An aerial photograph of a coastal area. On the left, there's a residential neighborhood with several houses. To the right, there's a body of water with a dock and some industrial or commercial structures. The foreground shows a mix of green grass and bare earth.

OYSTER VILLAGE COASTAL ADAPTATION AND RESILIENCE PLAN

A COMMUNITY-DRIVEN PROCESS

NOVEMBER 2024

Photo Credit: Zak Poulton,
The Nature Conservancy



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ACRONYMS

AAL	Average Annualized Loss
AASHTO	American Association of State Highway and Transportation Officials
AEP	Annual Exceedance Probability
A-NPDC	Accomack-Northampton Planning District Commission
ARPA	American Rescue Plan Act
BCA	Benefit Cost Analysis
BCR	Benefit Cost Ratio
BIG	Boating Infrastructure Grant
BRIC	Building Resilience Communities and Infrastructure
CBDG	Community Development Block Grant
CDC	Center for Disease Control
CEJST	Climate and Economic Justice Screening Tool
CFPF	Community Flood Preparedness Fund
DCR	Virginia Department of Conservation and Recreation
DEQ	Virginia Department of Environmental Quality
DHCD	Virginia Department of Housing and Community Development
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
IPR-Flex	Indoor Plumbing and Rehabilitation Flex
MHW	Mean High Water
MUTCD	Manual on Uniform Traffic Control Devices
NOAA	National Oceanic and Atmospheric Administration
RAFT	Resilience Adaptation Feasibility Tool
RSC	Resilience Steering Committee
RVRF	Resilient Virginia Revolving Fund
SFHA	Special Flood Hazard Area
SVI	Social Vulnerability Index
TNC	The Nature Conservancy
UVA	University of Virginia
VACRMP	Virginia Coastal Resilience Master Plan
VDH	Virginia Department of Health
VDOT	Virginia Department of Transportation
VIMS	Virginia Institute of Marine Science

EXECUTIVE SUMMARY

Oyster Village, an unincorporated community on the Eastern Shore of Virginia, has faced historic and present-day challenges with coastal flooding. In response to flooding concerns, The Nature Conservancy, in partnership with Northampton County, initiated the development of a community-driven Coastal Adaptation and Resilience Plan (the Plan) for Oyster Village. The Nature Conservancy, with input from the Oyster Village community, formed a Resilience Steering Committee of residents, government, non-profit, and university representatives to ensure key stakeholder inclusion and representation and guide the planning effort (Community Flood Preparedness Fund (CFPF) Requirement 8).

The Plan represents the Village's vision for the future of Oyster as a thriving community of people and wildlife that is safe, cohesive, and maintains a working waterfront for research as well as commercial and recreational fishing in the face of rising sea levels. Further, the Plan aligns with the requirements for a resilience plan as defined by the Virginia CFPF and noted throughout this summary.

CHANGING FLOOD HAZARDS

Residents of Oyster Village have experienced significant storm events and more frequent tidal flooding over recent years. A fundamental aspect of resilience planning is recognizing and assessing how these threats may worsen with increasing sea levels. For this effort, projected future coastal flood conditions were characterized by three different sea level rise scenarios and planning horizons: (1) 1.5 ft rise in the near-term (2040-2050); (2) 3.0 ft rise in the mid-term (2050-2080); and (3) 4.5 ft rise in the long-term (2080-2100) (CFPF Requirement 9). Flood hazard data from Virginia's Coastal Resilience Master Plan were used to depict the extent of flooding for these sea level rise intervals for conditions ranging from tidal flooding to the FEMA regulatory floodplain and beyond (CFPF Requirement 4).

These future conditions will bring increased flooding to the community. Places that flood occasionally today are projected to experience chronic or even daily flooding by mid-century with sea level rise. These locations include Broadwater Circle, the working waterfront, and where Crumb Hill Road crosses Cobb Mill Creek. Severe flood conditions, such as those associated with major hurricanes (now a rare occurrence) will likely become more common. For example, a present-day event with the same conditions as Hurricane Isabel (defined by having the same flood depth and inundation extent) has a 1-in-50 chance of occurring in any given year. As sea levels rise, this magnitude of event is projected to have a 1-in-4 chance of occurring annually in the mid-term (2050-2080) planning horizon.

