the SFHA. It also has higher standards for fill. Community Development office administers the ordinance. Ordinance addresses accessory structures.
	York County	Chief of Stormwater Programs	Yes	The ordinance requires 3 feet of freeboard for residential structures and an additional foot of freeboard for structures in the Coastal A Zone.
Southside	Norfolk	Floodplain Administrator (Planning)	Yes	Revisions to ordinance approved 2020 with several higher standards, including 3 feet freeboard, and coastal A zone regulation to V Zone standards. City has robust flood mitigation program, CRS program and ordinance administration system through city Planning, Building Safety and the Development Services Center.
	Portsmouth	Environmental Manager	Yes	Last updated in 2015, the ordinance requires 3 feet freeboard and V Zones requirements for Coastal A Zone structures. Zoning-related inquiries and information regarding floodplains is handled by the Department of Neighborhood Advancement. The city has a robust flood mitigation program and CRS program.
	Suffolk	Director of Planning and Community Development	No	The floodplain management ordinance was updated in 2015. Flood damage is tied to the assessor's record for properties. High water mark data are collected along the Nansemond River at North Main Street. The city does not maintain ECs digitally.
	Virginia Beach	Public Works Director	Yes	The city ordinance requires 2 feet of freeboard. The ordinance was last updated in 2020. A

TABLE 6.2: NFIP MANAGEMENT IN PARTICIPATING COMMUNITIES

SUBREGION	COMMUNITY	Designated Floodplain Manager/Agency	CFM on Staff?	Notes on Floodplain Management Ordinance and Administration
				major rewrite in 2013 had several higher standards, including compensatory fill in specified areas, and no new residential structures on lots created after October 23, 2001. 38% of the SFHA is protected as open space. Lowest floor data for new structures is recorded in online permit record and EC are attached to Certificate of Occupancy. City has a Southern Rivers watershed buffer and the CBPA buffers which help protect natural and beneficial functions of floodplains.
	Chesapeake	Director of Development and Permits	Yes	Ordinance was updated in 2014 and includes 1.5 feet of freeboard. The city maintains ECs digitally.
Western Tidewater	Isle of Wight County	Director of Planning and Zoning	Yes	The County has freeboard of 1.5 feet required in their 2015 ordinance, has no freeboard outside the SFHA.
	Smithfield	Planning & Zoning Administrator	No	2015 ordinance has 1.5 feet freeboard and is administered by Planning, Engineering & Public Works.
	Windsor	Planning and Zoning	No	Ordinance does not require freeboard and is administered by Planning and Zoning Department.
	Franklin	Zoning Administrator	Yes	The city updated ordinance in 2016; requires freeboard of 2 feet. City routinely considers higher standards and the impact when updating ordinance. The Comprehensive Plan promotes a greenway along the Blackwater River and zoning protects open space along the river. The city recently joined the CRS. Online maintenance of ECs is under development. The Downtown area has an older Flood Recovery Plan.
	Southampton County	Director of Community Development	Yes	The County adopted State Model Floodplain Ordinance and included 1.5 feet of freeboard. Residential structures are required to have large, front-yard-type, setbacks along waterfront, rather than smaller rear yard setbacks. Comprehensive Plan encourages conservation easements/ag and forestal districts and reforestation of clear-cut properties plus environmental goals to protect waterways and wetlands. Nottoway and Blackwater Rivers are part of State Scenic River program, limiting development that visually impacts rivers, thereby helping limit development in the floodplain.
	Boykins	Mayor	No	Ordinance requirements administered by town staff, as required.
	Branchville	Unknown	No	Ordinance requirements administered by town staff, as required.
	Courtland	Mayor	No	Ordinance requirements administered by town staff, as required.

TABLE 6.2: NFIP MANAGEMENT IN PARTICIPATING COMMUNITIES				
SUBREGION	COMMUNITY	Designated Floodplain Manager/Agency	CFM on Staff?	Notes on Floodplain Management Ordinance and Administration
	Ivor	Clerk	No	Ordinance requirements administered by town staff, as required.
	Surry County	Planning & Community Development Director	No	Ordinance was updated in 2015. Unclear on freeboard as ordinance contains template language: "recommend for > 1 foot".
	Claremont	Information not provided	No	Ordinance not available online and not provided by Town.

An additional indicator of floodplain management capability is participation in the CRS. The CRS is an incentive program that encourages communities to undertake defined flood mitigation activities that go above and beyond the minimum requirements of the NFIP, adding extra local measures to provide protection from flooding. The creditable CRS mitigation activities are assigned a range of point values. As points are accumulated and identified thresholds are reached, communities can apply for an improved CRS class rating. Class ratings, which run from 10 to 1, are tied to flood insurance premium reductions as shown in **Table 6.3**. As class ratings improve (decrease), the percent reduction in flood insurance premiums for NFIP policy holders in that community increases. Every 500 points accumulated is equal to a 5% reduction in flood insurance premiums in the SFHA; premium discounts are typically limited to 5% outside the SFHA.

TABLE 6.3: CRS PREMIUM DISCOUNTS, BY CLASS	
CRS CLASS	PREMIUM REDUCTION
1	45 percent
2	40 percent
3	35 percent
4	30 percent
5	25 percent
6	20 percent
7	15 percent
8	10 percent
9	5 percent
10	0 percent

Source: Federal Emergency Management Agency

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10.

- As of January 2022, there were ten communities in the study area participating in the Community Rating System: Hampton (Class 7); Newport News (Class 7); James City County (Class 5); Norfolk (Class 5); Poquoson (Class 8); Portsmouth (Class 7); Chesapeake (Class 7); York County (Class 7); Virginia Beach (Class 7); and Franklin (Class 9). Successful participation in the CRS shows continued compliance with the NFIP on the part of these communities. Newport News and Franklin are the most recent communities to join CRS and their premium discounts will begin in Spring 2021. Virginia Beach joined in 2019.

Floodplain Management Plan: A floodplain management plan (or a flood mitigation plan) provides a framework for the identification and implementation of corrective and preventative measures specifically designed to reduce the impacts of floods.

- The City of Portsmouth is the only community in the study area that has adopted a separate floodplain management plan, but the community has decided to use the hazard mitigation planning process to develop and enact flood mitigation activities in the future rather than maintaining both documents separately.

Open Space Management Plan: An open space management plan is designed to preserve, protect and restore largely undeveloped lands, and to expand or connect areas in the public domain, including parks, greenways and other outdoor recreation areas. Open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state.

Stormwater Management Plan: A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of frequent urban nuisance flooding.

- Virginia Department of Environmental Quality (VDEQ) is the lead agency for developing and implementing statewide stormwater management and nonpoint source pollution control programs to protect the Commonwealth's water quality and quantity. Currently, three laws apply to land disturbance activity in Virginia: the Stormwater Management Act (§ 62.1-44.15:24 et seq.), Erosion and Sediment Control Law (§ 62.1-44.15:51 et seq.), and Chesapeake Bay Preservation Act (§ 62.1-44.15:67 et seq.). These laws evolved at different times, have been administered by different agencies throughout the years, and created three distinct regulatory programs with varying requirements. At the request of the Chairs of the Virginia House and Senate Natural Resources committees, DEQ pulled together a group of stakeholders to consider ways to streamline and possibly combine these programs. The goal is to make the requirements clearer, more consistent and more “user-friendly”, while continuing to ensure the protection of the Commonwealth’s water quality. The Department asked representatives of all affected constituencies to take part in this important effort – including local governments, the development community, environmental organizations, agriculture, and others.
- Local governments in Virginia are required to administer the stormwater management and erosion and sediment control laws and regulations promulgated by the State through local ordinances. Surry County’s program is administered directly by DEQ.
- As part of this update, the contractor reviewed the City of Virginia Beach’s Stormwater ordinance to understand the higher standards that the City has incorporated above and beyond the State minimum requirements.

Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability is evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability associated with the implementation and success of proposed mitigation activities. Technical capability is evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using GIS to assess community hazard vulnerability.

Staff interviews were used to capture information on administrative and technical capability through the identification of available staff, and available personnel resources, whether through consultants or collaborators with community government. **Table 6.4** provides a summary of the results. A checkmark (✓) indicates that local staff members are tasked with the services listed.

TABLE 6.4: RELEVANT STAFF / PERSONNEL RESOURCES

COMMUNITY	Planners with knowledge of land development and land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Emergency manager	Floodplain manager	Land surveyors	Scientist familiar with the hazards of the community	Staff with education or expertise to assess the community vulnerability to hazards	Personnel skilled in Geographic Information Systems and/or HAZUS	Resource development staff or grant writers
PENINSULA										
Hampton	✓	✓	✓	✓	✓			✓	✓	✓
Newport News	✓	✓	✓	✓	✓			✓	✓	✓
Poquoson	✓	✓	✓	✓	✓		✓			✓
Williamsburg	✓	✓	✓	✓	✓			✓	✓	✓
James City County	✓	✓	✓	✓	✓			✓	✓	
York County	✓	✓	✓	✓	✓				✓	
SOUTHSIDE										
Norfolk	✓	✓	✓	✓	✓				✓	✓
Portsmouth	✓	✓	✓	✓	✓	✓		✓	✓	✓
Suffolk	✓	✓	✓	✓				✓	✓	✓
Virginia Beach	✓	✓	✓	✓	✓	✓		✓	✓	
Chesapeake	✓	✓	✓	✓	✓	✓			✓	✓
Franklin	✓	✓	✓	✓	✓			✓	✓	

TABLE 6.4: RELEVANT STAFF / PERSONNEL RESOURCES										
COMMUNITY	Planners with knowledge of land development and land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Emergency manager	Floodplain manager	Land surveyors	Scientist familiar with the hazards of the community	Staff with education or expertise to assess the community vulnerability to hazards	Personnel skilled in Geographic Information Systems and/or HAZUS	Resource development staff or grant writers
WESTERN TIDEWATER										
Isle of Wight County	✓	✓	✓	✓					✓	
Smithfield	✓	✓	✓	✓					✓	
Windsor										
Southampton County	✓	✓	✓	✓	✓			✓	✓	✓
Boykins		✓								
Branchville										
Capron										
Courtland	✓	✓								
Ivor										
Newsoms										
Surry County	✓	✓	✓	✓	✓		✓	✓	✓	✓
Claremont					✓					
Dendron										

Fiscal Capability

The ability of a local government to take action is often closely associated with the amount of money available to implement policies and projects. This may take the form of grant funding or locally-based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project such as the acquisition of flood-prone homes, which can require a substantial commitment from local, state and federal funding sources.

Staff interviews were used to capture information on fiscal capability through the identification of locally available financial resources. **Table 6.5** provides a summary of the results. A checkmark (✓) indicates that the listed fiscal resource is locally available for hazard mitigation purposes.

TABLE 6.5: FISCAL CAPABILITY

COMMUNITY	Capital Improvement Programming	Community Development Block Grants	Special Purpose Taxes	Gas / Electric Utility Fees	Water / Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation Bonds	Partnering Arrangements or Intergovernmental Agreements
PENINSULA									
Hampton	✓	✓	✓	✓		✓		✓	✓
Newport News	✓	✓			✓	✓			✓
Poquoson	✓	✓				✓		✓	✓
Williamsburg	✓	✓		✓	✓			✓	✓
James City County	✓	✓							✓
York County	✓	✓							✓
SOUTHSIDE									
Norfolk	✓	✓		✓	✓	✓			✓
Portsmouth	✓	✓			✓	✓		✓	✓
Suffolk	✓	✓	✓	✓	✓		✓	✓	✓
Virginia Beach	✓	✓	✓		✓	✓	✓	✓	✓
Chesapeake	✓	✓			✓	✓	✓	✓	✓
WESTERN TIDEWATER									
Isle of Wight County	✓	✓		✓	✓			✓	✓
Smithfield	✓	✓			✓		✓		✓
Windsor	✓	✓					✓		✓
Franklin	✓	✓	✓	✓	✓				✓
Southampton County	✓	✓		✓	✓			✓	✓
Boykins		✓						✓	✓
Branchville		✓						✓	✓
Capron		✓			✓			✓	✓
Courtland		✓			✓			✓	✓
Ivor		✓			✓			✓	✓
Newsoms		✓						✓	✓
Surry County	✓	✓			✓				✓
Claremont		✓			✓				✓
Dendron		✓							✓

Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of hazards. The adoption of hazard mitigation measures may be seen as an impediment to growth and economic development, which may adversely impact other hazard-related initiatives. Mitigation may not generate the same level of interest among local officials when compared with competing priorities.

Self-Assessment of Capabilities

In addition to the inventory and analysis of specific local capabilities, communities should self-assess their capability to implement hazard mitigation activities. Officials were encouraged to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. The committee classified each of the capabilities as either "limited," "moderate" or "high."

Table 6.6 summarizes the results of the self-assessment process. An "L" indicates limited capability; an "M" indicates moderate capability; and an "H" indicates high capability.

TABLE 6.6: SELF ASSESSMENT OF LOCAL CAPABILITY					
COMMUNITY	Planning and Regulatory Capability	Administrative and Technical Capability	Fiscal Capability	Political Capability	Overall Capability
PENINSULA					
Hampton	H	H	M	M	M
Newport News	H	H	M	H	H
Poquoson	H	H	M	M	H
Williamsburg	H	H	H	H	H
James City County	H	H	M	H	H
York County	H	H	M	H	H
SOUTHSIDE					
Norfolk	M	H	M	H	M
Portsmouth	M	M	L	M	M
Suffolk	M	H	M	L	M
Virginia Beach	M	H	M	L	M
Chesapeake	H	H	M	M	H
WESTERN TIDEWATER					
Isle of Wight County	H	M	M	M	M
Smithfield	L	L	L	M	L
Windsor	L	L	L	L	L
Franklin	M	M	L	M	M
Southampton County	M	M	L	M	M
Boykins	L	L	L	M	L
Branchville	L	L	L	M	L
Capron	L	L	L	M	L
Courtland	M	M	L	M	M
Ivor	L	L	L	M	L
Newsoms	L	L	L	M	L
Surry County	M	M	M	M	M
Claremont	L	L	L	L	L
Dendron	L	L	L	L	L

INTEGRATING MITIGATION MEASURES INTO COMMUNITY LIFE

The success of future mitigation efforts in a community can be gauged to some extent by its past efforts. Previously implemented mitigation measures indicate that there is and continues to be a desire to reduce the effects of natural hazards in the region. The success of these projects can be influential in building local government support for new mitigation efforts. Additional capability toward realizing mitigation goals is built through the integration of mitigation strategies into other local planning and administrative tasks.

While the notes below are not an exhaustive list of all mitigation actions taken in the region, they do provide a summary of very recent mitigation measures undertaken by communities in Hampton Roads and in part describe how many of the communities have integrated their mitigation strategies into other planning mechanisms. Additionally, as called for in the *National Mitigation Framework*, the aspects of leadership, collaboration, partnership building, and education/skill building have been shown in the following summary notes whenever possible.

Regional Activities

- In 2015, HRPDC prepared grant application for hazard mitigation plan update that combined 7 existing plans into 1 large regional plan. Updated plan streamlined the list of hazards to align more closely with the State Hazard Mitigation Plan. The PDC also conducted two Joint Land Use Studies described below for each participating city, in partnership with the U.S. Navy, Portsmouth, Chesapeake, Norfolk and Virginia Beach.
- The All-Hazards Advisory Committee (AHAC) was formed in 2015 to bring together mitigation practitioners from each of the HRPDC communities. This group is helping the PDC administer the mitigation planning contract among other tasks.
- Coastal Virginia CRS Users' Group meets every other month to review best practices of other communities and stay up to date on floodplain management and CRS issues. Consulting hazard mitigation planners for the HRPDC updated the group on how to create and update mitigation capability analyses at spring 2015 meeting.
- Each community's comprehensive plan, local and state resilience plans, and the State Hazard Mitigation Plan were used and will continue to be used to carefully update the goals and objectives in the HMP to align with existing plan goals at the State and regional levels.
- Most communities in the region include mitigation planning committee members who are also involved in the comprehensive planning process. This helps ensure consistency across planning documents. Since there are 15 comprehensive plans to consider during this HMP update, it is expected that common themes can be found that will help focus the HMP goals and objectives.
- VDEM procured Crisis Track for each of Virginia's counties and independent cities in 2017. The primary objective was to provide all localities with the capability to quickly complete, document, and report the outcomes of local damage assessments in a manner that allowed VDEM to see real-time data of the disaster consequences. This real-time data will help VDEM to be better prepared to support any unmet needs and assist VDEM in more quickly processing requests for Federal Assistance when needed. Crisis Track uses local government GIS data, such as address points and tax parcel layers, to locate and valuate every structure in the Commonwealth. When an incident occurs, local emergency managers use Crisis Track to identify all infrastructure in an area of concern and send pre-populated damage assessment forms to each damage assessment team's mobile device. As teams complete the damage assessment forms, Crisis Track calculates damage costs using tax assessment values and summarizes results for each county. Most of the communities in the study area have pre-populated and tested Crisis Track, and several have already implemented the software for incident assessment.
- HRPDC developed a regional Elevation Certificate database with information from 10 Hampton Roads local governments, to include over 2000 data points. The data from Hampton and Chesapeake were then used to evaluate statistical approaches for estimating building first floor

elevations regionally in support of local and regional vulnerability assessments under various flooding scenarios.[1]

City of Hampton

- The city's Fire Department Public Educator has added more hazards to their 4th grade fire presentation.
- The 2011 Hazard Mitigation Plan, especially HIRA information, was integrated into city's 2014 Emergency Operations Plan update.
- Hampton and Newport News applied for and received a hazard mitigation grant to add a generator to Hines Middle School, which is one of the shelters in the city's MOU with Newport News.
- Hampton received a State Homeland Security Grant in 2014 to add specialized items for sheltering children, such as highchairs and pack and plays.
- As a result of a previous HMP action to evaluate/review options for more effective public warning systems to upgrading/replace existing reverse 911 system, in 2013 Hampton switched to Everbridge which provides more options for alerting the public. This system is also integrated with the system being used by VDEM.
- HMP action to educate elected officials and residents on the importance of the NFIP has resulted in a multi-agency effort to provide flood insurance brochures at all outreach events. The importance of flood insurance is in the city's general presentation that is given to the public on emergency management.
- A high priority action in the HMP was to support mitigation of priority flood-prone structures through promotion of acquisition/demolition, elevation and flood proofing of non-residential projects where feasible using FEMA hazard mitigation grant programs where appropriate. The city has hired new staff to implement grants and has completed several home elevation projects.
- The city has implemented a revolving loan fund for residential elevation projects. The revolving loan program is up and running. It is the only program of its kind, in Virginia, for residents to apply for low-interest loans to help with qualifying mitigation projects. This project is supported by the Office of Emergency Management, Hampton Redevelopment and Housing Authority, and Old Point National Bank.
- Mitigation action to provide NOAA weather radios to high risk populations was funded and completed with weather radios provided to residents that live in mobile homes in Hampton in April 2015.
- HMP mitigation action to evaluate the relocation of Hampton City Schools Maintenance Building was implemented by chance when the building was destroyed by a tornado that hit Hampton on January 11, 2014. The building was not rebuilt.
- The city plans to improve CRS Class 7 rating to a Class 6 using inputs and capabilities across many city departments.
- City currently has a Newmarket Creek mitigation project in design phase with the USACE, in addition to other projects in design phase: North Armistead Avenue Road Raining, Oakland-Old Point Area Drainage Improvements, Phoebus Area Drainage Improvements at Hygeia, North and Sherwood Street. These projects rely on CIP funding and stormwater fee funds.
- The city announced in December 2021 that they will receive more than $9 million in grants to deal with sea level rise and extreme weather as part of an ongoing statewide effort by the Virginia CFPF. The grants, announced last week by Gov. Ralph Northam, will be directed at four specific projects in Hampton: $3,841,555 for Lake Hampton and North Armistead Avenue; $3,008,500 for the Big Bethel Blueway (Albany Drive at Big Bethel Road); $2,022,143 for the Sunset Creek Urban Channel Naturalization Project; and $291,850 for the Billy Woods Canal. The four Hampton grants were among 30 applications from 22 local government organizations to receive grants made possible with funding from the RGGI.

[1] *Developing First Floor Elevation Data for Coastal Resilience Planning in Hampton Roads*, February 2019. Available online at: https://www.hrpdcva.gov/library/view/932/wr19_01-developing-first-floor-elevation-data-for-coastal-resilience-planning-in-hampton-roads.

- As part of the city's Resilient Hampton initiative, the city hired a Resiliency Officer and has worked in multiple phases to implement the living with water approach across the city. Throughout this effort, the Initiative has approached the work at multiple scales, from looking at policy and process changes that influence resiliency across the city, to supporting plans and projects designed to create benefits for a whole neighborhood, to identifying opportunities to support individual homeowners to increase their resilience. The city issued a General Obligation Bond in 2019 and an Environmental Impact Bond in 2020 to help fund identified projects. Phase I (citywide) planning is complete, while Phase II (watershed level) plans are underway.

City of Newport News

- The Comprehensive Plan update process during the summer of 2015 examined goals, objectives, and actions from the previous HMP. This hazard mitigation planning effort drew mitigation actions from the latest comprehensive plan. Many of the same planning team members are continually involved in both plan updates.
- The emphasis on floodplain management through ordinance administration in the HMP resulted in flood ordinance changes in 2014 that included adoption of freeboard.
- Certified Floodplain Managers, a professional certification program administered by the Association of State Floodplain Managers, increased in number across at least 2 departments and they participate in hazard mitigation planning on a regular basis.
- The City Watch program was expanded to include post-disaster messages as a result of a careful capability analysis.
- The city formed a Generator Committee to address needs in the city identified during hazard mitigation capability review.
- A mitigation action in a previous hazard mitigation plan recommended developing a natural hazards school curriculum. Existing Fire Department programs were expanded to address this need.
- The previous HMP identified City Line apartments as a high hazard area and some retrofits were made to the complex's HVAC system. Additional flood protection measures for this and an adjacent housing complex are being pursued in conjunction with the City of Hampton, U.S. Department of Housing and Urban Development and other State and Federal agency partners.
- Six mitigation actions from the 2017 plan were removed because they have been completed. Projects used a combination of state, Federal and CIP funds.
- The city currently has a Class 7 CRS rating but plans to use the capabilities across several city departments to improve their rating. The city is negotiating a contract that will provide master planning services for water resources, including CRS, stormwater management, floodplain management and resilience planning by a single contractor over the next few years.
- The city's Flood Assistance Program has had measurable benefits using primarily acquisition to mitigate an average of 2 structures per year since 1999. Eighty properties comprising 15.2 acres have been purchased. In some cases, the Newport News Green Foundation gets involved in preserving, transforming and promoting the resultant green spaces created as a result of mitigation projects.
- Many of the city's new and ongoing mitigation actions are tied closely to projects already approved for CIP funding or the Stormwater Fund.

City of Poquoson

- In partnership with Hampton, the two cities hired a shared grants administrator specifically to pursue funding for mitigation actions identified for sea level rise and flood mitigation.
- The city continues to elevate repetitively flooded structures using Federal funding mechanisms, and plans to pursue CFPF funding, as well.
- Many projects to protect critical infrastructure are completed or ongoing. Poquoson has protected almost every pump station, fire station, and several schools over the past decade through demo/rebuild, elevation, generator-installation and other retrofits.
- The city continues to use various measures to collect existing Elevation Certificates from property owners and is investigating methods for putting that information online for public accessibility.

- Poquoson has ongoing partnerships with nearby NASA for drone data collection and with Langley Motor Speedway for car storage prior to predicted flood events.
- The Wythe Creek Road to Hampton elevation project will begin construction in spring 2022. The Victoria Boulevard widening project is still in the planning stages. Cooperation with adjacent York County and Hampton remains critical to getting these projects to completion. City has agreement with York County for road clearance to aid evacuation of Poquoson and York County residents.
- Poquoson does not have a large staff of city employees, but representatives from various departments, including Finance and the City Manager's office, are always deeply involved in mitigation planning meetings and document reviews, which results in bringing flood mitigation to the forefront of other planning efforts such as the comprehensive plan and capital planning.
- City coordinates with Virginia Marine Resources Commission for help enforcing the "No Wake Zones" instituted to help protect flooded structures from further flooding when floodwaters remain high.

City of Williamsburg

- The city has and maintains StormReady designation.
- City staff coordinate mitigation planning and emergency preparedness efforts with both Colonial Williamsburg and the College of William and Mary to ensure coordinated response to a variety of hazard incidents. This high level coordination has led to inclusion of mitigation actions in this plan regarding the high hazard potential dam on campus, the tree maintenance program Colonial Williamsburg uses to protect visitors and historic resources and the development of elements for the Continuity of Operations Plan for the city. The team is also assessing large assembly planning and coordinating command and control efforts especially if a secondary hazard event impacts a large assembly and evacuation is needed.
- The stormwater program has started a series of inter-departmental training sessions to help other city staff who are out in neighborhoods to recognize problems associated with drainage maintenance, including waste dumping, improper use of drains and proper notification of problems. Drainage system maintenance is a medium priority action in the HMP and this innovative method for addressing maintenance problems has been well-received in by the Fire Department.
- Shelter generator maintenance program called for in previous HMPs has been implemented through the CIP, with a regular maintenance budget and real-time monitoring software included.
- Strengthening the GIS capability was a medium priority in the last two HMPs. The city has now hired GIS staff and hazard-related GIS data gathering has been accomplished, including verification of hydrant locations and identification/mapping of critical structures and infrastructure.
- Several hazards are identified and addressed through recommendations in the city's comprehensive plan. Those data and recommendations were reviewed to identify potential mitigation actions for this planning effort.
- The city has a development review process for circulating proposed developments that includes hazard-related reviews by various departments.
- Williamsburg is working with the Local Emergency Planning Committee on the Peninsula to obtain a grant for a commodity flow study in light of the railroad that traverses the city.
- During the pandemic, city officials partnered with the school system, the Health Department, Colonial Williamsburg, William & Mary, James City County and York County regarding clinics for testing, vaccination and supply distribution.

James City County

- Repetitive flood loss data is reviewed annually as part of the County's participation in the CRS, or when the data is made available. This action is included in the Hazard Mitigation Plan but is also part of the County's plan to address flood mitigation through the CRS. The county has maintained a Class 5 CRS rating for several years, which requires inputs across many departments and stakeholders.
- Both the County and Busch Gardens, a theme park in the county, received StormReady designation through NOAA.

- The county is considering expanding their existing pre-disaster debris management plan across several departments and beyond public properties. Public outreach elements are being considered, as well.
- The County is participating in the regional "Flood Fluent" initiative.
- Several mitigation actions in this version of the plan are derived from the "Environment" section of the county's most recent comprehensive plan. This practice reinforces the importance of mitigation planning and spreads the responsibility for implementation across various departments, with funding considered through capital spending.

York County

- A mitigation action in the Hazard Mitigation Plan suggests evaluating sustainability and safety of critical facilities. The county's ongoing plan for generator replacement is now tied to the CIP. The county's new Sheriff's Office incorporated resilient design measures such as a generator.
- York County, Newport News and Newport News Waterworks work jointly on forest management at the Waterworks-owned property. Fire trails are regularly maintained.
- Part of staff responsibilities include making information/speakers available to business for contingency planning as needed, or as requested. This is a mitigation action identified in the Hazard Mitigation Plan and reflected in day-to-day operations.
- The County adopted 3 feet of freeboard for structures built or substantially improved in flood hazard areas. Freeboard was recommended as an action in the hazard mitigation plan.
- Comprehensive Plan adopted in 2013 echoes several of the hazards included in the previous hazard mitigation plan and proposes Implementation Strategies to address them in great detail. The shoreline erosion strategies will continue to be referenced, or included directly, in the 2017 update to the Hazard Mitigation Plan.

City of Norfolk

- Updated Comprehensive Plan was adopted March 26, 2013 and was recognized as an example of content and metrics to include in a comprehensive plan. The plan was also recognized for its inclusion of sea level rise, flooding and mitigation actions as part of the metrics.
- As a result of a previous mitigation action plan strategy to expand existing notification systems, several city departments have come together to expand the city's ability to notify the public. Sources include real-time updates the web page, email distribution lists, Facebook and Twitter.
- The city continues to update the flooding awareness webpage, accessible from the homepage. A cross-departmental Flood Awareness Committee was formed, and also provides quarterly updates to citizens as well as to the professional community regarding the city's progress on flood mitigation as well as providing an opportunity for dialogue for all interested stakeholders. The city has a Coastal Resiliency Manager dedicated to managing resilience projects, coordinating the CRS participation, coordinating grants and emergency managers, and presenting information to public and private boards and commissions across the spectrum of city government and civic organizations.
- The city is part of the Rockefeller Foundation RE.invest Initiative which explores ways the private sector can be engaged to enhance flood protection in some older areas of Norfolk with a history of flooding.
- The city is recognized as part of the initial cohort of the 100 Resilient Cities. Also funded by the Rockefeller Foundation, the program provides access to a worldwide network and knowledge base that will be able to identify additional strategies to help the city be more resilient to physical, social, and economic threats.
- As a result of a previous mitigation action plan strategy, Norfolk and Norfolk Public Schools have funded and are in the design phase of multiple school replacements throughout Norfolk. These new facilities will replace older facilities that do not meet current requirements for stormwater management and, in some cases, elevation for flood protection. New structures will meet these requirements and provide safer emergency shelters in times of need.
- Public Works has completed improvements to Brambleton Avenue that provide better access and egress to Sentara Norfolk General Hospital and Eastern Virginia Medical College during storm and flooding events.

- After a storm or flooding event occurs, properties that have received damage are mapped using GIS as part of the damage assessment reporting. Damage assessment training is provided each spring for staff that inspect properties after events.
- RISE, a Norfolk-based nonprofit funded through the Virginia Department of Housing and Community Development, accelerates innovation and business growth around solutions to coastal communities' critical resilience challenges. RISE and FloodMapp launched a novel (and award-winning) forecast flooding technology with Waze, the navigation app. FloodMapp's innovative solution allows Waze to be the only traffic app to offer drivers real-time, street level alerts about flooded roads. FloodMapp is piloting the program in the City of Norfolk where Waze users will be the first in the world to test the new feature. FloodMapp's groundbreaking forecast technology mixes tidal, riverine and rainfall data to create a rapid, real-time flood inundation model. The information is automatically layered with Norfolk's citywide road network and sent to Waze in real time. Drivers receive pop-up icons and audio alerts to warn them about flooded streets along their route and help them avoid property and life-threatening hazards. Drivers can confirm flooding in the app, which helps validate FloodMapp's technology and makes future Waze alerts more accurate. The information will also be used for an automatic rerouting feature, which is now under development.
- Revisions to the Zoning Ordinance were approved and implemented on January 1, 2014. These revisions allow for development to be more resilient to flood damage. Changes helped lower the city's CRS classification and further reduce flood insurance premiums for property owners in the city. The city now has a Class 5 CRS rating thanks to participation across several city departments.
- The city has acquired Everbridge, calling it Norfolk Alert, to alert property owners in flood-prone areas of need for evacuation or other short-term actions ahead of, during or after events.
- The city's GIS department development a tool termed the Tidal Inundation Tracking Application for Norfolk (TITAN) that shows potential flooding based on current tide projections or other hypothetical scenarios.
- HRPDC and the U.S. Navy worked together with City of Virginia Beach and City of Norfolk on an intergovernmental Joint Land Use Study presented to the public in 2019. More frequent flooding is affecting military operations and access to military facilities. This study focused on identifying specific conditions, including recurrent flooding, coastal storms, and erosion, outside of the military footprint that have the potential to impact Navy operations in Hampton Roads. Two recommendations that stand out for local planners are the wastewater treatment plant vulnerability assessment, and Terminal Boulevard rail and roadway grade separation project.
- Norfolk was awarded a $112 million federal grant from the National Disaster Resilience Competition for the Ohio Creek Watershed Project. Goals were multi-objective and show how flood hazard mitigation can feed into creating economic opportunity, advancing community interconnectivity, and deconcentrating poverty. Expected completion in 2023. Project addressed flooding in two residential, predominantly African American neighborhoods with civic leagues and a strong community identity: Historic Chesterfield Heights with over 400 houses on the Historic National Register; and Grandy Village, which includes a public housing community with more than 300 units.

City of Portsmouth

- In addition to HMP, Portsmouth has the 2015 Floodplain Management Plan. Plans are slightly redundant but serve different purposes.
- Flood Information Pamphlets are distributed by several city departments, including recently to all rental units as inspections are completed, and at the public counters in Planning and Inspections. Originally developed for CRS and repetitive loss mailings, pamphlets have an expanded purpose and audience in recent years.
- Staff created a "flood speakers bureau" for Civic Leagues and has attended several civic/neighborhood meetings to speak.
- Floodplain Management function was transferred to the Department of Neighborhood Advancement in August 2013. New web page was created in 2014.

- Staff training on the NFIP is a priority in the HMP. Staff provided training to City Council and Planning Commission on Biggert-Waters 2012 and other NFIP legislative changes to increase knowledge and allow integration of NFIP information in city planning strategies.
- Identifying and funding drainage improvements and protecting water/sewer infrastructure from flooding is a high priority in the HMP and FMP. Work has been coordinated between several departments and an outside engineering firm and funded through capital improvements planning. New stormwater lines are being replaced with larger lines and outfalls are getting flood gates. New and retrofitted pump stations can be quickly connected to generators or auxiliary pump connections. The city's seawall has also been substantially replaced, a high priority item in both the HMP and the FMP.
- GIS is being used to map flood-prone properties that store hazardous materials as identified by the Fire Department. This inter-departmental use of funds was a priority in the FMP. This action increases the city's ability to identify capability gaps with regard to fire and flood as compounding hazards.
- While not complete, an interdepartmental effort to help homes for persons with disabilities develop emergency operations plans is underway. This priority of the FMP will tie together several existing plans for flood, emergency operations and outreach/warning.
- HRPDC and the U.S. Navy worked together with City of Chesapeake and City of Portsmouth on an intergovernmental Joint Land Use Study (JLUS) presented to the public in 2021. Navy facilities in Portsmouth and Chesapeake face several impacts from the surrounding communities, including transportation impacts (such as congestion, existing and planned capital improvements, facility access, gate security, and rail operations), stormwater management, waterway management, land use conflicts, and residential, commercial, and industrial encroachment impacts. Nuisance and storm surge flooding can have major impacts on Navy operations by obstructing access and damaging local infrastructure on which military facilities rely. This study identifies specific conditions and develops mutually beneficial recommendations to address these issues. The JLUS effectively implemented Mitigation Action 16 from the 2017 HMP by "creating dialog between governmental and nongovernmental stakeholders to encourage incorporation of mitigation strategies into projects and policies".
- Portsmouth has rewritten their Zoning Ordinance to capture recommendations of the Comprehensive Plan, which contains hazard-related elements regarding CRS, CIP-funded drainage improvement projects, geographic information on flood exposure, development of a COOP, and a long list of resilience recommendations such as adding a Resilience Officer (completed), transfer/purchase of development rights in floodprone areas, developing a guide for resilient building retrofits, and positioning cool buildings/shelters for access by socially vulnerable populations.

City of Suffolk

- Information from the 2011 HMP was incorporated into the 2015 Revision of the City of Suffolk Emergency Operations Plan and into the 2015 revision to the City of Suffolk Hazardous Materials Response Plan.
- Flood hazard risk and vulnerability information was considered for the city's 2035 Comprehensive Plan and the recent FIRM updates.
- As a result of a previous mitigation action plan strategy, a FIRM viewer and a Hurricane Surge Viewer are in place on the city's Emergency Management website in the "Flooding" tab. A PDF document also resides there for users who are not comfortable with mapping programs.
- Suffolk OEM answers email and phone requests for address-specific flood data. Personalized maps can either be generated in the office or during community outreach events.
- Hurricane/tropical storm/flood safety talks are delivered upon request to church, civic and community groups.
- Hurricane/flooding preparedness brochures are placed at local libraries, the visitor's center and other public buildings around the city.
- Many of the hazard mitigation plan recommended actions will be incorporated into the city's resilience planning effort related to CFPF grants.

City of Virginia Beach

- The 2015 Comprehensive Plan update references the hazard mitigation plan update process; new upcoming rewrite will incorporate city's resiliency initiatives. The Sustainability Plan references the Hazard Mitigation Plan content in the appendices, echoes the goals and objectives of the Hazard Mitigation Plan, and contains a flood component to address the interrelationship of flood mitigation and sustainability.
- The ComIT Data Center relocation mitigation action is near completion using city funds.
- The city changed floodplain management ordinance to adopt two feet of freeboard for structures built or substantially improved in flood hazard areas.
- City is aggressively tackling enforcement issues in floodplains.
- City is integrating floodplain management more widely into other community actions such as the preliminary development review process which includes flood mitigation recommendations early in the process and formation of the City Manager's Sea Level Rise/Flooding Work Group.
- Although the Hazard Mitigation Plan is not referenced per se in the annual CIP, projects are included that reflect mitigation actions from the plan on a regular basis. One example was the relocation and rebuilding of the city's Animal Control Facility. Another example is the complete replacement of the public safety communication hardware and the 6-year spending/replacement plan that is reflected in each CIP.
- Public information, particularly regarding floodplain management, has been redesigned on the city's web site and the site references and includes information from the HIRA in the Hazard Mitigation Plan.
- CERT curriculum was revised to include damage assessment and storm preparation advice as a result of mitigation actions and hazard information included in the Hazard Mitigation Plan.
- The city's Urban Forestry Management Plan, a component of the Comprehensive Plan, was published in 2014 and includes strategies for better management of dunes and landscaping in V Zones. The plan is expressly tied to the Sustainability Plan, the city's stormwater management regulations, the Strategic Growth Area Plans, and the Outdoors Plan, and includes a reference to Sea Level Rise as a threat to tree cover in the city.
- HRPDC and the U.S. Navy worked together with City of Virginia Beach and City of Norfolk on an intergovernmental Joint Land Use Study presented to the public in 2019. More frequent flooding is affecting military operations and access to military facilities. This study focused on identifying specific conditions, including recurrent flooding, coastal storms, and erosion, outside of the military footprint that have the potential to impact Navy operations in Hampton Roads.
- The city is implementing a long-term comprehensive program for addressing rising sea levels and recurrent flooding risk entitled *Sea Level Wise*. The strategy has four phases: Impact Assessment, Adaptation Research, Strategy Development and Implementation. The *Sea Level Wise* program has been key in identifying projects and planning efforts related to state funding through CFPF. Similar to the HMP mitigation action categories, adaptation for Virginia Beach involves a series of natural mitigations (nature based solutions), engineered defenses (structural flood protection measures), adapted structures (siting/design/retrofit measures), and prepared communities (educational services and financial planning tools). The program also includes a series of watershed-based strategies for precisely targeting flood-related challenges and suggesting opportunities. Data gathering for this effort included collection of lowest floor elevations of many of the city's flood-prone existing structures; data that were used for the Hazus modeling summarized in Section 5 of this plan.
- City passed a bond referendum in 2021 to speed up funding of flood prevention infrastructure in the CIP. Money is administered by Department of Public Works.
- A High Priority mitigation action in the 2017 HMP was to join the CRS. That initiative has been successful thanks to the participation of numerous departments. Virginia Beach currently has 11 certified floodplain managers across numerous departments, in recognition of the role that flood vulnerability plays in everyday administration of city business.
- In summer 2020, the city revised and strengthened stormwater management requirements for new site plans to include calculation of future conditions (precipitation, flooding and sea level rise). Public Works promulgated design standards for residential structures as well as nonresidential.