CHANGING FLOOD IMPACTS

To better understand the potential impacts of changing flood hazards, the effects of future flooding on buildings, critical assets, socially vulnerable areas, and natural wetland habitats were characterized. Oyster Village does not have designated political boundaries as an unincorporated community, however, within the study area, there are no repetitive loss or severe repetitive loss structures (CFPF Requirement 4).

As sea levels rise, more buildings in Oyster Village will be exposed to frequent flooding. Within the Broadwater Circle and Crumb Hill Road area, the anticipated losses to structures and contents in any given year (average annualized flood losses) for residential buildings are estimated to reach \$340,000 in the near-term and reach as high as \$1.77 million by the end of the century, an increase of 18 times the losses from present-day. Critical assets in the community, including the Cherrystone Aquaculture facility, R&C Seafood, the University of Virginia (UVA) Research Lab, Public Boat Ramp, Travis Chapel, The Nature Conservancy (TNC) Habitat Restoration Facility, and Horse Island Trail, are also projected to face chronic or daily flooding by the end of the century.

Using data from TNC's Coastal Resilience Tool, projections show approximately 42% of the total marsh and wetland habitat in the study area projected to be lost by the end of the century, with the potential for expansion of transitional salt marsh habitats by up to 11 acres (nearly 90% increase) depending on future land use.

Oyster Village's vulnerability goes beyond physical risks—it is also shaped by the community's ability to cope with worsening conditions. Elderly and low-income residents within Oyster Village and the broader Northampton County area may be especially vulnerable during disasters. This planning effort provided opportunities for all community members to provide input through a series of well-attended public meetings (CFPF Requirement 3).

STRATEGY FRAMEWORK

The adaptation strategy framework focuses on four core planning themes that align with the community's vision for the future of Oyster Village: (1) conserve natural resources, (2) protect the Working Waterfront, (3) maintain a connected community, and (4) adapt at-risk areas. The planning effort explored various strategies to support coastal adaptation for Oyster Village, including structural and nonstructural measures. The community preferred green and hybrid infrastructure, accommodation, and avoidance strategy typologies. Through a prioritization process with input from the community, the Resilience Steering Committee selected five priority actions that aligned with these strategy typologies for the action plan.

COASTAL ADAPTATION AND RESILIENCE ACTION PLAN

The following five projects focused on flood control and resilience were advanced to concept-level design (CFPF Requirement 1):

- 1. Protect the Shoreline with Earthen Berm and Stem Wall/Sheet Pile Wall:** Create an earthen berm with wetland plantings and offshore breakwaters to offer coastal protection to the Broadwater Circle area (CFPF Requirement 2). To complete this flood risk reduction system, a sheet pile wall and stem wall are included in the concept design along the working waterfront of Oyster Harbor.
- 2. Install Floating Docks:** Replace existing fixed docks with floating docks along Oyster Harbor.
- 3. Explore Opportunities for Home Elevation:** Elevate homes within the Broadwater Circle and Crumb Hill Road Area.

4. Adapt Septic Systems: Adapt septic systems to rising groundwater levels by leveraging existing and emerging technologies.

5. Establish a New Access Point for Crumb Hill Road: Establish a new access point for Crumb Hill Road along higher elevation ground on the north side of the Village.

For each project, high-level preliminary cost estimates, level of flood protection, complexity, and maintenance considerations are provided.

CONCLUSION AND FUTURE DIRECTION

As coastal flood conditions continue to change with sea level rise and other compounding environmental factors, the community of Oyster Village recognizes the importance of taking action to adjust to future flooding. While this plan provides an essential first step, securing funding and continued coordination with community partners will be critical to advance priority projects (CFPF Requirement 8). The five priority projects represent the initial phases of implementation. The RSC and community considered other longer-term projects, policy, and relocation strategies that could be integrated in additional implementation phases.

The remaining CFPF requirements are fulfilled as follows:

- Property acquisition or relocation guidelines are not included (CFPF Requirement 5).
- The Northampton County Emergency Operations Plan Section 3.20 ESF#20 - Debris Management (2024) provides a debris management strategy (CFPF Requirement 6).
- The Northampton County floodplain ordinance provides administrative procedures for substantial development/improvement (Northampton County, Code of Ordinances Ch. 158, §159.106 Administration (2023) (CFPF Requirement 7).