- The city's new Historic Resources Plan is currently being finalized. This effort has guidance for structure modifications, including guidance for flood-prone historic structures.
- Amazon Web Services awarded Virginia Beach the 2017 City on a Cloud Innovation Challenge for StormSense. This program, in partnership with VIMS, enhances the capability of the city and neighboring communities to predict coastal flooding in ways that are replicable, scalable, and measurable. The project applies data science and artificial intelligence to: create historic, current and future data analysis platforms; address flood-related issues caused by coastal storms; and empower citizens to better manage their real-time and future flood risk. Available online at: https://stormsensedev.vbgov.com/

City of Chesapeake

- Chesapeake recently attained a Class 7 rating in the CRS program (improved from Class 8), qualifying most Chesapeake SFHA property owners for a 15 percent discount in flood insurance premiums, due to its continued vigilance in floodplain management, hazard mitigation planning, open space policies, public outreach in flood issues, and acquisition, demolition and elevation of severe repetitive flood loss properties through various grant programs.
- The city has expanded its ability to notify the public of potential flood hazards by using Everbridge, which is a part of Chesapeake Alert. Additionally, Emergency Management has coordinated with Public Information offices and Public Works to provide the public with real-time updates via its city webpage, Facebook and Twitter.
- Chesapeake provides continued information on flood-related issues, including the NFIP, via the city's home web page and the Emergency Management web page.
- Chesapeake has obtained and continues to apply for FEMA grants for acquiring repetitive flood loss homes and has committed CIP funds to mitigate flooding. City has acquired at least $7,515,092.00 in FMA grant funds over the past twelve years to acquire and demolish 25 and elevate five severe repetitive loss structures. Five of 7 applications are in the process of being processed from a 2018 FMA Grant. Two applications were submitted for houses in 2019 and 3 applications were submitted for houses in 2020. Additionally, stormwater flood protection reduction projects are scheduled for numerous subdivisions in the SFHA.
- Chesapeake begins its hazard mitigation planning through the Natural Event Mitigation Advisory Committee (NEMAC). NEMAC is a citizen/city staff advisory committee appointed by City Council to advise it on all hazards and report yearly on progress in mitigation and resiliency. NEMAC's 8 citizens (who form the quorum) is supported by 9 city department representatives, with each department representing a part of mitigation problems and solutions. NEMAC normally meets 6 times a year to plan for hazards, to make recommendations for improvements in the hazard mitigation plan to increase resiliency, and to provide oversight on accomplishing the actions recommended therein. One particular resiliency improvement overseen by the NEMAC was providing guidance to include sea level rise and land subsidence in the city's standalone 2014 hazard mitigation plan as a critical hazard.
- In 2022, the city will begin a resiliency planning project for the industrial waterfront, a mitigation action that will help protect valuable waterfront businesses for the long-term.
- City built new Public Safety building that serves as the city's EOC. The building can withstand a Category 3 hurricane, a magnitude 4 earthquake as it's the only systematically safe non-DOD building on the East Coast and has multiple redundancy infrastructure built into the building. City Jail project to install a generator to run the HVAC and Kitchen of the building is in current CIP. The city has applied for a grant to outfit the city's Community Centers with generators using FEMA Pre-Disaster Mitigation funds. Chesapeake has applied for PDM funds for mitigation purposes to install generators at Public Utilities Pump Stations. These generators will ensure there is not flooding due to lack of power to pump water.
- City uses CIP funds to outfit all community centers and the conference center with generators and completed the work on two new Fire Stations. Sta #10 in Bowers Hill & Sta #7 in Southern Chesapeake are now open. Sta #10 serves both as a Fire Station and Logics Center for the department, increasing the city's ability to prepare, respond and mitigate following a disaster. Sta #7 is dual use facility, as a Fire Station and a newly added Police Precinct.

- The city will implement planning measures to pursue CFPF funding in the coming planning period. Mitigation projects will align with priorities set by the NEMAC in the hazard mitigation plan.
- HRPDC and the U.S. Navy worked together with City of Chesapeake and City of Portsmouth on an intergovernmental Joint Land Use Study presented to the public in 2021. Navy facilities in Portsmouth and Chesapeake face several impacts from the surrounding communities, including transportation impacts (such as congestion, existing and planned capital improvements, facility access, gate security, and rail operations), stormwater management, waterway management, land use conflicts, and residential, commercial, and industrial encroachment impacts. Nuisance and storm surge flooding can have major impacts on Navy operations by obstructing access and damaging local infrastructure on which military facilities rely. This study identifies specific conditions and develops mutually beneficial recommendations to address these issues.

Isle of Wight County

- Comprehensive Plan updates in the region have included resource conservation areas. Sea level rise continues to be a consideration for future planning efforts. Previous plan mitigation action related to development of a sea level rise adaptation strategy has been reevaluated and removed as a mitigation action because county officials felt that existing zoning measure adequately address new development and vulnerable lands.
- Stormwater drainage in floodprone areas has been identified as a local hazard and related action to implement a drainage plan is being acted upon through implementation of a stormwater master plan in development.
- Flooding of access roads identified as a problem in the HIRA. VDOT owns and maintains all roadways in the county. County has recently added a transportation planner/VDOT liaison to staff to help with coordination of issues like this. Similarly, an extra fueling station for county vehicles was needed and has been installed in conjunction with the new volunteer rescue squad building. The most recent comprehensive plan includes a section devoted to transportation planning.
- The County has increased GIS capabilities in recent years, which will benefit various land use and hazard-planning efforts.
- Several new mitigation actions in this 2022 updated plan reflect similar strategies identified in the most recent comprehensive plan, such as preparation of a green infrastructure network plan.

City of Franklin

- City has successfully enrolled in the CRS as recommended in the 2017 hazard mitigation plan. Planners aspire to improve their rating and increase savings to policyholders.
- Having made Elevation Certificates widely available in the community, city planners see the next logical step to be installing high water marks in downtown buildings to visually remind owners and visitors of the flood risk.
- City is reviewing and considering updates to the Flood Recovery Plan identified in previous versions of this plan.
- The city's 2015 Comprehensive Plan included recommendations regarding HMGP funding for flood proofing nonresidential buildings downtown and elevating floodprone residential buildings downtown.
- American Rescue Plan Act (ARPA) funding made available following the COVID-19 pandemic has been used to address other flood hazard vulnerabilities in the city and radio system and citywide wireless network upgrades. They are working with Dominion to raise electrical panels and other equipment, possibly including the substation.
- The city uses Virginia Department of Forestry materials to distribute to the public to help reduce the prevalence of hazardous trees, as recommended in the 2017 hazard mitigation plan.

Southampton County

- The County has implemented the necessary shelter retrofits and improvements to Southampton County High School, including a new roof and a generator at the substation dedicated to the high school. Emergency operations will be amended accordingly.
- One additional staff member is working to become CFMs in calendar year 2022.

- The County's Comprehensive Plan is undergoing revision one chapter at a time. The new document will include hazard-related impacts.
- The County is helping Newsoms implement their drainage area plan, as called for in the 2017 hazard mitigation plan.
- County Courthouse renovations are underway with considerable flood protection measures included.
- Tree preservation and landscaping requirements are included in a proposed solar ordinance that the County is considering in winter 2021, as called for in previous mitigation plan.
- County has considered participation in the CRS, but after reviewing location of most insured structures in the County, has determined that the program is likely not cost effective.
- The County has implemented many of the ordinance revisions called for in the previous comprehensive plan, which also relate to hazard mitigation, such as smart growth principles such as clustering, and building streets to State standards.
- County has implemented a comprehensive plan recommendation calling for removal and disposal of junk vehicles, dilapidated structures, litter, hazardous materials and debris.

Town of Boykins

- An acquisition project on Spring Garden Street is complete with the exception of 1 vacant home. Boykins Volunteer Fire Department acquired and cleared the remaining structures.
- Identified as a problem flooding area in the HIRA, the town has done what they can to clean out Tarrara Creek. Private property owners have removed beaver dams and other impediments.
- The mayor is going to put a flyer on each door in town reminding people to sign up for the county's reverse 911. He'll mention it at town council meetings and put it on the town's updated website, which he will ask the county to link to from the county site.
- The town has a new web site and Boykins Fire-Rescue has a Facebook page to post hazard-related warnings for community members, such as that shown in **Figure 6.2**.

FIGURE 6.2: BOYKINS FIRE-RESCUE FACEBOOK WARNING, WINTER STORM



Source: Boykins Facebook page, 2022

Town of Newsoms

- Drainage improvements to eliminate standing water in yards and drainage ditches as identified in a 2011 stormwater study were targeted as a high priority in the previous HMP. Town procured a grant in 2012 to evaluate storm drainage and recommend improvements. Preliminary engineering report was completed. Town applied for Community Development Block Grant (CDBG) and, as part of the application, also completed a preliminary housing assessment in 2013. The grant was denied, but the Town has sought additional funding sources and has a Virginia Department of Housing and Community Development grant underway that includes stormwater improvements and other initiatives.

Surry County

- The County's Director of Planning is considering putting together an official administrative design review committee for all development to include hazard review.
- County has a Post-Disaster Debris Management Plan.
- The County recently updated their Radiological Emergency Plan in August 2021. Regular exercises with VDEM maintain currency of the plan, which is especially important given the location of Surry Power Station with the county.

- Surry County Department of Economic Development regularly connects businesses to various agencies and tools that provide business resilience planning assistance.
- Public Information Officer regularly uses social media and the county's web site to disseminate hazard- and mitigation-related information.
- The County's Economic Development Plan is contained within the Comprehensive Plan. Both documents were reviewed for potential mitigation actions under this planning effort.

In summary, much of the work of integrating hazard mitigation into other planning mechanisms has already happened since the adoption of the first hazard mitigation plans. The process is ongoing in Hampton Roads communities as leaders identify new ways to incorporate hazard mitigation priorities into the life of their community. Table 6.7 summarizes how individual communities expect to continue integrating hazard mitigation actions into other planning tools, regulations and activities beyond those activities listed above. Check marks indicate which planning mechanisms are targeted for existing or future coordination and integration with that community's mitigation action plan. None of the communities participating in the NFIP are considering a change in status at this time.

TABLE 6.7: INTEGRATION OF HAZARD MITIGATION ACTIONS INTO OTHER PLANNING MECHANISMS

COMMUNITY	Regulations	Administrative & Technical Procedures	Fiscal Planning (CIP, grants, budgeting)	Land Use Planning (comprehensive, resilience, transportation)	Other (public information, activities, etc)
PENINSULA					
Hampton	✓	✓	✓	✓	✓
Newport News	✓	✓	✓	✓	✓
Poquoson	✓	✓	✓	✓	✓
Williamsburg	✓	✓	✓	✓	✓
James City County	✓	✓	✓	✓	✓
York County	✓	✓	✓	✓	✓
SOUTHSIDE					
Norfolk	✓	✓	✓	✓	✓
Portsmouth	✓	✓	✓	✓	✓
Suffolk	✓	✓	✓	✓	✓
Virginia Beach	✓	✓	✓	✓	✓
Chesapeake	✓	✓	✓	✓	✓
WESTERN TIDEWATER					
Isle of Wight County	✓	✓	✓	✓	✓
Smithfield	✓	✓	✓	✓	✓
Windsor	✓	✓			
Franklin	✓	✓	✓	✓	✓
Southampton County	✓	✓	✓	✓	✓
Boykins	✓	✓	✓	✓	

TABLE 6.7: INTEGRATION OF HAZARD MITIGATION ACTIONS INTO OTHER PLANNING MECHANISMS

COMMUNITY	Regulations	Administrative & Technical Procedures	Fiscal Planning (CIP, grants, budgeting)	Land Use Planning (comprehensive, resilience, transportation)	Other (public information, activities, etc)
Branchville	✓	✓	✓	✓	
Capron	✓			✓	
Courtland	✓	✓	✓	✓	
Ivor	✓	✓	✓	✓	
Newsoms	✓		✓	✓	
Surry County	✓	✓	✓	✓	✓
Claremont	✓	✓	✓	✓	
Dendron	✓			✓	

Regional Capabilities

The communities of Southside Hampton Roads are part of HRPDC, one of 21 Planning District Commissions in the Commonwealth of Virginia. HRPDC is a regional organization representing the area's sixteen local governments. Planning District Commissions are voluntary associations and were created in 1969 pursuant to the Virginia Area Development Act and a regionally executed Charter Agreement. The HRPDC was formed in 1990 by the merger of the Southeastern Virginia Planning District Commission and the Peninsula Planning District Commission.

The purpose of planning district commissions, as set out in the Code of Virginia, Section 15.2-4207, is "…to encourage and facilitate local government cooperation and state-local cooperation in addressing on a regional basis, problems of greater than local significance." The HRPDC mission is to:

- Serve as a forum for local and elected officials and chief administrators to deliberate and decide issues of regional importance;
- Provide the local governments and citizens of Hampton Roads credible and timely planning, research and analysis on matters of mutual concern; and
- Provide leadership and offer strategies and support services to other public and private, local and regional agencies, in their efforts to improve the region's quality of life.

The HRPDC serves as a resource of technical expertise to its member local governments. It provides assistance on local and regional issues pertaining to Economics, Physical and Environmental Planning, Emergency Management, and Transportation. For example, the commission staff is currently working on cataloging GIS data for the region and improving compatibility of the data on a regional basis.

Additional regional capabilities exist with regard to the management of coastal zone resources in the Commonwealth. A permit must be obtained from the Virginia Marine Resources Commission (VMRC) to build, dump or otherwise trespass upon or over, encroach upon, take or use any material from the beds of the bays, ocean, rivers, streams or creeks within the jurisdiction of Virginia. The permitting process is

designed to reduce the unnecessary filling of submerged land, to minimize obstructions or hazards to navigation and to avoid conflicts with other uses of state-owned submerged lands or state waters.

In addition, the VMRC is responsible for managing and regulating the use of Virginia's tidal wetlands in conjunction with Virginia's local wetlands boards. Under Virginia law, tidal wetlands include both vegetated and non-vegetated intertidal areas. Vegetated wetlands include all the land lying between and contiguous to mean low water and an elevation above mean low water equal to a factor 1.5 times the mean tidal range at the site and upon which is growing at least one of the botanical species specified in the Virginia Wetlands Act. Non-vegetated wetlands include all the land lying contiguous to mean low water and between mean low water and mean high water at the site.

Technical assistance and advice on dredging and filling operations that involve subaqueous bottoms and wetlands, all aspects of the marine environment, marine science and marine affairs is available from the VIMS. The institute provides technical assistance, often at no cost, to businesses whose development plans have impacts on marine resources.

The Virginia Coastal Zone Management Program (CZM Program) was established in 1986 to protect and manage Virginia's "coastal zone." The CZM Program is part of a national coastal zone management program, a voluntary partnership between the National Oceanic and Atmospheric Administration, National Ocean Service Office of Ocean and Coastal Resource Management, and U.S. coastal states and territories authorized by the federal Coastal Zone Management Act. The Virginia program was established through an Executive Order, which is renewed by each new governor. The program is not a single centralized agency or entity, but a network of state agencies and local governments which administer the following enforceable laws, regulations and policies that protect our coastal resources:

- Tidal and Nontidal Wetlands;
- Fisheries;
- Subaqueous Lands;
- Dunes and Beaches;
- Point Source Air Pollution;
- Point Source Water Pollution;
- Nonpoint Source Water Pollution;
- Shoreline Sanitation; and
- Coastal Lands.

The geographic areas of particular concern for the CZM Program include:

- spawning/nursery/feeding grounds;
- coastal primary sand dunes;
- barrier islands;
- significant wildlife habitat areas;
- significant public recreation areas;
- significant sand and gravel resource deposits;
- underwater historic resources;
- highly erodible/high hazard areas; and
- waterfront development areas.

Currently, some of the projects that the CZM Program is pursuing that have applications with regard to hazard capabilities include: adapting to climate change, special area management planning, coastal land conservation, shoreline management, and public access.

A local nonprofit organization and mitigation planning stakeholder, Wetlands Watch, has provided regional (and statewide) leadership in the natural resource management arena, especially with regard to sea level rise and related threats to tidal wetlands, wildlife and fish habitats, and the economy of coastal Virginia. Wetlands Watch works to raise awareness, engage and educate all stakeholders and decision-

makers about existing and potential sea level rise impacts, incorporate this threat into regional and local land-use plans and decisions, and develop and implement sea level rise adaptation plans. The group's impact can be seen through the number of new CRS communities in the region, an initiative they promote by creating useful tools and forums for interested communities, and through the evolution of the *Coastal Resilience Master Plan,* among other things.

MITIGATION STRATEGY

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2022 UPDATE

Section 7 was updated to reflect the Committee's work to update the Goals and Objectives. The following major changes were incorporated:

1) All tables were added or updated to reflect new information, including the new goals and objectives;
2) Mitigation actions were reviewed, completed actions were deleted; and, new mitigation actions were revised and added as directed by Committee members; and
3) Mitigation actions were modified to include a ranking for social vulnerability.

INTRODUCTION

This section of the Plan provides the "blueprint" for Hampton Roads to become less vulnerable to natural hazards. It is based on the general consensus of the Committee along with the findings and conclusions

of the Capability Assessment and Risk Assessment. The Mitigation Strategy section consists of the following four subsections:

- MITIGATION GOALS
- IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES
- SELECTION OF MITIGATION TECHNIQUES
- MITIGATION ACTION PLAN

The intent of the Mitigation Strategy is to provide participating communities with the goals that will serve as the guiding principles for future mitigation policy and project administration, along with a list of proposed actions available to meet those goals and reduce the impact of natural hazards. It is designed to be comprehensive and strategic in nature.

The development of the strategy included a thorough review of all natural hazards and identified policies and projects intended to not only reduce the future impacts of hazards, but also to assist the region in achieving compatible economic, environmental, and social goals. The development of this section is also intended to be strategic, in that all policies and projects are linked to established priorities assigned to specific departments responsible for their implementation and assigned target completion deadlines. Funding sources are identified when possible, that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific, action-oriented tasks listed in the Mitigation Action Plan. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas), and hazard mitigation projects that seek to address specifically targeted at-risk properties (such as the acquisition and relocation of flood-prone structures). Additional mitigation measures are then considered over time as new mitigation opportunities are identified, new data become available, technology improves, and mitigation funding becomes available.

The last step in designing the Mitigation Strategy is the creation of a set of jurisdictionally specific Mitigation Action Plans (MAPs). The MAPs represent the key outcome of the mitigation planning process. MAPs include a prioritized list of proposed hazard mitigation actions (policies and projects), including accompanying information such as those agencies or individuals assigned responsibility for their implementation, potential funding sources, and an estimated target date for completion. The MAPs provide those individuals or agencies responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring progress over time. The collection of actions listed in the MAP also serves as a synopsis of activities for local decision makers.

In preparing the Mitigation Action Plans, committee members considered their overall hazard risk and capability to mitigate natural hazards, in addition to the mitigation goals. The prioritization of mitigation actions was based on the following five factors: (1) effect on overall risk to life and property; (2) ease of implementation; (3) political and community support; (4) a general economic cost/benefit review; and (5) funding availability. A separate ranking for impact on socially vulnerable populations is also included. This High, Moderate or Low impact rating is based on the NRI vulnerability information provided in Section 5. Where projects were identified in a specific location and/or tied to reducing vulnerability from a single hazard, the hazard-specific ranking for that Census tract or hazard was used. Projects geared toward reducing risk community-wide, such as general outreach, were ranked based on the relative NRI social vulnerability of that community versus the percent of counties/cities with lower social vulnerability in Virginia (Low - less than 40% of other counties/cities have lower social vulnerability; Moderate – 41-75%; High –75-100%). In cases where an action was specifically geared toward socially vulnerable populations within a community, the impact was rated High.

MITIGATION GOALS

The goals of the Hampton Roads Hazard Mitigation Plan were crafted as part of Workshop #3, a facilitated discussion and brainstorming session with committee members (see Section 2: *Planning Process*). As part of the 2022 update, the planning consultant reviewed the goals and objectives of the previous plan as well as pertinent goals and objectives from Virginia Beach's *Sea Level Wise: Adaptation Strategy*, Norfolk's *Coastal Resilience Strategy Report*, Hampton's *Living with Water Hampton: A Holistic Approach to Addressing Sea Level Rise and Resiliency*, Virginia's *Coastal Resilience Master Planning Framework,* and the 2018 *Commonwealth of Virginia Hazard Mitigation Plan.* In this way, the committee was able to incorporate some important regional resilience goals and work to find common ground in statewide, regional and local mitigation programming.

The groups reassessed each goal word for word, reprioritized the list, and edited overall for brevity. The original document ("2017 Plan Goals and Objectives") and updated ("2022 Goals and Objectives") goals with strikethrough and underline are provided in **Table 7.1** below, with notes about the discussion leading to the changes. Each of the following goal statements represent a broad target to achieve through implementation of specific *Mitigation Action Plans*.

TABLE 7.1: UPDATED GOALS AND OBJECTIVES

2017 PLAN GOALS AND OBJECTIVES	2022 GOALS AND OBJECTIVES
Goal 1: Increase community resiliency by reducing vulnerability to hazards. *Objective 1.1: Reduce damage to repetitively flooded properties* *Objective 1.2: Protect existing and future development* *Objective 1.3: Protect critical facilities/infrastructure* *Objective 1.4: Maintain government services throughout hazard events* *Objective 1.5: Reduce hazard-related impacts on daily routines* *Objective 1.6: Preserve and enhance benefits of natural areas*	**Goal 1: Increase community resiliency by reducing vulnerability to hazards.** *Objective 1.1: Reduce damage to all repetitively flooded properties, not just NFIP-insured structures* *Objective 1.2: Protect existing and future development* *Objective 1.3: Protect critical facilities/infrastructure, including High Hazard Potential Dams* *Objective 1.4: Maintain diverse, equitable and inclusive government functions and services throughout the duration of hazard events* *Objective 1.5: Reduce hazard-related impacts on daily routines* *Objective 1.6: Preserve and enhance benefits of natural areas* **Why the Change?** High Hazard Potential Dams were added to clarify that a high priority goal and objective of the plan is to reduce long-term vulnerabilities from eligible high hazard potential dams that pose an unacceptable risk to the public. Changes to Objective 1.4 express the explicit focus communities are making to ensure that the functions of government touch *all* citizens before, during and after hazard events.
Goal 2: Educate the public about hazard vulnerabilities and ways to reduce risk *Objective 2.1: Encourage property owners to assume responsibility for reducing vulnerability*	**Goal 2: Educate the public about hazard vulnerabilities and ways to reduce risk** *Objective 2.1: Encourage citizens and businesses ~~property owners~~ to assume responsibility for reducing vulnerability* *Objective 2.2: Ensure that information and hazard education opportunities are available to all elements of the communities* *Objective 2.3: Pursue public/private partnerships that help facilitate access to hazard-related educational opportunities and gather feedback from citizens* **Why the Change?** The committee felt Objective 2.1 should be expanded to include all citizens, not just property owners. Renters, for example, need hazard education to protect their personal property and businesses, as well. Objective 2.2 was added to document community goals to work toward a whole-community effort with regard to hazard education. Objective 2.3 focuses on the importance of involving other stakeholders in hazard outreach.
Goal 3: Strengthen and develop partnerships for mitigating hazard impacts *Objective 3.1: Integrate mitigation concepts into local and regional government plans, policies and actions* *Objective 3.2: Improve and standardize hazard data collection and mapping* *Objective 3.3: Leverage shared resources in pursuit of funding for hazard mitigation projects* *Objective 3.4: Develop partnerships among local, regional, national, and international organizations*	**Goal 3: Strengthen and develop partnerships for mitigating hazard impacts** *Objective 3.1: Integrate mitigation concepts into local and regional government plans, policies and actions* *Objective 3.2: Improve and standardize hazard data collection and mapping* *Objective 3.3: Leverage shared resources in pursuit of funding for hazard mitigation projects* *Objective 3.4: Develop partnerships among private, local, regional, national, and international organizations* **Why the Change?** Objective 3.4 was changed to emphasize the importance of private funding sources – a change that has come about in the past 5 years.

IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

44 CFR Requirement
Part 201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating Hampton Roads' *Mitigation Strategy*, a wide range of activities was considered in order to help achieve the goals and address specific hazard concerns. At the third workshop, committee members considered six broad categories of mitigation techniques. Committee discussions regarding each category are summarized beneath each category, including notes on the appropriateness and applicability of each as it applies to Hampton Roads.

1. Prevention

Preventative activities are intended to reduce the impact of future hazard events, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are constructed. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Shoreline/riverine setbacks

Committee Discussion: Prevention activities have been implemented in the past in Hampton Roads, are ongoing, and will continue to be included in this and future mitigation action plans. Many communities will mitigate flood damage through planning and zoning actions, such as amendments to their floodplain management ordinances which are viewed as very effective mitigation tools locally. Most communities in the region are continually updating zoning ordinances, especially for flood zones. The statewide building code is viewed as a rather static mitigation tool; it has components that mitigate especially for wind and flood, but is not a product that local governments exert a great deal of influence upon regularly. Appendix F of the building code could be adopted by communities concerned about protecting future construction from the impacts of radon exposure.

Open space preservation strategies are contained in most of the regional comprehensive plans, including Newport News. In York County and several other communities, open space preservation is also addressed in subdivision regulations. Franklin has taken action to promote cluster development outside of flood hazard areas and create conservation and recreation districts along riverbanks. Several communities, including Hampton, Newport News and Southampton County, have integrated information from their existing hazard mitigation plans into Comprehensive Plan revisions.

Stormwater management regulations and drainage system maintenance rules promulgated at the state level are viewed as quite robust and not in need of additional local action at this time, although Virginia Beach has adopted more stringent regulations to require use of future precipitation levels; in addition, VDOT performs much of the drainage system maintenance in the Wester Tidewater region. Similarly, the state's Chesapeake Bay Act regulations governing shoreline setbacks are enforced locally. Capital

improvements programming is seen as a useful tool in the implementation of high priority mitigation activities across the participating communities.

2. Property Protection

Property protection measures involve the modification of existing buildings and structures or the removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., windproofing, floodproofing, seismic design)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

Committee Discussion: Property protection measures have been implemented in the past in the region and across the state, and are ongoing primarily through HMGP projects. These measures will continue to be included in this and future mitigation action plans. Acquisition is preferred over elevation for Isle of Wight County. Relocation of flood-prone structures is not a high priority in the Western Tidewater region, and is not a preferred alternative in the more built-out municipalities on the Peninsula and Southside. Building elevation projects, critical facilities protection, and floodproofing/retrofitting are popular alternatives with the region's emergency managers, and many communities continually seek ways to increase insurance coverage for vulnerable property owners.

The Community Rating System and related activities encompass and highlight several property protection measures ongoing in the participating communities. The committee decided to continue acquisition, relocation, and elevation measures for repetitively flooded properties, including critical facilities retrofits, in the Mitigation Action Plan, but did not act on any measures specifically for safe rooms or shatter-resistant glass as tornadoes are not a high risk critical hazard. Some communities in Western Tidewater have had discussions about providing safe rooms in designated areas, but no action was taken for this plan.

Existing building code requirements are seen as sufficient with regard to wind and tornado protection; however, hurricane shutters and shatter-resistant glass may be an option for critical facility or emergency shelter retrofits as necessary. Lobbying to ensure critical infrastructure partners are required to have generator power backup, as well as wind protection design elements, was brought up as both a preventive and property protection measure. Many of the study area communities have installed or are considering installation of back-up generators for specific critical facilities, and this will be reflected in the MAP.

With regard to insurance, some communities in Western Tidewater have produced community flyers regarding the importance of having insurance coverage on structures, and the counties participate in the Virginia Association of Counties Group Self-Insurance Risk Pool, a member-owned program that provides equitable rates with stable prices for long-term budgeting purposes. The City of Norfolk recently completed a detailed Program for Public Information and Flood Insurance Coverage Improvement Plan to address areas of the City that are under-insured for flood.

3. Natural Resource Protection

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

- Land acquisition
- Floodplain protection
- Watershed management

- Beach and dune preservation
- Riparian buffers
- Forest and vegetation management (i.e., fire resistant landscaping, fuel breaks)
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization
- Historic properties and archaeological site preservation

Committee Discussion: Natural resource protection measures remain commonly-used throughout the coastal Virginia region. Many state programs discussed in Section 6, such as the Chesapeake Bay Act, are established natural resource protection measures that are not expected to be weakened in the near- or long-term. The most important of these measures in relation to Hampton Road's critical hazards are floodplain protection, erosion and sediment control, wetland preservation, and watershed management. Several communities in Western Tidewater discussed the fact that they did a lot of land acquisition after Isabel and Floyd and feel like that measure is no longer a high priority under consideration, and others indicated the cost of flood-prone land acquisition is often prohibitive for their local governments.

Several rivers in the study area are designated scenic rivers and that designation has positively impacted watershed management efforts. Forest and vegetation management were discussed and determined to be low priority items at this time, although changes in risk or vulnerability for wildfire may change this thinking in the future. Beach and dune preservation is another state-promulgated program that requires permitting for impacts.

Several communities decided to continue floodplain protection measures and land acquisition in the Mitigation Action Plan, but did not act specifically on other natural resource protection measures as those are considered to be sufficiently addressed through state regulations. Invasive species control is an important habitat preservation technique used, especially in Isle of Wight County within a 200-acre park containing both wetlands and floodplains. York County has a rare and endangered species overlay in the zoning ordinance, as well as an overlay zone for protection of historic or significant archaeological sites. Slope stabilization is not seen as a particularly high priority need in the study area, although individual projects have been implemented in the past, such as a bridge replacement in Franklin and cliff stabilization at a park along the James River at Fort Boykins. Smithfield recently spent $3 million on historic property preservation on the Pagan River to protect a valuable historic asset; additional projects may be under consideration but were not believed to be tied to hazard mitigation at this time.

4. Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the hazard itself through construction. These projects are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams/levees/dikes/floodwalls/seawalls
- Diversions/detention/retention
- Channel modification
- Beach nourishment
- Storm sewers

Committee Discussion: New large-scale reservoirs are not under consideration at this time in the region. Dam regulations at the state level are considered sufficient and communities are not considering additional regulation; however, physical upgrades to existing dams are necessary and some are currently underway, including raising and strengthening of the Newport News Waterworks reservoir. Virginia DCR provided input on additional dam maintenance, retrofit and repair projects that are necessary in the region in the coming years. "Dutch Dialogues", or conversations with Dutch engineers

regarding successful flood mitigation techniques overseas, including structures, have resonated with several Hampton Roads communities as they explore ways to protect their built environment from sea level rise. Examples under consideration include green streets and other infrastructure that help manage stormwater so that rising seas and stormwater can be managed effectively. In Newport News, Norfolk and Portsmouth, deteriorating seawalls are under consideration for replacement with increased levels of protection. Virginia Beach, Norfolk and Hampton have ongoing beach nourishment programs to provide flood protection and recreation amenities, and this will be reflected in MAP actions for those communities.

Other structural protection measures are in place and must be maintained by the communities or private owners. Channel modifications, diversions, and detention/retention, such as tide gates, backflow preventers and stream restoration, have been effective in reducing flood hazards in some areas of the region and will remain viable mitigation actions in the future, especially for reducing the compounding effects of increased precipitation, floods and sea level rise. Stream restoration was recently included as a BMP in the State's BMP clearinghouse and some committee members believe that this may result in this method being considered and possibly used more in the future.

Isle of Wight County is implementing some watershed management measures through installation of larger BMPs. Dry hydrants, and smoke testing of sanitary sewers, and the stormwater management preventive maintenance schedule are potential structural projects, with dry hydrants particularly important in wildfire control in the western parts of the study area. High value structural projects are being considered for some study area communities.

5. Emergency Services

Although not typically considered a "mitigation" technique, emergency services can minimize the impacts of a hazard event on people and property. These actions are often taken prior to, during, or in response to an emergency or disaster. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

Committee Discussion: Traditional riverine warning systems are inappropriate for some of the region's flood hazards, but a system of citizen and institutional tidal gauge monitoring provides limited input to community emergency planners for specific watersheds in the region. Hampton and Newport News have flood gauges with alerts along Newmarket Creek. Flood warning systems in Southampton County and Franklin are implemented and effective and Isle of Wight County has switched to a more robust system. Several communities have recently implemented Everbridge unified critical communications software to deliver messages to targeted audiences, and most communities have some form of reverse 911. Leveraging the various communities' flood warning systems to create a more regional approach would aid the citizens who live and commute through multiple jurisdictions. Regional cooperation on this front could benefit citizens and visitors to the region and may result in savings to communities by reducing the need to invest in so many systems.

Evacuation planning is aided at the regional and state levels, but local planners use many tools to continually manage and improve the program; several are now considering more use of sheltering in place, the use of central evacuation locations or evacuating more targeted groups rather than automatically going to mass evacuations. Evacuation and sheltering plans for vulnerable populations are a high priority for the region's emergency planners at this time, and Western Tidewater planners continue to work with NC officials regarding Outer Banks evacuation routes that traverse the region.

Sandbagging for flood protection is generally considered helpful, but local governments are not involved in helping property owners sandbag, with the exception of Franklin and Virginia Beach. In Franklin, a new rule allows downtown business owners to get sand and bags from the City. Virginia Beach does provide sandbagging opportunities when necessitated based on storm impacts. Sandbagging is not provided for

any and every storm in Virginia Beach, but is most likely available in response to a hurricane. Individual property owners may decide to sandbag for protection, but this is not an action committee members want to include in the MAP, as longer-term retrofit protection methods are deemed preferable. Adding generator electrical circuits to support jail operations during power outages was discussed and included in the MAP for Chesapeake. This activity is both an Emergency Services action and a Property Protection measure. Some communities, such as Poquoson, Newport News, and York County, have installed shutters for wind protection on Emergency Operations Centers; Hampton is building a new EOC outside the SFHA. Committee members in Western Tidewater discussed battery backups for stoplights, but indicated that in their region, such a measure would require assistance and cooperation with VDOT to implement.

6. Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures used to educate and inform the public include:

- Outreach projects
- Speaker series/demonstration events
- Hazard mapping
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard expositions
- Inter-governmental coordination

Committee Discussion: Public education and outreach activities are a particular focus of emergency planners in the region and are ongoing, particularly through existing web sites and several CRS-related activities. Speaker series and demonstration events, such as hurricane awareness events, are supported by several of the local governments throughout the year, but may not rise to the importance of being included in the MAP for each of these communities. For example, Hampton participates in the Home Expo and Emergency Preparedness Day annually, and York County has a Safety Town Program each summer. Norfolk has a speaker series on stormwater concepts for schoolchildren. The groups considered ways to improve upon these programs in the MAP moving forward, including working with the State Department of Education to integrate mitigation lessons in the Virginia Standards of Learning. This is potentially a mitigation action for future State Hazard Mitigation Plan updates.

FEMA, working with the U.S. Army Corps of Engineers, has revised many of the Flood Insurance Rate Maps for the region as ongoing coastal studies are completed. Additional hazard mapping was discussed and some communities have worked with HRPDC to gather more structure lowest floor elevations in flood prone areas. Real estate disclosure, particularly for flood risk and radon risk, is guided by current State regulations and not influenced by local government. Library materials, school programs, and open houses are included in the MAP for many communities.

Committee members discussed train-the-trainer opportunities in conjunction with the City's Community Emergency Response Team (CERT) and the Tidewater Builders Association and several decided to add this as an action or to append it to existing actions despite the altered functions of CERTs during the COVID-19 disaster. The HRPDC supports several efforts at inter-governmental coordination, including the Hampton Roads All Hazards Advisory Committee (AHAC) and HR Green. There is also a local CRS User's Group that is very active among CRS and CRS-interested communities in the study area.

SELECTION OF MITIGATION TECHNIQUES

In order to determine the most appropriate mitigation techniques, committee members reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment*. Other considerations included each mitigation action's effect on overall risk reduction, its ease of implementation, its degree of political and community support, its general cost-effectiveness and funding availability.

FEMA guidance for meeting the planning requirements of the Disaster Mitigation Act of 2000 also specifies that local governments should prioritize their mitigation actions based on the level of risk a hazard poses to the lives and property of a given jurisdiction. A Mitigation Technique Matrix (**Table 7.2**) shows that those hazards posing the greatest threat are addressed by the updated MAP.

The matrix provides the committee with the opportunity to cross-reference each of the priority hazards (as determined through the *Risk Assessment*) with the comprehensive range of available mitigation techniques, including prevention, property protection, natural resource protection, structural projects, emergency services, and public education and awareness. The *Mitigation Action Plan* includes an array of actions targeting multiple hazards, not just those classified as either high or moderate risk.

As part of the 2022 update, the committee reviewed several documents to assist with the development of new mitigation actions and the assessment of existing actions. Review documents included: 1) a spreadsheet of each community's capabilities and any mitigation program gaps subsequently identified; 2) each community's Comprehensive Plan and Resilience Plans (if available), specifically components that may be compatible with mitigation goals, or that may be appropriate as mitigation actions; 3) contractor review of local floodplain management regulations; 4) the mitigation action items from the existing plans with 2022 status information; and 5) several recommended publications, including FEMA Publication *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, January 2013, FEMA's *Mitigation Best Practices* and *Mitigation Action Portfolio* web site, and resilience design guidelines for Miami Beach, Boston and New York City.

TABLE 7.2: MITIGATION TECHNIQUE MATRIX						
MITIGATION TECHNIQUE	HIGH RISK HAZARDS			MODERATE RISK HAZARDS		
	Flooding	Tropical/Coastal Storm	Sea Level Rise and Land Subsidence	Winter Storm	Tornado	Hazardous Materials Incident
PREVENTION	✓	✓	✓	✓	✓	✓
PROPERTY PROTECTION	✓	✓	✓	✓	✓	
NATURAL RESOURCE PROTECTION	✓		✓			✓
STRUCTURAL PROJECTS	✓	✓	✓	✓	✓	
EMERGENCY SERVICES	✓	✓		✓	✓	✓
PUBLIC EDUCATION AND AWARENESS	✓	✓	✓	✓	✓	✓

MITIGATION ACTION PLAN

The mitigation actions proposed for local adoption are listed in the MAP on the pages that follow. They will be implemented according to the plan maintenance procedures established for the *Hampton Roads Hazard Mitigation Plan* (see Section 8: Plan Maintenance Procedures). The action items have been designed to achieve the mitigation goals and priorities established by the committee.

Each proposed mitigation action has been identified as an effective measure to reduce hazard risk in Hampton Roads. Each action is described with available background information such as the location of the project and general cost benefit information.

Other information provided includes data on cost estimates and potential funding sources to implement the action should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out, as well as a timeframe for its completion. These implementation mechanisms ensure that the *Hampton Roads Hazard Mitigation Plan* remains a functional document that can be monitored for progress over time. Proposed actions are not listed in exact priority order though each has been assigned a priority level of “high,” “moderate” or “low” as described in the previous section.

Table 7.3 describes the key elements of the Mitigation Action Plan, and **Table 7.4** lists the additional considerations that were evaluated for each proposed action once selected for inclusion in the Mitigation Action Plan. This includes social, technical, administrative, political, legal, economic, and environmental considerations collectively known as "STAPLEE" evaluation criteria.

As part of the plan update process, the committee reviewed the list of recommended actions included in their respective existing plans to determine if the actions should be deleted because they are completed, deferred, cancelled, or continued, and made recommendations regarding modified and new actions. Summary results of this review are included in **Appendix F**.

TABLE 7.3: KEY ELEMENTS OF THE MITIGATION ACTION PLAN	
Proposed Action	Identifies a specific action that, if accomplished, will reduce vulnerability and risk in the impact area. Actions may be in the form of local policies (i.e., regulatory or incentive-based measures), programs or structural mitigation projects and should be consistent with any pre-identified mitigation goals and objectives.
Site and Location	Provides details with regard to the physical location or geographic extent of the proposed action, such as the location of a specific structure to be mitigated, whether a program will be Citywide, countywide or regional, etc.
Cost Benefit	Provides a brief synopsis of how the proposed action will reduce damages for one or more hazards.
Hazard(s) Addressed	Lists the hazard(s) the proposed action is designed to mitigate for.
Goal(s) Addressed	Indicates the Plan's established mitigation goal(s) the proposed action is designed to help achieve.
Priority	Indicates whether the action is a "high" priority, "moderate" priority, or "low" priority based on the established prioritization criteria.
Impact on Socially Vulnerable Populations	Indicates whether the action has a "high" impact, "moderate" impact , or "low" impact based on the established ranking criteria.
Estimated Cost	Indicates what the total cost will be to accomplish this action. This amount will be an estimate until actual final dollar amounts can be determined.
Potential Funding Sources	If applicable, indicates how the cost to complete the action will be funded. For example, funds may be provided from existing operating budgets or general funds, a previously established contingency fund, or a cost-sharing federal or state grant program.
Lead Agency/Department Responsible	Identifies the local agency, department or organization that is best suited to implement the proposed action.
Implementation Schedule	Indicates when the action will begin and when it is estimated to be completed. Some actions will require only a minimal amount of time, while others may require a long-term or continuous effort.

TABLE 7.4: ADDITIONAL CONSIDERATIONS (STAPLEE EVALUATION)	
Socially Acceptable	Is the proposed action socially acceptable to the community? Is the action compatible with present and future community values? Are there equity issues involved that would mean that one segment of the community is adversely affected?
Technically Feasible	Will the proposed action serve as a long term solution? Will it create any negative secondary impacts? Are there any foreseeable problems or technical constraints that could limit its effectiveness?
Administratively Possible	Does the community have the capability to implement the proposed action? Is there someone available to coordinate and sustain the effort?
Politically Acceptable	Is there political support to implement the proposed action? Is there enough public support to ensure the success of the action?
Legal	Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for the action? Are there any potential legal consequences of the action?
Economically Sound	What are the costs and benefits of the proposed action? Does the cost seem reasonable for the size of the problem and the estimated benefits? Are there funding sources available to help offset costs of the action? Is the action compatible with other economic goals of the community?
Environmentally Sound	How will the action impact the environment? Will the action require any environmental regulatory approvals? Is the action consistent with other environmental goals of the community?

The following is a list of current funding sources and their acronyms as may be indicated in the mitigation actions. Additional acronyms used throughout this plan are interpreted in Appendix G. The pool of potential funding mechanisms is changing very rapidly as a result of COVID and other Federal and state legislative priorities at the time of this update.

Key to Potential Funding Source Acronyms:

DHS U.S. Department of Homeland Security
- **BRIC –** Building Resilient Infrastructure and Communities
- **HMGP –** Hazard Mitigation Grant Program
- **FMA –** Flood Mitigation Assistance Program
- **HHPD –** Rehabilitation of High Hazard Potential Dams (HHPD) grant program

ARPA American Rescue Plan Act

USACE U.S. Army Corps of Engineers
- **SFCP** – Small Flood Control Projects
- **FPMS** – Flood Plain Management Services Program
- **CAP** – Continuing Authorities Program

DOI U.S. Department of the Interior
- **LWCF –** Land and Water Conservation Fund Grants

EDA U.S. Economic Development Administration
- **DMTA –** Disaster Mitigation and Technical Assistance Grants

EPA U.S. Environmental Protection Agency
- **CWA –** Clean Water Act Section 319 Grants

HUD U.S. Department of Housing and Urban Development
- **CDBG –** Community Development Block Grant Program

USDA U.S. Department of Agriculture
- **EWP –** Emergency Watershed Protection
- **WPFP –** Watershed Protection and Flood Prevention
- **WSP –** Watershed Surveys and Planning

Virginia
- **CFPF – Virginia Community Flood Preparedness Fund**

Table 7.5 provides a matrix indicating that each critical and noncritical hazard affecting communities is addressed in the Mitigation Action Plan.

TABLE 7.5: MITIGATION ACTIONS FOR CRITICAL AND NON-CRITICAL HAZARDS

	Flooding	Tropical/Coastal Storm	Sea Level Rise and Land Subsidence	Tornado	Winter Storm	Hazardous Materials Incident	Landslide/Coastal Erosion	Earthquake	Wildfire	Radon Exposure	Flooding Due to Impoundment Failure	Pandemic Flu or Communicable Disease
Regional Actions	M*	2, 3	M	2	2	2	2	2, 3	2	2,4	2	2
Hampton	M	M	M	M	M	M	M	M	M	M	M	M
Newport News	M	M	M	3	3	3	M	3, 5	3, 8	3	3, 10	3
Poquoson	M	M	M	M	M	M	M	M	M	4	n/a	4, 10
Williamsburg	M	M	M	M	M	M	M	M	M	M	M	M
James City County	M	M	M	M	M	M	6, 9	M	M	1,7	M	1,7
York County	M	M	M	M	M	M	M	M	M	M	M	M
Norfolk	M	M	M	M	M	3	M	M	3	3,5	M	3,5
Portsmouth	M	M	M	M	M	M	M	M	M	M	n/a	M
Suffolk	M	M	M	M	M	M	2,4	M	M	2	2,8	2
Virginia Beach	M	M	M	M	M	M	M	M	M	6,20	M	M
Chesapeake	M	M	M	M	M	M	M	M	M	M	M	M
Isle of Wight County	M	M	M	M	M	M	M	M	M	5,8	5,8	5,8
Smithfield	M	M	M	M	M	8	M	M	6, 8	8	n/a	8
Windsor	M	3	1	3	3	3	1	3	3	3	n/a	3
Franklin	M	M	M	M	M	M	5,11	M	M	12, 13	n/a	12
Southampton County	M	M	17	M	M	M	M	M	M	M	n/a	10,11
Boykins	M	2,4	3,4	3,4	2,4	3,4	3,4	3,4	M	3,4	n/a	3,4
Branchville	M	M	M	M	M	M	1,3	M	M	1,3	n/a	1,3
Capron	1	1	1	1	1	1	1	1	1	1	n/a	1
Courtland	M	M	M	M	M	M	1,4	3,4	M	2,4	n/a	2,4
Ivor	4,3	3	3,4	3	3,4	3	3	3	M	3	n/a	3
Newsoms	M	1	M	1,2	1,5	1,2	1	1	1,2	1,2	n/a	1,2
Surry County	M	M	M	M	M	M	M	M	M	M	n/a	M
Claremont	M	M	M	M	M	2,5	M	M	M	M	n/a	2,5
Dendron	1	1	1	1	1	1	1	1	1	1	n/a	1

**M = 3 or more actions address this hazard*

REGIONAL STRATEGIES

REGIONAL MITIGATION ACTION 1	
Use existing or create new Elevation Certificates to collect lowest floor elevation data for flood-prone structures in the region, focusing initially on repetitive loss areas in each community.	
BACKGROUND INFORMATION	
Site and Location:	Hampton Roads region, particularly repetitive flood loss areas as identified in Section 5 of this plan
Cost Benefit:	Lowest floor elevation data for pre-FIRM structures are critical information for developing robust cost-benefit analyses of mitigation options for flood-prone structures. The data are necessary in order to prioritize and fund mitigation projects, especially through Federal and state grant processes.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 3, Objectives 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/Low; Hampton, Newport News, Norfolk and Portsmouth have Moderate NRI flood risk – all other communities have Low
Estimated Cost:	Estimated $30/structure, based on similar project in eastern North Carolina
Potential Funding Sources:	USACE: FPMS; DHS: BRIC and HMGP; Virginia CFPF
Lead Agency/Department Responsible:	AHAC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Significant progress made in recent years by gathering archived Elevation Certificates from building records.	

REGIONAL MITIGATION ACTION 2	
Use AHAC structure and HRPDC resources to develop additional regional mitigation strategies and initiate annual workshop on mitigation project funding.	
BACKGROUND INFORMATION	
Site and Location:	Throughout Hampton Roads study area
Cost Benefit:	Through AHAC organizational structure, VDEM and HRPDC can provide no-cost assistance to the communities to help satisfy reporting requirements, make progress on mitigation actions, and apply for mitigation grant funding.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All Hazards
Goal(s) Addressed:	Goal 3, Objectives 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Travel costs and staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	AHAC/HRPDC, partner with Wetlands Watch, HR Green
Implementation Schedule:	Annually
ADDITIONAL COMMENTS	
Proposed workshop agenda: 1. HRPDC and VDEM to provide update on funds available, details on how to apply, and what projects are eligible; 2. HRPDC update on regional mitigation actions and progress; 3. Break into community-based work groups to provide report on status of each mitigation action (modified, complete, not started and why).	

REGIONAL MITIGATION ACTION 3	
Analyze and update the platform, availability, and accuracy of HAZUS input data and output results for the purposes of conducting future, more detailed vulnerability analyses.	
BACKGROUND INFORMATION	
Site and Location:	Throughout Hampton Roads study area
Cost Benefit:	Some of the data used to update HAZUS in this study were not intended for the purposes of flood vulnerability analyses. Particularly, the assessor databases from communities are for tax purposes and the data are incomplete.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm and Earthquake
Goal(s) Addressed:	Goal 1, Goal 3; Objective 3.2, 3.3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate/Low; Hampton, Newport News, Norfolk and Portsmouth have Moderate NRI flood risk – all other communities have Low
Estimated Cost:	$60,000
Potential Funding Sources:	USACE, HMGP, HMGP 5% Initiative, BRIC
Lead Agency/Department Responsible:	HRPDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
The PDC has established a platform, but as data and computing needs change, platforms requires ongoing analysis. Some progress has been made and the PDC continues to investigate workshare arrangements with VDEM, CRS Task Force, VFMA/ASFPM and the Silver Jackets.	

REGIONAL MITIGATION ACTION 4	
Use commercially available radon test kits to determine radon levels in structures. Evaluate radon data against known geological formations in the region to determine geographic variability in vulnerability. End product will be a refined map of radon zones.	
BACKGROUND INFORMATION	
Site and Location:	Hampton Roads, particularly areas of suspected high radon concentration over the western extent of the Yorktown Formation.
Cost Benefit:	Radon exposure has a high cost; it is a known cause of lung cancer, especially in smokers. Radon tests are inexpensive (<$50) and structural mitigation is inexpensive. The results of additional testing and map refinement will provide local and state officials with additional tools to advise homeowners when testing is advised, resulting in mitigation of lung cancer. Leaders at the local, regional and State level will gain valuable information to determine if a change in capabilities is warranted (*e.g.*, building code requirements, real estate transaction disclosures).
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Radon Exposure
Goal(s) Addressed:	Goal 1, Objective 1.2, 1.3, 1.5; Goal 2, Objective 2.1, 2.2, 2.3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate – Franklin has very high NRI social vulnerability; Hampton, Newport News, Portsmouth and Williamsburg have relatively moderate social vulnerability; all other communities have low or relatively low
Estimated Cost:	Estimated $30/structure, plus mapping costs
Potential Funding Sources:	EPA, DHS: HMGP, BRIC
Lead Agency/Department Responsible:	HRPDC, College of William & Mary
Implementation Schedule:	Begin project within 2 years of plan adoption; project may extend beyond 2027 planning horizon
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 5	
Partner with VDEM to review repetitive flood loss data from FEMA on a regular basis, update repetitive flood loss area polygons and shapefiles, and analyze data for patterns, errors and mitigation opportunities.	
BACKGROUND INFORMATION	
Site and Location:	Throughout HRPDC jurisdictions
Cost Benefit:	Implementing this action at the State level would reduce the burden on communities by centralizing the process. Using state GIS capabilities would ensure consistency across the Commonwealth and help make this data available beyond just CRS participating communities.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	DHS; Virginia CFPF
Lead Agency/Department Responsible:	VDEM, HRPDC, all Hampton Roads flood-prone communities, particularly those participating in the CRS
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
VDEM GIS staff can assist with ranking RL polygons by more detailed social vulnerability measure than NRI.	

REGIONAL MITIGATION ACTION 6
Address high and significant hazard dam safety in the region, to include: • **Investigate and conduct risk assessments on dams using risk prioritization methodology;** • **Conduct alternatives analyses to identify preferred plans for dam rehabilitations and the estimated costs for design and construction;** • **Repair, removal, or any other structural or nonstructural measures to rehabilitate an eligible high hazard potential dam, including development of conceptual, preliminary, and final design plans;** • **Conduct additional inundation studies, and use dam inundation data and flood depths to determine if retrofits to affected critical facilities may be necessary.**

BACKGROUND INFORMATION	
Site and Location:	Throughout HRPDC jurisdictions. Harwood's Mill Dam in York County, Little Creek Dam in James City County and Godwin's Millpond Dam in Suffolk are of particular concern because they are high hazard dams in poor condition. See Figures 5.13 and 5.14 for dam locations.
Cost Benefit:	Local engineering expertise and regional knowledge may prove effective in supplementing existing, limited state resources for inspecting and rating dams. Dam inundation planning is similarly impacted.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.3; Goal 3, Objective 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low/Moderate
Estimated Cost:	TBD
Potential Funding Sources:	FEMA: HHPD; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Virginia DCR, HRPDC, affected communities
Implementation Schedule:	Continuously over next 5 years

ADDITIONAL COMMENTS
HRPDC and its localities work to act as local sponsors of HHPD projects and determine whether specific structural or non-structural measures are needed to meet state standards. In more complex situations, dam owners are advised to undertake alternatives analysis to ensure a cost effective solution is implemented that also meets state and federal environmental requirements.

REGIONAL MITIGATION ACTION 7
Provide regional leadership regarding the new NFIP's new Risk Rating 2.0 system and renewal policy planning, to include assistance with: **1) Evaluation of rating accuracy and "minus-rated" policies;** **2) Messaging and outreach to homeowners;** **3) Elevation Certificate correction; and** **4) Mitigation assistance for property protection.**

BACKGROUND INFORMATION	
Site and Location:	Throughout HRPDC jurisdictions
Cost Benefit:	The PDC has contacts and the ability to assemble and then disseminate information at a more cost-effective price point than if each locality on its own.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	FEMA: HMGP, BRIC
Lead Agency/Department Responsible:	HRPDC AHAC, Virginia DCR
Implementation Schedule:	Over the next 2 years

ADDITIONAL COMMENTS

REGIONAL MITIGATION ACTION 8	
Strengthen existing and create new regional transportation networks and hubs for evacuation and sheltering. The purposes and needs for evacuation and sheltering are evolving, and communities are moving away from traditional, large shelters to house large populations toward a more targeted approach that tries to anticipate disaster-related needs more specifically. Educating the public about these changes is an important component to this type of regional planning.	
BACKGROUND INFORMATION	
Site and Location:	Throughout HRPDC jurisdictions
Cost Benefit:	Evacuation and sheltering costs, in particular, can be impacted by how many people are evacuated and how they are moved to shelters. The services available at shelters is impacted, as well. Regional approaches to evacuation can save valuable time and money.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.4, 1.5; Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – evacuation of socially vulnerable populations will be a focus of the planning effort
Estimated Cost:	TBD
Potential Funding Sources:	FEMA
Lead Agency/Department Responsible:	HRPDC AHAC; Stakeholders (e.g., hospital systems, universities, military bases, American Red Cross, social service agencies, transportation partners)
Implementation Schedule:	Immediately upon adoption
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 9	
Work with private companies to advance continuity of operations, including but not limited to power, gas, and water service restoration. Mitigation actions may include implementation of system redundancies, mutual aid agreements or other partnerships to address critical capability gaps. Physical retrofits may increase resilience of critical infrastructure, such as burying power lines and provision of dependable backup power to water and wastewater treatment facilities.	
BACKGROUND INFORMATION	
Site and Location:	Throughout HRPDC jurisdictions
Cost Benefit:	Damages are reduced when critical lifelines are returned to service promptly after a disaster. By creating partnerships between private utility providers, the region can expect a faster return to full operations, thereby reducing losses to business and property owners.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1, Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	ARPA, FEMA
Lead Agency/Department Responsible:	Dominion, HRPDC AHAC
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

HAMPTON

HAMPTON MITIGATION ACTION 1	
Maintain participation in National Flood Insurance Program and Community Rating System, with goal of obtaining Class 6 CRS rating. Continue enforcement of standards in existing ordinance that meet and exceed NFIP minimum requirements.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The NFIP and related flood mapping and development regulations have proven benefits nationwide. CRS benefits accrue through increased insurance coverage, improved hazard awareness and reduced flood insurance premiums; a Class 6 rating equates to a 20% flood insurance premium savings for most flood-prone property owners. New construction and future development are protected from current flood conditions through existing standards that meet or exceed NFIP minimum requirements.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, and Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff time
Impact on Socially Vulnerable Populations:	High – All 13 repetitive flood loss areas contain areas of very high or relatively high NRI flood risk, which includes analysis of social vulnerability
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management, Public Works and Community Development
Implementation Schedule:	Annually
ADDITIONAL COMMENTS	

HAMPTON MITIGATION ACTION 2	
Acquire, elevate, relocate, retrofit or floodproof structures in flood prone areas. This action includes acquisition/demolition of repetitive and severe repetitive losses from trustee sales/tax sales.	
BACKGROUND INFORMATION	
Site and Location:	Flood prone areas Citywide
Cost Benefit:	Retrofit measures that address flooded structures, particularly those designated as repetitive loss or severe repetitive loss by the NFIP, have quantifiable benefits. The City has collected elevation data and will continue collection as part of this action in order to more easily make cost-benefit analyses of at risk structures. City acquisition of repetitively flooded trustee sales is a cost-effective way to remove severely flood-prone structures from the real estate market and prevent resale without mitigation. These properties can be purchased inexpensively. Treasurer's Office can provide list of tax sales on regular basis.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, and Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.5, 1.6
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – All 13 repetitive flood loss areas contain areas of very high or relatively high NRI flood risk, which includes analysis of social vulnerability
Estimated Cost:	Cost will be based on specific flood protection measures chosen. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; USACE: SFCP, FPMS; HUD: CDBG; USDA: WPFP; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, Community Development, Treasurer's Office
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Locally funded projects may be creditable under the Community Rating System.	

HAMPTON MITIGATION ACTION 3	
Provide flood, wind and heat protection and dry access/egress for critical facilities and infrastructure. Retrofits may include, but are not limited to: elevate and harden communication sites, provide generator backup or prewire evacuation shelters for quick hook-ups, and upgrade sewer pump stations.	
BACKGROUND INFORMATION	
Site and Location:	Critical facilities Citywide
Cost Benefit:	Benefits of mitigating damage to critical facilities are realized by all citizens through the city's ability to maintain the highest operational capabilities post-disaster. Benefits are based on reduced response times, and longevity of critical infrastructure.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Extreme Heat
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Cost will be based on specific protection measures chosen for each facility. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; Stafford Act Section 406 - post-disaster mitigation funds under Public Assistance for damaged public facilities
Lead Agency/Department Responsible:	Emergency Management, Public Works, Hampton City Schools
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
New 911/EOC is nearing construction out of the SFHA, on Big Bethel Road.	

HAMPTON MITIGATION ACTION 4	
Adopt and implement holistic water plans to mitigate flooding on a watershed level.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Identify and prioritize impactful and implementable projects, policies, and programs to reduce flooding impacts, spur flood-safe redevelopment and add value to affected neighborhoods.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Approximately $250,000 per water plan, or $1 million in total for remaining plans
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative; Virginia CFPF
Lead Agency/Department Responsible:	Community Development, Public Works
Implementation Schedule:	Ongoing; planning complete in approximately 5 years
ADDITIONAL COMMENTS	
Planning is led by the Resilient Hampton Initiative, and is based on the idea of living with water. The focus is on flood mitigation, economic growth, mobility and access, green infrastructure, natural resources, and revitalization of flood-prone areas. Plans aim to coordinate a variety of goals while mitigating flooding impacts, working together with the community to identify assets, approaches, and projects.	

HAMPTON MITIGATION ACTION 5	
Maximize use of social media before, during and after hazard events.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Minimal cost to reach larger audience more effectively
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Drought, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 2; Objective 2.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$200,000 annually, including staff time
Potential Funding Sources:	n/a
Lead Agency/Department Responsible:	Marketing Department, Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
The prominence of social media points to a need to refine activity on Twitter, Facebook, Instagram and other programs. Need to be pro-active and targeted in messages. Identify specific messages, links. Other information that we will need to spread and the most effective methods, may include short videos, maps, links, photos, and infographics. In 2021, Hampton won an award for Top 10 Digital City for its size range. Efforts to reach a broad group of citizens are working and should continue.	

HAMPTON MITIGATION ACTION 6	
Develop a Resilient Hampton Education Plan, which may include a CRS Plan for Public Information. **Prepare public outreach materials and conduct outreach to educate elected officials and residents on methods of mitigating flood damage, the importance of maintaining flood insurance coverage, the City's floodplain management efforts, and the benefits of the City's CRS participation.** **Expand capacity building and training for various groups and neighborhood-serving organizations to include communication about mitigation, building code requirements, and response.**	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on vulnerable neighborhoods with less access to social or broadcast media
Cost Benefit:	Local residents are better able to address and then communicate the needs of their specific neighborhoods. Using community members to transmit information to neighbors can expand capacity of City staff to communicate, mitigate and respond more effectively.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Extreme Heat
Goal(s) Addressed:	Goal 2, Objective 2.1; Goal 3, Objectives 3.1, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$5,000 to $50,000
Potential Funding Sources:	General Fund – Neighborhood Education Programs; HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management, Community Development, Marketing, Public Works
Implementation Schedule:	Ongoing; incorporate into upcoming Resilient Hampton education plan
ADDITIONAL COMMENTS	
Also considering partnerships with neighboring localities to share training opportunities for interested citizens. Make sure homeowners have flood insurance coverage. Flood insurance coverage has been shown to reduce response needs and help Hampton's citizens return to normalcy more quickly after flooding.	

HAMPTON MITIGATION ACTION 7	
Improve stormwater management capacity of existing system, to include improving drainage system maintenance using increased sediment and debris clearance, and ongoing analysis of the current system's status of functionality.	
BACKGROUND INFORMATION	
Site and Location:	Drainageways citywide. Engineering studies have specifically identified Mill Creek Terrace, Mary Peake and Riverdale as particular areas of concern.
Cost Benefit:	The City's network of structures, channels and underground pipes that carry stormwater help reduce flooding, especially during high frequency events. Maintenance and retrofits are required to keep the system functioning effectively, especially as sea level rises.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.4, 1.5, 1.6
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$22.1 million (see additional information below)
Potential Funding Sources:	Stormwater Utility Fee; Bond Funding; ARPA; IIJA
Lead Agency/Department Responsible:	Public Works Engineering
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Hampton's MS4 permit has requirements for this activity and the city is required to increase debris and sediment removal for each 5-year permit. Pochin Place was completed December 2020, cost $762,183, the total cost for the remaining mitigation efforts in the Mill Creek Watershed are $2,361,000, Mary Peake Watershed $10,561,699 and the Riverdale Watershed is $10,561,699. The total cost is estimated at $22,120,109.	

HAMPTON MITIGATION ACTION 8	
Coordinate with owners of post-FIRM structures that are NFIP "minus-rated" to help property owners determine reason for rating and implementing solutions. Identify funding sources to help identify and fund retrofits.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone locations citywide
Cost Benefit:	Minus-ratings are typically related to flood vents and are straightforward, low cost retrofits. Assistance from City staff and/or private insurers could help owners reduce flood insurance premiums while gaining flood resilience.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5; Goal 2, Objective 2.1, 2.3; Goal 3, Objective 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time. Some private companies that offer flood insurance often provide this service to homeowners free of charge.
Potential Funding Sources:	HMGP 5% Initiative; Hampton's flood mitigation fund provides low-cost loans for mitigation
Lead Agency/Department Responsible:	Community Development, Emergency Management, Public Works
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

HAMPTON MITIGATION ACTION 9	
Conduct repetitive loss area analyses of repetitive flood loss areas, partnering with HRPDC and VDEM where relevant. Include outreach to homeowners regarding potential mitigation options.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas Citywide (see Section 5 for maps)
Cost Benefit:	Analyses benefit property owners by identifying potential mitigation actions, making the repetitively flooded areas better known to elected officials and the public, and possibly garnering CRS points to contribute to reducing flood insurance premiums.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objective 1.1, 1.2, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – All 13 repetitive flood loss areas contain areas of very high or relatively high NRI flood risk, which includes analysis of social vulnerability
Estimated Cost:	$100,000
Potential Funding Sources:	Grant funding through Emergency Management; see also Regional Action #5
Lead Agency/Department Responsible:	Community Development, Public Works/Engineering and Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HAMPTON MITIGATION ACTION 10	
Continue to build resiliency into the city's approach to social, economic and physical challenges. Incorporate resilience strategies into City plans (community plan, capital improvement plan, master plans, etc.). Develop a tool to evaluate how City decisions align with resiliency goals.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	As the historic patterns of natural hazards shift with the impacts of climate change, addressing hazards and their impacts on citizens is increasingly the work of all City departments. Disseminating responsibility for addressing resilience to relevant staff through education and training, and updating guidelines and creating tools, is more cost effective than hiring additional resources to address hazards. Approaching resiliency from a whole-community standpoint in plans helps to reduce counterproductive measures, conflicting projects, and redundancy in operation, thus saving taxpayer funds in the long-term.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1; Goal 3, Objectives 3.1, 3.3 and 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	CIP
Lead Agency/Department Responsible:	City Manager's Office and Community Development Resiliency Officer
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HAMPTON MITIGATION ACTION 11	
Maintain storm-resistant public beaches.	
BACKGROUND INFORMATION	
Site and Location:	Atlantic Ocean/Chesapeake Bay shoreline
Cost Benefit:	Maintaining the existing beach profile provides flood protection and wave protection to waterfront structures.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.6
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$7,000,000 as proposed for 2022
Potential Funding Sources:	ARPA
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HAMPTON MITIGATION ACTION 12	
Ensure safe ramp access is provided for rapid extraction of City-owned boats prior to Tropical/Coastal storm.	
BACKGROUND INFORMATION	
Site and Location:	Hampton River and Back River
Cost Benefit:	Emergency Services has invested considerable resources in rescue boats. The ability to extract these boats protects assets from storm damage or loss.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Landslide/Coastal Erosion, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Undetermined
Potential Funding Sources:	
Lead Agency/Department Responsible:	Public Safety and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
As various City departments examined options for redevelopment at the Sunset Boat Ramp in 2021, Emergency Management highlighted the importance of the public ramp for this purpose.	

HAMPTON MITIGATION ACTION 13	
Develop, finalize and implement Disaster Recovery Plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	A plan for disaster recovery minimizes the negative impacts of hazard events on City functions, citizens and businesses, and may even identify opportunities for safer redevelopment.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	DHS, VDEM
Lead Agency/Department Responsible:	Emergency Management, Community Development
Implementation Schedule:	Ongoing, with plan expected to be finalized in 2022 or 2023.
ADDITIONAL COMMENTS	
Disaster recovery can be short-term or long-term depending on the nature of the event itself. The City is developing a Disaster Recovery Plan to set out expectations for managing multiple hazard events and the related recovery processes, to include setting up a Storm Response Center, assigning roles and responsibilities to the recovery team members, collecting and backing up data, restoring/continuing City and private utility operations, and testing and maintaining critical facilities. Major disasters may also require longer-term recovery plans that address Community Development and resiliency issues to minimize hazardous redevelopment practices.	

HAMPTON MITIGATION ACTION 14	
Develop a plan to collect surveyed high water mark data following flood events.	
BACKGROUND INFORMATION	
Site and Location:	Citywide floodplains
Cost Benefit:	Collection of high water mark data allows better calculation of a storm's frequency, thus improving cost benefit analyses for future mitigation projects.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High – All 13 repetitive flood loss areas contain areas of very high or relatively high NRI flood risk, which includes analysis of social vulnerability
Estimated Cost:	Staff time, Post-disaster surveys could be used to collect high water mark elevations at approximately $500/structure (for a large number of surveys at once)
Potential Funding Sources:	USACE: FPMS; VDEM: HMGP, HMGP 5% Initiative, USGS
Lead Agency/Department Responsible:	Public Works, Emergency Management
Implementation Schedule:	Set up any necessary post-disaster contracts within 2 years of plan adoption
ADDITIONAL COMMENTS	
Structural inventories with elevations, high water marks, and flood frequency data help prepare accurate cost-benefit analyses for a large number of structures rapidly, which is especially useful in a post-disaster scenario.	

HAMPTON MITIGATION ACTION 15	
Provide business resiliency planning services to the City's business owners, particularly Virginia Department of Minority Business Enterprise (DMBE)-certified SWaM businesses that may have access to fewer resources than larger establishments. Workshops and outreach would identify businesses interested in further planning, with more detailed assistance then provided to assist businesses with details regarding risk and vulnerability assessment, preparedness, continuity of operations planning and adaptation/recovery. Help businesses identify specific mitigation projects and sources of funding to reduce vulnerability and increase resiliency.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Businesses that are prepared for disasters unique to their location are more likely to remain operational or to resume operations quickly post-disaster, thus making the business' services available to residents more quickly. Pre-disaster planning costs reduce post-disaster damages for the business, the customers, and the City.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.4, 1.5; Goal 2, Objectives 2.1, 2.2, 2.3; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	Medium
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	To be determined based on business community interest
Potential Funding Sources:	DHS: BRIC, HMGP; Virginia CFPF; EDA DMTA; Commonwealth Center for Recurrent Flooding Resiliency (CCRFR)
Lead Agency/Department Responsible:	Economic Development, CCRFR
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	
The CCRFR has prepared the Coastal Virginia Small Business Self-Assessment and Guide available at: https://www.floodingresiliency.org/coastal-virginia-small-business-resilience-self-assessment-and-guide/ which could be useful for beginning this action.	

HAMPTON MITIGATION ACTION 16	
Implement structural and nature-based flood control projects in flood prone areas, such as tide gates, berms, constructed wetlands, roadway elevations, etc. This action includes projects identified by the *Resilient Hampton* Initiative plans.	
BACKGROUND INFORMATION	
Site and Location:	Flood prone areas Citywide
Cost Benefit:	Multi-objective projects have benefits across the spectrum, including flood protection benefits, and benefits that accrue from natural and beneficial functions of floodplains and wetlands.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, and Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Cost will be based on specific flood protection measures chosen.
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; USACE: SFCP, FPMS; HUD: CDBG; USDA: WPFP; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, Community Development, Treasurer's Office
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEWPORT NEWS

NEWPORT NEWS MITIGATION ACTION 1	
Maintain participation in National Flood Insurance Program. Continue enforcement of standards in existing ordinance that meet and exceed NFIP minimum requirements. Improve floodplain management program and CRS rating.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The NFIP and related flood mapping and development regulations have proven benefits nationwide. CRS benefits accrue through increased insurance coverage, improved hazard awareness and reduced flood insurance premiums. New construction and future development are protected from floods through existing standards that meet or exceed NFIP minimum requirements.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, and Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management/Engineering
Implementation Schedule:	Annually
ADDITIONAL COMMENTS	
The city is currently a class 7 in the CRS program.	

NEWPORT NEWS MITIGATION ACTION 2	
Acquire, elevate, relocate, retrofit or floodproof structures in flood prone areas. Flood protection may include small structural flood control projects, such as tide gates, or backflow preventers. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Flood loss areas Citywide
Cost Benefit:	Retrofit measures that address flooded structures, particularly those designated as repetitive loss or severe repetitive loss by the NFIP, have quantifiable benefits. The City's Flood Assistance Program has had measurable benefits using primarily acquisition to mitigate an estimated 2 structures per year since 1999. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, and Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2 and Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – Salter's Creek and Newmarket Creek repetitive flood loss areas contain areas of very high or relatively high NRI flood risk, which includes analysis of social vulnerability. The other 6 repetitive flood loss areas affect moderate to low risk areas.
Estimated Cost:	Estimated $750,000 per year through various channels and sources
Potential Funding Sources:	CIP; DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; USACE: SFCP, FPMS; HUD: CDBG; USDA: WPFP; Virginia CFPF. Flood Assistance Program has primarily used City funds.
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
80 properties comprising 15.2 acres have been purchased.	

NEWPORT NEWS MITIGATION ACTION 3	
Protect critical facilities and infrastructure, including access/egress. Retrofits may include, but are not limited to: upgrades or relocation of the 911/EOC/311 facilities and wind vulnerability of building, components and equipment; floodproofing or elevating pump stations; retrofitting remaining pump stations with generators or quick-connect hookups.	
BACKGROUND INFORMATION	
Site and Location:	Critical facilities Citywide. Pump stations #2, #53 and #99 have been identified as high priority locations for non-structural mitigation measures.
Cost Benefit:	Benefits of mitigating flood damage to critical facilities are realized by all citizens through the city's ability to maintain the highest operational capabilities post-disaster. Benefits are based on reduced response times, and longevity of critical infrastructure. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.4s
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Cost will be based on specific flood protection measures chosen for each building.
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; Stafford Act Section 406 - post-disaster mitigation funds under Public Assistance for damaged public facilities
Lead Agency/Department Responsible:	Emergency Management, Facilities Engineering
Implementation Schedule:	Long-term, 3 to 7 years
ADDITIONAL COMMENTS	
Wind retrofits should ensure EOC is protected with winds up to 120mph.	

NEWPORT NEWS MITIGATION ACTION 4	
Construct new access road to Pump Station 49 on Warwick Boulevard.	
BACKGROUND INFORMATION	
Site and Location:	Pump Station 49, Warwick Blvd – new access road from Old Courthouse Way
Cost Benefit:	Existing access drive is below the 100-year flood elevation and has been flooded by the adjacent Stoney Run Creek during significant storm events. This flooding prevents access to the station including the delivery of fuel needed to run the station emergency power generator. Finished floor elevation of the station is above the 100-year flood elevation and it is not considered susceptible to flooding. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$300,000, includes acquisition of undeveloped commercial property
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Within 5 to 7 years
ADDITIONAL COMMENTS	
Other alternatives considered but rejected include: 1) raise existing service road (would require undesirable impacts to Stoney Run); and 2) new access road from Warwick Blvd (steep grade issues would limit access).	

NEWPORT NEWS MITIGATION ACTION 5	
Drainage improvements on Chelsea Place, to include increased flow through the drainage outfall from the apartments and diversion of some of the flow from Edgemoor Drive to a new outfall.	
BACKGROUND INFORMATION	
Site and Location:	Chelsea Place Apartments, Warwick Blvd
Cost Benefit:	Existing drainage system drains to a channel along the CSX right-of-way, then through a small culvert to a drainage channel along Warwick Blvd. The culvert under the railroad is undersized and causes flooding in the parking lot of the apartments. The flooding enters at least 15 ground floor apartments rendering them unrentable and has resulted in the loss of multiple vehicles.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1,1, 1,2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$750,000
Potential Funding Sources:	Stormwater Management Fund
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Construction estimated to begin late 2022
ADDITIONAL COMMENTS	
Project delayed by CSX close to agreement for crossing. Design is being updated.	

NEWPORT NEWS MITIGATION ACTION 6	
Provide various watershed and flood warning improvements to reduce danger to lives and property from flooding along Newmarket Creek. This action may include Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Newmarket Creek watershed
Cost Benefit:	Several alternatives considered. Combination of computer modeling improvements, early warning/detection systems and drainage improvements considered most beneficial for multi-objective management of the watershed. Benefits include: 1) upgrades to current watershed models to pinpoint drainage improvements; 2) detection systems to alert City officials to pre-determined water levels in drainage system to initiate procedures for warning/evacuating residents; 3) drainage improvements (quality and quantity controls) to improve lifespan of the system, reduce nuisance flooding, and provide credit for pollutant reduction; 4) measures may provide sufficient flood mitigation/protection to result in removal of repetitive flood loss properties from the City's inventory and may provide points under CRS.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 3, Objectives 3.3, 3.4
Impact on Socially Vulnerable Populations:	High – Newmarket Creek repetitive flood loss area contains areas of relatively high NRI flood risk, which includes analysis of social vulnerability.
Priority (High, Moderate, Low):	High
Estimated Cost:	Computer model upgrade = $152,000 Projects pending watershed model & analysis in 2023 Early Warning/Detection systems = $200,000 Drainage Improvements – pipe installations= $7,350,000 Drainage Improvements – channel upgrades = $3,725,000 Drainage Improvements – BMP installations = $6,683,000
Potential Funding Sources:	DHS: FMA, HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	
Implementation Schedule:	5 to 10 years; sensors have been installed
ADDITIONAL COMMENTS	
Other alternatives considered include: raise elevation of all houses within 100-year floodplain; purchase properties and relocate residents in 100-year floodplain; build structures (levees, floodwalls, gates/pumps) to protect properties; provide detection systems within watershed to alert to high water levels within major drainage channels; modify current City programs to streamline application process for homeowners; assist in redeveloping areas of the watershed (commercial/businesses, recreational areas, and residential neighborhoods).	

NEWPORT NEWS MITIGATION ACTION 7	
Improve drainage system maintenance, including increased sediment and debris clearance.	
BACKGROUND INFORMATION	
Site and Location:	Drainageways citywide.
Cost Benefit:	The City's network of structures, channels and underground pipes that carry stormwater help reduce flooding, especially during high frequency events. Maintenance is required to keep the system functioning effectively.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$2,275,500
Potential Funding Sources:	Stormwater User Fee, Capital Improvement Program
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing as part of 5-year CIP updated annually. New projects continually identified.
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 8	
Continue Forest Management Program to mitigate wildfire hazards and promote forest health.	
BACKGROUND INFORMATION	
Site and Location:	Program is primarily focused on Waterworks land holdings near the utility's reservoirs.
Cost Benefit:	This ongoing program reduces the number of fires, and works to control pine beetle infestations. Forest thinning is a primary control mechanism. This is one of many programs the utility implements related to hazard mitigation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Net cost is low because costs are offset by selling the timber
Potential Funding Sources:	Waterworks Enterprise Fund
Lead Agency/Department Responsible:	Newport News Waterworks
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 9	
Prepare public outreach materials. Educate elected officials and residents on the importance of the NFIP and the City's floodplain management efforts, maintaining flood insurance coverage, and methods for mitigating flood damage. City's comprehensive master floodplain management planning will include developing educational, outreach and more accessible materials and tools.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Citywide
Cost Benefit:	Making sure homeowners have flood insurance coverage has been shown to reduce response needs and help Newport News' citizens return to normalcy more quickly after flooding.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5; Goal 2, Objective 2.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – Salter's Creek and Newmarket Creek repetitive flood loss areas contain areas of very high or relatively high NRI flood risk, which includes analysis of social vulnerability. The other 6 repetitive flood loss areas affect moderate to low risk areas.
Estimated Cost:	<$5,000 per year
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Continuous
ADDITIONAL COMMENTS	
While this action is ongoing, it is important to retain in the hazard mitigation plan to ensure continued funding is secured annually.	

NEWPORT NEWS MITIGATION ACTION 10	
Rehabilitation and improvement of Harwood's Mill Dam which impounds Harwood's Mill Reservoir to provide water for Harwood's Mill Water Treatment Plant. The planned improvement project consists of the demolition of the existing outlet works and principal spillway chute and construction of a new principal spillway floor slab, training walls, intake structure and flume, access bridge, concrete crest wall and the rehabilitation of the existing spillway weir.	
BACKGROUND INFORMATION	
Site and Location:	Yorktown, Virginia – Route 17
Cost Benefit:	Repairs are needed to bring project into compliant with State regulations. Project avoids damages which could result from a compromised spillway.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding Due to Impoundment Failure/High Hazard Dam
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.3, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – Downstream of the dam are areas of relatively moderate to relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	$12,800,000
Potential Funding Sources:	CIP
Lead Agency/Department Responsible:	Facilities Engineering
Implementation Schedule:	February 2022 – December 2023
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 11	
Stormwater Master Planning: the City will develop three separate, yet inter-dependent master plans for citywide stormwater management, floodplain management, and resilience & climate change management.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The City's current Stormwater and Floodplain management plans are out of date and no longer viable for addressing current or future flooding problems. Last year the state issued new requirements for addressing climate change.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$5,500,000
Potential Funding Sources:	Capital Improvement Plan, CFPF
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Planning to begin 2022 and will last 3 years
ADDITIONAL COMMENTS	
Newport News does not have a comprehensive City specific plan for addressing climate change and resilience. The combined master planning will include an assessment of the existing state of several components of the City's stormwater management; public engagement; general inventory, documentation, and evaluation of infrastructure; analysis of ordinances and design manuals; greenway corridor planning and conceptual plan development with capital planning, cost estimating, and financial planning. Planning will also provide data on where structures lie in the City with regard to future flooding and sea level rise so that regulations governing future development can based on more detailed vulnerability.	

NEWPORT NEWS MITIGATION ACTION 12	
Improve the Lions Bridge Dam which impounds Mariners' Lake to bring the dam into compliance with current state dam safety standards.	
BACKGROUND INFORMATION	
Site and Location:	100 Museum Drive
Cost Benefit:	The current Lions Bridge Dam was built in 1937 before dam safety regulations. The current dam is considered a significant hazard dam because greater than 400 vehicles per day travel on the roadway across the dam. The dam will be armored to safely withstand overtopping during the half probable maximum flood.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.5, 1.6
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$11,000,000
Potential Funding Sources:	Capital Improvement Plan, Lake Maury Fund
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Design will be completed Spring 2022, construction will begin late 2022
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 13	
Nicewood Area Drainage Improvements. Evaluation of existing storm system and implementation of recommended improvements to address flooding.	
BACKGROUND INFORMATION	
Site and Location:	Area around the intersection of Malden Lane and Maryle Court to Nicewood Park in the Runnymeade Subdivision
Cost Benefit:	Citizens within the area of the intersection of Malden Lane and Maryle Court and the outfalling storm system to Nicewood Park experience frequent flooding during significant rain events. The existing storm drainage system is inadequate. The project will reduce the risk of flooding and damages to approximately 70 homes and approximately 2200 linear feet of roadway.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low – the area has very low NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	$2,100,000
Potential Funding Sources:	Stormwater user Fee, Capital Improvement Program
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Design will begin 2022
ADDITIONAL COMMENTS	
The project includes funding for a detailed model of the storm system to determine what improvements are required, along with funds for the design and construction of a new system once improvements are identified.	

NEWPORT NEWS MITIGATION ACTION 14	
Marshall Ridley. Redevelopment of a large area of outdated apartments with no existing stormwater management system in place. The new development will include multiple BMPs and a regional stormwater management facility.	
BACKGROUND INFORMATION	
Site and Location:	Between Jefferson Avenue and Ivy Avenue, between 12th Street and 18th Street
Cost Benefit:	The area currently does not have any stormwater management, so all stormwater outfalls directly into Seafood Industrial Park Small Boat Harbor without detention or water quality treatment. The new development will provide treatment and serve as a regional BMP for approximately 30 acres. Provide improved drainage on public right-of-way to alleviate nuisance flooding; upgrade to City's drainage system for another 50 years, reduce maintenance costs for repairs, and provide a new storm system that meets current design standards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – the area has very high or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	$6,000,000
Potential Funding Sources:	Stormwater user Fee, Capital Improvement Program
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Design 2021, Construction 2022
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 15	
Governors Drive Stream Restoration & BMP, including restoration of Flaxmill Creek to alleviate erosion and protect a major HRSD force main.	
BACKGROUND INFORMATION	
Site and Location:	Flaxmill Creek between Governors Drive and Riverview Farm Park.
Cost Benefit:	The existing drainage channel at the rear of residential properties is experiencing erosion and has deteriorated to a point where it is unstable.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm; Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$2,000,000
Potential Funding Sources:	Stormwater Fees, Capital Improvement Plan, & State Local Assistance Fund (SLAF)
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Design 2022, Construction 2024
ADDITIONAL COMMENTS	
The project will include providing a stable and constant cross-section with applicable natural and stone armaments for conducting stormwater runoff from a 10-year storm event. This channel conducts stormwater runoff from several public right-of-ways such as Lucas Creek Rd, Menchville Rd, and roads within Denbigh Plantation.	

NEWPORT NEWS MITIGATION ACTION 16	
Analyze and improve drainage/stormwater system along Stoney Run.	
BACKGROUND INFORMATION	
Site and Location:	Northern portion of the Stoney Run Watershed
Cost Benefit:	Several neighborhoods (Colony Pines, Windsor Great Park, and surrounding areas), totaling approximately 900 acres, within the northern portion of the Stoney Run watershed experience repeated issues frequent flooding during high intensity storm events. Most of the storm system was designed and constructed under a 5-year design storm requirement, and current regulations require storm systems be designed to handle a 10-year storm event. A detailed analysis will determine potential modifications and additions to the stormwater system, including the stormwater management facilities. Funding is included to design and implement identified modifications and additions necessary to improve the drainage system and maintain the efficient conveyance of runoff while meeting regulatory requirements for water quantity and quality.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$8,500,000
Potential Funding Sources:	Stormwater Fees, Capital Improvement Plan, SLAF, CFPF
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Computer Model Analysis 2021, Construction within 5 – 10 years
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 17	
Salters Creek Analysis and Drainage Improvements. Develop computer model analysis and implement identified drainage projects. Reduce flooding throughout the Salters Creek watershed by improving the capacity of the existing drainage system, providing additional storage, and ensuring compliance with stormwater regulations.	
BACKGROUND INFORMATION	
Site and Location:	Salters Creek Watershed
Cost Benefit:	The Salters Creek watershed in the Southeast Community is approximately 1,236 acres and is extremely low-lying. As a result, the surrounding area experiences issues with drainage and frequent flooding from storms and high tides. A detailed computer model analysis will be performed to determine potential modifications and additions to the stormwater system. Funding is also included for the design and construction of identified improvements. The project will result in implementing improvements necessary to maintain the efficient conveyance of runoff during storm and high tidal events.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – Salter's Creek repetitive flood loss area contains areas of very high or relatively high flood risk, which includes analysis of social vulnerability.
Estimated Cost:	$7,200,000
Potential Funding Sources:	Stormwater Fees, Capital Improvement Plan, SLAF, CFPF
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Design 2021, Construction 3-7 years
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 18	
James River Shoreline Stabilization. Stabilize 720 linear feet of shoreline on the James River to address severe erosion and failure of the steep slope along River Rd, and protect existing utilities and the road.	
BACKGROUND INFORMATION	
Site and Location:	James River along River Rd from 9304 to 9508 River Road
Cost Benefit:	The project provides restoration and stabilization of 720 feet of shoreline adjacent to River Road to reduce erosion of the existing embankments, prevent loss of shoreline, and protect the City's roadway and underground utilities. The improvements will be a combination of stone riprap sills and a vegetative slope along with a living shoreline.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Landslide/Coastal Erosion, Flooding, Sea Level Rise, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$3,400,000
Potential Funding Sources:	CAP funding, Stormwater Fees, CIP
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Design 2022
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 19	
Christopher Shores Drainage Improvements. Address repeated flooding in the Christopher Shores subdivision by installing larger storm pipes and additional pipes and inlets to alleviate flooding during tidal events.	
BACKGROUND INFORMATION	
Site and Location:	Christopher Shores subdivision
Cost Benefit:	The project consists of construction of a new storm drain system and outfalls to replace an existing system that is outdated and does not conform to present City standards. This project will alleviate ongoing flooding issues caused by rainfall events, storm surges, and tidal action of Hampton Roads within the existing closed drainage systems in approximately 66 acres of the Christopher Shores area of the Southeast Community. Street flooding is an issue for residents especially when it hampers their ability to evacuate the area when major storm events are predicted.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$5,600,000
Potential Funding Sources:	Stormwater Fees, CIP
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Construction 2022
ADDITIONAL COMMENTS	

NEWPORT NEWS MITIGATION ACTION 20	
Deep Creek Shoreline Stabilization. Stabilize the shoreline at Menchville Marina on Deep Creek.	
BACKGROUND INFORMATION	
Site and Location:	Menchville Marina, 494 South Menchville Road
Cost Benefit:	Restore and stabilize approximately 300 LF of shoreline along Deep Creek at the Menchville Marina. Existing conditions include old wooden posts and nuisance vegetation, as well as erosion problems.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low – the area has low NRI Coastal Flood Risk
Estimated Cost:	$600,000
Potential Funding Sources:	Stormwater Fees, CIP
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Construction 2022
ADDITIONAL COMMENTS	

POQUOSON

POQUOSON MITIGATION ACTION 1
Continue participating in the National Flood Insurance Program and the Community Rating System, with a goal of becoming a Class 7 community. Continue enforcement of standards in existing floodplain management ordinance that meet and exceed NFIP minimum requirements. Encourage additional staff to become Certified Floodplain Managers. **Study feasibility of implementing additional floodplain management ordinance changes, including:** **1. Changes to the definition of "substantial improvement" that would require accumulation of costs of improvements and repairs of buildings, based on issued building permits, over a set time period; and,** **2. Coastal A Zone regulations that apply coastal high hazard area requirements in areas delineated by FEMA as subject to wave heights between 3 feet and 1.5 feet high.**

BACKGROUND INFORMATION	
Site and Location:	Special Flood Hazard Areas of Poquoson
Cost Benefit:	Additional measures to manage floodplains can further reduce flood response needs in the long-term, and reduce flood insurance premiums through CRS rating changes in the near-term. The NFIP and related flood mapping and development regulations have proven benefits nationwide.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – the area has relatively moderate or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	Travel costs and staff time
Potential Funding Sources:	Existing budgets; HMGP 5% Initiative
Lead Agency/Department Responsible:	Building Inspections
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS

POQUOSON MITIGATION ACTION 2	
Elevate, relocate, acquire, retrofit or floodproof structures in hurricane prone areas. Flood protection may include minor localized flood reduction projects, as well. Wind retrofit measures are also included and may be appropriate for some structures, especially publicly-owned structures. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Citywide, and Citywide for wind retrofits
Cost Benefit:	Retrofit measures that address flood- and wind-prone structures, particularly those designated as repetitive loss or severe repetitive loss by the NFIP, have quantifiable benefits by reducing future damages to the structures. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – the area has relatively moderate or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	In multiple $250,000 phases as grant money becomes available. Individual structure costs vary.
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; USDA; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management and Building Inspections
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

POQUOSON MITIGATION ACTION 3	
Implement the Shoreline Management Plan developed by Virginia Institute of Marine Science, as conditions warrant.	
BACKGROUND INFORMATION	
Site and Location:	Shorelines Citywide
Cost Benefit:	Implementation is not costly and could be absorbed by existing department budgets. Materials to share with property owners and training for staff (and interested property owners) are available from VIMS at very low cost. Adding links from the City web page to the VIMS toolbox is low cost but would provide valuable information to property owners.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.6; Goal 2, Objective 2.1; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate/High – the area has relatively moderate or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	Staff time only
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Planning Department, Permitting, and Engineering
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Currently, Virginia's Shoreline Erosion Advisory Service is not funded. Property owners need guidance on best management shoreline protection methods from reliable sources and not necessarily just from shoreline repair contractors. The *Poquoson Comprehensive Plan 2008-2028*, Environmental Management Element, Shoreline Sub-Element, states as its second goal, "Develop a shoreline management plan to ensure property shoreline protection and create a framework for incentive[s] based on programs to encourage less intrusive means of shoreline protection." While permitting incentives were considered that might encourage living shorelines, City staff determined that permit fees and review times are already as low as possible.	

POQUOSON MITIGATION ACTION 4	
Continue to increase flood and wind protection and flood access/egress for critical facilities and infrastructure. Elevate new critical facilities, retrofit existing facilities as necessary, and elevate roads to provide access to elevated critical facilities. Retrofits may include but are not limited to: installation of emergency backup power, elevation of structure or components, relocation or retrofit of building components, and installation of tidal/flap valves on drainage structures. Coordinate with public utilities to protect or retrofit transformers, critical infrastructure and overhead power lines.	
BACKGROUND INFORMATION	
Site and Location:	Critical facilities Citywide.
Cost Benefit:	Benefits of mitigating flood damage to critical facilities are realized by all citizens through the city's ability to maintain the highest operational capabilities post-disaster. Flooding of roads prevents access to elevated critical facilities. Benefits are based on reduced response times, and longevity of critical infrastructure. Elevation of roads could reduce evacuation times once flooding begins, and protect roadbeds from erosion associated with sea level rise in the future.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – the area has relatively moderate or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	Cost will be based on measures chosen for each building
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; Stafford Act Section 406 - post-disaster mitigation funds under Public Assistance for damaged public facilities; Virginia CFPF
Lead Agency/Department Responsible:	Public Works/Engineering, Fire Department, Police Department, Public Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Some vital infrastructure such as storm sewer and sanitary sewer are subject to flooding, and possibly vulnerable to sea level rise in the future.	

POQUOSON MITIGATION ACTION 5	
Collect and share hazard-related data in GIS-compatible format, including but not limited to: **1) add tide gauges for flood prediction and collect high water marks and calculate flood frequency for all coastal storms;** **2) continue to collect Elevation Certificates for each structure in the 100-year floodplain and post online for property owner use;** **3) use sidescan LIDAR to collect additional data regarding structure elevations Citywide;** **4) incorporate new software for the assessor's database that includes flood elevation data;** **5) use drone-produced real-time storm surge/tidal conditions mapping developed in conjunction with NASA and ODU; and,** **6) inventory and prioritize low-lying secondary roads and intersections critical to evacuation.**	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Collection of elevation information and retention of Elevation Certificates can reduce surveying costs for property owners and buyers in the future. The partnership with NASA for real-time mapping has been a very successful and low-cost venture.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion, Winter Storm, Hazardous Materials Incident
Goal(s) Addressed:	Goal 3, Objectives 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – the area has relatively moderate or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	Staff time Post-disaster surveys could be used to collect structure elevations at approximately $300/structure (for a large number of structures at once)
Potential Funding Sources:	NASA and ODU; HRPDC, USACE: FPMS; DHS: HMGP, HMGP 5% Initiative; USGS; Virginia CFPF
Lead Agency/Department Responsible:	Engineering, Building Inspections, Emergency Management
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
The City Building Inspector continues to compile and digitize a collection of Elevation Certificates for existing structures, elevated/mitigated structures and new structures, and he maintains pertinent data from the forms in a digital format. City has collected high water marks after recent floods and anticipates doing so again in the future. City notifies residents on low-lowing roads of evacuation needs early via CodeRed, posts digital signage and advises them to move personal property early in the evacuation process.

POQUOSON MITIGATION ACTION 6	
Review and update Pre-Disaster Debris Management Plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Pre-disaster debris management reduces damage to structures and infrastructure from flood and wind. Also, regular clean-up requirements can reduce the costs of post-disaster debris clean-up. City could also have access to the additional 5-percent cost incentive from FEMA's Public Assistance money.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5, 1.6; Goal 2, Objective 2.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing capital budgets; HMGP, BRIC or FMA (with very clearly articulated benefits for flood damage reduction); Virginia CFPF
Lead Agency/Department Responsible:	Public Works, Solid Waste
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
City recently purchased two new tractors for pre-event debris clearance.	

POQUOSON MITIGATION ACTION 7	
Coordinate with public utilities, and use City resources to trim trees in the public right-of-way.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Benefits include reduced debris clean-up costs and increased utility service reliability.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tropical/Coastal Storm, Tornadoes, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$100,000, including contributions from utility providers
Potential Funding Sources:	Existing capital budgets, HMGP. In some cases, utilities may be eligible for some FEMA grant monies, as well.
Lead Agency/Department Responsible:	Public Works, utility providers; City has agreement with York County for keeping roadways clear to accommodate evacuations
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

POQUOSON MITIGATION ACTION 8	
Eliminate barriers to the orderly evacuation of citizens: **1) Elevate and widen the causeway to Hampton (Wythe Creek Road);** **2) Widen Victory Boulevard;** **3) Continue car evacuation agreement with Langley Motor Speedway to allow citizens to park cars there prior to expected flooding; and,** **4) Address low-lying roadways/intersections identified in Mitigation Action #5, including use of temporary flood barriers for critical resident evacuation routes and first responder access/egress.**	
BACKGROUND INFORMATION	
Site and Location:	Wythe Creek Road and Victory Boulevard
Cost Benefit:	These two roadways are considered critical infrastructure for the evacuation and protection of citizens in Poquoson. Wythe Creek Road floods regularly at high tide, cutting off the route and requiring all citizens to evacuate via Victory Boulevard. Providing a no-cost alternative for parking vehicles out of harm's way encourages people to consider the advantages and consequences of evacuating cars and people.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence, Wildfire, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objective 1.5; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – the area has relatively moderate or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost to Poquoson:	Wythe Creek Road - $19.8 million Victory Boulevard - $22.7 million
Potential Funding Sources:	VDOT, Hampton, York County and other partners; Virginia CFPF
Lead Agency/Department Responsible:	Engineering and City Manager's Office
Implementation Schedule:	Wythe Creek Road is scheduled for construction in 2022; Victory Boulevard widening is in the planning stages.
ADDITIONAL COMMENTS	
The City also has emergency access roads which are normally closed but which can be linked together in case of evacuation or emergency.	

POQUOSON MITIGATION ACTION 9	
Support and maintain decal system for re-entry to the City following a disaster. Use social networking to strengthen the system.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Benefits accrue to: 1. property owners through reduced secondary damage (*e.g.,* from car wakes on flooded streets); and, 2. Police operating budgets through reduced traffic management costs, better response times and more efficient use of staff following a disaster.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornadoes, Earthquake
Goal(s) Addressed:	Goal 1, Objectives 1.4, 1.5; Goal 2; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$2,500 annually
Potential Funding Sources:	Capital budget; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	City Manager's Office; Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Gawkers and sightseers from outside Poquoson are not cognizant of the added damage and inconvenience their visits can inflict. A low-cost decal system was put in place in 2010, and together with police presence at key entry points to the City, officials can now control re-entry.	

POQUOSON MITIGATION ACTION 10	
Support and maintain Code Red, the City's Reverse 911 system. Prepare messages to release to citizens before and after a natural hazard event.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Other methods of notifying citizens require massive amounts of staff time which exceed budgetary restraints. Code Red quickly and efficiently uses existing infrastructure to notify property owners of appropriate pre- and post-disaster mitigation actions.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Hazardous Materials Incident, Drought, Extreme Heat, Pandemic Flu or Communicable Disease
Goal(s) Addressed:	Goal 1, Objectives 1.4, 1.5; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$10,000 to $15,000
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
While the Code Red system is already functioning, an opportunity to use the system to urge property owners to take mitigative actions exists. Identification of persons with disabilities has been built into the dispatch notifications.	

POQUOSON MITIGATION ACTION 11	
Protect flood-prone natural resources as a buffer against sea level rise, including, but not limited to: **1) Protect in perpetuity the 69 acres of natural land at the end of Poquoson Avenue donated to the City;** **2) Provide additional access points for the City's Blueway system, a series of canoe and kayak water trails in and around the City and Plum Tree Island; and,** **3) Provide opportunities for retail and residential development on land that is less prone to flooding and sea level rise, such as the Big Woods area.**	
BACKGROUND INFORMATION	
Site and Location:	Eastern portion of the City, especially undeveloped portions along the water.
Cost Benefit:	Just as damages from sea level rise are not easily quantifiable, the benefits of adjusting to sea level rise are also more abstract. These measures are relatively low in cost compared to the damages that flooding will continue to inflict in Poquoson if no adjustments are made.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.6
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate/High – the area has relatively moderate or relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	1) Existing budgets for legal and real estate costs. 2) Access points on the Blueway may incur costs to the city as additional sites are identified. Costs would be dependent on site amenities. 3) Staff time
Potential Funding Sources:	Existing budgets; DCR: VRTF, L&WCF, VCWRLF; Virginia CFPF
Lead Agency/Department Responsible:	Parks, City Manager's Office, Planning
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
A long-term plan of gradual adjustment begins with small steps. This action highlights the opportunity to identify additional ways to protect flood-prone areas with multiple benefits for citizens in the long- and short-term. While zoning regulations may protect land in the short-term, zoning can be altered by future officials. CRS points may be available for sub-action #1, especially for the recently protected 6 acres set aside for parks.

POQUOSON MITIGATION ACTION 12	
Continue to participate in coalition with Virginia Tech and others using drones for storm/event damage assessment and wildland fire management.	
BACKGROUND INFORMATION	
Site and Location:	Eastern portion of the City, primarily
Cost Benefit:	This low-cost method of assessing damage after a storm or to assess wildfire potential in undeveloped areas has benefits for the reduction of spreading wildfire risk and the management of post-flood redevelopment.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Tropical/Coastal Storm, Wildfire, Tornado, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 3, Objectives 3.1, 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets; DCR: VRTF, L&WCF, VCWRLF; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	City Manager's Office
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
The City has drones and trained drone operators available to implement this action.	

WILLIAMSBURG

WILLIAMSBURG MITIGATION ACTION 1	
Maintain and improve drainage system maintenance, including increased sediment and debris clearance. Purchase additional equipment for pre-storm debris clearance. Explore turf options for parking lots, streetscapes and underground retention where feasible, particularly in Colonial Williamsburg.	
BACKGROUND INFORMATION	
Site and Location:	Drainageways citywide.
Cost Benefit:	The City's network of structures, channels and underground pipes that carry stormwater help reduce flooding, especially during high frequency events. Maintenance is required to keep the system functioning effectively.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objective 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$40,000
Potential Funding Sources:	Existing Budget and CIP
Lead Agency/Department Responsible:	Public Works, Colonial Williamsburg, College of William & Mary
Implementation Schedule:	This is a continuous activity of the City's Public Works Department.
ADDITIONAL COMMENTS	
Smoke testing on sewer system is part of the action. Cross training on stormwater management problem detection with other departments is critical for maintenance in Williamsburg and will continue.	

WILLIAMSBURG MITIGATION ACTION 2	
Continue participating in the National Flood Insurance Program. Review and update floodplain management ordinance to include current resilience standards. Continue enforcement of standards in existing floodplain management ordinance that meet and exceed NFIP minimum requirements.	
BACKGROUND INFORMATION	
Site and Location:	Special Flood Hazard Areas of Williamsburg
Cost Benefit:	The NFIP and related flood mapping and development regulations have proven benefits nationwide.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.6
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Designated Floodplain Manager
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

WILLIAMSBURG MITIGATION ACTION 3	
Maintain StormReady designation through the National Weather Service.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	StormReady helps arm communities with the communication and safety skills needed to save lives and property--before, during and after the event. StormReady helps community leaders and emergency managers strengthen local safety programs.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Extreme Heat
Goal(s) Addressed:	Goal 1, Goal 2, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	<$2,000 annually
Potential Funding Sources:	Local funds
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

WILLIAMSBURG MITIGATION ACTION 4	
Continue Colonial Williamsburg Tree Maintenance Program. Expand in-house crew.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Seasonal inspections and trimming reduce storm damage from trees, particularly in the historic area, and increase guest safety.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Tornado, Tropical/Coastal Storm, Wildfire, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4, 1.5, 1.6
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	<$5,000 annually
Potential Funding Sources:	Private – CWF
Lead Agency/Department Responsible:	CWF Landscape crew with City assistance; College of William & Mary
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This action will be coordinated with the Fire Department to make sure fire equipment access is maintained, as well. Choice of species and wind resistance is especially important when selecting trees for the colonial area and the College of William & Mary. Goals of this program include guest safety, building preservation, scouting with 24-hour phone line, and overall tree risk assessment. Pre-storm checklists and procedures begin each hurricane season and are increased one week prior to potential storm landfall. The Colonial Williamsburg Arboretum is a Level 2 Certified Arboretum comprised of 18th-century tree and woody shrub varieties. The collection features 25 period species of oak trees and more than 30 historic gardens. The Arboretum is home to 20 Virginia state champion trees and two national champion trees.	

WILLIAMSBURG MITIGATION ACTION 5	
Continue shelter generator maintenance and monitoring program. Assess need for and uses of additional shelter at William & Mary Tennis Center.	
BACKGROUND INFORMATION	
Site and Location:	Shelters citywide
Cost Benefit:	The maintenance and daily monitoring of shelter generators helps ensure that these facilities operate at full capacity when needed.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objective 1.3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$4,000 annually
Potential Funding Sources:	Local funds; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Generator status is continually monitored through a computer system accessed by Fire Department personnel.	

WILLIAMSBURG MITIGATION ACTION 6	
Strengthen GIS digital mapping program. Efforts include, but are not limited to, constant data updates with regard to water/sewer/SWM utilities, improved geodata and cloud use with data migration to a portal for use by public and by practitioners in the field. Additional hazard data to be added may include radon exposure in conjunction with William & Mary researchers.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The City's ongoing efforts to increase databases related to hazards is reflected in this plan. Additional databases help staff and planners recognize and plan for various hazards, persons with disabilities, evacuations and response.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Hazardous Materials Incident, Landslide/Coastal Erosion, Radon Exposure
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$100,000
Potential Funding Sources:	Local funds; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	IT, William & Mary
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
New layers are continually added to the system. Staff training on use of the map data is included in the cost estimate. City maintains handheld GPS unit for data collection. The City's goals with regard to GIS are to leverage hazard data for public safety purposes and to create a data driven, efficient system of City administration.	

WILLIAMSBURG MITIGATION ACTION 7	
Expand capacity/training for CERT groups and neighborhood-serving organizations to include communication about mitigation and response.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on vulnerable neighborhoods with less access to social or broadcast media
Cost Benefit:	Local residents are better able to address or communicate the needs of their specific neighborhoods. CERT members can expand capacity of City staff to communicate, mitigate and respond more effectively.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Drought, Extreme Heat, Hazardous Materials Incident, Landslide/Coastal Erosion, Radon Exposure, Pandemic Flu or Communicable Disease
Goal(s) Addressed:	Goal 1; Goal 2, Objective 2.1; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$50,000
Potential Funding Sources:	HSGP/CCP grants, local funding; DHS: HMGP 5% Initiative, BRIC
Lead Agency/Department Responsible:	Emergency Management, partnering with James City County Emergency Management and College of William & Mary
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
CERT team is very active in Williamsburg and training is provided to members at least 2 times per year. They participate in 1 exercise per year and refresher training is also provided. During COVID, CERT remained active with monthly radio reports and other training and outreach.	

WILLIAMSBURG MITIGATION ACTION 8	
Expand social media and use of Everbridge mass notification system for pre- and post-disaster information distribution; partner with CERT for assistance.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Getting information to citizens before, during and after disaster events is critical to reducing damage, reducing panic and creating a resilient citizen base that responds positively to government messages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Drought, Extreme Heat, Hazardous Materials Incident, Flooding Due to Impoundment Failure/High Hazard Dam, Pandemic Flu or Communicable Disease
Goal(s) Addressed:	Goal 2; Goal 3, Objectives 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$10,500 annually
Potential Funding Sources:	Locality funding, VDEM Radiological funding DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Communications Specialist, Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
In recent years, the role of the City's Public Information Officer has expanded. The prominence of social media points to a need to refine activity on Twitter, Facebook, Instagram and other programs. Need to be pro-active and targeted in messages. Identify specific messages, links. Identify other information that City can disseminate and the most effective methods, such as short videos, maps, links, photos, and infographics.	

WILLIAMSBURG MITIGATION ACTION 9	
Per the *William & Mary Hazard Mitigation Plan* (2014), implement mitigation projects to protect historical and critical infrastructure at the College of William & Mary: **1) dry or wet floodproof vulnerable basements;** **2) implement corrective actions necessary to ensure compliance of Lake Matoaka Dam with state dam safety regulations;** **3) weatherize buildings to reduce damage associated with water infiltration through roofs and windows;** **4) continue rooftop inspection program, looking for signs of wear or damage;** **5) elevate building mechanical systems above potential areas of flooding and standing water; and,** **6) Identify areas affected by the City's drainage system and collaborate on means of improvement to improve stormwater flow.**	
BACKGROUND INFORMATION	
Site and Location:	Campuswide; the *William & Mary Hazard Mitigation Plan* (2014) identifies priority buildings.
Cost Benefit:	Partnerships with the College benefit citizens, students and staff by reducing need for emergency response and protecting all who live in the City.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake
Goal(s) Addressed:	Goal 1; Goal 3: Objectives 3.1, 3.2, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Costs to be developed as individual projects are developed
Potential Funding Sources:	DHS: BRIC, HMGP
Lead Agency/Department Responsible:	College of William & Mary
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
The Lake Matoaka Dam project significantly reduces the potential for dam failure. Components include: installing articulated block armor along the backside of the dam to protect the earthen structure from failure during a storm where the roadway is overtopped. Brick-faced training walls on both sides will channel the water from the overtopping flood to the armored section where it then flows across the downstream face to the discharge channel of College Creek. The block will be covered with topsoil and grass so will not be visible. Currently, in the event of a storm event that results in flow overtopping the dam, the dam will likely fail resulting in the loss of Jamestown Road which will adversely impacts the ability of emergency responders to reach citizens of Williamsburg and William and Mary students. Also, dam failure will sever the utilities under the road (electric power, communications, water and sewer) which will result in loss of service. Dating back several years the grounds department has been doing 2 to 3 stormwater mitigation projects per year. Furthermore, many of the newly installed planting beds are infiltration beds. Examples include the ADA ramp planting beds at T-Hall and the planting bed behind Blow Hall. These are above and beyond the requirements of the MS4 plan. The outfall and BMP facility renovations each year are done to either upgrade or correct the deficiencies with these structures. We also regrade gravel roads to mitigate storm water erosion in these areas. This past summer (2021) the road/path off Compton road was regraded due to severe erosion and the tripping hazard it posed to the students and staff using the path. Project is in the planning stage to raise the stormwater pipe under Yates Drive to correct a blockage on the north side of Yates Hall.

WILLIAMSBURG MITIGATION ACTION 10	
Prepare elements of Continuity of Operations Plan (COOP) to address cyber security, utility continuity and redundancies, and communications.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Plans that reduce the impacts of ongoing disasters save taxpayer dollars by bringing businesses back online sooner and providing normal services to citizens in need.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	CIP, DHS/VDEM
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

WILLIAMSBURG MITIGATION ACTION 11	
Address command and control coordination for large assembly hazard events.	
BACKGROUND INFORMATION	
Site and Location:	Areas where large assemblies are permitted, such as the Grand Illumination each December, especially those near the railroad tracks.
Cost Benefit:	Organized command and control reduces loss of life and property associated with large gatherings.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Earthquake, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1: Objective 1.5; Goal 3: Objectives 3.1, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	DHS/VDEM
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

JAMES CITY COUNTY

JAMES CITY COUNTY MITIGATION ACTION 1	
Protect critical facilities, including refuges, while increasing potential refuge capacity and/or protected areas. Protection measures may include emergency generators or other power sources, wind or flood retrofits, elevation, relocation, or reconstruction.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	The purpose of this action is to maintain citizen safety, and continuity of county operations during a disaster event. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objective 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	To be determined based on corrective actions selected
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, EMPG
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Continuing
ADDITIONAL COMMENTS	

JAMES CITY COUNTY MITIGATION ACTION 2	
Mitigate flooding problems identified in the flood studies performed for Powhatan Creek watershed. Measures may include, but are not limited to improvements to road crossings by increasing flow capacity, or installing over-topping protection, and stream restoration.	
BACKGROUND INFORMATION	
Site and Location:	Powhatan Creek watershed
Cost Benefit:	Lower cost improvements to roadways are expected to provide significant benefits in this area.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate - NRI Coastal Flood Risk
Estimated Cost:	$6,000,000
Potential Funding Sources:	VDOT, Federal Transportation Administration, DHS
Lead Agency/Department Responsible:	General Services Stormwater
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

JAMES CITY COUNTY MITIGATION ACTION 3	
Conduct annual meeting with VDOT and utilities to identify hazard areas and potential projects to mitigate those areas.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Keeping roads and utilities operational during high frequency events and maximizing their operability during disasters is a countywide priority.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Winter Storm, Tropical/Coastal Storm, Tornado, Earthquake, Hazardous Materials Incident, Wildfire
Goal(s) Addressed:	Goal 1, Objective 1.3, 1.4, 1.5; Goal 3, Objective 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Annually
ADDITIONAL COMMENTS	

JAMES CITY COUNTY MITIGATION ACTION 4	
Elevate, acquire, relocate, retrofit or floodproof structures in flood-prone areas. Flood protection may include minor localized flood reduction projects, as well. Wind retrofit measures are also included and may be appropriate for some structures, especially publicly-owned structures. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Countywide, and Countywide for wind retrofits. Particular focus on Chickahominy Haven and Powhatan Shores, as well as repetitive flood loss areas throughout the County.
Cost Benefit:	Retrofit measures that address flood- and wind-prone structures, particularly those designated as repetitive loss or severe repetitive loss by the NFIP, have quantifiable benefits by reducing future damages to the structures. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/Low – three repetitive flood loss areas on Chickahominy River have relatively moderate NRI flood risk as do the 5 along Powhatan Creek. The areas near Lake Powell and James Terrace have low NRI flood risk.
Estimated Cost:	Historically, approximately $90,000 per structure. However, this may change based on funding availability.
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; USDA and 5% initiative funds; Virginia CFPF
Lead Agency/Department Responsible:	Community Housing
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

JAMES CITY COUNTY MITIGATION ACTION 5	
Continue strengthening the County's Floodplain Management Program with the following actions: **1) Review floodplain ordinance regularly for appropriateness of higher standards and necessary updates;** **2) Provide specialized training and support for Certified Floodplain Manager (CFM) certification for floodplain plan reviewers, inspectors and permit processors;** **3) Continue to assess repetitive loss data annually for loss accuracy, geographic accuracy, and determination whether structure(s) on property have been mitigated and if so, by what means. Provide corrections as necessary using FEMA AW-501;** **4) Maintain current CRS Class 5 rating or better; and,** **5) Building Safety and Permits plans examiners to provide information and resources to help builders and owners evaluate hydrostatic (flood) vent options. Materials to be available on department's website. Request FEMA QuickGuide for Virginia from DCR.**	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Countywide
Cost Benefit:	The NFIP has a proven record of reducing annual flood damages through floodplain regulations that guide design of flood-prone properties.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Winter Storm, Tropical/Coastal Storm; Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/Low – three repetitive flood loss areas on Chickahominy River have relatively moderate NRI flood risk as do the 5 along Powhatan Creek. The areas near Lake Powell and James Terrace have low NRI flood risk.
Estimated Cost:	Staff time
Potential Funding Sources:	Virginia CFPF; Virginia NFIP Community Assistance Program State Support Services Element
Lead Agency/Department Responsible:	Community Development/General Services , Emergency Management, Virginia DCR
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

JAMES CITY COUNTY MITIGATION ACTION 6	
Continue outreach efforts through "Flood Fluent" web site, hurricane and winter weather preparedness activities through FEMA and NOAA, and the social media outreach activities of Emergency Management.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Benefits derive from reduced flood insurance premiums and increased public knowledge as a result of this initiative. The approach reduces long-term costs by: 1) minimizing need to repeat messages; 2) involving outreach/marketing professionals from within County government; 3) investigating regional partnerships that could result in additional cost savings through cost sharing; 4) using existing programs and resources to maximum advantage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise, Tropical/Coastal Storm, Winter Storm, Landslide/Coastal Erosion, Tornado, Earthquake, Wildfire, Drought, Extreme Heat and Hazardous Materials Incident, Flooding Due to Impoundment Failure/High Hazard Dam
Goal(s) Addressed:	Goal 2,; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Less than $7,500 annually
Potential Funding Sources:	Existing budgets and staff time; DHS: PDM, HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management (lead)
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
Audiences include, but are not limited to: property owners, new residents, tourists, businesses, County officials, pet owners, and schoolchildren. Stakeholders may include: various County departments, HRPDC, Peninsula Housing and Builders Association, Parent Teacher Associations, VDEM, DEQ, and DCR. Potential outreach needs include: flood risk awareness, focus on repetitive loss property owners in outreach efforts, contingency planning for businesses, response guidance with emphasis on community resiliency, publicizing the County's mitigation efforts, informing property owners of long-term and short-term property protection measures (*e.g.,* protecting vinyl siding windows from wind damage, flood vent demos and displays), creating a dedicated web site/social media sites for floodplain management permitting process, early preparation of post-disaster permitting and redevelopment materials such as press releases, videos, brochures, forms, and fees. Use questionnaires on social media to garner feedback.

JAMES CITY COUNTY MITIGATION ACTION 7	
Conduct annual Hazard Mitigation Workshop to update and share hazard mitigation information, discuss potential projects. Invite relevant County departments, non-profit agencies and other stakeholders. Develop annual Hazard Mitigation Potential Project List with ready packages for submittal as funding becomes available.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Ready packages for submittal will: • allow the County to increase focus on hazard mitigation opportunities; • closely track hazard mitigation efforts, implementation, and successes; and, • maximize opportunities to move forward with specific mitigation actions identified over time.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 3, Objectives 3.1., 3.3; Goal 4, Objectives 4.1, 4.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management, Finance, Community Development/General Services , VDEM, Silver Jackets, VFMA
Implementation Schedule:	Immediately
ADDITIONAL COMMENTS	

JAMES CITY COUNTY MITIGATION ACTION 8	
Implement regulations and procedures to ensure that site development projects, including those initiated by the County, are consistent with the protection of environmentally sensitive areas and the maintenance of the County's overall environmental quality so that development projects do not exacerbate current or future flooding in flood prone areas.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Protecting new development from increasing current or future flooding may increase development costs in the near-term but reduces response and repair costs in the future.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.3, 1.6
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD on project-specific basis
Potential Funding Sources:	DHS: BRIC; Virginia CFPF
Lead Agency/Department Responsible:	All
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	
This action is also included in the County's Comprehensive Plan, *2045: Our County, Our Shared Future.*	

JAMES CITY COUNTY MITIGATION ACTION 9	
Finalize, fund and implement the County's Flood Resiliency Plan and associated projects, which are adopted herein by reference. Projects are expected to include shoreline erosion and stream restoration projects among others. Three watershed management plans are also expected to begin in the near future (2 are updates and 1 is new), which will prioritize stream restoration needs and outline priorities for CIP funding.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Flood resiliency planning will take into account future conditions for precipitation and flooding in an effort to reduce not just short term average annual flood damages, but also long-term damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/Low – three repetitive flood loss areas on Chickahominy River have relatively moderate NRI flood risk as do the 5 along Powhatan Creek. The areas near Lake Powell and James Terrace have low NRI flood risk.
Estimated Cost:	Staff time for Resiliency Plan; detailed project costs to be determined in planning process
Potential Funding Sources:	CIP; Virginia CFPF; DHS: BRIC, FMA, HMGP; USACE: SFCP, FPMS
Lead Agency/Department Responsible:	Community Development/General Services
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	

YORK COUNTY

YORK COUNTY MITIGATION ACTION 1	
Continue outreach efforts using the following steps: **1. Assess County's public information needs** **2. Formulate multi-hazard messages** **3. Identify outreach projects to convey the messages** **4. Examine other public information initiatives** **5. Implement**	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	The organized nature of the approach reduces long-term costs by: 1) minimizing need to repeat messages; 2) investigating regional partnerships that could result in additional cost savings through cost sharing; 3) using existing programs and resources to maximum advantage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm, Landslide/Coastal Erosion, Tornado, Earthquake, Wildfire, Drought, Extreme Heat and Hazardous Materials Incident, Flooding Due to Impoundment Failure/High Hazard Dam, Radon Exposure, Pandemic Flu or Communicable Disease
Goal(s) Addressed:	Goal 2, Objective 2.1; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Less than $7,500
Potential Funding Sources:	Existing budgets and staff time
Lead Agency/Department Responsible:	Emergency Management, Development Services
Implementation Schedule:	Within 2 years of plan adoption

ADDITIONAL COMMENTS
Audiences include: property owners, elected officials, businesses, County officials, pet owners, and schoolchildren. Stakeholders may include: various County departments, HRPDC, Peninsula Housing and Builders Association, Parent Teacher Associations, VDEM, DEQ, DCR, and American Red Cross. Potential outreach needs include: content and method of public service announcements, flood risk awareness, focus on repetitive loss property owners in outreach efforts, contingency planning for businesses, publicizing the County's mitigation efforts, informing property owners of long-term and short-term property protection measures (*e.g.,* protecting vinyl siding windows from wind damage), creating a dedicated web site/social media sites for floodplain management permitting process, increasing property owner awareness of flood zone location and flood insurance availability, awareness of the flood hazard in general, and information about the Letter of Map Amendment process regarding the FEMA FIRM, early preparation of post-disaster permitting and redevelopment materials such as press releases, videos, brochures, forms, and fees. Use questionnaires on social media to garner feedback.

YORK COUNTY MITIGATION ACTION 2	
Continue strengthening the County's Floodplain Management Program with the following actions: **1) Review and update floodplain ordinance regularly and continue to provide annual Floodplain Management Report;** **2) Consider regulating land outside 100-year floodplain but subject to future flooding as a result of sea level rise;** **3) Continue participating in the Community Rating System;** **4) Collect lowest floor elevation data for flood-prone structures;** **5) Continue specialized training and support for Certified Floodplain Manager (CFM) certification for floodplain plan reviewers, inspectors and permit processors; and,** **6) Continue to assess repetitive flood loss data annually for loss accuracy, geographic accuracy, and determination whether structure(s) on property have been mitigated and if so, by what means. Provide corrections as necessary using FEMA AW-501.**	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Countywide
Cost Benefit:	The NFIP has a proven record of reducing annual flood damages through floodplain regulations that guide design of flood-prone properties.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Winter Storm, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.4; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – The majority of the county's repetitive loss areas have relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Public Works and Development Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 3	
Retrofit or floodproof structures in flood-prone areas; projects may include elevation, acquisition, relocation and minor localized flood reduction projects. Wind retrofit measures are also included and may be appropriate for some structures, especially publicly-owned structures. This action includes Mitigation Reconstruction projects. Tie mitigation efforts to outreach efforts listed in action #1 and encourage property owners to perform minor retrofits on their own.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Countywide, and Countywide for wind retrofits.
Cost Benefit:	Retrofit measures that address flood- and wind-prone structures, particularly those designated as repetitive loss or severe repetitive loss by the NFIP, have quantifiable benefits by reducing future damages to the structures. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the county's repetitive loss areas have relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	In multiple phases as grant money becomes available. Individual structure costs vary.
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; USDA; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, Public Works, Planning
Implementation Schedule:	Ongoing as opportunities are identified
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 4	
Develop public outreach materials to educate citizens about the wildland fire hazard and the wildland/urban interface.	
BACKGROUND INFORMATION	
Site and Location:	Wildfire urban interface zones countywide
Cost Benefit:	Knowledge of wildfire hazards can be helpful in encouraging homeowners to mitigate the hazard themselves. Low-cost measures are available to responsibly mitigate the wildfire hazard, especially during high risk times.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	Goal 2, Objective 2.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Department of Fire and Life Safety
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 5	
Maintain program for continued assessment and mitigation of identified stormwater "choke points"; ensure roads remain flood free for evacuation of low-lying areas.	
BACKGROUND INFORMATION	
Site and Location:	Countywide; especially ensuring access/egress to the Seaford and Back Creek Road areas.
Cost Benefit:	Pre-disaster assessment and action to alleviate choke points can reduce flooding damage and improve the stormwater system's ability to perform as designed.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	This program is absorbed into staff time spent on stormwater program and thus is not budgeted separately.
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 6	
Evaluate critical facilities for safety and sustainability during emergencies. Take appropriate corrective actions, which may include but are not limited to: providing backup power sources, wind retrofits and flood retrofits.	
BACKGROUND INFORMATION	
Site and Location:	Countywide to include generators to boost effectiveness of York High School and construction of a new Sheriff's Office with generator power
Cost Benefit:	Critical facility operation protects the public, maintains governmental operations and furthers community sustainability.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	To be determined
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Department of Fire and Life Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 7	
Continue support of the Newport News Department of Public Utilities (Waterworks) forest management program to mitigate wildfire hazards and promote the health of forests within the reservoir watersheds.	
BACKGROUND INFORMATION	
Site and Location:	Waterworks reservoir watersheds in the County
Cost Benefit:	This ongoing program reduces the number of fires, and works to control pine beetle infestations. Forest thinning is a primary control mechanism. This is one of many programs the utility implements related to hazard mitigation. Additional benefits from environmental or ecosystem benefits may be included in the benefits cost analysis.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Winter Storm
Goal(s) Addressed:	Goal 1, Objective 1.3; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Waterworks Enterprise Fund, existing budgets; DHS: HMGP
Lead Agency/Department Responsible:	Department of Fire and Life Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 8	
Manage shoreline erosion through the following actions: **1. Request and share VIMS staff recommendations for shoreline erosion control permit applications with Wetlands Board citizen members; and,** **2. Continue to include shoreline erosion control element in the Comprehensive Plan.**	
BACKGROUND INFORMATION	
Site and Location:	Shorelines countywide
Cost Benefit:	
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.6; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate – NRI Hurricane Risk
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Development Services Department, Planning Division, Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 9	
Increase knowledge of hazardous materials storage areas to reduce impacts from overlapping hazard events through the following: **1) Create and maintain geodatabase of known storage locations of hazardous materials;** **2) Add hazmat data to dispatch system so that first responders can better visualize sites during response;** **3) Use data layer to build better response capabilities; and** **4) Analyze data in conjunction with other hazard layers (flood, sea level rise, wildfire, etc.) to identify problem areas and possible retrofits to reduce risk.**	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Database provides critical information for hazard planning, especially when hazards overlap. For example, knowing the location of hazardous materials in the floodplain can be a critical element in floodplain management planning.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Incident, Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm, Earthquake, Wildfire
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$5,000 to $10,000
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Fire and Life Safety, Information Technology (GIS), PLEPC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
County has hazard point layers that requires continual update and maintenance. Peninsula LEPC is working to establish this capability throughout the Peninsula region.	

YORK COUNTY MITIGATION ACTION 10	
Install and maintain high water marks signs and gauges in flood-prone areas.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas countywide
Cost Benefit:	Drivers who are aware of the extent of high water on roads can avoid unsafe travel, avoiding damage to humans, rescue personnel, and vehicles.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – The majority of the county's repetitive loss areas have relatively high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	Estimated $200 per sign post, installed
Potential Funding Sources:	HRPDC; VDOT; DHS: BRIC, HMGP, HMGP 5% Initiative; Virginia CFPF; USACE: FPMS
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	
High water signs and markers have been strategically placed in low-lying areas of York County. They are regularly inspected and maintained - especially during the approach of significant storms. York County has investigated tidal gauges/sensors through VIMS and the City of Newport News. County is currently relying on the gauge near the USCG Base (Yorktown).	

YORK COUNTY MITIGATION ACTION 11	
Consider expanding existing Pre-Disaster Debris Management Plan to refocus beyond stormwater management on public property and to include public outreach and hazardous materials facilities. Remove existing trees and debris that pose hazard during natural disaster.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Pre-disaster debris management reduces damage to structures and infrastructure from flood, wind and possibly snow. Also, regular clean-up requirements can reduce the costs of post-disaster debris clean-up. County could also have access to the additional 5-percent cost incentive from FEMA's Public Assistance money.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 2; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing capital budgets; HMGP, HMGP 5% Initiative, BRIC or FMA (with very clearly articulated benefits for flood damage reduction); Virginia CFPF
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	
Prior to any significant storm, Public Works inspects and cleans every ditch within the County. Any hazards or debris found in the ROW are removed. The County does not enter private property to remove existing hazards without a Right of Entry Permit. This action is only done on an as needed basis (for example, it was done following Hurricane Isabel in 2003). Consider adding language that encourages citizens to perform pre-storm inspections and take action on their own to reduce risk.	

YORK COUNTY MITIGATION ACTION 12	
Align existing Disaster Recovery Plan with regional expectations. As Hampton Roads region develops a regional plan, continually monitor progress to ensure York County has all necessary components up to date.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Recovery plans reduce vulnerability after an event by helping to ensure that "return to normalcy" is coupled with mitigation strategies to address long-term vulnerability.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1; Goal 2: Objective 2.3; Goal 3: Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	Low/Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	DHS: BRIC, HMGP; Virginia CFPF
Lead Agency/Department Responsible:	Planning Division, Emergency Management
Implementation Schedule:	Within 5 years of plan adoption and in accordance with regional plan schedule
ADDITIONAL COMMENTS	

YORK COUNTY MITIGATION ACTION 13	
Review and consider adoption of International Residential Code Appendix F, Radon Control Methods. This appendix to the Virginia USBC contains provisions intended to mitigate the transfer of radon gases from the soil into dwelling units.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, although measures could be targeted to high radon concentrations areas of the County if future data collection and mapping provides improved data
Cost Benefit:	Mitigation measures to resist radon entry into new construction and prepare the building for post-construction radon mitigation (if necessary) require minimum cost at the time of construction.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Radon Exposure
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.5; Goal 3: Objective 3.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Building Regulation
Implementation Schedule:	Within 5 to 7 years after plan adoption
ADDITIONAL COMMENTS	
See requirements at: https://codes.iccsafe.org/content/IRC2018/appendix-f-radon-control-methods	

YORK COUNTY MITIGATION ACTION 14	
Modify County Comprehensive Plan (Charting the Course to 2035) to account for hazard mitigation and flood resiliency.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Cost is minimal to incorporate hazard mitigation plan elements, such as actions, goals and objectives, into an accompanying plan for the county's future. Plan integration helps reduce conflict and re-emphasize important concepts in the mitigation planning arena.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	All
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	CIP, Virginia CFPF
Lead Agency/Department Responsible:	Planning Division
Implementation Schedule:	In conjunction with next scheduled Comp Plan update
ADDITIONAL COMMENTS	

NORFOLK

NORFOLK MITIGATION ACTION 1	
Maintain and protect the City's beaches and shorelines using structural means.	
BACKGROUND INFORMATION	
Site and Location:	Chesapeake Bay, Willoughby Bay, Elizabeth River, Lafayette River, Pretty Lake shorelines
Cost Benefit:	Increased frequency and severity of flooding in Norfolk is expected to dramatically increase flood damages in coming years. Without well-planned protection measures, Norfolk's shoreline is particularly vulnerable to erosion resulting from floods and sea level rise. FEMA will now fund hazard mitigation projects that include sea level rise estimates for calculating benefits.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Landslide/Coastal Erosion, Tropical/Coastal Storm Surge
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3; Goal 3, Objectives 3.1, 3.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High –The majority of the census tracts along the shoreline have relatively high or very high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	$300,000,000 (5-year expenditure)
Potential Funding Sources:	USACE, General funds, CIP, CFPF, Municipal Bonds, Special Service District Assessments, DHS: HMGP, BRIC
Lead Agency/Department Responsible:	Office of Resilience, Public Works
Implementation Schedule:	Ongoing
COMMENTS	
Multiple activities are covered under this effort, including breakwater and other structural features, beach surveys and source identification, and environmental permitting. Following completion of the recent USACE beach nourishment project, periodic renourishment is required on the average of once every nine years in order to maintain the integrity of the flood and storm protection. Norfolk completes biennial dune surveys and wave gauge monitoring as part of its maintenance commitment to the USACE. In January 2022, Norfolk was awarded up to $249.3M for Coastal Storm Risk Management; $134M needed from nonfederal sponsor. See Norfolk Action 2 for related nonstructural CSRM projection measures.	

NORFOLK MITIGATION ACTION 2	
Maintain and protect the City's beaches and shorelines using natural shoreline protection measures.	
BACKGROUND INFORMATION	
Site and Location:	Chesapeake Bay, Willoughby Bay, Elizabeth River, Lafayette River, Pretty Lake shorelines
Cost Benefit:	Increased frequency and severity of flooding in Norfolk is expected to dramatically increase flood damages in coming years. Natural protection measures help the shoreline adjust to sea level rise with less intervention. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Landslide/Coastal Erosion, Tropical/Coastal Storm Surge
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.6; Goal 3, Objectives 3.1, 3.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High –The majority of the census tracts along the shoreline have relatively high or very high NRI flood risk, which includes analysis of social vulnerability.
Estimated Cost:	$50,000,000
Potential Funding Sources:	USACE, General funds, CIP, CFPF, Municipal Bonds, Special Service District Assessments, DHS: HMGP, BRIC
Lead Agency/Department Responsible:	Office of Resilience, Public Works
Implementation Schedule:	Ongoing
COMMENTS	
Multiple activities are covered under this effort, including shoreline restoration, and dune planting and stabilization and environmental permitting. Features include Natural and Nature Based Features (NNBFs). The first segment of the Coastal Storm Risk Management project with the USACE calls for 7,200 lf new living shorelines (+3,800 lf mitigated), and 5,250 lf of oyster reefs.	

NORFOLK MITIGATION ACTION 3
Provide educational engagement and improve communications to residents to increase awareness of vulnerability to multiple hazards. Focus on hurricanes, sea level rise, flooding, nuisance flooding and severe repetitive flood losses. **Provide engagement that increases citizens' ability to take mitigative actions prior to disaster event. Focus on hurricane preparedness and flood mitigation.**

BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Public education can have numerous intangible benefits from the public safety peace of mind. It can result in preventing or lessening damage caused by disasters and can save lives. Teaching citizens how to protect their lives and property themselves has tangible benefits to property owners and the City by reducing the need to for disaster response and increasing community resiliency.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All Hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4, 1.5: Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$50,000
Potential Funding Sources:	Operating Budget, DHS: HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Preparedness & Response, Chief Resilience Officer, Planning, Public Works, Chief Marketing Officer
Implementation Schedule:	Ongoing

COMMENTS
Outreach to floodplain residents and repetitively flooded areas is a part of the community's CRS program and will continue. This action is also part of the City's Strategy for Continued Compliance with the NFIP.

NORFOLK MITIGATION ACTION 4
Continue to implement capital improvements that improve stormwater management and control flooding, especially for undersized and out-of-date drainage systems and patterns.

BACKGROUND INFORMATION	
Site and Location:	Citywide. Projects mitigate flooding and run-off problems throughout the City. New projects will be chosen as opportunities to improve city TMDL requirements and stormwater capacity are identified.
Cost Benefit:	Annual damage occurs to homes and businesses in vulnerable areas due to poor drainage. FEMA will now fund hazard mitigation projects that include sea level rise estimates.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Approx. $19,000,000 per year
Potential Funding Sources:	General funds, CIP, DHS: HMGP & BRIC, Private funds; Virginia CFPF
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing

COMMENTS
Hazard Mitigation Grants should be considered as a potential funding source and used as a basis for property protection. Existing consultant's study has identified multiple flood mitigation measures. Additional projects will be identified throughout city that will improve drainage capacity as well as improve water quality. The new Watershed Master Plan recently awarded by the Virginia CFPF will update the 2012 Citywide Drainage Master Plan with additional criteria within the prioritization formula to include Social Vulnerability Index as a priority input. Projects and designs should be prepared for future applications of funds when they become available.

NORFOLK MITIGATION ACTION 5
Identify and improve critical facilities and infrastructure to minimize flood and wind damage, specifically targeting schools, EOC and emergency shelters. Action may also include placing utility lines underground or preemptive traffic systems for emergency vehicles. **Purchase and install generators or other continuous power sources for critical facilities and infrastructure. This action may include, but is not limited to pump stations, EOC, shelters, underpasses and important traffic signals.** **Include critical public facility generator requirements and required connection materials in the USACE Emergency Power Facility Assessment Tool (EPFAT).**

BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Critical facilities are located within the floodplain due to built environment of the City. Providing protected utilities and backups are necessary to properly aid in protecting and serving citizens. Maintaining a functioning EOC is vital to response and recovery efforts Citywide from a large variety of possible hazards. Damage occurs yearly with damaged equipment and vehicles stuck in underpasses. During Hurricane Isabel, City lost +90 percent of traffic signal operations for various time periods. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$1,000,000
Potential Funding Sources:	DHS: HMGP, BRIC, Virginia CFPF; ARPA
Lead Agency/Department Responsible:	Public Works, Emergency Preparedness & Response, Public Utilities
Implementation Schedule:	Ongoing

COMMENTS
This action may include multiple projects including, upgrading of utilities and emergency connections, as well as improving transportation access to buildings and flood protection of facilities.

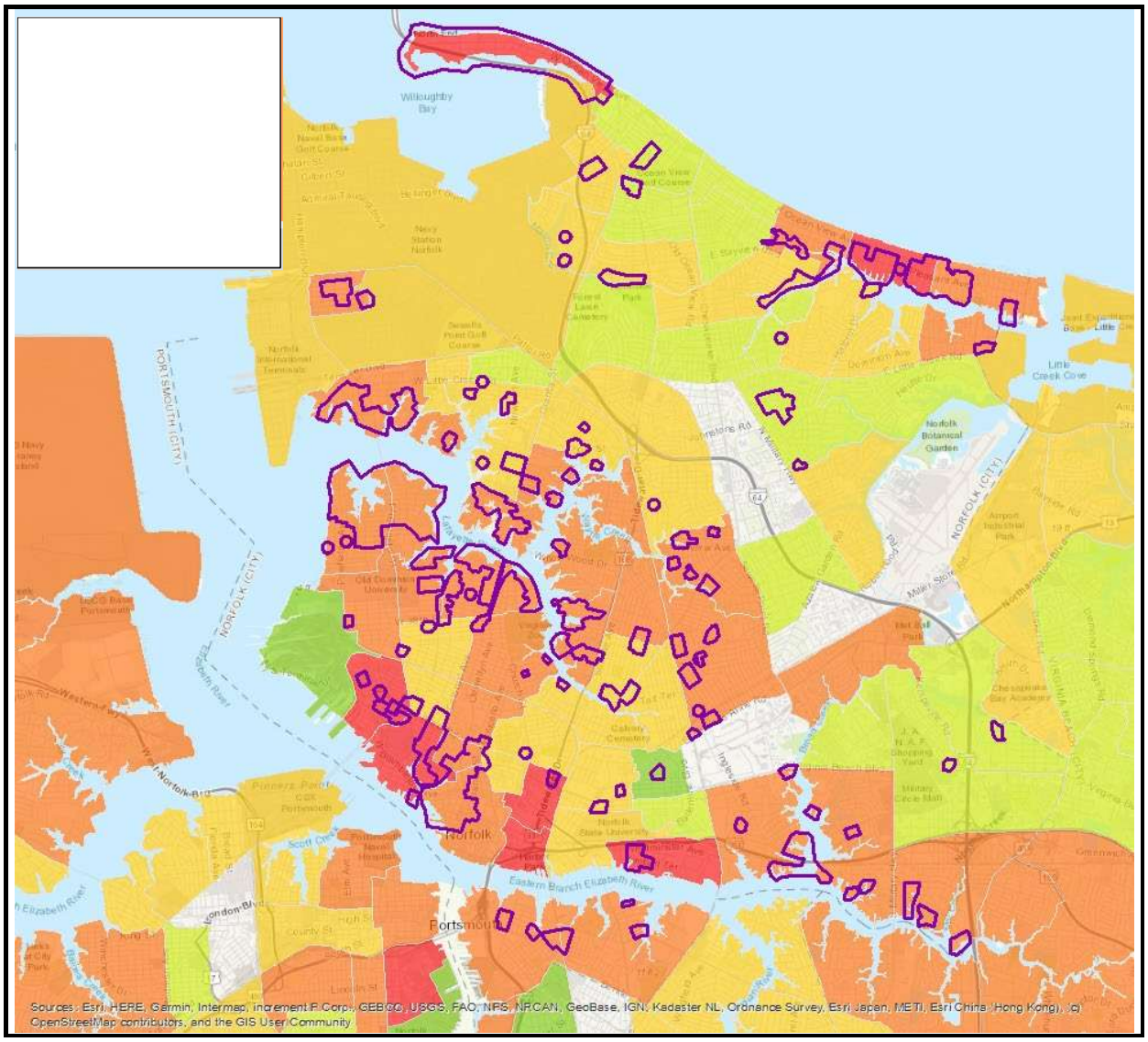
NORFOLK MITIGATION ACTION 6
Protect flood-prone structures through the following ongoing actions: **1) Incorporate CDC's Social Vulnerability Index tools to align actions with the City's commitment to being a diverse, equitable and inclusive city;** **2) Give highest priority to protection of "severe repetitive losses" as defined by the National Flood Insurance Program (NFIP), including verifying the location of all repetitive losses, verifying location and need for mitigation;** **3) Second highest priority to mitigation of historic resources, or meeting the Secretary of the Interior's standards for eligibility as a historic resource. Historic resources should be protected in place, or relocated; raised not razed;** **4) Prepare Repetitive Loss Area Analyses for CRS credit under CRS Activity 512(b);** **5) Elevate, acquire, relocate or otherwise retrofit structures. This action includes Mitigation Reconstruction projects for non-historic resources, ground floor conversion projects and basement fill projects.** **6) Target potential properties or clusters of properties on low elevations near wetlands for purchase and conversion to public open space;**

BACKGROUND INFORMATION	
Site and Location:	Floodplains throughout the City, particularly those with high social vulnerability
Cost Benefit:	Repetitive losses and severe repetitive losses drain public funds for disaster response and require repeated expenditures on the part of property owners. Mitigation actions that fix the problems long-term are cost effective when average annual damages exceed average annual costs of retrofitting, elevating or acquiring the structure. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Very High – Norfolk has 114 repetitive flood loss areas; 87 of them (or 76%) are located

	in areas designated as having Relatively High or Very High NRI flood risk. See map excerpt below for additional detail.
Estimated Cost:	$5,000 to $300,000 per structure.
Potential Funding Sources:	DHS: HMGP, FMA, BRIC, FMA; USACE: FPMS; Virginia CFPF
Lead Agency/Department Responsible:	City Planning
Implementation Schedule:	Ongoing

COMMENTS
Structures insured through the NFIP are often eligible for more grant funds than uninsured structures. The repetitive flood loss areas provided in Section 5 of this plan will help identify areas of the City to be addressed through this action. Measures should include parcel scale, neighborhood scale, and watershed scale protection measures. Parcel scale measures include rain barrels, pervious pavers, and rain gardens amongst other best practices.


Willoughby Bay
Norfolk Botanical Garden
Little Creek Cove
Norfolk
Portsmouth
Eastern Branch Elizabeth River
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

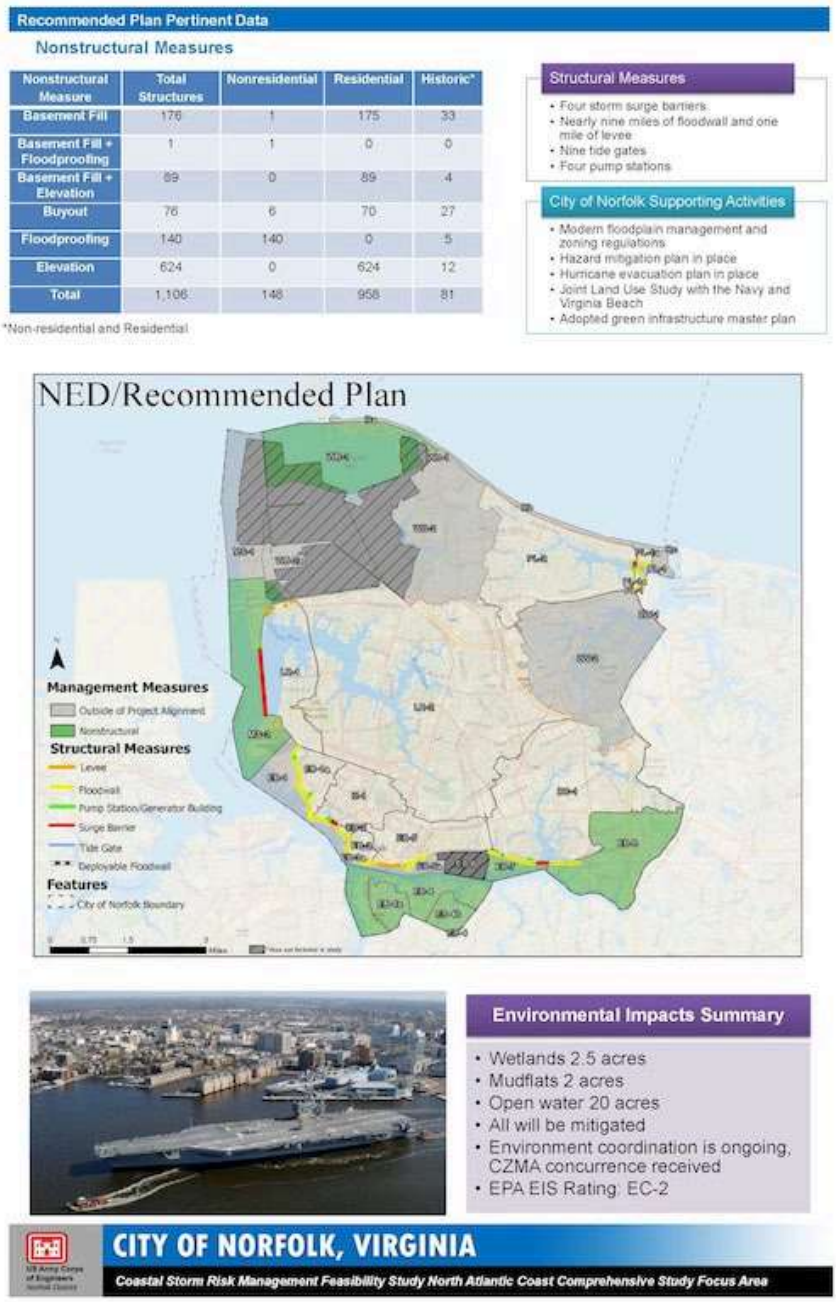
NORFOLK MITIGATION ACTION 7	
Implement a full rollout of Crisis Track to improve post-event damage assessment procedures so that damages, event frequencies, and other data are more readily available for mitigation planning and fully integrated into VDEM and FEMA's SDE Tool.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Crisis Track will allow easier processing of post-disaster permits and assessments, increasing reliance on the system and integration with VDEM systems for assessing damage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquakes, Flooding Due to Impoundment Failure/High Hazard Dam
Goal(s) Addressed:	Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	HMGP, HMGP 5% Initiative, City funds, VDEM
Lead Agency/Department Responsible:	Information Technology, Emergency Preparedness & Response, Finance, City Planning, Neighborhood Services
Implementation Schedule:	Ongoing
COMMENTS	
Create and implement a post-incident data collection plan which would organize city staff, volunteers and damage assessment teams. Include pre-approved documents and procedures with regard to substantial damage/improvement and personnel to conduct inspections/determinations.	

NORFOLK MITIGATION ACTION 8	
Implement actions to improve Community Rating System (CRS) classification to at least a Class 4 with a 30 percent discount on most flood insurance policies.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The City's Class 5 rating currently results in flood insurance premium savings of 25%. The dollars saved go back into property owners' pockets to spend in the local economy. Implementing additional activities creditable under CRS is expected to increase the number of policies Citywide, thus decreasing reliance on City and federal resources after a flood. Many of the measures suggested by CRS activities are non-structural in nature and help reduce the flood vulnerability of new and substantially improved construction.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objective 1.2; Goal 2, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$500,000
Potential Funding Sources:	Staff time; Virginia CFPF
Lead Agency/Department Responsible:	Planning & Community Dev.; Public Works
Implementation Schedule:	Within 3 years
COMMENTS	
Lobby for changes to State stormwater requirements to obtain CRS Watershed Management Plan credit.	

NORFOLK MITIGATION ACTION 9	
Assess and protect historic resources and structures from flooding and sea level rise. Measures should include short-, medium- and long-term solutions.	
BACKGROUND INFORMATION	
Site and Location:	Historic structures and areas throughout the City
Cost Benefit:	Historic structures throughout the city are located in flood prone areas. Value of historic resources are more than just the value of the structure which adds value to normal mitigation methods.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – All of the City's historic districts with one exception are in areas of Very High or Relatively High NRI Flood Risk. (Ballentine Place is rated Moderate.)
Estimated Cost:	Staff time/consultant fees estimated at $50,000 to resurvey existing historic areas with new surveys estimated at $75,000
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; Virginia CFPF; NPS, VDHR, Preservation Virginia
Lead Agency/Department Responsible:	City Planning, Chief Resilience Officer
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Initial methods should include updating surveys of listed historic areas and structures. Other neighborhoods should be reviewed and determined if the structures and integrity of the neighborhood have been preserved to allow for additional surveys. Different methods should be explored to preserve and protect structures, including generation of FEMA approved guidance for protection of these structures and areas that differ from current allowed practices for residential and non-residential structures.	

NORFOLK MITIGATION ACTION 10	
Identify and implement resilient strategies throughout the city to provide better watershed, neighborhood and parcel specific flood protection and mitigation. Perform feasibility study for coastal storm risk protection for Norfolk southside neighborhoods based on future sea level rise and flood conditions. Other projects include, but are not limited to recommendations of the Joint Land Use Study in conjunction with the City of Virginia Beach and the U.S. Navy, as well as the Norfolk Coastal Storm Risk Management solutions.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Resilient strategies range from small to larger scale projects. Ability to provide protection to properties at risk with innovative measures are necessary to protect entire city.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Variable based on individual projects.
Estimated Cost:	+$60,000,000
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC, ACOE, City CIP, HUD; USACE; Virginia CFPF; OLDCC through DoD MIR Review; ARPA
Lead Agency/Department Responsible:	Chief Resilience Officer, Public Works, City Planning, Emergency Preparedness and Response
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Methods should include hard infrastructure and green infrastructure. Multiple methods can be joined together to provide better protection to the properties and all citizens. JLUS recommendations include: Willoughby Bay Shoreline Floodwall Willoughby Spit Floodplain Management Strategy Pretty Lake Storm Surge Barrier Norview Avenue Drainage Study Resilient Underpass Pump Station Study Lafayette River Annex Vulnerability Study Mason Creek Flood Mitigation Strategy Wastewater Treatment Plant Vulnerability Assessment Terminal Boulevard Rail and Roadway Grade Separation (new rail underpass)	

Norfolk Coastal Storm Risk Management solutions are shown in the diagram below.



NORFOLK MITIGATION ACTION 11	
Explore partnership with NASA to use Interferometric Synthetic Aperture Radar (InSAR) to study changes in the rate of localized subsidence and possible links to relative sea level rise.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	InSAR makes high-density measurements over large areas by using radar signals from Earth-orbiting satellites to measure changes in land-surface altitude at high degrees of measurement resolution and spatial detail. It is often less expensive than obtaining sparse point measurements from labor-intensive spirit-leveling and GPS surveys, and can provide millions of data points in a region about 10,000 square kilometers.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 3: Objectives 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Virginia CFPF; National Science Foundation; ODU ICAR
Lead Agency/Department Responsible:	Office of Resilience, NASA
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	

NORFOLK MITIGATION ACTION 12	
Update the City's Combined Coastal and Precipitation Flooding Master Plan to meet the minimum CRS requirements for a Watershed Master Plan	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The CRS watershed master will provide Norfolk with a tool it can use to make decisions that will reduce the increased flooding from development on a watershed-wide basis and incorporate future conditions to inform CIP investment decisions and land development policy that addresses existing flood problems.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Tropical/Coastal Storm Surge
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.6; Goal 2, Objective 2.1; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$350,000
Potential Funding Sources:	General funds, CIP, Virginia CFPF
Lead Agency/Department Responsible:	Office of Resilience, Public Works, Planning
Implementation Schedule:	Ongoing
COMMENTS	
The City of Norfolk was awarded a $315,000 grant from the Virginia CFPF for this effort. Norfolk will provide $35,000 and solicit a consultant to facilitate development of the watershed master plan, incorporating future conditions and including social vulnerability as a factor within the prioritization formulae.	

NORFOLK MITIGATION ACTION 13	
Obtain direct technical assistance to incorporate green infrastructure, social vulnerability, and environmental justice into Benefit-Cost Analysis/Ratio (BCA/R) calculations for structural/hybrid flood protection measures for the Southside communities of Berkley and Campostella.	
BACKGROUND INFORMATION	
Site and Location:	Southside communities of Berkley and Campostella
Cost Benefit:	The BCR methodology used for the CSRM feasibility study does not account for the decades of redlining and disinvestment that has plagued the Southside and depressed BCR inputs such as property assessments. The Southside has "Very High Social Vulnerability," with low access to transportation, making the population difficult to evacuate. Southside is a "disadvantaged community" (EO 14008) and is surrounding by heavy industry which will bring environmental toxins and life-threatening debris into the community in the event that only nonstructural flood protection measures are provided.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Tropical/Coastal Storm Surge, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5, 1.6; Goal 3, Objectives 3.2, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$100,000 - $250,000
Potential Funding Sources:	BRIC, General funds, CIP, Virginia CFPF
Lead Agency/Department Responsible:	Office of Resilience
Implementation Schedule:	Ongoing
COMMENTS	
The Southside community is historic, with large portions listed on the National Register of Historic Places.	

NORFOLK MITIGATION ACTION 14	
Increase number of real-time flood inundation storm sensors installed throughout the City and made available for public API integration within Norfolk Open GIS Data portal.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Storm sensors optimization within a real-time continuous-simulation model will allow City staff and the public to refine the inputs necessary to inform high-tech outputs such as a refined Digital Elevation Model for Norfolk, real-time STORM Dashboard map, flooded street re-router for Waze GPS app, tailwater conditions for urban coastally-influenced stormwater systems.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sea Level Rise and Land Subsidence, Flooding, Tropical/Coastal Storm Surge
Goal(s) Addressed:	Goal 1, Objectives 1.5; Goal 3, Objectives 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$250,000 - $750,000
Potential Funding Sources:	General funds, CIP, Virginia CFPF, HRPDC
Lead Agency/Department Responsible:	Office of Resilience, Public Works, EOC
Implementation Schedule:	Ongoing
COMMENTS	
The City of Norfolk was awarded a $315,000 grant from the Virginia CFPF for this and related efforts. The HRPDC was the recipient of a grant to install multiple storm sensors throughout Hampton Roads, including five in Norfolk.	

PORTSMOUTH

PORTSMOUTH MITIGATION ACTION 1	
Develop a post-disaster continuity of operations plan to assist in more rapid recovery after a disaster.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	By identifying post-disaster processes for almost all City department functions across an array of hazard events, and putting these processes on paper, the plan would aid staff and temporary staff in keeping processes running smoothly and not contributing to additional conflicts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.4, 1.5; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$25,000
Potential Funding Sources:	Staff time, DHS planning grants, HMGP 5% Initiative; ARPA
Lead Agency/Department Responsible:	Emergency Management, Planning, Permits & Inspections, Engineering, Public Works
Implementation Schedule:	Phase II is being planned and awaiting funding
ADDITIONAL COMMENTS	
Identifying post-disaster processes/functions for all departments could feed into a recovery plan for future disasters.	

PORTSMOUTH MITIGATION ACTION 2	
Designate non-flood-prone pickup points within the city evacuation zones to assist citizens who must rely on alternative or public transportation to evacuate.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	As seen with Hurricane Katrina, the evacuation of large numbers of residents after a hazard event has already commenced adds layers of difficulty and danger. Promoting and providing safe pickup points will reduce hazards to citizens.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.4, 1.5; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	Staff time for identification of population centers and publicizing the pickup points
Potential Funding Sources:	City budgets
Lead Agency/Department Responsible:	Emergency Management, Planning
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
Locations have been established for hurricane evacuation, along with agreement with HRT to help in an event. More robust analysis is needed to refine pickup points and also determine points of distribution during an emergency.	

PORTSMOUTH MITIGATION ACTION 3	
Hurricane/flood outreach/education to residents and businesses. Determine new and best way(s) to get information to the most vulnerable and least connected residents.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Protection of personal property and lives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 2, Objective 2.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	$20,000
Potential Funding Sources:	City budgets; use free FEMA materials when available; HMGP 5% Initiative; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, Planning
Implementation Schedule:	Continuous
ADDITIONAL COMMENTS	
Flyers have been used in the past, primarily on topic of flooding with some information on hurricanes. These are sent out to those in the flood zones. Fire Dept sends out notifications on social media through City Marketing department.	

PORTSMOUTH MITIGATION ACTION 4	
Identify sources and evaluate use of available data to pinpoint the location of persons with disabilities for mitigation, evacuation, response, recovery.	
BACKGROUND INFORMATION	
Site and Location:	Citywide areas of high social vulnerability
Cost Benefit:	Protection of persons with disabilities before, during and after hazard events has broad benefits for protecting lives and property.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.4, 1.5; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	To be determined as projects are identified.
Potential Funding Sources:	City budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Planning, GIS
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
City contractor will review available data sources on vulnerability indices as potential addendum to this plan. Certain data is difficult to obtain because of privacy concerns (e.g. health department raw data).	

PORTSMOUTH MITIGATION ACTION 5	
Implement additional flood monitoring stations to track real-time water levels in targeted areas to support response efforts. Leverage regional efforts to determine best technology, including cost effectiveness analysis.	
BACKGROUND INFORMATION	
Site and Location:	Olde Towne/ Downtown, Paradise Creek/ Cradock
Cost Benefit:	Enable real-time assessment of flood levels which will allow more responsive warnings and alerts to be broadcast.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4, 1.5; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	$80,000 plus $10,000 annual maintenance
Potential Funding Sources:	USGS, FEMA, State, City budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Planning, Emergency Management, HRPDC
Implementation Schedule:	Within 5 years
ADDITIONAL COMMENTS	
System in place to collect and report data. Still in process of improving functionality of software.	

PORTSMOUTH MITIGATION ACTION 6	
Systematically track and map areas that sustain non-tidal flooding and "sunny day" flooding, with focus on currently flooded streets and areas susceptible to future flooding. Allow community to sign up for notifications when streets flood and pair floodwater sensors with rain gauge data to improve prediction capability. Expand number of sensors.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Tracking where flooding actually occurs will allow mitigation action and projects to be directed to those areas. Flooded roads reduce functionality of transportation system, hampering commerce and emergency response.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	Staff time
Potential Funding Sources:	City CIP budget
Lead Agency/Department Responsible:	Engineering, Planning, Emergency Management, Public Works, GIS; DHS: HMGP 5% Initiative; Virginia CFPF
Implementation Schedule:	Continuous
ADDITIONAL COMMENTS	
Desired expansion of existing sensors should focus on accuracy and cost effectiveness.	

PORTSMOUTH MITIGATION ACTION 7	
Protect City's critical infrastructure: 1) implement Citywide drainage improvement projects; 2) elevate city emergency generators above the base flood elevation plus 2 feet freeboard; 3) retrofit/elevate/relocate existing facilities to provide future flood protection.	
BACKGROUND INFORMATION	
Site and Location:	Citywide. Specific examples include Old Town Stormwater Pump Station, new pump station being planned, and Frederick Boulevard corridor upgrades.
Cost Benefit:	Frequent flooding in these areas damages cars, structures and contents. Damages to city infrastructure will also be reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	$500,000,000
Potential Funding Sources:	City CIP budget, stormwater funds, FEMA, State; DHS: HMGP
Lead Agency/Department Responsible:	Engineering, Public Works
Implementation Schedule:	Long term; as funding becomes available
ADDITIONAL COMMENTS	
Long-term program. Several projects (e.g. Street drainage, sea-wall, pump station etc.) have been initiated.	

PORTSMOUTH MITIGATION ACTION 8	
Implement action items from 2015 Floodplain Management Plan and Repetitive Flood Loss Plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Each action has separate costs and benefits identified in Plan. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Goal 2, Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	As shown in the plan
Potential Funding Sources:	City budgets, DHS: BRIC, HMGP, Severe Repetitive Loss, stormwater funds; Virginia CFPF
Lead Agency/Department Responsible:	Planning, Emergency Management
Implementation Schedule:	Ongoing. Some long-term as funding available
ADDITIONAL COMMENTS	
Not planning to update the 2015 plan as City as largely transitioned to regional hazard mitigation plan for this role and future Plan/Strategies to be developed.	

PORTSMOUTH MITIGATION ACTION 9	
Mitigate flood-prone and repetitive flood loss structures. Mitigation measures may include acquisition, relocation, elevation, or other retrofit measures to provide flood protection. This action includes Mitigation Reconstruction projects. Develop a guide or adapt an existing manual that advises residents/property owners how they can retrofit their buildings for increased sustainability and resiliency.	
BACKGROUND INFORMATION	
Site and Location:	Within the City's flood zones
Cost Benefit:	Benefits for individual structures are based on the average annual damages, which is based on the structure's lowest floor elevation and frequency of flooding. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	$10,000 to $200,000 per structure (paid by citizen or through grant funds obtained by citizen)
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; Virginia CFPF
Lead Agency/Department Responsible:	Planning, Emergency Management
Implementation Schedule:	Continuous
ADDITIONAL COMMENTS	
At this time, City does not desire to pay for mitigation of individual structures. City intends to provide options, knowledge/technical support, resources and information to support residents in individual efforts.	

PORTSMOUTH MITIGATION ACTION 10	
Determine whether Repetitive Flood Loss properties have been mitigated.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas throughout the City
Cost Benefit:	Repetitively flooded structures strain local and federal resources after disasters, and detract from the fiscal solvency of the NFIP. The NFIP focuses mitigation efforts and funds on properties listed as repetitive losses; therefore, checking the accuracy of the list is a necessity for the NFIP, States and, through this action, local governments.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	Staff time estimated at $50 per structure x 220 structures = $11,000
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC
Lead Agency/Department Responsible:	Planning
Implementation Schedule:	Continuous
ADDITIONAL COMMENTS	
City is continuing to track homeowner efforts via permitting process. FEMA has not made any additional data available on RL/SRL properties.	

PORTSMOUTH MITIGATION ACTION 11	
Advocate for improved and increased grants for mitigation activities from State and Federal sources.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The current processes are long and cumbersome. More streamlined processes and access to mitigation funds will aid in the mitigation of flooded properties and areas.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 3, Objectives 3.1, 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	City budgets
Lead Agency/Department Responsible:	Planning, Emergency Management, Permits & Inspections, Engineering
Implementation Schedule:	Continuous
ADDITIONAL COMMENTS	
City would prefer HMGP funds benefit citizens directly for improvements on private property and to provide additional avenues for mitigation efforts.	

PORTSMOUTH MITIGATION ACTION 12	
Review and revise City's series of procedures and pre-approved messages to ensure that Code sections do not conflict and do not hamper recovery efforts and that permitting is streamlined and efficient. Leverage technology to facilitate prompt permit processing during or after an event using mobile and electronic means.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Ensuring that processes are in place prior to a disaster event will speed recovery and increase the community's resilience.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm, Wildfire, Earthquake
Goal(s) Addressed:	Goal 1; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	City budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Planning, Permits & Inspections, Engineering, Public Works, Emergency Management
Implementation Schedule:	Within 5 years
ADDITIONAL COMMENTS	

PORTSMOUTH MITIGATION ACTION 13	
Review existing plans to ensure that they integrate mitigation concepts. Ensure that future plans integrate mitigation concepts detailed in the Hazard Mitigation Plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Ensuring that plans incorporate mitigation concepts and strategies will aid the City's resilience.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	City budgets
Lead Agency/Department Responsible:	Planning, Permits & Inspections, Engineering, Public Works, Emergency Management
Implementation Schedule:	Ongoing as new plans are developed
ADDITIONAL COMMENTS	
Build One Portsmouth Comp Plan adopted was successful implementation of this concept.	

PORTSMOUTH MITIGATION ACTION 14	
Implement green infrastructure for flood and stormwater abatement.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Green infrastructure can be a cost-effective approach for improving water quality and can provide multiple environmental, economic, and community benefits. Under HMGP grants, additional benefits from environmental or ecosystem benefits may be included in the benefits cost analysis.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.6
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	To be determined
Potential Funding Sources:	City CIP budget, stormwater funds, FEMA, EPA, State; DHS: HMGP, BRIC; Virginia CFPF
Lead Agency/Department Responsible:	Planning, Engineering, Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Some projects are being initiated (*e.g.* Court Street Improvements). Future projects are prioritizing the use of green infrastructure.	

PORTSMOUTH MITIGATION ACTION 15	
Replace the Seawall.	
BACKGROUND INFORMATION	
Site and Location:	Downtown
Cost Benefit:	The Portsmouth waterfront seawall and bulkhead is a major element of the downtown waterfront. It is aging and in need of replacement to ensure safety of citizens and visitors. It is impacted daily by pedestrian and vessel use, weather and the waters of the river.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.5; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$20,000,000
Potential Funding Sources:	City CIP budget, stormwater funds, FEMA, State
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Significant components of the seawall have been replaced; project is approximately 75% complete.	

PORTSMOUTH MITIGATION ACTION 16	
Create dialogs with other governmental (e.g. HRT, HRSD, Port of Virginia) and non-governmental (e.g. Dominion Virginia Power, Verizon, etc) stakeholders to encourage and coordinate incorporation of mitigation strategies into projects and policies that affect Portsmouth's citizens and visitors.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Ensuring that our partner organizations incorporate mitigation concepts and strategies into their projects and policies will aid the City's resilience.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Hazardous Materials Incident
Goal(s) Addressed:	Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	City budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Planning, Engineering, Emergency Management
Implementation Schedule:	Continuous
ADDITIONAL COMMENTS	
Coordination is ongoing as the City leverages regional meetings to promote mutually beneficial projects. As an example, Dominion has undergounded assets due to high wind assessment in the Churchland area. The recently completed regional Joint Land Use Study with the City of Chesapeake and the U.S. Navy is another example.	

PORTSMOUTH MITIGATION ACTION 17	
Develop inventory of first floor elevations (and possibly Elevation Certificates) of structures in flood zones in low- to moderate-income housing areas.	
BACKGROUND INFORMATION	
Site and Location:	Citywide low to moderate areas
Cost Benefit:	In order to assess any potential mitigation actions, first floor elevations (at a minimum) will be needed. Assisting low to moderate income homeowners to obtain this information will allow these structures to be protected from future flooding.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – The majority of the City's repetitive flood loss areas Very High or Relatively High NRI flood risk.
Estimated Cost:	To be determined
Potential Funding Sources:	USACE, FEMA, HUD; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Planning
Implementation Schedule:	Within 5 years
ADDITIONAL COMMENTS	
City and corporate partners are initiating a new project to provide accurate data collection for a large number of structures in a short timeframe.	

PORTSMOUTH MITIGATION ACTION 18	
Continue implementing City's Heat Injury Prevention Plan and position cool buildings for easiest access by high vulnerability populations and neighborhoods.	
BACKGROUND INFORMATION	
Site and Location:	High vulnerability areas citywide
Cost Benefit:	This low cost plan, when implemented, prevents heat injuries by making existing City buildings available to people without access to air conditioning.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Tropical/Coastal Storm (and associated power outages)
Goal(s) Addressed:	Goal 1: Objectives 1.4, 1.5; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Facility operating costs and minimal staff time to prepare outreach
Potential Funding Sources:	Facility operating costs/utilities
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUFFOLK

SUFFOLK MITIGATION ACTION 1	
Protect repetitively flooded infrastructure and structures through elevation, acquisition, relocation, retrofits or repurposing. Other structural means are included, as appropriate, for protecting critical infrastructure. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the City
Cost Benefit:	In rural areas of the city, roads flood each time there is a significant rainfall. In the urban downtown, commercial structures flood frequently. FEMA now funds hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low/Moderate - Repetitive flood loss areas at Bennetts Creek Ln, Yeates Drive and Bracey Drive have relatively moderate NRI flood risk, which includes analysis of social vulnerability. All other repetitive loss areas are rated Low.
Estimated Cost:	$10,000 to $200,000 per structure; infrastructure protection costs to be determined
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management and Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUFFOLK MITIGATION ACTION 2	
Provide emergency power to critical infrastructure, critical facilities and critical roadway intersections during extended power outages. Increase emergency generator capabilities at school facilities used as shelters to meet ADA functional needs requirements.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the City
Cost Benefit:	Maintaining basic city functions in the aftermath of both major and minor events is important for the safety of citizens and the environment. Emergency power is mandatory at the shelters to address access and medical equipment that requires electricity. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$500,000
Potential Funding Sources:	Existing Budgets; DHS: HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Public Utilities, Public Works, Facility Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
City Hall, Public Works Operations, and Public Works Operations Yards at Whaleyville, Holland and Chuckatuck all have emergency backup generators installed and functional. 36 traffic signals have backup gas generators and 22 signals have battery only backup. New requirement mandates any new signal built or rehabilitated must have a permanent backup generator.	

SUFFOLK MITIGATION ACTION 3	
Provide hurricane and flood outreach and education materials to residents within the City to make flood protection information available to property and business owners and renters.	
BACKGROUND INFORMATION	
Site and Location:	Throughout City floodplains, with materials available at public libraries, recreation centers and City Hall
Cost Benefit:	Protection of personal property and lives
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.5; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$2500
Potential Funding Sources:	Existing budgets; use free FEMA materials; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	

SUFFOLK MITIGATION ACTION 4
Continue to implement capital improvements that improve stormwater management and control flooding, especially for undersized and out-of-date drainage systems and patterns. This action includes all initiatives identified in the 2022 Resilience Plan.

BACKGROUND INFORMATION	
Site and Location:	City-wide. Projects mitigate flooding and run-off problems throughout the City, including drainage projects previously identified and planned such as Oldetown Drainage Project and Oakland Drainage Project
Cost Benefit:	Annual damage occurs to homes and business in vulnerable areas due to poor drainage. Additional green infrastructure values from environmental or ecosystem benefits should be included in the benefits cost analysis.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low/Moderate - Repetitive flood loss areas at Bennetts Creek Ln, Yeates Drive and Bracey Drive have relatively moderate NRI flood risk, which includes analysis of social vulnerability. All other repetitive loss areas are rated Low.
Estimated Cost:	Estimated $1,000,000 annually, but variable based on several factors
Potential Funding Sources:	General funds, DHS: BRIC, HMGP, Private funds; Virginia CFPF
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing

COMMENTS
Hazard Mitigation Grants should be considered as a potential funding source and used as a basis for property protection.

SUFFOLK MITIGATION ACTION 5	
Develop a Resilience Plan that incorporates a stormwater drainage plan to address issues in flood-prone areas; prioritize and implement plan recommendations. This action includes all initiatives identified in the 2022 Resilience Plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Flooding as a result of stormwater accumulation can exacerbate coastal flooding, contributing to flood damages of cars, structures, roads and other infrastructure. Nuisance flooding can result in businesses closed down. Additional green infrastructure values from environmental or ecosystem benefits should be included in the benefits cost analysis.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low/Moderate - Repetitive flood loss areas at Bennetts Creek Ln, Yeates Drive and Bracey Drive have relatively moderate NRI flood risk, which includes analysis of social vulnerability. All other repetitive loss areas are rated Low.
Estimated Cost:	$250,000 to $3,000,000
Potential Funding Sources:	General funds; Virginia CFPF
Lead Agency/Department Responsible:	Planning and Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUFFOLK MITIGATION ACTION 6	
Continue strengthening the City's Floodplain Management Program with the following actions: **1) Reviewing and adopting State Model Floodplain Ordinance, including 1 foot freeboard elevation requirement;** **2) Incorporating floodplain requirements into permit process with information in the online FAQs, BFE required on the building permit application (as required by NFIP), creating and posting online standardized forms for substantial improvement/damage determination;** **3) Providing specialized training and support Certified Floodplain Manager (CFM) certification for applicable City staff;** **4) Preparing educational materials in the permit office on the value of flood insurance, freeboard and NFIP compliance; and,** **5) Continuing participation in the Severe Repetitive Loss program.**	
BACKGROUND INFORMATION	
Site and Location:	Floodplains throughout the City
Cost Benefit:	• The NFIP has a proven record of reducing annual flood damages through floodplain regulations that guide design of flood-prone properties. • Freeboard - More stringent measures for flood prone structures have a very small upfront cost that is recovered within approximately 10 years through lower flood insurance costs. The reduction in average annual damages with just 1 foot of freeboard is substantial.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5; Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low/Moderate - Repetitive flood loss areas at Bennetts Creek Ln, Yeates Drive and Bracey Drive have relatively moderate NRI flood risk, which includes analysis of social vulnerability. All other repetitive loss areas are rated Low.
Estimated Cost:	Staff time
Potential Funding Sources:	Negligible
Lead Agency/Department Responsible:	Planning (lead) and Public Works
Implementation Schedule:	Within 4 years
ADDITIONAL COMMENTS	

SUFFOLK MITIGATION ACTION 7	
Verify the geographic location of each NFIP repetitive loss property, and determine if that property has been mitigated and, if so, by what means.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas throughout the City
Cost Benefit:	Repetitively flooded structures strain local and federal resources after disasters, and detract from the fiscal solvency of the NFIP. The NFIP focuses mitigation efforts and funds on properties listed as repetitive losses; therefore, checking the accuracy of the list is a necessity for the NFIP, States and, through this action, local governments.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding and Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objective 1.1; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low/Moderate - Repetitive flood loss areas at Bennetts Creek Ln, Yeates Drive and Bracey Drive have relatively moderate NRI flood risk, which includes analysis of social vulnerability. All other repetitive loss areas are rated Low.
Estimated Cost:	Staff time estimated at $100 per structure x 13 structures = $650
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; VDEM
Lead Agency/Department Responsible:	Planning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
An initial attempt to contact property owners by mail will be followed up by phone calls, and site visits as necessary. Receipt of data from FEMA or State officials is problematic.	

SUFFOLK MITIGATION ACTION 8	
Retrofit Primary Shelters in the City to conform to the Ultimate Design Wind Speed for Risk Category 3 structures as referenced in the current edition of the Uniform Statewide Building Code, Part 1 (USBC).	
BACKGROUND INFORMATION	
Site and Location:	Citywide locations
Cost Benefit:	According to the Suffolk Public Schools Director of Facilities, none of the schools in the City designated as shelters are engineered to withstand winds greater than 90 mph. A Category 2 or greater hurricane would result in residents having to take shelter outside the City. Transportation costs for such an evacuation would be staggering.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Hazardous Materials Incident, Extreme Heat
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	To be determined
Potential Funding Sources:	Capital budgets; DHS
Lead Agency/Department Responsible:	Capital Programs Director and Public Schools Director of Facilities and Planning
Implementation Schedule:	5 to 7 years
ADDITIONAL COMMENTS	
Hurricane shutters may provide a partial solution for some structures at a lower cost than complete retrofits.	

SUFFOLK MITIGATION ACTION 9	
Install markers indicating the flood water depth along streets or roads subject to tidal, riverine or urban flooding.	
BACKGROUND INFORMATION	
Site and Location:	Flood prone areas citywide; City is developing a program to prioritize the installation of these signs starting with the arterial and collector highways and priority routes within the City's urbanized area.
Cost Benefit:	Elevated water levels in recent weather events have caused damage and down time to emergency vehicles while responding to calls for assistance. These markers can also be useful during droughts to indicate low water levels.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Drought
Goal(s) Addressed:	Goal 1, Objective 1.5; Goal 2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low/Moderate - Repetitive flood loss areas at Bennetts Creek Ln, Yeates Drive and Bracey Drive have relatively moderate NRI flood risk, which includes analysis of social vulnerability. All other repetitive loss areas are rated Low.
Estimated Cost:	<$10,000
Potential Funding Sources:	Public Works annual operating budget; DHS: BRIC, HMGP 5% Initiative; Virginia CFPF
Lead Agency/Department Responsible:	Traffic Engineering, Emergency Management
Implementation Schedule:	3 to 5 years
ADDITIONAL COMMENTS	
Other alternatives considered included developing a policy regarding emergency vehicle operations on flooded streets or roads; however, flood depth markers would have added benefits by alerting a broader audience of citizens and commuters regarding areas with unsafe water levels for driving. Savings of up to $5,000 per City vehicle in repairs could be realized.	

SUFFOLK MITIGATION ACTION 10	
Retrofit the East Suffolk Recreation Center with an emergency generator to support shelter operations for that section of the City.	
BACKGROUND INFORMATION	
Site and Location:	East Suffolk
Cost Benefit:	When school is in session, using a school as a shelter is a conflict. The Recreation Center is a potential alternative. Also, this center would add a second ADA-compatible shelter to the City's shelter inventory, increasing accessibility for persons with disabilities.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low/Moderate - Repetitive flood loss areas at Bennetts Creek Ln, Yeates Drive and Bracey Drive have relatively moderate NRI flood risk, which includes analysis of social vulnerability. All other repetitive loss areas are rated Low.
Estimated Cost:	$7500
Potential Funding Sources:	Capital Budget (for generator), Mitigation Grant (for quick-connect); DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Capital Programs and Facilities, Department of Parks and Recreation
Implementation Schedule:	5 to 7 years
ADDITIONAL COMMENTS	

SUFFOLK MITIGATION ACTION 11	
Work with the owner to rehabilitate Godwin's Millpond Dam.	
BACKGROUND INFORMATION	
Site and Location:	6145 Godwin Boulevard, Suffolk
Cost Benefit:	Potential impacts of dam failure include: 1 roadway (Route 10 for .04 miles downstream), 1 home, and 3 businesses. The dam impounds 165.00 acre-feet at normal pool.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding due to Impoundment Failure/High Hazard Dam, Flooding
Goal(s) Addressed:	Goal 1, Objective 1.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Relatively Low
Estimated Cost:	To be determined based on additional inspection and analysis of retrofits needed.
Potential Funding Sources:	FEMA: HHPD; owner resources; CIP
Lead Agency/Department Responsible:	Fire & Rescue
Implementation Schedule:	3 to 5 years
ADDITIONAL COMMENTS	
Godwin's Millpond Dam was assessed "poor" in 2018 by DCR. The high hazard potential earthen dam is located along Chuckatuck Creek and has a drainage area of 6.87 square miles.	

VIRGINIA BEACH

VIRGINIA BEACH MITIGATION ACTION 1	
Relocate the ComIT Data Center.	
BACKGROUND INFORMATION	
Site and Location:	ComIT Data Center, Building 2, 2405 Courthouse Drive
Cost Benefit:	There have historically been marginal flooding problems in Building 2 that included: 1) Flooding from a leak in the fire sprinkler system on 1st floor. 2) Flooding from leaks in the roof's drainage system. 3) Water backup on the Data Center sub-floor, due to the drainage system, which has occurred on multiple occasions. 4) In 2004, there were two occasions of flooding due to equipment failure in Building 1 where damage and loss of service was avoided only because on-site staff discovered the flood before water reached the Data Center. 5) During Hurricane Isabel, it was necessary to shut down all computer systems in Data Center and physically move equipment to 2nd floor. Moving equipment carries associated risks and at least two servers were corrupted during process.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	To be determined
Potential Funding Sources:	DHS: HMGP, FMA, BRIC, RFC; Existing budgets
Lead Agency/Department Responsible:	ComIT
Implementation Schedule:	Within 1.5 years
ADDITIONAL COMMENTS	
In recent years, the importance of data management to overall City operations has increased the priority of this action. Project is nearing completion. Building 2 construction is in progress. The COMIT Data Center is relocating from the basement of Building 2 to the third floor of Building 2. This work is part of the Building 1, 2 & 11 Phase I Renovation which began in February 2021. The third floor and IT pathways are estimated to be completed in the first quarter of calendar 2022. Installation and turn up of IT equipment is estimated to be complete by the third quarter of calendar year 2022 or sooner.	

VIRGINIA BEACH MITIGATION ACTION 2	
Strengthen the City's Floodplain Management Program with the following actions: **1) Continue participating in the National Flood Insurance Program. Continue enforcement of standards in existing floodplain management ordinance that meet and exceed NFIP minimum requirements;** **2) Incorporate floodplain management tools/regulations into existing development review procedures;** **3) Continue participation in the Community Rating System in order to reduce property owner premiums for flood insurance;** **4) Provide specialized training and support Certified Floodplain Manager (CFM) certification for floodplain plan reviewers, inspectors and permit processors;** **5) Prepare educational materials in the permit office on the value of flood insurance, freeboard and NFIP compliance;** **6) Participate in the Severe Repetitive Loss program to mitigate flood-prone structures; and,** **7) Consider changes to floodplain management ordinance to regulate repetitive flood losses and increase ICC availability, limit the size of enclosures beneath elevated structures in coastal high hazard areas, map and regulate a future conditions 100-year floodplain, and regulate Coastal A Zones to Zone V standards.**	
BACKGROUND INFORMATION	
Site and Location:	Floodplains throughout the City
Cost Benefit:	• The NFIP has a proven record of reducing annual flood damages through floodplain regulations that guide design of flood-prone properties. • The large number of flood-prone properties and repetitive flood losses in Virginia Beach merits additional investigation to determine what measures have been taken by property owners to protect structures and what additional measures may have measurable benefits.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objective 1.2; Goal 2, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – Most of the City's repetitive flood loss areas are in NRI Relatively Moderate, Relatively High or Very High Flood Risk areas. Exceptions are areas behind Brandon Middle School, near Paca Lane/Newtown Road, Thalia Shores, and Thoroughgood neighborhoods.
Estimated Cost:	Staff time
Potential Funding Sources:	DHS: HMGP, FMA, BRIC; Virginia CFPF
Lead Agency/Department Responsible:	Planning and Public Works
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS

-The City officially entered the CRS program as a Class 7 on May 1, 2019.

- There are currently 8 CFMs within the Planning and Community Development Department and 3 CFMs employed within other City departments. Additionally, one of our CFMs serves as a board member of the Virginia Floodplain Management Association. In 2021, the Planning and Community Development Department sent 5,000 annual NFIP letters to homeowners near and within identified repetitive flooding areas.

- Annual floodplain and flood insurance information is available in the permits office as well as numerous other public offices.

- The Office of Emergency Management applies for and manages elevation and acquisition projects for the severe repetitive loss program and continues to identify structures for future mitigation. Currently, OEM is performing elevations of 2 FEMA grants and acquisitions on 1 FEMA grant. Additionally, the City received an FY19 FMA grant award in November 2022 to elevate 6 residences.

VIRGINIA BEACH MITIGATION ACTION 3	
Create coalition of business owners, including some who have implemented mitigation actions in the past, to promote the value of hazard protection and help identify and implement retrofit/elevation/acquisition projects in the business community.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The hardening of businesses supports their ability to recover from potential disasters, thereby helping sustain citizens' way of life in the aftermath of a hazard event.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Active Threat, Civil Unrest, Cyber Infrastructure Attack, Power Outage, Structure Fire, Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion, Winter Storm
Goal(s) Addressed:	Goal 1, Objective 1.1; Goal 2, Objective 2.1; Goal 3
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing Budgets; DHS: BRIC, HMGP 5% Initiative; Private funds
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 5 years
ADDITIONAL COMMENTS	
Two members of the Virginia Beach Emergency Management Office participated in the Resilient Enterprise Solutions (RES) Home Raising Academy, launched in Hampton Roads in 2020. Various commerce sectors participated in the Home Raising Academy including local government, construction, and real estate. The training curriculum included an introduction to the NFIP, Flood Maps, Elevation Certificates, Outreach, Proactive Selling, Financing & Insurance, and Home Elevation.	

VIRGINIA BEACH MITIGATION ACTION 4	
Better define what is considered a critical facility and update the City's critical facility list annually. Provide emergency power to critical infrastructure, critical facilities, pump stations and critical roadway intersections during extended power outages. Emergency power and quick connect wiring is needed for critical intersections. Generator capability is needed at multiple school facilities used as shelters.	
BACKGROUND INFORMATION	
Site and Location:	Critical Intersections identified by Police Department and Public Works Building 18: Human Resources (Has a partial building generator that supports the IT function). Various Stormwater Pump stations Various Sewer Pump stations Various Public Schools: Those designated as shelters, focusing on the high schools as the top priority.
Cost Benefit:	Maintaining basic city functions in the aftermath of both major and minor events is important for the safety of citizens and the environment. Emergency power is mandatory at the shelters to address access and medical equipment that requires electricity.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Active Threat, Civil Unrest, Complex Coordinated Terrorist Attack, Cyber Infrastructure Attack, Power Outage, Structure Fire, Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Extreme Heat
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4, 1.5; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$3,500,000
Potential Funding Sources:	Existing Budgets; DHS: HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Public Utilities, Public Works, Sheriff, Emergency Management
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
Generator projects at the Central Plant and EMS Headquarters have been completed. Central Plant Generator- $5.3 million project cost. Work substantially completed June 23, 2021. This included the instillation of 2 (n+1) generators for 100% back-up power of the Municipal Center central heat/cooling plant. This will enable uninterrupted heat and air conditioning to be provided to City Hall, Operations Buildings, School Administration Building, the Police Department (VB Police Head Quarters and 1st Precinct), the Correctional Center, and the Juvenile Detention Center. The Correctional Center Buildings (7A, 7B, and &C) all have whole building generator back-up. Building 21: Fire Administration has a partial building generator for emergency lighting. EMS HQ Generator- $472,000 project cost. Work substantially completed July 13, 2020. The project provided for whole building generator power for the backup emergency communications (911/311) center and backup emergency operations center (EOC) at the EMS Headquarters Building located at 4160 Virginia Beach Boulevard.

VIRGINIA BEACH MITIGATION ACTION 5	
Design or retrofit public safety facilities vulnerable to wind damage and/or flooding.	
BACKGROUND INFORMATION	
Site and Location:	Three EMS volunteer facilities are vulnerable to flooding or wind damage. EMS Rescue 1 is vulnerable to flooding. EMS Rescue 8 and 14 are vulnerable to wind load hazards. EMS Headquarters is not designed for wind load hazard.
Cost Benefit:	EMS Rescue 1, 8, and 14 are volunteer owned public safety facilities built on city land through long term lease agreements and offer critical life-safety operations. EMS Headquarters is a city owned building that houses the backup emergency communications (911 / 311) center and the backup emergency operations center (EOC) along with EMS Administration and Training. Vulnerability to flooding and wind damage could threaten the availability of this capability during a flood or high wind event.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Active Threat, Civil Unrest, Complex Coordinated Terrorist Attack, Cyber Infrastructure Attack, Power Outage, Structure Fire, Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Project dependent
Estimated Cost:	To be determined
Potential Funding Sources:	DHS: HMGP, Virginia CFPF
Lead Agency/Department Responsible:	Public Works and Public Safety Departments
Implementation Schedule:	Long-term, over a 15-year period

ADDITIONAL COMMENTS
The city has conducted formal analyses of critical facilities and HMGP grants were obtained to harden some facilities. As HMGP funds become available through the State, additional grant requests should be prepared and ready to submit for “shovel-ready” projects. Older public safety facilities are incorporating retrofits as repairs are scheduled. New facilities are built to current standards with freeboard making them more resistant to flooding. All are designed to sustain up to 117mph winds.

VIRGINIA BEACH MITIGATION ACTION 6	
Provide educational outreach to residents to increase awareness of vulnerability to multiple hazards and preventative actions that can be taken. Focus on hurricane preparedness, sea level rise and flooding.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	By training community leaders in how to protect hazard-prone properties, the City spreads information on the value of retrofitting directly to those in need at low cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All Hazards
Goal(s) Addressed:	Goal 2, Objective 2.1; Goal 3, Objective 3.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$30,000
Potential Funding Sources:	DHS: HMGP, HMGP 5% Initiative; Operating Budget; FEMA materials available free
Lead Agency/Department Responsible:	Emergency Management and Communications
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
The city has multiple programs and strategies for the dissemination of emergency preparedness information, but it is currently coming out of multiple offices and this will assist in streamlining the information. This action is part of Virginia Beach's strategy for continued compliance with the NFIP.	

VIRGINIA BEACH MITIGATION ACTION 7	
Replace, as necessary, and maintain the existing regional interoperable communications system.	
BACKGROUND INFORMATION	
Site and Location:	Citywide and Southside Hampton Roads region
Cost Benefit:	Modern interoperable communications systems support preparedness, response and recovery activities for all hazards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Active Threat, Civil Unrest, Complex Coordinated Terrorist Attack, Cyber Infrastructure Attack, Power Outage, Structure Fire, Transportation Hazard-Incident, Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 2; Goal 3, Objectives 3.1, 3.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$10,000,000
Potential Funding Sources:	DHS: HMGP, others; CIP
Lead Agency/Department Responsible:	ComIT
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
The city has modernized much of its communication systems to include interoperability of city systems, as well as regional systems. New systems require maintenance and replacement on a regular basis.	

VIRGINIA BEACH MITIGATION ACTION 8	
Protect Atlantic Ocean and Chesapeake Bay shorelines from storm damage. Continue work with the Army Corps of Engineers and other federal agencies to ensure ongoing maintenance of the Hurricane Protection Project and other maintained beaches within the city.	
BACKGROUND INFORMATION	
Site and Location:	Atlantic Ocean and Chesapeake Bay shorelines, particularly Resort Area and Sandbridge
Cost Benefit:	Severe and frequent shoreline erosion in this economically valuable area merits structural protection on an ongoing basis. Multiple project reports contain detailed information on the costs and benefits of these projects. City continues to provide beach replenishment as funds and projects allow, which continues to provide ongoing storm protection to $3 billion worth of homes and businesses from Rudee Inlet to Fort Story.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence, Winter Storm; Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 3, Objectives 3.1, 3.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High
Estimated Cost:	Estimated $14,000,000 every ten years
Potential Funding Sources:	COE, CIP, Special Tax District, TGIF, SSD, TIF
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
In addition to maintaining existing “engineered beaches”, the City should seek additional beaches or shorelines to be considered for structural hardening. The City’s beach restoration program currently focuses on six key areas: Ocean Park Beach Restoration, Cape Henry Beach Restoration, Chesapeake Beach Replenishment, Resort Beach, Sandbridge Beach, and Croatan Beach.	

VIRGINIA BEACH MITIGATION ACTION 9	
Maintain a dam inventory and monitor the condition of dams within the City making improvements when needed. Develop a dam safety plan to address protection, preparedness, response, and rebuilding for high hazard dams and areas in dam inundation zones.	
BACKGROUND INFORMATION	
Site and Location:	Area downstream from dams in Virginia Beach
Cost Benefit:	Infrastructure in dam inundation zones is susceptible to flooding but may not be protected from flooding should a dam failure or breech occur.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.4, 1.5, 1.6; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Project location dependent
Estimated Cost:	To be determined
Potential Funding Sources:	DHS: BRIC, FMA, RFC, HMGP, HMGP 5% Initiative, HHPD
Lead Agency/Department Responsible:	Public Works and Public Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Virginia DCR is increasingly involved in this action and recent regulatory changes have affected which dams are regulated.	

VIRGINIA BEACH MITIGATION ACTION 10	
Improve and/or update alert, warning and notification capabilities. Potential capabilities include: **1) Utilizing the City's CRM registration portal and additional support services;** **2) Maintenance and addition of sensor installations for data collection as part of the VB StormSense Network to enhance Alexa voice assisted AI and intelligent predictive visualization platform.**	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Low cost hazard notification through the use of cellular phones and computers can now reach large segments of the population quickly. Notifying residents of low-lying flood-prone areas before flooding occurs helps reduce flood damages to cars, structures, and possessions. Traffic problems associated with evacuations, frequent flooding and other hazard events can cause secondary economic disasters and major disruptions to citizens' lives in Hampton Roads.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Landslide/Coastal Erosion, Earthquake, Wildfire, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$1,000,000
Potential Funding Sources:	DHS: HMGP, HMGP 5% Initiative; Private funds; CFPF
Lead Agency/Department Responsible:	Emergency Management, IT, Communications
Implementation Schedule:	Improvements within 4 years; Ongoing Warning and Notification

ADDITIONAL COMMENTS
Action focuses on keeping up with new types of social media and the most modern methods of communicating with citizens in the event of a disaster. This action includes identification and real-time mapping of frequently flooded roads and will incorporate special planning regarding evacuation routes for persons with disabilities (nursing homes, assisted living facilities, hospitals). VB StormSense sensor network was established within a 3-year period and currently provides real-time water levels from 50 sensors in Virginia Beach at 6-minute intervals, including 10 USGS sensors. The data is currently used by Public Works in addition to 10 USGS Sensors for road closures and street-level flooding. Several sensors have flood levels of Action, Minor, Moderate and Major stages assigned. National Weather Service (NWS) at Wakefield is planning to add a few sensors to their Advanced Hydrologic Predication Service (AHPS). The data is currently accessed internally through mapping applications using mobile devices in near real-time. The system also provides real-time data through Alexa skill. The applications are planned for release in the first quarter of 2022. A subscription service for citizens is in development that will be connected with RAVE alerting system. A predictive visualization system is in early stages of development to support the mitigation goals. In 2019, the City entered into a partnership with WAZE for traffic notification to citizens for road closures due to natural hazards. In 2022 and beyond, Google/Waze is planning to provide the technical capabilities for CVB and their partners in our region to develop and implement communication of safety message templates to all drivers that use the Waze app within a partners geographical boundary. The messages will appear in the language that the user sets their Waze app to display. Qualified partners, such as CVB, may select one safety message to post quarterly in a partner's geographical area. The message will appear in the app when the vehicle is stopped for more than 10 seconds and automatically disappears with the first movement of the vehicle. Waze users may see the message twice per quarter. Waze will share the number of impressions made from the campaign on a monthly basis. Waze will be sharing more information with CVB and their partners about how to participate once they have the results and best practices to share from their launch partners (VDOT, Miami-Dade, LA County DPW, Penn Turnpike, and Mass DOT). - release date TBA. The City also obtained the RAVE alerting system in 2019 which has the ability to create a Smart 911 profile for a caller. The City is currently in the process of training staff on the RAVE alerting system and drafting an updated public alert and warning notification plan.

VIRGINIA BEACH MITIGATION ACTION 11	
Retrofit existing stormwater management system throughout the City into state-of-the-art facilities to minimize flooding after heavy storms while also addressing water quality objectives.	
BACKGROUND INFORMATION	
Site and Location:	Citywide. Over the last year, City commenced or completed actual stormwater and drainage improvement projects in 8 neighborhoods to retrofit aging undersized infrastructure and/or based on analysis by citywide master stormwater modeling in certain watersheds. Capital improvement program projects associated with these neighborhoods include: - Aragona Drainage Improvements - Ashville Park Drainage Improvements - Chubb Lake/Bradford Lake - College Park and Level Green Drainage Improvements - Eastern Shore Drive Drainage - Southern Canal/Lead Ditch - Windsor Woods Drainage
Cost Benefit:	Frequent flooding in the City is a result of numerous factors. Updating stormwater management facilities will help reduce both nuisance flooding of yards, roads and intersections, and more severe flooding that affects structures.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate/High – Most of the City's repetitive flood loss areas are in NRI Relatively Moderate, Relatively High or Very High Flood Risk areas.
Estimated Cost:	To be determined
Potential Funding Sources:	Stormwater Management Program; DHS: BRIC, HMGP; Virginia CFPF
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
City currently has 36 active projects and programs in the Flood Control Section of the Stormwater Capital Improvement Program (CIP).	

VIRGINIA BEACH MITIGATION ACTION 12	
Mitigate incursion of storm surge and tidal inundation of low-lying areas. Investigate coastal barrier technologies and tidal stream diversion techniques.	
BACKGROUND INFORMATION	
Site and Location:	Shorelines and tidal tributaries Citywide
Cost Benefit:	Costs and benefits of various projects are continuously updated and compared. Projects are prioritized based on those that provide the greatest benefits to existing structures and infrastructure. Possible projects may include, but are not limited to: tide gates, check valves, or road/bridge/structure elevation. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate/High – Most of the City's repetitive flood loss areas are in NRI Relatively Moderate, Relatively High or Very High Flood Risk areas.
Estimated Cost:	To be determined
Potential Funding Sources:	Stormwater Management Program; DHS: HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing and Long Term
ADDITIONAL COMMENTS	
Nor'easters, hurricanes and tropical storms, and some severe thunderstorms produce heavy precipitation in low-lying areas, creating runoff that cannot flow into tidal bodies at high tide. As sea level rises over the long-term, areas affected by this problem are expected to increase. The City of Virginia Beach is developing plans to address both repetitive flooding and projected increases in flooding caused by sea level rise through the City's Comprehensive Sea Level Rise and Recurrent Flooding Response Plan. The plan is an effort between local government and various stakeholders (corporate and individual) to collect, sort, interpret, and understand the data behind how sea level rise is affecting our City and how we should best respond.	

VIRGINIA BEACH MITIGATION ACTION 13	
Elevate, acquire, relocate or retrofit structures in flood prone areas that have suffered repetitive flood damage. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Within the City's flood-prone areas
Cost Benefit:	Benefits for individual structures are based on the average annual damages, which is based on the structure's lowest floor elevation and frequency of flooding. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objective 1.1, 1.2, 1.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – Most of the City's repetitive flood loss areas are in NRI Relatively Moderate, Relatively High or Very High Flood Risk areas.
Estimated Cost:	$50,000 to $300,000 per structure
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; Virginia CFPF
Lead Agency/Department Responsible:	Planning, Emergency Management
Implementation Schedule:	Within 5 years
ADDITIONAL COMMENTS	
16 residences are in the process of being elevated with FMA funding at the time of this plan. Additionally, the City received an FY19 FMA grant award in November 2022 to elevate 6 residences.	

VIRGINIA BEACH MITIGATION ACTION 14	
Acquire open space in strategic locations that can provide management benefits for multiple mitigation objectives. Objectives may include but are not limited to: flood control, water quality, public access to waterways, preserving or creating tree canopy, and preserving unique ecological and cultural heritage sites. Incorporation of the Parcel Level Mitigation Program for these projects.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Benefits from open space acquisition can occur in several categories for a single project. A flood-prone area can be set aside for recreation and flood control, for example.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion, Winter Storm
Goal(s) Addressed:	Goal 1, Objective 1.6; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Project dependent
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; USACE; USDA, Agricultural Extension
Lead Agency/Department Responsible:	Agriculture; Parks and Recreation; Public Works; Emergency Management
Implementation Schedule:	Long-term, 5 to 10 years

ADDITIONAL COMMENTS

The Agriculture Reserve Program continues to assist the AG farmers/landowners with the option of preserving their AG land versus selling off for house development options. During Fiscal Year 2021 there were 379.58 acres added to the program. This included acquiring 22 development rights on a total of 6 parcels in the southern watersheds. There is now a cumulative total of 10,366.32 acres and 898 development rights captured in the Agricultural Reserve Program. In addition, there were recent changes to the City's ARP ordinance. These changes allow Virginia Beach to target other sensitive and valuable farmland for not only agriculture and forest land protection but also other valuable green infrastructure functions.

Parks and Recreation: No new land acquisition of open space has occurred. The city is attempting to acquire a small piece of non-developable property from a shopping center owner to create water access for a kayak launch as well as provide for bank stabilization and outfall for new stormwater quality facility in the Kempsville section of the city.

The 2019 FMA Acquisition grant application included 3 properties that will be demolished and returned to open space, incorporated into an existing city park. The grant was awarded in October 2020 and the acquisition project initiated shortly after.

VIRGINIA BEACH MITIGATION ACTION 15	
Verify the geographic location of each NFIP repetitive loss property, and determine if that property has been mitigated and, if so, by what means. Prepare Repetitive Loss Area Analyses for CRS credit.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas throughout the City
Cost Benefit:	Repetitively flooded structures strain local and federal resources after disasters and detract from the fiscal solvency of the NFIP. The NFIP focuses mitigation efforts and funds on properties listed as repetitive losses; therefore, checking the accuracy of the list is a necessity for the NFIP, States and, through this action, local governments.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding (Storm Surge)
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – Most of the City's repetitive flood loss areas are in NRI Relatively Moderate, Relatively High or Very High Flood Risk areas.
Estimated Cost:	Staff time estimated at $50 per structure x 500 structures = $25,000
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; VDEM; HRPDC
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Through the CRS process each rep loss property was mapped and evaluated for mitigation in 2018.	

VIRGINIA BEACH MITIGATION ACTION 16	
Develop a local hurricane evacuation framework/plan and identify communication networks for evacuation messaging.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The state evacuation plan does not take all local factors into account and may not be sufficient for some residents of Virginia Beach. Local planning will facilitate evacuation when needed and better focus evacuation messaging to reduce confusion, speed evacuation and reduce the number of people in danger.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm, Earthquake, Wildfire, Hazard Materials Incident
Goal(s) Addressed:	Goal 1: Objectives 1.4, 1.5; Goal 2: Objectives 2.1, 2.2; Goal 3: Objective 3.1, 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – neighborhoods most in need of evacuation are areas of NRI high hurricane risk, which includes analysis of social vulnerability
Estimated Cost:	Staff time
Potential Funding Sources:	DHS/VDEM; HRPDC
Lead Agency/Department Responsible:	Emergency Management, Communications Office
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	
While evacuation planning typically focuses on hurricanes and coastal storms, the procedures may be used in other emergencies.	

VIRGINIA BEACH MITIGATION ACTION 17	
Promote and sustain local programs such as the Parcel Level Mitigation Program (PLMP) to provide flood protective actions such as acquisition, flood vents, relocating utilities, elevation etc. to vulnerable flood areas. Utilize grant funding to expand capabilities of PLMP when appropriate and eligible.	
BACKGROUND INFORMATION	
Site and Location:	Flood prone areas Citywide, especially high social vulnerability repetitive flood loss areas
Cost Benefit:	Flood protective actions reduce long-term repair and recovery costs.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Flooding due to Impoundment Failure/High Hazard Dam
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4, 1.5; Goal 2: Objectives 2.1, 2.2, 2.3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate/High – Most of the City's repetitive flood loss areas are in NRI Relatively Moderate, Relatively High or Very High Flood Risk areas.
Estimated Cost:	Cost vary based on each structure's needs. Acquisition and elevation are more costly than small retrofits such as relocating utilities or installing flood vents.
Potential Funding Sources:	Virginia CFPF; DHS: HMGP, BRIC; USACE: FPMS
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	

VIRGINIA BEACH MITIGATION ACTION 18	
Monitor and enhance the City's cybersecurity capabilities to protect the City from cybersecurity threats especially during or immediately after a disaster or emergency.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Major cities' operational reliance on cyber technology increases the importance that the technology remains operational during or after a disaster. Disaster-related or disaster-concurrent outages can rapidly increase the costs of damage and the time needed to return to normal operations. Attempted cyberattacks can also increase following a natural disaster.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Cyber Infrastructure Attack, Active Threat, Complex Coordinated Terrorist Attack, Explosives, Radiological Attack, Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, , Hazardous Materials Incident, Pandemic Flu or Communicable Disease, , Extreme Heat
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS
Lead Agency/Department Responsible:	IT (Cybersecurity)
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

VIRGINIA BEACH MITIGATION ACTION 19	
Facilitate discussions with agencies responsible for providing local transportation to encourage them to evaluate, improve, and/or establish local and regional transportation plans to address the transportation needs of vulnerable populations such as the elderly, college and university students, those with disabilities, visitors, etc. in the event of an evacuation.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The state evacuation plan does not take all local factors into account and may not be sufficient for some residents of Virginia Beach with limited transportation options. Local planning will facilitate evacuation when needed and provide transport options to speed evacuation and reduce the number of people in danger.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm, Earthquake, Wildfire, Hazard Materials Incident, Civil Unrest, Power Outage, Water Utility Disruption / Contamination.
Goal(s) Addressed:	Goal 1: Objectives 1.4, 1.5; Goal 2: Objectives 2.1, 2.2; Goal 3: Objective 3.1, 3.2, 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	DHS/VDEM; HRPDC
Lead Agency/Department Responsible:	Planning (Transportation), Emergency Management
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	
Hampton Roads Transit (HRT) is responsible for providing local public transportation within Virginia Beach. Virginia Beach does not have control over HRT's operation requirements.	

VIRGINIA BEACH MITIGATION ACTION 20	
Review all City rules, regulations, policies, procedures, ordinances and plans to ensure a consistent approach that aligns with hazard mitigation goals, objectives and actions.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Cost is negligible but speaking about hazards with a consistent message informs citizens, and continually reinforces the City's stance on important issues for staff and elected officials.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	All
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	n/a
Potential Funding Sources:	n/a
Lead Agency/Department Responsible:	Planning, Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Many new programs and initiatives over the past 5 years have been implemented across many departments. Public Works stormwater management and erosion and sediment control regulations, CRS goals, floodplain management ordinance revisions, all require similar starting points. The City has made a lot of progress on each of these, but additional review will help with consistency. *Sea Level Wise* calls for ensuring that flood mitigation practices identified in a future Flood Mitigation Plan are incorporated into future Comprehensive Plan and this hazard mitigation plan.	

VIRGINIA BEACH MITIGATION ACTION 21	
Implement the action items and projects outlined in *Sea Level Wise*, particularly the following high priority items*:* **1) identify regional flood risk reduction projects that could be pursued with neighboring jurisdictions, such as the City of Norfolk;** **2) increase freeboard to 3 feet or to a future design flood elevation;** **3) require mechanical and electrical systems to be elevated to design flood elevation (with freeboard);** **4) expand height allowance for buildings outside the SFHA, where property owners want to elevated structures to reduce flood risk;** **5) (paraphrased and combined) include sea level rise and future flooding considerations in designing adequate drainage controls, and in development of subdivision/site plans; and,** **6) develop informational materials on how to renovate historic properties to enhance flood resilience consistent with historic preservation requirements.**	
BACKGROUND INFORMATION	
Site and Location:	Areas subject to future flooding citywide
Cost Benefit:	All of these elements will reduce future flood damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.3, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	n/a
Lead Agency/Department Responsible:	Planning, Emergency Management, Public Works
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

CHESAPEAKE

CHESAPEAKE MITIGATION ACTION 1	
Maintain participation in National Flood Insurance Program and Community Rating System. Continue enforcement of standards in existing ordinance that meet and exceed NFIP minimum requirements. Consider updates to 2013 floodplain management ordinance to include protection of areas outside the current SFHA subject to future flooding as sea level rises, and additional restrictions on rehabilitation of existing structures in the SFHA such as freeboard and substantial damage requirements. Goal to become CRS Class 6 community.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The NFIP and related flood mapping and development regulations have proven benefits nationwide. Elevating structures to 1.5 feet above the BFE has a benefit cost ratio of 6:1, according to FEMA (*2008 Supplement to the 2006 Evaluation of the National Flood Insurance Program's Building Standards)*. CRS benefits accrue through increased insurance coverage, improved hazard awareness and reduced flood insurance premiums. New construction and future development are protected from floods through existing standards that meet or exceed NFIP minimum requirements.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storms
Goal(s) Addressed:	Goal 1, Objective 1.1, 1.2, Goal 2, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – most of the repetitive flood loss areas have very high or relatively high NRI flood risk, especially the largest area southwest of Battlefield Commons
Estimated Cost:	Travel costs and staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Annually
ADDITIONAL COMMENTS	
Chesapeake is a CRS Class 7 community.	

CHESAPEAKE MITIGATION ACTION 2	
Acquire, elevate, relocate, retrofit or floodproof structures in flood prone areas. Flood protection may include minor localized flood reduction projects, as well. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Flood loss areas Citywide
Cost Benefit:	Retrofit measures that address flooded structures, particularly those designated as repetitive loss or severe repetitive loss by the NFIP, have quantifiable benefits. The City is proposing to collect elevation data as part of this action in order to more easily make cost-benefit analyses of these structures. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – most of the repetitive flood loss areas have very high or relatively high NRI flood risk, especially the largest area southwest of Battlefield Commons
Estimated Cost:	In multiple $750,000 phases as grant money becomes available.
Potential Funding Sources:	City CIP; DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; USACE: SFCP, FPMS; HUD: CDBG; USDA: WPFP; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS

The City of Chesapeake Office of Emergency Management continues to apply for grants for Acquisitions. 5 of the 7 applications are being processed from the 2018 FMA Grant. 2 applications were submitted for houses in 2019 and 3 applications were submitted for houses in 2020. Additionally, stormwater flood protection reduction projects are scheduled for numerous subdivisions in the SFHA.

There are 3,869 structures identified as being within repetitive flood loss areas. Locally funded projects may be creditable under the Community Rating System.

Detailed activities to support this overall mitigation action include:

1. Coordinate with the City Surveyor in Public Works Department to complete Elevation Certificates for structures when doing other survey work in repetitive flood loss areas.
2. Use pictometry to further refine repetitive flood loss area identification and to collect approximate first floor elevation information for structures in those areas.
3. Use Public Works Department expertise to identify retrofit measures for flood-prone structures. This may be creditable under CRS.
4. Regularly crosscheck real estate market with repetitive flood loss list. Purchase of empty structures may be possible at lower cost.

CHESAPEAKE MITIGATION ACTION 3	
Conduct detailed vulnerability review: cross reference locations of existing manufactured homes and manufactured home parks relative to repetitive flood loss areas and new FEMA 100-year floodplains. Review their vulnerability to flood and wind hazards. Implement measures to retrofit, relocate, or acquire vulnerable units. This action may include Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Citywide
Cost Benefit:	While the value of manufactured homes is quite low, the costs to elevate or retrofit them to protect from flood and wind can be low, as well. The costs to determine locations and review vulnerability are minimal versus the cost of additional hazard damage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	TBD
Estimated Cost:	Staff time for analysis; approx. $150,000 for retrofit measures such as elevation assistance and tie-downs
Potential Funding Sources:	Virginia CFPF; DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; USACE: SFCP, FPMS; HUD: CDBG; USDA: EWP, WPFP, WSP
Lead Agency/Department Responsible:	Emergency Management, with support from GIS and Engineering Division
Implementation Schedule:	within 2 years of plan adoption
ADDITIONAL COMMENTS	
Manufactured homes and their occupants are particularly vulnerable to wind and flood hazards. The cost of minor retrofits can have exponential benefits in reducing the risk to lives. Procedures are in place for prohibiting new manufactured homes in SFHA; this action addresses existing structures.	

CHESAPEAKE MITIGATION ACTION 4	
Protect critical facilities from damage. Measures may include installation of emergency backup power, elevation of structure or components, relocation or retrofit of building components.	
BACKGROUND INFORMATION	
Site and Location:	Critical facilities Citywide
Cost Benefit:	Benefits of mitigating flood damage to critical facilities are realized by all citizens by maintaining operational capabilities post-disaster.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High for Jail High for Fire Station #2 Medium for Schools Low for other Critical Facilities
Impact on Socially Vulnerable Populations:	
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; USACE; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, with GIS and Public Works Engineering Division
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
New Public Safety building/EOC can withstand Category 3 hurricane or earthquake and has multiple redundancy infrastructure built into the building. All community centers and conference center outfitted with generators. The city has also completed the work on two new Fire Stations, Sta #10 in Bowers Hill & Sta #7 in Southern Chesapeake. Sta #10 serves both as a Fire Station and Logics Center for the department, increasing the city's ability to prepare, respond and mitigate following a disaster. Sta #7 is dual use facility, as a Fire Station and a newly added Police Precinct.

CHESAPEAKE MITIGATION ACTION 5	
Flow test and inspect existing City-owned and grant-funded dry hydrants annually to help maintain operability.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Chesapeake has determined that maintaining the highest level of operability for the existing system is more feasible than installing new hydrants.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	Goal 1, Objective 1.2, 1.3, 1.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing Budgets
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Ongoing per annual maintenance schedule
ADDITIONAL COMMENTS	
Installation of additional hydrants has proven challenging. This alternative presents a reasonable cost-effective method for maintaining capacity to fight wildfire. There are currently 56 dry hydrants in Chesapeake, mainly in the southern part of the City. This project is overseen by a Captain in the Fire Department who is assisted by a Supervisor in Public Utilities. Hydrants are regular schedule of maintenance and testing. This is not only done for operational purposes, but for training purposes of field forces, especially new recruits in the field.	

CHESAPEAKE MITIGATION ACTION 6	
Seek and use additional revenue sources and local matching funds for mitigation planning and projects.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Local funding sources for mitigation projects can further the benefits of available federal funding. Untapped and unusual funding sources likewise reduce the burden of mitigation on Chesapeake citizens.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 3, Objectives 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	DHS: BRIC; Virginia CFPF; American Rescue Plan Act; USACE
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
NEMAC submits recommendations annually to City Council regarding the status of current mitigation projects and this plan, programmatic problems, an inventory of new potential mitigation projects and unmet needs. City Council evaluates those needs against internal funding sources. NEMAC aggressively pursues and seeks public and private grants to support mitigation activities, and enlists a number of other stakeholders in this process. Related resources may address multiple objectives, such as environmental issues, preparedness, sustainability, and blight reduction. NEMAC is prepared to pursue special appropriations and grants that are available after a disaster. City has obtained and continues to apply for FEMA grants for acquiring repetitive flood loss homes and has committed Capital Improvement Funds to mitigate flooding. City has applied for PDM funds for mitigation purposes to install generators at Public Utilities Pump Stations. City uses emergency management grant funds to enhance its Alert and Everbridge system to warn citizens of flooding issues, along with other potential disasters.	

CHESAPEAKE MITIGATION ACTION 7	
Continue to implement a Pre-Disaster Homeowner Tree Preventive Maintenance and Hazard Awareness Program.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	A low-cost effort can bring many benefits to individual property owners and significantly reduce response costs after a disaster. Benefits accrue to the City through reduced response needs, to homeowners through reduced damages, and through reduced vulnerability wildfire.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Tropical/Coastal Storm, Winter Storms, Wildfires
Goal(s) Addressed:	Goal 2, Objective 2.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Approximately $7,500
Potential Funding Sources:	USDA, Soil and Water Conservation District, Va. Tech Agricultural Extension; DOI - LWCF; Virginia CFPF
Lead Agency/Department Responsible:	Parks and Recreation Department, Emergency Management, Development and Permits
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This program expands on existing programs in the City that focus on the value of trees, particularly healthy old-growth trees, and how to properly care for trees to prevent them from causing additional damage during wind events. Chesapeake has been designated as a “Tree City USA” for over 27 years, protects trees in the Chesapeake Bay Preservation Area, and has a “What is a Tree?” program for schoolchildren in conjunction with the Agriculture Department. The Chesapeake Arboretum is active in tree resource management and will be approached about participating. A “Prune in June” campaign may be considered as a possible focus for this mitigation action. City to hire Urban Forester/City Arborist in 2022. Messaging has gone out to homeowners regarding what to do following a storm on how to care for damaged trees. Public Communications routinely sends messaging regarding pre-storm maintenance. City works with Garden Clubs and the VT Cooperative Extension to craft and disseminate important information.	

CHESAPEAKE MITIGATION ACTION 8	
Improve stormwater management infrastructure. Implement preventive maintenance schedule and system upgrades. Projects typically include replacement and upgrade of existing facilities, enlarging pipes/ ditches to provide for increased capacity and construction of stormwater management facilities/BMPs to provide flood control and water quality compliance. Provide replacement schedule for stormwater management and inspection equipment and vehicles, including purchases of plows for new trucks to assist with dual purpose of snow removal.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Maintaining and improving the stormwater system provides Citywide benefits from both high and low frequency flood events. The preventive maintenance schedule is a relatively new activity that will help sustain the highest level of operability for the existing system. Equipment replacement prevents downtime, purchases can be more cost effective than repair expenses on depreciated equipment, and new equipment provides for potential for use in other natural event responses (such as Winter Storms).
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Winter Storm
Goal(s) Addressed:	Goal 1, Objective 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate/High – most of the repetitive flood loss areas have very high or relatively high NRI flood risk, especially the largest area southwest of Battlefield Commons
Estimated Cost:	$1.8 million
Potential Funding Sources:	Approved and proposed budgets and stormwater utility fees; Virginia CFPF
Lead Agency/Department Responsible:	Public Works/Engineering/Operations
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
While NEMAC recognizes these activities are already ongoing, their importance to maintaining a functioning and effective stormwater system during flood events is critical to hazard management in Chesapeake. Engineering has Master Drainage Plan that identifies watersheds and completed watershed studies identifying system deficiencies and required improvements. Department maintains list of funded and unfunded projects Unfunded projects list is reviewed and updated regularly to ensure flooding and poor drainage areas citywide are addressed. Public Works schedules and provides for regular maintenance and repairs to ensure the existing stormwater system is functioning as intended.

CHESAPEAKE MITIGATION ACTION 9	
Part I. Maximize training and educational opportunities for NEMAC, City staff, elected officials, CERT members and citizen/neighborhood/civic league leaders regarding hazard mitigation, disaster preparedness and the relationship of mitigation to reduced recovery needs. Use modern social media forums such as NextDoor. Provide samples of retrofitting tools and examples of products. **Part II. Accommodate training and related support for at least two staff in the Department of Development and Permits to receive and maintain Certified Floodplain Manager (CFM) certification through the ASFPM.**	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Many training opportunities are already available through FEMA, VDEM, and other agencies. Costs to provide or make arrangements for the training in Chesapeake are minimal versus the benefits of a well-informed citizenry and highly trained floodplain management staff.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 2, Objective 2.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Less than $12,000 over five years
Potential Funding Sources:	Existing budgets, staff time; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management Department of Development and Permits
Implementation Schedule:	Ongoing as opportunities arise
ADDITIONAL COMMENTS	
City Staff in OEM and Development & Permits have taken classes on Floodplain Management. OEM staff have taken classes on CRS. OEM continues to oversee NEMAC. City CERT Coordinator continues to train citizens on Disaster Preparedness and being Response Ready. Citizens are taught how to mitigate before, during, and after a disaster, and not be a burden on emergency resources. The CERT Coordinator and members of CERT conduct outreach initiatives, and since COVID slowed down the ability for CERT to meet, members worked with various groups to provide online training on disaster preparedness. Two Development & Permits personnel and two Office of Emergency Management personnel have attended EMI Floodplain Management Courses. D&P personnel will continue toward CFM certification. OEM and D&P personnel will continue to take classes in NFIP & CRS. OEM and D&P actively take part in CRS / Wetlands Watch Workgroup Meetings	

CHESAPEAKE MITIGATION ACTION 10	
Conduct Hazardous Environmental Action Team (HEAT) program to oversee industrial facilities, particularly hazardous facilities, to discuss hazards and mitigation alternatives.	
BACKGROUND INFORMATION	
Site and Location:	Industrial facilities Citywide
Cost Benefit:	Reduces the likelihood of compounding incidents, thereby reducing response costs.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Winter Storm, Wildfire, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objective 1.2, 1.3, 1.4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$8,000
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
HEAT Team is tasked with preventing and investigating environmental crimes such as illegal dumping of chemicals and waste, illegal transportation and/or storage of hazmat, chemical releases into atmosphere and waterways, burial of hazmat, and failure to report chemical releases. Team members serve on LEPC and help review emergency plans, hazmat management plans, and TIER II reports that are submitted. Team works closely with Emergency Management Office, DEQ, EPA and USCG. Program reduces illegal handling, storage and discharge of hazmat. Members are committed to educating residents and businesses on negative impacts to the environment of illegal dumping and polluting.	

CHESAPEAKE MITIGATION ACTION 11	
Support and maintain City's new Reverse-911 system. Prepare messages to release to citizens before and after a natural hazard event.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Other methods of notifying citizens require massive amounts of staff time which exceeds budgetary restraints. Reverse 911 quickly and efficiently uses existing infrastructure to notify property owners of appropriate pre- and post-disaster mitigation actions.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$7,500
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
The City continues to subscribe to Everbridge (Chesapeake Alert) with enhanced features to allow additional public outreach. Messages have been developed and pre-approved for alerting citizens to potential flooding, and a weather alert component has been incorporated in partnership with NWS, Wakefield. OEM and 911 Dispatch have more trained IPAWS Users, which will allow the City to broadcast WEA messages should an incident occur and notifications are needed quickly.	

CHESAPEAKE MITIGATION ACTION 12	
Prevent sanitary sewer inflows to the system during flood events. Smoke test public and private sanitary sewer infrastructure to determine priorities.	
Site and Location:	Sewer infrastructure Citywide
Cost Benefit:	The consequences and costs of sanitary sewer inflows during a flood event are high for reasons related to human health and damage to infrastructure. Smoke tests are a low-cost alternative to televising all sanitary sewer lines and allow more detailed (and costly) methods to be used only where problems are identified during smoke tests.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$525,000, annually
Potential Funding Sources:	Existing capital budgets
Lead Agency/Department Responsible:	Public Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Over 10% of the system is checked annually.	

CHESAPEAKE MITIGATION ACTION 13	
Continue lease agreement and maintenance of facilities along the Dismal Swamp Canal Trail to accommodate recreational use of the floodplain.	
BACKGROUND INFORMATION	
Site and Location:	Along the Dismal Swamp Canal
Cost Benefit:	Recreational use of this vast floodplain area is the highest and best use, especially in light of projected sea level rise. Facilities to make this area accessible and enjoyed by so many residents of Hampton Roads and northeast North Carolina are low cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Winter Storm, Tropical/Coastal Storm, Wildfire
Goal(s) Addressed:	Goal 1, Objective 1.6; Goal 3, Objective 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$400,000
Potential Funding Sources:	VDOT, USACE and others, as deemed appropriate
Lead Agency/Department Responsible:	Parks and Recreation
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
The Dismal Swamp Canal Trail is a former section of Virginia State Route 17, now a multi-use trail open to bicycling, walking, running, horseback riding, and boating. The north trailhead is located at the intersection of Dominion Blvd. and Old Rt. 17 in Chesapeake, and runs south 8.5 miles, adjacent to the Dismal Swamp Canal. This multipurpose-linear nature trail threads through some of the most uniquely historical and ecologically-significant habitats in the United States. The Dismal Swamp Canal Trail is an historic, environmental and outdoor recreation delight open to walkers, hikers, boaters, bicyclists, and horse owners. Trail improvements have been completed, including paved parking areas and two separate restroom facilities. Trail was recently fully repaved in 2020. The City continues to lease and maintain facilities adjacent to and on the Dismal Swamp Canal Trail. As a sign of the City's commitment to sharing the story of the Dismal Swamp, they have secured funding and designed a Historic Village concept on Glencoe Street (and near the Superintendent's House). The concept includes the move and restoration of a historic schoolhouse previously located on Benefit Road, addition of a Visitor Center and additional structures to share the history of Indigenous communities in the region, maroon communities in the Swamp, the Underground Railroad and its relationship to the Swamp, and the story of the canal with regard to regional trade. Future plans include full restoration of the Superintendent's House in conjunction with the USACE.

CHESAPEAKE MITIGATION ACTION 14	
Continue outreach efforts through a strategically-developed plan to inform and educate citizens before, during and after disasters. Develop pre-approved letters and notification system for structure significantly damaged after any disaster, particularly flood-prone structures with stringent repair requirements.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	The organized nature of the approach reduces long-term costs by: 1) minimizing need to repeat messages; 2) involving outreach/marketing professionals from within City government; 3) investigating regional partnerships that could result in additional cost savings through cost sharing; 4) using existing programs and resources to maximum advantage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All, but primarily Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm
Goal(s) Addressed:	Goal 1, Goal 2, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Less than $7,500
Potential Funding Sources:	Existing budgets and staff time; DHS: BRIC, HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Emergency Management (lead) Planning & Development Public Communications
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
The departments of Public Communications, IT, OEM, Police, and Fire meet as a Workgroup that focuses on messaging to the citizens and public before, during, and after a disaster. Boilerplate messaging is constantly reviewed and updated and can be redefined based on the incident or disaster. Last year the Workgroup worked with VDEM to adjust the “Know Your Zone” color coding to make more sense regarding the zones that were more likely to flood. The Workgroup created direct messaging that goes out strategically at the start of hurricane season. The state provided some basic messaging and key points that the Workgroup enhanced and made Chesapeake specific. The Public Communications and Information Technology departments, routinely tracks website hits, “likes”, shared posts, retweets, etc. to gauge the effectiveness of the campaign and the overall success of the Workgroup.

CHESAPEAKE MITIGATION ACTION 15	
Acquire open space in strategic locations that can provide multi-objective management benefits. Objectives may include but are not limited to: flood control, water quality, public access to waterways, preserving or creating tree canopy, and preserving unique ecological and cultural heritage sites. Acquire repetitive flood loss properties up for sale for via trustee sale.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Benefits from open space acquisition can occur in several categories for a single project. A flood-prone area can be set aside for recreation and flood control, for example.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion, Winter Storm, Tornado, Winter Storm, Wildfire
Goal(s) Addressed:	Goal 1, Objective 1.6; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate/High – most of the repetitive flood loss areas have very high or relatively high NRI flood risk, especially the largest area southwest of Battlefield Commons
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; USACE; USDA, Va. Tech Agricultural Extension, DOI – LWCF; Virginia CFPF
Lead Agency/Department Responsible:	Planning & Development; Parks, Recreation and Tourism
Implementation Schedule:	Long-term, 5 to 10 years
ADDITIONAL COMMENTS	
Projects may tie in with the recently adopted Green Sea Blueway and Greenway Plan. Since 2017, the City has acquired Cornland School, a cultural heritage site, and completed task of moving it out of flood-prone location, and is in the process of elevating the school. City is acquiring Newton Neck parcel adjacent to Dominion Boulevard Veterans Bridge and putting it under conservation easement. The park site is adjacent to many flood-prone neighborhoods. Future park design will include flood prevention measures. Parks, Recreation and Tourism is acquiring several FEMA properties, including adjacent to Costa Avenue. Design for Blue Heron Landing Park in Indian River planning area is complete. New design boasts significantly more pervious area than before, along with a significant increase of trees, shrubs, and improved landscaping.	

CHESAPEAKE MITIGATION ACTION 16	
Identify, create database, and plan uses for data regarding vulnerable populations. Uses may include targeted outreach, emergency notification and specialized evacuation planning. Study high social vulnerability repetitive flood loss areas to identify opportunities to support property owners and renters with recommended property-specific flood damage reduction tools and methods.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Outreach and early notification of events to vulnerable populations aids in evacuation, re-entry, sustainability and community resiliency.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake Wildfire, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$10,000
Potential Funding Sources:	DHS: UASI, BRIC, HMGP, HMGP 5% Initiative; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management (lead) Public Communications
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
City continues to work with state Shelter Coordinator to update databases of those with functional needs. The City now has a MIH (Mobile Integrated Health Coordinator), who is also creating a database of vulnerable populations. MIH Team regularly checks on citizens that have medical issues but do not need constant medical oversight. City has databases of those in modular home parks, in high risk areas near chemical facilities, and in repetitive flood areas. These groups can easily be notified using Everbridge should an incident occur. Messaging can also be sent should general information need to go out to the public in these areas.	

ISLE OF WIGHT COUNTY

ISLE OF WIGHT COUNTY MITIGATION ACTION 1	
Acquire, elevate, relocate or retrofit structures in coastal high hazard areas and other flood prone areas that have suffered repetitive flood damage. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Within the VE and AE flood zones along the James River and associated tributaries in Isle of Wight County
Cost Benefit:	Just 17 structures alone in the VE zone suffered damages in 1999 during Hurricane Floyd ($62,000), and 2003 from Hurricane Isabel ($476,483). One structure was recently acquired. FEMA will now fund hazard mitigation projects that include sea level rise estimates.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate – All repetitive flood loss areas are located in NRI relatively moderate flood risk areas, with the exception of an area near Jones Town Driver and Annisons Lane
Estimated Cost:	$3,400,000 (approximately $200,000/property) per phase. Up to 5 phases are planned. One recent acquisition cost $135,000.
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; Virginia CFPF
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing – County has ongoing process to assess needs
ADDITIONAL COMMENTS	
There are 16 properties with structures located in the VE flood zone that are targeted for participation. The project will have to be performed in phases as grant funds are made available. Acquisition and demolition of structures represent land use changes that the County may be able to claim as credits under new Chesapeake Bay Total Maximum Daily Load (TMDL) requirements. Careful tracking of these projects can also contribute significant points to the Community Rating System classification (see Mitigation Action 2).	

ISLE OF WIGHT COUNTY MITIGATION ACTION 2	
Strengthen floodplain management program through the following: **1) Continue participation in the National Flood Insurance Program and the Community Rating System;** **2) Conduct annual outreach to flood prone property owners;** **3) Review all existing environmental ordinances, such as the CBPA, Floodplain and Stormwater Management Ordinances, to ensure they include the best practicable protection measures, including guiding new development away from flood hazard areas; and** **4) Require new development in Coastal A Zones to meet Zone V standards for design and construction.**	
BACKGROUND INFORMATION	
Site and Location:	Countywide, Isle of Wight County
Cost Benefit:	Participation in the CRS at a Class 9 rating would result in 5% premium savings on most flood insurance policies. A Class 8 rating saves property owners 20% on premiums in the SFHA.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate – All repetitive flood loss areas are located in NRI relatively moderate flood risk areas, with the exception of an area near Jones Town Driver and Annisons Lane
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This action is part of the County's Strategy for Continued Compliance with the NFIP, and echoes policies and actions recommended in the Comprehensive Plan.	

ISLE OF WIGHT COUNTY MITIGATION ACTION 3	
Develop and maintain a stormwater drainage plan to address issues in flood-prone areas; prioritize and implement plan recommendations.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Flooding as a result of stormwater accumulation can exacerbate coastal flooding, contributing to flood damages of cars, structures, roads and other infrastructure. Nuisance flooding can result in businesses closed down.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate – All repetitive flood loss areas are located in NRI relatively moderate flood risk areas, with the exception of an area near Jones Town Driver and Annisons Lane
Estimated Cost:	$250,000 to $3,000,000
Potential Funding Sources:	General funds; DHS: HMGP
Lead Agency/Department Responsible:	Utility Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

ISLE OF WIGHT COUNTY MITIGATION ACTION 4	
Implement countywide Transportation Plan adopted in 2010 as part of the County Comprehensive Plan; include coordination with the Virginia Department of Transportation to address safety along all evacuation routes, including culvert redesigns and other installations to alleviate flooding.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Safe evacuation routes are mandatory for citizen protection during hazard events.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm
Goal(s) Addressed:	Goal 1, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate – All repetitive flood loss areas are located in NRI relatively moderate flood risk areas, with the exception of an area near Jones Town Driver and Annisons Lane
Estimated Cost:	Planning is underway; individual project costs to be determined through planning efforts
Potential Funding Sources:	General funds, VDOT and Federal assistance
Lead Agency/Department Responsible:	Planning and Public Works/Utility Services, VDOT, HRPDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
U.S. 460 is a priority for the County. County added a transportation planner/VDOT liaison to staff.	

ISLE OF WIGHT COUNTY MITIGATION ACTION 5	
Replace, as necessary, and maintain the existing regional interoperable communications system.	
BACKGROUND INFORMATION	
Site and Location:	Countywide and Southside Hampton Roads region
Cost Benefit:	Modern interoperable communications systems support preparedness, response and recovery activities for all hazards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All Hazards
Goal(s) Addressed:	Goal 1; Goal 3, Objectives 3.1, 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$10 million to $14 million
Potential Funding Sources:	DHS: HMGP, HMGP 5 % Initiative, others; CIP
Lead Agency/Department Responsible:	Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Replacement is needed and scheduled for near future.	

ISLE OF WIGHT COUNTY MITIGATION ACTION 6	
Verify the geographic location of each NFIP repetitive loss property, and determine if that property has been mitigated and, if so, by what means.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas throughout the County
Cost Benefit:	Repetitively flooded structures strain local and federal resources after disasters, and detract from the fiscal solvency of the NFIP. The NFIP focuses mitigation efforts and funds on properties listed as repetitive losses; therefore, checking the accuracy of the list is a necessity for the NFIP, States and, through this action, local governments.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate – All repetitive flood loss areas are located in NRI relatively moderate flood risk areas, with the exception of an area near Jones Town Driver and Annisons Lane
Estimated Cost:	Staff time estimated at $50 per structure x 18 structures = $900
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Within 2 years of plan adoption and in conjunction with CRS initial application
ADDITIONAL COMMENTS	
An initial attempt to contact property owners by mail will be followed up by phone calls, and site visits as necessary.	

ISLE OF WIGHT COUNTY MITIGATION ACTION 7	
Identify and address multiple hazards along high traffic evacuation routes throughout county, to include removal of utility poles and burying utility lines.	
BACKGROUND INFORMATION	
Site and Location:	High hazard areas for flood, and other areas of community importance (intersections, evacuation routes, critical facilities, and critical businesses)
Cost Benefit:	Overhead utilities are at risk of failure from several types of hazard events. By burying these lines underground, the vulnerability is dramatically reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Winter Storm, Tropical/Coastal Storm, Tornado, Earthquake, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.2; Goal 3, Objectives 3.3, 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	To be determined
Potential Funding Sources:	CIP, Private Funds
Lead Agency/Department Responsible:	Public Works, VDOT, HRPDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Burying electrical power lines must be reviewed with Dominion Virginia Power for potential opportunities within the community. Much of Hampton Roads evacuates through Isle of Wight County; therefore, safe, evacuation routes are a high priority for the region as well. New development is required to have underground power lines. VDOT maintains road ROWs and regularly conducts tree trimming.	

ISLE OF WIGHT COUNTY MITIGATION ACTION 8	
Continue use of social media before, during and after hazard events.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Minimal cost to reach larger audience more effectively
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 2; Objective 2.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal cost/staff time
Potential Funding Sources:	DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Public Information
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
The prominence of social media points to a need to refine activity on Twitter, Facebook, Instagram and other programs. Need to be pro-active and targeted in messages. Identify specific messages, links. Other information that we will need to spread and the most effective methods, such as short videos, maps, links, photos, and infographics.	

ISLE OF WIGHT COUNTY MITIGATION ACTION 9	
Obtain StormReady designation through NOAA.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	StormReady helps arm communities with the communication and safety skills needed to save lives and property--before, during and after the event. StormReady helps community leaders and emergency managers strengthen local safety programs.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Wildfire
Goal(s) Addressed:	Goal 1, Goal 2, Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

ISLE OF WIGHT MITIGATION ACTION 10	
Continue developing a post-disaster continuity of operations plan to assist in more rapid recovery after a disaster.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	By identifying post-disaster processes for almost all County department functions and putting these processes on paper, the plan would aid staff and temporary staff in keeping processes running smoothly and not contributing to additional conflicts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Landslide/Coastal Erosion, Winter Storm, Earthquake, Wildfire, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objectives 1.4, 1.5; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$25,000
Potential Funding Sources:	Staff time, DHS planning grants
Lead Agency/Department Responsible:	Emergency Management, Planning, Permits & Inspections, Engineering, Public Works
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
The County has made progress refining procedures, but there is more work to do to finalize the plan.	

ISLE OF WIGHT MITIGATION ACTION 11	
Formalize a Green Infrastructure Network Plan to preserve the County's large undisturbed forests, preserve scenic landscapes, provide habitat, reduce stormwater runoff, maintain air quality and moderate temperature. Include a riparian buffer protection strategy for those areas in the Blackwater River Watershed which are not protected by CBPA.	
BACKGROUND INFORMATION	
Site and Location:	Watersheds countywide
Cost Benefit:	Protecting land prior to development is critical for long-term protection of land and water resources.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.6
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Virginia CFPF
Lead Agency/Department Responsible:	Community Development
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	
These actions are also in the County's Comprehensive Plan.	

SMITHFIELD

SMITHFIELD MITIGATION ACTION 1	
Provide training for member(s) of Town staff to become Certified Floodplain Manager (CFM) through the Association of State Floodplain Managers (ASFPM).	
BACKGROUND INFORMATION	
Site and Location:	Throughout Town
Cost Benefit:	Training related to implementation of floodplain management regulations, permitting, reading Flood Insurance Rate Maps, and other topics will help Town staff properly administer floodplain management regulations, thereby protecting future development from flood damage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objective 1.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	<$1,000 for conference attendance, test taking, and ASFPM membership
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Planning and Engineering
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
This action is part of the Town's Strategy for Continued Compliance with the NFIP.	

SMITHFIELD MITIGATION ACTION 2	
Review information required on the Zoning Permit Application to ensure continued compliance with the NFIP.	
BACKGROUND INFORMATION	
Site and Location:	Throughout Town
Cost Benefit:	Identification of floodplain zones during the Zoning Permit review process provides this hazard information to developers and property owners early in the construction process to help ensure compliance with floodplain management regulations.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objective 1.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Planning and Engineering
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
The NFIP requires that applicants for a floodplain permit provide certain flood hazard information (e.g., Base Flood Elevation, flood zone, Flood Insurance Rate Map identifying information) on the permit application. Coordination with the County, which administers the building permit, may be required. This action is part of the community's Strategy for Continued Compliance with the NFIP.	

SMITHFIELD MITIGATION ACTION 3	
Identify strategic locations throughout town to remove utility poles and bury utility lines.	
BACKGROUND INFORMATION	
Site and Location:	High hazard areas for flood, and other areas of community importance (intersections, critical facilities, and critical businesses)
Cost Benefit:	Overhead utilities are at risk of failure from several types of hazard events. By burying these lines underground, the vulnerability is dramatically reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Winter Storms, Tropical/Coastal Storm, Tornado, Earthquake, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	To be determined
Potential Funding Sources:	CIP, Private Funds
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Long-term, over a 10-year period
ADDITIONAL COMMENTS	
Burying electrical power lines must be reviewed with Dominion Virginia Power for potential opportunities within the community.	

SMITHFIELD MITIGATION ACTION 4	
Verify the geographic location of each NFIP repetitive loss property, and determine if that property has been mitigated and, if so, by what means.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood losses
Cost Benefit:	Repetitively flooded structures strain local and federal resources after disasters, and detract from the fiscal solvency of the NFIP. The NFIP focuses mitigation efforts and funds on properties listed as repetitive losses; therefore, checking the accuracy of the list is a necessity for the NFIP, States and, through this action, local governments.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objective 1.1, 1.2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
An initial attempt to contact property owners by mail will be followed up by phone calls, and site visits as necessary.	

SMITHFIELD MITIGATION ACTION 5	
Waterworks Dam/Smithfield Lake - Examine options to either bring dam into compliance with state regulations at a cost of more than $1.5 million, or decommission dam which may cost less, or as much as two times that, depending on the type of environmental restoration chosen for the lakebed.	
BACKGROUND INFORMATION	
Site and Location:	Waterworks Dam is on the west side of Smithfield.
Cost Benefit:	Actions are mandated regardless of cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Winter Storm, Earthquake, Flooding Due to Impoundment Failure
Goal(s) Addressed:	Goal 1, Objective 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$250,000 for the study. Mitigation action costs to be determined by study.
Potential Funding Sources:	DEQ, DCR, Town funds
Lead Agency/Department Responsible:	Town Engineer
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
On October 7, 2007, excessive rainfall caused the dam to be topped, resulting in dam erosion and damage to the roadway running along the top of the dam. In 2010, heavy rains weakened the structure. Repair project was put out for bids in October 2017. In 2020, the town was informed they needed to repair the dam to get another operating permit.	

SMITHFIELD MITIGATION ACTION 6	
Increase fuel storage at reverse osmosis water plant, allowing for extended operations during emergency situations.	
BACKGROUND INFORMATION	
Site and Location:	Town's water plant
Cost Benefit:	Due to size of the generator, the most cost effective option is to increase fuel capacity rather convert to natural gas.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire
Goal(s) Addressed:	Goal 1, Objective 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Estimated $100,000, depending on the size of the tank and ability to locate additional fuel storage
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative; Town funds
Lead Agency/Department Responsible:	Plant Manager
Implementation Schedule:	3 to 5 years
ADDITIONAL COMMENTS	
Currently, the generator at the plant has a 48-hour run time. The town also has the ability to store around 48 hours of water supply in tanks, giving the town a 4-day supply depending on usage.	

SMITHFIELD MITIGATION ACTION 7	
Purchase variable message roadway signs, primarily for traffic control during flood events.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone roadways throughout the Town
Cost Benefit:	Signs will reduce damage by rerouting traffic around flooded areas, and increase availability of public safety staff for more important tasks. Signs will have other uses beyond traffic control for floods, improving the department's ability to get information out to the public and motorists.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm
Goal(s) Addressed:	Goal 1, Objective 1.5; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$13,000 per sign
Potential Funding Sources:	Highway budget, VDOT; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Town Engineer
Implementation Schedule:	Purchase 1 sign per year for the next 5 years
ADDITIONAL COMMENTS	
Several roadways flood during even higher frequency events, so being able to reroute traffic around these roadways becomes even more critical during major storm events.	

SMITHFIELD MITIGATION ACTION 8	
Change generators at critical facilities from diesel to natural gas.	
BACKGROUND INFORMATION	
Site and Location:	Critical facilities throughout the town, including but not limited to: Public Works Maintenance Building, Police Department, and Sewer Pump Stations
Cost Benefit:	Recovery from major disasters requires continuity of operations for the town, to the extent possible.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	To be determined based on availability of natural gas and whether individual generators can be converted or will have to be replaced.
Potential Funding Sources:	DHS: UASI, BRIC, HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Begin work immediately, starting with the oldest and most critical systems
ADDITIONAL COMMENTS	
Delivery of fuel during disasters is problematic and the town wants to improve ability to maintain continuity of operations.	

WINDSOR

WINDSOR MITIGATION ACTION 1	
Provide training for member of Town staff to become a Certified Floodplain Manager (CFM) through the Association of State Floodplain Managers (ASFPM).	
BACKGROUND INFORMATION	
Site and Location:	Throughout Town
Cost Benefit:	Training related to implementation of floodplain management regulations, permitting, reading Flood Insurance Rate Maps, and other topics will help Town staff properly administer floodplain management regulations, thereby protecting future development from flood damage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 1, Objective 1.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	<$1,000 for conference attendance, test taking, and ASFPM membership
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
This action is part of the community's Strategy for Continued Compliance with the NFIP.	

WINDSOR MITIGATION ACTION 2	
Review information required on the Zoning Permit Application to ensure continued compliance with the NFIP.	
BACKGROUND INFORMATION	
Site and Location:	Throughout Town
Cost Benefit:	Identification of floodplain zones during the Zoning Permit review process provides this hazard information to developers and property owners early in the construction process to help ensure compliance with floodplain management regulations.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objective 1.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Town Manager
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
The NFIP requires that applicants for a floodplain permit provide certain flood hazard information (e.g., Base Flood Elevation, flood zone, Flood Insurance Rate Map identifying information) on the permit application. Coordination with the County, which administers the building permit, may be required. This action is part of the community's Strategy for Continued Compliance with the NFIP.	

FRANKLIN

FRANKLIN MITIGATION ACTION 1	
Use existing stormwater and drainage studies to prioritize and implement recommended improvements. Evaluate use of stormwater fee to fund future projects.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on Broad Street ditch, the Armory Drive ditch/ROW, and High Street north of the hospital.
Cost Benefit:	Stormwater drainage minimizes road closures, reduces damage to structures.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	City is currently completing a planning document that outlines recommended improvements and cost estimates for each.
Potential Funding Sources:	ARPA; DHS: BRIC, HMGP, FMA
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 2 to 3 years
ADDITIONAL COMMENTS	

FRANKLIN MITIGATION ACTION 2	
Maintain participation in the National Flood Insurance Program and the Community Rating System (CRS) and explore options for improving rating (currently a Class 9). Partner with Virginia DCR floodplain managers to update Appendix D of the Zoning Ordinance Floodplain Regulations.	
BACKGROUND INFORMATION	
Site and Location:	Flood insurance policyholders in the 100-year floodplain would be the primary beneficiaries. Standard X-Zone policyholders would also benefit up to a maximum 10 percent discount.
Cost Benefit:	Although there are numerous benefits to participation in CRS, the most quantifiable is the premium discounts to flood insurance policyholders. By reducing the amount residents pay in flood insurance premiums, this money is returned to the community and can be spent locally. Furthermore, many CRS communities experience a dramatic increase in the number of policies due to their outreach, which results in a reduction in uninsured losses after a flood. Then, Increased Cost of Compliance funds available to policyholders after a flood can be a valuable mitigation tool.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Goal 2, Goal 3
Priority (High, Moderate, Low):	Medium
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	There is no cost for submitting a CRS application, other than staff time. Additional hours are required for annual reviews and cycle applications every 5 years. FEMA/ISO will provide application assistance.
Potential Funding Sources:	Existing budgets.
Lead Agency/Department Responsible:	Community Development
Implementation Schedule:	Within 1 to 2 years
ADDITIONAL COMMENTS	
CRS provides a structured incentive program to address flood hazards by rewarding policyholders with premium discounts, enhancing public safety, reducing damage to property and public infrastructure, avoiding economic disruption and losses, reducing human suffering, protecting the environment, and increasing the flood insurance policy base.	

FRANKLIN MITIGATION ACTION 3	
Compile elevation and flood damage data, including but not limited to: **1) Ensure all flood-prone businesses have based flood elevations posted inside;** **2) Link gauge data and high water mark data in a digital environment to facilitate evacuation, notification and other community flood awareness elements;** **3) Continue to participate in the river gaging program (entered 5 year contract in 2020);** **4) Maintain completed FEMA Elevation Certificates in a publicly-accessible format.**	
BACKGROUND INFORMATION	
Site and Location:	Throughout City's flood hazard areas.
Cost Benefit:	Data will support analysis of costs and benefits of flood mitigation measures, particularly for repetitively flooded structures. Benefits accrue through reduced staff time in preparing mitigation grant applications, and improved accuracy of cost-benefit analyses and evacuation plans.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2; Goal 2; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time; approximately 100 hours.
Potential Funding Sources:	USACE: FPMS (high water marks, structure elevations), HRPDC: LIDAR DHS: HMGP, HMGP 5% Initiative
Lead Agency/Department Responsible:	Fire and Rescue, Department of Tourism, Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Gathering data to create an accurate cost-benefit analysis can be a particularly daunting part of the grant application process. By compiling data on historic floods and detailed damages in a single location/document, the City will support flood mitigation projects, both structural and nonstructural. Detailed elevation data in the Downtown Business District will assist in both evacuation planning and mitigation prioritization.	

FRANKLIN MITIGATION ACTION 4	
Work with the Department of Tourism and property owners to identify and implement wet and dry floodproofing projects to protect structures from future flood events. Floodproofing projects should be viewed from a holistic perspective while considering available technology and the building's age. Current floodplain management ordinance regulates floodproofing and residential elevations. Identify projects by providing flood audits to business owners. Mitigation projects may include acquisition, elevation, mitigation reconstruction projects, and retrofitting.	
BACKGROUND INFORMATION	
Site and Location:	Downtown Franklin
Cost Benefit:	Initial flood audits conducted by a structural engineer, together with detailed first floor elevations, will aid in prioritizing mitigation projects to ensure that implemented projects maximize the reduction in average annual flood damages and reduce economic strain on businesses and the City.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.5; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$2,500 to $10,000 per structure
Potential Funding Sources:	DHS: HMGP, RFC ACE: FPMS HRPDC SBA loans
Lead Agency/Department Responsible:	Community Development
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
Investigate the potential for "peer-to-peer" mentoring with other communities that have implemented historic downtown flood mitigation projects. Potential communities in the region with successful downtown flood mitigation projects include Grundy and Staunton, Virginia and Belhaven, North Carolina. The HRPDC can assist.	

FRANKLIN MITIGATION ACTION 5	
Conduct community disaster awareness campaign through the City's email newsletter to interested citizens, social media platforms through City of Franklin, Franklin Fire & Rescue and Franklin Police pages, and the cable Public, Education and Government (PEG) Channel. Address mitigation actions for multiple hazards, including purchase of flood insurance.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	For low cost, the City can distribute information on a variety of hazards to interested citizens on a regular basis. Benefits accrue when citizens aware of hazards begin to take actions to protect lives and property.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Drought, Extreme Heat, Hazardous Materials Incident, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 2
Priority (High, Moderate, Low):	Moderate/Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal costs for staff time. Materials are available from FEMA and other agencies for free.
Potential Funding Sources:	Existing budgets. DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Fire and Rescue, American Red Cross
Implementation Schedule:	Within one year.
ADDITIONAL COMMENTS	

FRANKLIN MITIGATION ACTION 6	
Increase protection and access/egress for critical facilities and infrastructure, primarily as a result of flooding. Elevate or floodproof new critical facilities; retrofit, relocate or repurpose existing facilities, or develop alternative options with close localities, and protect existing power line infrastructure. Mitigation projects may include acquisition, elevation, mitigation reconstruction projects, or retrofitting.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on: 1. Evaluating relocation of main fire station out of the Special Flood Hazard Area (100-year floodplain); 2. Regionally, along power line right-of-ways; and, 3. Wastewater treatment plant mitigation or relocation.
Cost Benefit:	Benefits are reduced response times, longevity of critical infrastructure and reduced downtime for utilities after a disaster. The fire station was constructed in 1979 and was flooded in 1999 and 2006. The wastewater treatment plant was built in the 1950s and is also located in the Special Flood Hazard Area and is subject to regular inundation. Recently completed Franklin Southampton shared Water/Sewer Study outlines costs and benefits of various alternatives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Winter Storm
Goal(s) Addressed:	Goal 1, Objective 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Relocation of Fire Station estimated at +$9 million. Relocation or Mitigation of Wastewater Treatment Plan estimated at +$70 million
Potential Funding Sources:	ARPA; DHS: BRIC, HMGP, FMA; ACE: FCW, SFCP Dominion
Lead Agency/Department Responsible:	Fire Station – Franklin Fire & Rescue Public Works, with Franklin Power & Light, and Dominion
Implementation Schedule:	Within 1 to 2 years
ADDITIONAL COMMENTS	
Existing power lines in the floodway and floodplain are current issues of concern. Some power lines are outside of the City but provide power to the City and there is concern that power outages during floods could be extensive. The City is actively raising electrical panels and other equipment to higher locations, and is evaluating raising the substation. The City should move forward with identification of available, non-flood-prone sites for a new Fire Station.	

FRANKLIN MITIGATION ACTION 7	
Reduce the prevalence of hazardous trees by: **1) Conducting routine inspection and tree-trimming maintenance conducted by Public Works on a yearly basis; and** **2) coordinating with the Beautification Committee to prepare and distribute guidelines for property owners on how to properly care for aging trees, especially at the onset of hurricane season. Use PEG channel for distribution.**	
BACKGROUND INFORMATION	
Site and Location:	Franklin is a designated "Tree City USA" and the Beautification Committee administers an ordinance regulating tree pruning on publicly owned property.
Cost Benefit:	Benefits accrue through reduced damages to people, structures and vehicles. Reduced power outages get the City back to full operability faster.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tropical/Coastal Storm, Winter Storm, Wildfire
Goal(s) Addressed:	Goal 1, Objective 1.2, 1.5; Goal 2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	VDOF Urban and Community Forestry Assistance, VDOT Transportation Enhancement Grants
Lead Agency/Department Responsible:	Public Works tree trimming team
Implementation Schedule:	within 1 year
ADDITIONAL COMMENTS	
Tree failure has been identified by citizens as a significant hazard concern. During high wind events, trees that have not been properly pruned represent a hazard to people, structures, power lines, and vehicles. City continuously share Department of Forestry guidelines with the public.	

FRANKLIN MITIGATION ACTION 8	
Coordinate with CSX to regulate and manage the amount, types and times of hazardous materials transport through Franklin, and in preparing for potential hazardous material incidents.	
BACKGROUND INFORMATION	
Site and Location:	CSX rail lines
Cost Benefit:	Through the low-cost exchange of transport information with the railroads, Franklin officials can maximize preparedness, and reduce potential damage from an incident occurring during peak travel times or special events.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.5; Goal 3, Objective 3.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	n/a
Lead Agency/Department Responsible:	Fire and Rescue
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Currently, staff are working with CSX to determine what hazardous materials travel through Franklin. The nearby Town of Boykins in Southampton County has passed an ordinance prohibiting overnight or longer-term parking of hazardous materials rail cars within town limits.	

FRANKLIN MITIGATION ACTION 9	
Continue upgrades to radio system to increase interoperability between departments and neighboring communities.	
BACKGROUND INFORMATION	
Site and Location:	Citywide and Neighboring Agencies
Cost Benefit:	Improved response capability builds community sustainability and increases citizen confidence in City services.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objective 1.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$1.6 million
Potential Funding Sources:	ARPC; DHS: BRIC, HMGP, HSGP
Lead Agency/Department Responsible:	Police; Fire and Rescue
Implementation Schedule:	Within 2 to 3 years
ADDITIONAL COMMENTS	
Franklin is working on this action currently using ARPA funds. Goal is to connect departments on local and regional levels.	

FRANKLIN MITIGATION ACTION 10	
Expand offside capabilities to city departments and citizens. Install citywide wireless network that will allow users to have access to computer network in a mobile environment. Provide signage for residents/travelers on how to connect to network.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Improves response capability, thereby reducing damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Extreme Heat, Hazardous Materials Incident
Goal(s) Addressed:	Goal 1, Objective 1.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$330,196
Potential Funding Sources:	ARPA; DHS: BRIC, HMGP, HMGP 5% Initiative, HSGP
Lead Agency/Department Responsible:	Police
Implementation Schedule:	2 years
ADDITIONAL COMMENTS	
Install a citywide wireless network that will allow emergency responders to access internet, street level maps of city, HAZMAT information, pre-fire plans, and VCIN/NCIC for law enforcement. Interoperable communications of information exchanged via secure instant messaging. Allows interoperability of outside agencies responding to an incident within the City of Franklin. Several systems have been tested in recent years, but none found adequate for designated purposes.	

FRANKLIN MITIGATION ACTION 11	
Upgrade existing GIS system to incorporate wetlands, NFIP flood maps and other risk information into the site plan review process for new development. Incorporate risk from tidal surge and rising sea levels on rivers and consider how floodplains will change over time.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	A very low cost mitigation action with the benefit of raising awareness of flood hazards at a time when the (readily available) information can be used in the development process to protect new structures and infrastructure.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Landslide/Coastal Erosion
Goal(s) Addressed:	Goal 3, Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	Community Development, Clerk's Office, Revenue Office
Implementation Schedule:	Immediately
ADDITIONAL COMMENTS	
Currently, staff are working with Clerk's Office, Revenue Office and GeoDecisions on overall GIS use/system. Currently have a wetlands test layer.	

FRANKLIN MITIGATION ACTION 12	
Help businesses develop multi-disaster recovery plans.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Disaster recovery plans minimize or eliminate disruptions to the local economy and may reduce the need for insurance claims or business assistance after events.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$30,000
Potential Funding Sources:	DHS: HSGP
Lead Agency/Department Responsible:	Community Development, with Chamber of Commerce, Franklin Southampton Economic Development and Department of Tourism, HRPDC
Implementation Schedule:	Within 2 years
ADDITIONAL COMMENTS	
Businesses with disaster recovery plans in place will reduce or eliminate the impact of future disasters on themselves and Franklin's local economy. The identification of potential hazard mitigation measures (i.e., building retrofits/elevation, secondary storage facilities, backup systems) should be encouraged. Staff are currently working with agencies and departments listed above to identify additional strategies and methods to include economic relief, recovery and incentives to bring in new businesses. Relocation of Community Development is also under consideration to provide continuity of permitting operations.	

FRANKLIN MITIGATION ACTION 13	
Identify and repair or demolish unsafe, unsanitary or hazardous housing and other structures, including those in repetitive flood loss areas. Mitigation projects may include acquisition, relocation, elevation, mitigation reconstruction projects, and/or retrofitting.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Cost Benefit:	Unsafe housing increases the potential for loss of life and property due to several hazards. By identifying housing vulnerable to natural hazards and prioritizing those structures for repair or demolition, average annual damages due to hazards can be reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Winter Storm, Tornado, Hazardous Materials Incident, Wildfire, Radon Exposure
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3; Goal 2, Objective 2.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Costs vary based on structure needs. Generally, costs for demolition start at about $10,000 per structure, while rehabilitation and elevation together start at approximately $100,000 per structure.
Potential Funding Sources:	ARPA; HUD: CDBG DHS: BRIC, FMA, HMGP, RFC (CDBG funds may be applied as a non-Federal match to DHS grant funds)
Lead Agency/Department Responsible:	Community Development & Franklin Fire
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	
Community has an ongoing housing needs assessment that must be partnered with this initiative. City is planning action in the near future using ARPA and CDBG funds.	

FRANKLIN MITIGATION ACTION 14	
Verify the geographic location of identified NFIP repetitive loss structures, and determine if those properties have been mitigated and, if so, by what means.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas throughout the City
Cost Benefit:	Repetitively flooded structures strain local and federal resources after disasters, and detract from the fiscal solvency of the NFIP. The NFIP focuses mitigation efforts and funds on properties listed as repetitive losses; therefore, checking the accuracy of the list is a necessity for the NFIP, States and, through this action, local governments.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Costs are being reevaluated.
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC
Lead Agency/Department Responsible:	Planning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
An initial attempt to contact property owners by mail will be followed up by phone calls, and site visits as necessary.	

SOUTHAMPTON COUNTY

SOUTHAMPTON COUNTY MITIGATION ACTION 1	
Protect existing and future critical facilities from damage due to flooding, tropical storm, earthquake and tornado. Projects may include: **1) Modify floodplain management ordinance to require new public safety buildings be located outside 500-year floodplain and that a detailed flood study be conducted to determine limits of the 100- and 500-year floodplains for proposed public safety buildings near approximate A Zone floodplain;** **2) continue mapping water and sewer lines countywide, including the towns, in order to identify problems and retrofit/upgrade needs in order to protect utilities from damage and provide continuity of operations during disaster;** **3) Retrofit new Sheriff's Office and EOC to protect from flooding, including access and egress; and,** **4) Ensure retrofitted Courthouse is protected from flooding.**	
BACKGROUND INFORMATION	
Site and Location:	To be determined
Cost Benefit:	The current EOC is subject to flooding which can hinder response efforts during flood events. Benefits accrue by increasing response capabilities and reducing average annual flood damages and predicted downtime for critical public safety structures and lifelines.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Tornado, Earthquake
Goal(s) Addressed:	Goal 1, Objectives 1.3, 1.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – repetitive flood loss areas in the county are NRI relatively high or very high flood risk
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets; DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	County Administrator's Office
Implementation Schedule:	Within 3 years
ADDITIONAL COMMENTS	

SOUTHAMPTON COUNTY MITIGATION ACTION 2	
Consider amendment to subdivision ordinance that requires solicitation to the Virginia Department of Forestry for wildfire mitigation comments on proposed major subdivisions in the County.	
BACKGROUND INFORMATION	
Site and Location:	To be determined
Cost Benefit:	During the site plan review process, comments regarding smart wildfire avoidance techniques, such as defensible space, can be incorporated into the project design.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	Goal 1; Goal 3, Objective 3.4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	VDOF
Lead Agency/Department Responsible:	Community Development
Implementation Schedule:	Within 5 years
ADDITIONAL COMMENTS	

SOUTHAMPTON COUNTY MITIGATION ACTION 3	
Protect repetitively flooded structures, including the County courthouse, from flood damage. Modifications could include floodproofing retrofits, elevation of structure and/or critical components, acquisition, relocation or repurposing the structure. This action includes Mitigation Reconstruction projects.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Average annual flood damages would be reduced through mitigation actions.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – repetitive flood loss areas in the county are NRI relatively high or very high flood risk
Estimated Cost:	To be determined
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; HSGP
Lead Agency/Department Responsible:	County Administrator's Office
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SOUTHAMPTON COUNTY MITIGATION ACTION 4	
Complete five remaining countywide drainage studies that prioritize drainage maintenance requirements and stormwater management projects to minimize flooding problems. Implement recommendations.	
BACKGROUND INFORMATION	
Site and Location:	One study proposed for each County planning area (Newsoms has been completed)
Cost Benefit:	The exact nature of flooding problems merits additional study before the costs and benefits of individual flood mitigation projects can be calculated with accuracy, and in order to determine which drainage maintenance projects maximize benefits from reduced flooding. Much of the County has only been studied to show approximate A Zone floodplains.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – repetitive flood loss areas in the county are NRI relatively high or very high flood risk
Estimated Cost:	$250,000
Potential Funding Sources:	DHS: BRIC, HMGP, HSGP; USDA: WPFP
Lead Agency/Department Responsible:	County Administrator's Office
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	
Many storm drainage ditches were constructed in the 1930's and are not maintained.	

SOUTHAMPTON COUNTY MITIGATION ACTION 5	
Institute web-based educational program to provide multi-hazard structural protection techniques to property owners. Include information on responsible tree pruning.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost benefit:	Low-cost protection measures help citizens help themselves.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Radon Exposure
Goal(s) Addressed:	Goal 2, Objectives 2.1, 2.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Approximately $2,500 annually
Potential Funding Sources:	DHS: BRIC, HGSP, HMGP, HMGP 5% Initiative; American Red Cross; FEMA materials available at no charge
Lead Agency/Department Responsible:	Community Development
Implementation Schedule:	Within 1 year
ADDITIONAL COMMENTS	
Particular life/safety concerns were identified, specifically related to driving on roads that have been or could be flooded, and promoting water conservation techniques during widespread power outages.	

SOUTHAMPTON COUNTY MITIGATION ACTION 6	
Verify the geographic location of all NFIP repetitive losses, and make inquiries as to whether the properties have been mitigated, and if so, by what means.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Average annual flood damages are reduced through mitigation actions.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1; Goal 3, Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – repetitive flood loss areas in the county are NRI relatively high or very high flood risk
Estimated Cost:	To be determined
Potential Funding Sources:	DHS: BRIC, HMGP, HMGP 5% Initiative, FMA, RFC; HSGP
Lead Agency/Department Responsible:	Community Development; HRPDC, VDEM
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SOUTHAMPTON COUNTY MITIGATION ACTION 7	
Maintain Certified Floodplain Manager (CFM) certification and training for two County employees.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Training related to implementation of floodplain management regulations, permitting, reading Flood Insurance Rate Maps, and other topics will help staff properly administer floodplain management regulations, thereby protecting future development from flood damage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2
Priority (High, Moderate, Low):	High.
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$1,000 per person
Potential Funding Sources:	Department training funds
Lead Agency/Department Responsible:	Department of Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SOUTHAMPTON COUNTY MITIGATION ACTION 8	
Enact tree preservation or landscape ordinance for new construction in all zoning designations.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Tree protection and landscape requirements mitigate effects of erosion and can contribute to stormwater management for new construction by requiring greater pervious areas and retention of existing landscaped areas.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Landslide/Coastal Erosion, Winter Storm, Wildfire
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.5, 1.6, Goal 3, Objective 3.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time only
Potential Funding Sources:	DHS: HMGP 5% Initiative
Lead Agency/Department Responsible:	County Administrator/Public Works Department/Community Development Department
Implementation Schedule:	within 3 years of plan adoption
ADDITIONAL COMMENTS	
County is adopting new zoning designation with landscaping requirements. Tree preservation and landscaping are also addressed in proposed solar energy ordinance now under consideration.	

SOUTHAMPTON COUNTY MITIGATION ACTION 9	
Encourage Litter Control Council and citizen groups to become more involved in roadside clean-ups to keep roadside ditches clear of debris.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Citizen involvement in ditch maintenance reduces costs to VDOT for ditch maintenance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Landslide/Coastal Erosion, Winter Storm
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.5, 1.6, Goal 2, Objective 2.1; Goal 3, Objective 3.3
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	<$5,000
Potential Funding Sources:	Grants for Litter Control Council
Lead Agency/Department Responsible:	Public Works (staff liaison to Litter Control Council)
Implementation Schedule:	Over the next 5 to 7 years
ADDITIONAL COMMENTS	

SOUTHAMPTON COUNTY MITIGATION ACTION 10	
Increase use of Reverse 911 by citizens. Registration for the service is required and is currently advertised primarily on county web site.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	Reverse 911 has a cost to the County, but increased users are needed to make the system as cost-effective as possible.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.4, 1.5, Goal 2, Objective 2.1, Goal 3, Objective 3.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	<$2,500
Potential Funding Sources:	To be determined.
Lead Agency/Department Responsible:	Sheriff's Office
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	
Sheriff's Office has plans in place for advertisement.	

SOUTHAMPTON COUNTY MITIGATION ACTION 11	
Include hazard mitigation priorities in budget preparation discussions and other County functions, such as comprehensive land use planning.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Cost Benefit:	The process for funding other mitigation actions included in this plan must begin with countywide budget priorities. There is no cost to including a discussion of the hazards and vulnerability to which the county is exposed, but the benefits accrue as mitigation actions get implemented.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.4, 1.5; Goal 3, Objectives 3.1, 3.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	Director/Coordinator of Emergency Management
Implementation Schedule:	Annually
ADDITIONAL COMMENTS	
Funds for mitigation efforts are necessary. Some costs are minimal (e.g., direct mail, web updates), some are expensive (e.g., structural mitigation, relocation of critical facilities). It is important for all County staff to look at hazard mitigation as a set of on-going actions rather than as a hard copy plan on the bookshelf. County Comprehensive Plan is currently undergoing revision and hazard mitigation-related goals and objectives will be incorporated.	

SOUTHAMPTON COUNTY MITIGATION ACTION 12	
Implement drainage plan for Newsoms area. The plan was created through a DHCD grant that is currently funded and underway until early 2023. Seek additional funding sources.	
BACKGROUND INFORMATION	
Site and Location:	Newsoms
Cost Benefit:	Drainage study and plan are completed and provide steps necessary to fix drainage problems and repair damaged homes.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 2, Objective 2.1; Goal 3, Objectives 3.1, 3.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$50,000 - $500,000, per plan, which was broken into several geographic areas, so phased implementation is feasible.
Potential Funding Sources:	DHS: HMGP
Lead Agency/Department Responsible:	Director/Coordinator of Emergency Management
Implementation Schedule:	Annually
ADDITIONAL COMMENTS	
Three more phases of the plan are anticipated.	

SOUTHAMPTON COUNTY MITIGATION ACTION 13	
Develop long-term housing plan, including consideration of adopting the Property Maintenance Section of the USBC to address existing housing deficiencies. Long-term plan should include housing for displaced populations in the incorporated and unincorporated parts of Southampton County in the event of a disaster.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular focus on flood-prone and socially vulnerable population centers in the towns.
Cost Benefit:	Disaster resilience is only achieved when the hardest hit citizens can return to a new normal, safe from repeat events. By focusing on population centers and identifying future housing needs for socially vulnerable populations, the County will reduce future costs and uncertainty in a post-disaster scenario.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Hazardous Materials Incident, Radon Exposure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 14, 1.5
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High/Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Virginia CFPF; DHS: BRIC, HMGP; HUD: CDBG; Virginia Department of Housing and Community Development; HRPDC
Lead Agency/Department Responsible:	Sheriff's Office, Community Development, Social Services
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

SOUTHAMPTON COUNTY MITIGATION ACTION 14	
Conduct additional watershed mapping for the Blackwater and Nottaway Rivers, similar to the recently completed effort on the Meherrin River.	
BACKGROUND INFORMATION	
Site and Location:	Blackwater and Nottaway River watersheds
Cost Benefit:	Better mapping facilitates better regulation of stormwater and other development-related impacts in the watersheds.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – repetitive flood loss areas in the county are NRI relatively high or very high flood risk
Estimated Cost:	TBD
Potential Funding Sources:	USACE, Silver Jackets, County General Fund
Lead Agency/Department Responsible:	Community Development
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	

SURRY COUNTY

SURRY COUNTY MITIGATION ACTION 1	
Increase staff resources for emergency management.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Insufficient staffing increases the demands on existing staff and can be problematic in program administration during disasters.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1..3, 1.4, 1.5; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$60,000 to $80,000 per position
Potential Funding Sources:	County Budget and Staffing Plan; DHS
Lead Agency/Department Responsible:	Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SURRY COUNTY MITIGATION ACTION 2	
Establish signage notifications for additional high water marks along creeks and rivers in floodprone areas.	
BACKGROUND INFORMATION	
Site and Location:	To be determined.
Benefit Cost:	Signage that notifies drivers about how high the water is helps reduce water rescues and save lives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1: Objective 1.5; Goal 2; Goal 3: Objectives 3.3, 3.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – northern Census tract with 3 repetitive flood loss areas Low – southern Census tract with 1 repetitive flood loss area
Estimated Cost:	<$5000
Potential Funding Sources:	Staff, VDOT
Lead Agency/Department Responsible:	Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SURRY COUNTY MITIGATION ACTION 3	
Protect critical facilities and infrastructure. Measures may include retrofitting of existing buildings and facilities as shelters, stormwater management or drainage improvements, elevation or relocation of structures or facilities out of hazard-prone locations. Continue to install the necessary electrical hook-up, wiring, and switches to allow readily-accessible connections to emergency generators at key critical public facilities.	
BACKGROUND INFORMATION	
Site and Location:	County facilities throughout the County
Benefit Cost:	Continuity of operations after a hazard event is dependent upon operational utilities, shelters, communications and medical services.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.3, 1.5; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	CIP, DHS: HMGP; Virginia CFPF
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SURRY COUNTY MITIGATION ACTION 4	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, and earthquakes. Use social media to quickly and effectively inform the public.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Damage from hazard events is reduced when citizens are prepared and knowledgeable about mitigation techniques to protect their lives and property, and preparedness techniques for staying safe when events happen.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time; less than $2500 annually
Potential Funding Sources:	DHS materials; CIP
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SURRY COUNTY MITIGATION ACTION 5	
As part of continuing participation in the NFIP and a new application to the Community Rating System, request list of NFIP repetitive flood losses to ensure accuracy. Review will include verification of the geographic location of each RL property and determination if mitigated and by what means. Provide corrections if needed by filing form FEMA AW-501. Update flood ordinance to clarify freeboard requirement.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Community Rating System participation may reduce flood insurance premiums throughout the County.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High – northern Census tract with 3 repetitive flood loss areas Low – southern Census tract with 1 repetitive flood loss area
Estimated Cost:	Staff time investment in CRS application is significant.
Potential Funding Sources:	VDEM
Lead Agency/Department Responsible:	Department of Planning and Zoning
Implementation Schedule:	within 2 years of plan adoption
ADDITIONAL COMMENTS	
Discussions with VDEM and the regional PDC's may transfer some of the repetitive flood loss monitoring to VDEM in the future.	

SURRY COUNTY MITIGATION ACTION 6	
Improve GIS and 911 capabilities with better data collection, integration and functionality.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Tropical/Coastal Storm, Tornado, Winter Storm, Earthquake, Wildfire, Extreme Heat, Hazardous Materials Incident, Pandemic Flu or Communicable Disease
Goal(s) Addressed:	Goal 3: Objectives 3.2, 3.4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	Public Safety Answering Points (PSAP) Operations Grant
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SURRY COUNTY MITIGATION ACTION 7	
Protect public and private property through a variety of measures, including but not limited to: acquisition, elevation or relocation of structures from hazard prone areas, retrofitting of existing buildings, and minor structural flood control projects.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Protecting structures in hazard-prone locations, particularly floodplains, has been shown to reduce future damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding Due to Impoundment Failure/High Hazard Dam, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion, Tornado, Earthquake, Winter Storm, Wildfire, Radon Exposure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 2: Objective 2.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – northern Census tract with 3 repetitive flood loss areas Low – southern Census tract with 1 repetitive flood loss area
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC, FMA; Virginia CFPF; USACE: FPMS, SFCP
Lead Agency/Department Responsible:	Public Safety; Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF CLAREMONT

TOWN OF CLAREMONT MITIGATION ACTION 1	
Protect public and private property through a variety of measures, including but not limited to: acquisition, elevation or relocation of structures from hazard prone areas, retrofitting of existing buildings, and minor structural flood control projects.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	Protecting structures in hazard-prone locations, particularly floodplains, has been shown to reduce future damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Sea Level Rise and Land Subsidence, Tropical/Coastal Storm, Landslide/Coastal Erosion, Tornado, Earthquake, Winter Storm, Wildfire, Radon Exposure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 2: Objective 2.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC, FMA; Virginia CFPF; USACE: FPMS, SFCP
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF CLAREMONT MITIGATION ACTION 2	
Protect critical facilities and infrastructure. Measures may include retrofitting of existing buildings and facilities as shelters, stormwater management or drainage improvements, elevation or relocation of structures or facilities out of hazard-prone locations.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	Continuity of operations after a hazard event is dependent upon operational utilities, shelters, communications and medical services.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.3, 1.5; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; Virginia CFPF; USACE: FPMS
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF CLAREMONT MITIGATION ACTION 3	
Continue to work with VDOT to develop an alternative ingress/egress to Claremont Beach.	
BACKGROUND INFORMATION	
Site and Location:	Claremont Beach
Benefit Cost:	
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Tropical/Coastal Storm, Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	Virginia CFPF; DHS: HMGP
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF CLAREMONT MITIGATION ACTION 4	
Review NFIP repetitive loss and severe repetitive loss property list to ensure accuracy. Verify location of each property and determine if that property has been mitigated and by what means.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Sea Level Rise and Land Subsidence
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.2; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Approximately 5 hours staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	within 1 year of data receipt
ADDITIONAL COMMENTS	

TOWN OF CLAREMONT MITIGATION ACTION 5	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	Prepared and knowledgeable citizens can help reduce damage from events and protect their own property.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4, 1.5; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Minimal, as many materials are readily available from American Red Cross, FEMA and other entities
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF DENDRON

TOWN OF DENDRON MITIGATION ACTION 1	
Protect public and private property through a variety of measures, including but not limited to: acquisition, elevation or relocation of structures from hazard prone areas, retrofitting of existing buildings, and minor structural flood control projects. **Distribute materials that teach residents about mitigation measures for protection of their own lives and property from a wide range of hazards.**	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	Protecting structures in hazard-prone locations, particularly floodplains, has been shown to reduce future damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.3, 1.4, 1.5; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC, FMA; Virginia CFPF; USACE: FPMS, SFCP
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

PLAN MAINTENANCE PROCEDURES

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2022 UPDATE

Section 8 was updated to modify the scope and to include all 25 communities participating in this planning process.

INTRODUCTION

This section discusses how the *Mitigation Strategy* will be implemented by the communities and how the overall Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public and participating stakeholders will continue to be involved in the hazard mitigation planning process in the future. This section consists of the following three subsections:

- IMPLEMENTATION
- MONITORING, EVALUATION AND ENHANCEMENT
- CONTINUED PUBLIC INVOLVEMENT

IMPLEMENTATION

44 CFR Requirement
Part 201.6(c)(4)(i): The plan will include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle.

In addition to the assignment of a lead department or agency, an implementation time period has been established for each mitigation action in order to assess whether actions are being implemented in a timely fashion. Each community will seek funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in each *Mitigation Action Plan*.

44 CFR Requirement
Part 201.6(c)(4)(ii): The plan maintenance process will include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Emergency Management officials in each community will be responsible for determining additional implementation procedures beyond those listed within the *Mitigation Action Plan*. This includes further integrating the Hazard Mitigation Plan into other local planning documents such as comprehensive, resilience or capital improvement plans, when appropriate. The members of the planning committees for each community remain charged with ensuring that the goals and strategies of new and updated local planning documents (such as Comprehensive Plans and Zoning Ordinances) are consistent with the goals and actions of the Hazard Mitigation Plan, and that those planning documents will not contribute to an increased level of hazard vulnerability in the region.

Opportunities to integrate the requirements of this Plan into other local planning mechanisms will continue to be identified through future meetings of each community's mitigation planning committee and through the five-year review process described in this section.

Each community will integrate the tenets of this mitigation plan into relevant local government decision making processes or mechanisms. The primary means for integrating mitigation strategies into other local planning documents will be accomplished through the revision, update, and implementation of the Mitigation Action Plan that requires specific planning and administrative tasks (i.e., plan amendments, ordinance revisions, capital improvement projects). In addition, each community will incorporate existing planning processes and programs addressing the impacts of climate change, resiliency programs, flooding and sea level rise hazard mitigation into this document by reference.

MONITORING, EVALUATION AND ENHANCEMENT

Periodic revisions and updates to the Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with changing federal, state and local regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the *Mitigation Action Plan*.

The Hazard Mitigation Planning Working Group will continue to meet at least annually and following any disaster events warranting a re-examination of the mitigation actions, thus continuously updating the Plan to reflect changing conditions and needs within the communities. An annual report on the Plan will be developed and presented to elected officials through HRPDC in order to report progress on the actions identified in the Plan and to provide information on the latest legislative requirements. The report may also highlight proposed additions or improvements to the Plan. The report will be released to the media and made available to the public via appropriate methods, such as the HRPDC web site.

Each community has designated a lead person and agency responsible for the monitoring, evaluation and enhancements to the plan. Those position titles and agencies are shown in Tables 2.2a and 2.2b as rows marked with an asterisk. The individuals are the primary contacts moving forward with plan implementation.

ANNUAL PROGRESS REPORTS

Each community's hazard mitigation planning committee will be responsible for producing an annual progress report to evaluate the Plan's overall effectiveness. As part of the contract for preparing this

plan, the contractor is providing a mitigation action plan spreadsheet in Appendix F that lists all mitigation actions for each community and the region. Updating this spreadsheet with status information will allow periodic progress checkups that can feed into the annual progress reports.

FIVE-YEAR PLAN REVIEW

At a minimum, the Plan will be reviewed and must be updated every five years by the hazard mitigation planning committees as required by DMA 2000. The purpose of the review and update is to determine whether there have been any significant changes that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, the increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the content of the Plan.

The plan review provides community officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented. Each community will be responsible for reconvening and conducting the five-year review, although it is expected that the HRPDC will again lead the effort to update the plan in five years. During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals and actions address current and expected conditions?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the Plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Has the committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the community, agencies and other partners participate in the plan implementation process as proposed?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined in this section. Upon completion of the review and update process, the Plan will be submitted to the VDEM State Hazard Mitigation Officer for review and approval. The State Hazard Mitigation Officer will submit the Plan amendments to FEMA for final review as required by DMA 2000.

DISASTER DECLARATION

Following a state or federal disaster declaration, the hazard mitigation planning committee will reconvene and the Plan will be revised as necessary to reflect lessons learned or to address specific circumstances arising from the event. Community committees may find it necessary to convene following localized emergencies and disasters, or when pursuing funding for a specific mitigation project, in order to determine if administrative changes to the Plan are warranted.

REPORTING PROCEDURES

The results of the five-year review will be summarized by the committee in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include a brief progress report for each mitigation action, including the identification of delays or obstacles to their completion along with recommended strategies to overcome them. Any necessary revisions to the Plan must follow the plan amendment process outlined herein.

PLAN AMENDMENT PROCESS

Upon initiation of the amendment process, the community(ies) will forward information on the proposed change(s) to interested parties, including affected municipal departments. Information will also be forwarded to the VDEM. This information will be disseminated in order to seek input on the proposed amendment(s) for not less than a 5-day review and comment period.

At the end of the 5-day review and comment period, the proposed amendment(s) and all comments will be forwarded to HRPDC for final consideration. The committee, or the AHAC in temporary stead of convening the entire Steering Committee, will review the proposed amendments along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

IMPORTANT: Minor revisions to the plan may be approved by each community's Chief Administrative Officer, while substantial amendments and addendums must be approved by the community's elected governing body.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the committee:

- There are errors, inaccuracies or omissions made in the identification of issues/needs in the Plan;
- New issues/needs have been identified which are not adequately addressed in the Plan;
- There has been a change in data or assumptions from those upon which the Plan is based.

Upon receiving the recommendation from the committee and prior to adoption of the Plan, each community's governing body will hold a public hearing. The governing body will review the recommendation from the committee (including the factors listed above) and any oral or written comments received at public hearing(s). Following that review, the governing body will take one of the following actions:

- Adopt the proposed amendments as presented;
- Adopt the proposed amendments with modifications;
- Refer the amendments request back to the committee for further revision; or
- Defer the amendment request back to the committee for further consideration and/or additional hearings.

CONTINUED PUBLIC INVOLVEMENT

44 CFR Requirement
Part 201.6(c)(4)(iii): The plan maintenance process will include a discussion on how the community will continue public participation in the plan maintenance process.

Public participation is an integral component of the mitigation planning process. As described above, significant changes or amendments to the Plan will require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation and revision process will be made. These efforts differ by community based on each community's individual needs, public response and whether the community has been recently affected by a hazard event. Examples of how communities in Hampton Roads already engage the public during the interim planning period, or of how they may choose to approach this task in the future, include:

- Advertise meetings of the committee in local newspapers, public bulletin boards, web sites, social media and City buildings. Designating a diverse community mitigation committee through official resolution of the governing board, and then scheduling regular meetings of the committee and advertising those meetings aggressively has worked well for some communities.
- Designate willing citizens and private sector representatives as official members of the planning committee. While real estate, financial and construction industry leaders are natural partners in mitigation planning, look beyond these to include business leaders, large employers, and representatives of local military installations and transportation hubs, such as the Port of Virginia. Cultural institutions, like Jamestown-Yorktown Foundation, are an important component in the economy of Hampton Roads and their collections are vulnerable to many of the hazards discussed in the plan. Neighborhood groups, civic leagues and other citizen groups are a valuable source of mitigation ideas for specific areas.
- Engage elected officials and planning commission members in the process, beyond simply providing updates or reports. Elected officials have a responsibility to protect the health, safety and welfare of their constituents and their support is critical to successful implementation of the Mitigation Action Plan in every Hampton Roads community.
- Use local media to update the public about any maintenance or periodic review activities taking place. The media have moved beyond traditional print and televised media and their social media presence can be valuable in disseminating information about upcoming meetings or activities. Local non-profits can also be invaluable in spreading the word about mitigation planning meetings open to the public.
- Use questionnaires, open houses, fairs and other community events to obtain ongoing public comments on the Plan and its implementation. Many local emergency managers effectively use community events to inform and advise the public on preparedness and evacuation, but the venues can also be valuable for informing the citizenry about the components of effective mitigation, how their community is implementing their Mitigation Action Plan and gathering information from the public to inform the next plan revision.
- Use community web sites, social media and list-servs to advertise any maintenance or periodic review activities taking place. Periodic surveys on social media can be a fun way to raise awareness.
- Hold area-specific meetings on a regular basis to solicit feedback from neighbors. Such meetings, held in public venues, can be used to distribute literature, educate citizens on

mitigation actions they can implement on their own, and solicit input on how the mitigation process can be more effective for their area or neighborhood.

- Integrate mitigation action plans, goals and objectives, and other plan elements into other community planning objectives. When a community's comprehensive or resiliency planning process includes similar team members and incorporates or references pieces of the hazard mitigation plan, the public gains familiarity with the links between the plans and the ways in which the efforts complement each other.
- Maintain hard copies of the Plan in public libraries, on the web, or other appropriate venues. While many citizens are engaged in community affairs through computer technology, keeping hard copies of the plan in public venues with a business card or other contact information for providing feedback or answering questions is an old-fashioned but necessary way of reaching a much larger segment of citizens.

Table 8.1 provides summary feedback from individual community's committee leaders indicating how they anticipate their community will include the public in the 5-year period following adoption.

TABLE 8.1: INCLUDING THE PUBLIC DURING PLAN IMPLEMENTATION PERIOD

SUBREGION	COMMUNITY	Advertise committee meetings	Designate citizens, private sector reps as members of committee	Use local media to update public on maintenance activities	Use questionnaires, open houses to obtain public comment	Use web sites to advertise maintenance activities	Maintain copies of the plan in libraries, on the web, or other venues	Other
Peninsula	Hampton	✓	✓	✓	✓	✓	✓	annual update to Council
	Newport News	✓	✓	✓	✓	✓	✓	
	Poquoson	✓	✓	✓	✓	✓	✓	
	Williamsburg	✓		✓		✓	✓	
	James City County	✓	✓	✓	✓	✓	✓	
	York County				✓		✓	
Southside	Norfolk				✓	✓	✓	annual update to Council
	Portsmouth	✓		✓	✓	✓	✓	
	Suffolk						✓	
	Virginia Beach	✓		✓		✓	✓	
	Chesapeake		✓	✓	✓	✓	✓	
Western Tidewater	Isle of Wight County	✓		✓	✓	✓	✓	
	Smithfield	✓		✓			✓	
	Franklin	✓		✓		✓	✓	
	Southampton County				✓	✓	✓	
	Surry County	✓		✓		✓	✓	

OPPORTUNITIES FOR IMPROVEMENT

The 2022 plan update process represents the second time that the FEMA-recommended mitigation planning process in the Hampton Roads region has been addressed on such a large regional basis. Some previous plans were regional in nature but covered a smaller geographic area with many shared traits. As such, several opportunities for improving the plan and planning process are outlined below in **Table 8.2**, primarily as suggestions or strategies that may enhance the planning process effectiveness for either individual communities in the coming 5-year period of implementation, or for future updates of the entire plan.

TABLE 8.2: OPPORTUNITIES FOR IMPROVEMENT

Mitigation Planning Step	Opportunities
Phase I: Organize Resources Step 1. Get Organized Step 2. Plan for Public Involvement Step 3. Coordinate with Other Departments & Agencies	1. Continue to distribute Memorandum of Intent to Participate for all communities in the early stages of the planning process. 2. Engage public information officers, resiliency officers, equity officers, web site managers and other community communications specialists from each community throughout the process. 3. Ensure representatives from small communities are drawn into the planning process with multiple opportunities for comment and participation. 4. The survey in the 2022 update process was issued immediately prior to another regional survey going out with similar questions. This shortened time period for response, unfortunately. Such conflicts are hard to foresee in such a large study area. 5. The regional planning authority should continue to ask and rely on communities to reach out to large businesses, military installations, educational and medical institutions, neighborhood associations, non-profits, utilities and other groups to spur their involvement in the process, but communities need to provide documentation of these “asks” that is then included in the plan.
Phase II: Assess Risk Step 4. Identify the Hazards Step 5. Assess the Risks	1. Virtual meetings limited the feedback received after presentation of HIRA to the committee. 2. Distributing small elements of the assessment to the committee for review may increase participation and feedback. 3. Provide more detailed assessment/review of the dam safety data and help communities focus mitigation action plan on dam reconstruction/repair/removal.
Phase III: Develop Mitigation Plan Step 6: Review Mitigation Alternatives Step 7: Draft an Action Plan Step 8: Set Planning Goals	1. Provide a review form for each community to document their review and approval of each plan section. 2. “Office Hours” with consultant worked well for developing each community action plan but did not include all stakeholders. Reassess this approach once COVID restrictions are lifted.

County Administration
101-D Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784
P: 757-253-6728

jamescitycountyva.gov

January 17, 2025

Ms. Angela Davis
Director of Dam Safety and Floodplain Management
Virginia Department of Conservation and Recreation
600 E. Main Street, 24th Floor
Richmond, Virginia 23219

RE: Local Authorization for James City County's Community Flood Preparedness Fund Round 5 Application (CID510201B_James City County_CFPF)

Dear Ms. Davis and Members of the Review Team:

James City County staff have my authorization and our Board of Supervisors' support to submit a grant application to the Capacity Building and Planning category of the 2024 Community Flood Preparedness Fund (CFPF). The application will be subject to the approval, amendment, and appropriation of funds by the James City County Board of Supervisors upon award of the grant.

As detailed in the grant application, these grant funds would enable James City County to develop a resilience plan. Although James City County has taken substantial steps toward flood mitigation over the years through our watershed management plans, Comprehensive Plan, regional hazard mitigation plan, and participation in the Community Rating System, these efforts have been limited in scope and/or focused on different geographical areas. We believe a resilience plan will be able to build on these previous efforts and advance to the next stage of our flood preparedness by articulating a comprehensive, county-wide approach to flooding. Through the planning process, we will be better able to understand our exposure to recurrent and future flooding, assess our community's vulnerability and risk from future flood hazards, and identify and prioritize resilience actions. Once adopted, the resilience plan will put us in a position to access state funding for implementation items such flood prevention and protection studies and infrastructure projects.

If awarded, James City County will provide a 25% match, estimated at $72,750 of the resilience plan's total estimated cost of $291,000, to the CFPF application request of $218,250.

Sincerely,

Scott A. Stevens
County Administrator

Attachment – Resolution of Support

RESOLUTION

GRANT APPLICATION TO THE

COMMUNITY FLOOD PREPAREDNESS FUND - ROUND 5

WHEREAS, the Board of Supervisors of James City County, Virginia (the "County"), desires for the County to submit an application requesting up to $291,000 from the Community Flood Preparedness Fund (CFPF) through the Virginia Department of Conservation and Recreation (VDCR) - Round 5; and

WHEREAS, the County has allocated up to $72,750 to match the CFPF, as part of the Fiscal Year 2025 Stormwater and Resource Protection Division Capital Improvements Program budget, consistent with the year of the award; and

WHEREAS, the combined funding from the County and VDCR totaling up to $291,000 is requested to fund a local resilience plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby supports this application for an allocation up to $218,250 through the Community Flood Preparedness Fund and further approves a County contribution for the required match for this project, and hereby authorizes the County Administrator to sign the necessary applications, agreements, and other documentation necessary to administer this project.

James O. Icenhour, Jr.
Chair, Board of Supervisors

ATTEST:

Teresa J. Saeed
Deputy Clerk to the Board

	VOTES			
	AYE	NAY	ABSTAIN	ABSENT
HIPPLE	✓			
NULL	✓			
MCGLENNON	✓			
LARSON	✓			
ICENHOUR	✓			

Adopted by the Board of Supervisors of James City County, Virginia, this 14th day of January, 2025.

CFPFGrantRd5-res

CID510201 James City County CFPF Grant Application
Links to Appendices D, E, F, G, and H

Appendix D – Powhatan Creek Watershed Management Plan 2023
https://www.calameo.com/read/0045296420c57b6b01487?page=1

Appendix E – Yarmouth Creek Watershed Management Plan 2023
https://www.calameo.com/read/0045296429ff25dba7b8f?page=1

Appendix F – Diascund Creek Watershed Management Plan 2024
https://www.calameo.com/read/004529642ab91a77703de?page=1

Appendix G – Grove Area Stormwater Improvements Assessment Study
https://www.jamescitycountyva.gov/4006/Grove-Stormwater-Water-Quality-Improveme
This is the latest status report. The study is not uploaded to the County website but is available digitally if requested.

Appendix H – James City County FY2025 Budget – See pages A-14, C-73, and D-7
https://www.jamescitycountyva.gov/ArchiveCenter/ViewFile/Item/340