INTRODUCTION

INTRODUCTION

Water plays an important role in Oyster Village's history and future. Oyster Village has been connected to the seafood industry since the early 19th century, which drove the development of the working waterfront and surrounding community. While access to water is an essential economic driver, changing coastal conditions also present challenges for the Village. In 2003, Hurricane Isabel struck the community as a Category 2 storm and remains one of the most significant flood events in Oyster Village.

In addition to storm impacts, residents have observed increasingly frequent tidal flooding driven by high tides and strong northeast winds. This increased flooding is due to rising sea levels. Observational records show that the rate of sea level rise is increasing. Projected increases for the mid and late century, combined with the low-lying elevations of the Village, will result in more frequent and severe coastal flooding. Increasing rainfall trends and high groundwater further exacerbate this flood risk. These challenges require that Oyster Village recognize such issues and advance actions to adapt to these changing conditions gradually.

In partnership with Northampton County, TNC initiated the development of a community-driven Coastal Adaptation and Resilience Plan for Oyster Village. **Adaptation** in the context of this Plan is the process of adjusting to changing environmental conditions. Adaptation can include structural, ecological, or behavioral actions to account for future conditions. **Resilience** in the context of this Plan refers to the capacity to respond and recover from natural hazard events, including discrete storm events and more chronic stressors like tidal flooding.

With the help of community members, TNC established a Resilience Steering Committee (RSC) to support this vision and ensure the community was at the forefront of the planning effort. The RSC was composed of diverse stakeholders, including residents, government, industry, and academic representatives, and provided direction for this planning effort. This document, the Oyster Village Coastal Adaptation and Resilience Plan (the Plan), details the process of understanding changing flood hazards and impacts and identifying actionable solutions.

VISION

The Oyster Village Coastal Adaptation and Resilience Plan will support the community's vision for the future of Oyster as a thriving community of people and wildlife that is safe and cohesive and maintains a working waterfront for research and commercial and recreational fishing.

The Plan is organized as follows:

- **A Community-Driven Process:** Provides a characterization of Oyster Village, community involvement in the planning process, and the regional context supporting the Plan.
- **Changing Flood Hazards:** Describes historic and current flooding challenges facing Oyster Village and projected flooding exposure and frequency.
- **Changing Flood Impacts:** Summarizes potential flooding impacts to people, homes, critical assets, roadway access, and natural habitat.
- **Strategy Framework:** Describes the key themes, strategy typologies, and process for identifying priority projects.
- **Coastal Adaptation and Resilience Action Plan:** Details the critical projects of the action plan and additional considerations.
- **Conclusion and Future Direction:** Highlights the next steps for Oyster Village to take toward implementing the identified actions.

The Virginia CFPF and the National Fish and Wildlife Foundation provided funding for this planning effort. This Plan was also developed in alignment with the resilience plan requirements to be eligible for project funding from the CFPF.¹

¹ The 2021 funding manual for CFPF Round 1 was in affect at the time funding was awarded. This Plan further documents the requirements included in the current 2024 CFPF Round 5 funding manual.



A COMMUNITY-DRIVEN PROCESS

A COMMUNITY-DRIVEN PROCESS

Residents, businesses, university partners, and local and regional government representatives provided critical input to shape the development of this Plan. To understand the unique history and culture of Oyster Village, robust stakeholder engagement occurred throughout the planning process.

COMMUNITY OVERVIEW

Oyster Village is a small, unincorporated community in the eastern portion of Northampton County. Northampton County covers the southern half (approximately 35 miles) of Virginia's Eastern Shore and includes the Chesapeake Bay Bridge-Tunnel entrance, which connects the Eastern Shore to mainland Virginia.



FOCUS AREA FOR THE OYSTER VILLAGE COASTAL ADAPTATION AND RESILIENCE PLANNING EFFORT.

The current population of permanent residents in Oyster Village is approximately 125 individuals. Oyster is a quiet, tight-knit community. While some residents have lived in the area for generations, the natural beauty of Oyster has also attracted retirees and vacation home buyers.

Oyster Village residents take great pride in their community, affectionately referring to it as the 'Hidden Pearl of Virginia.' Several residents are proud of the unique name 'Oyster' and have various anecdotes behind its origin. Did 'Oyster' come from the wide availability of oysters in the area? Or did it stick when a federal official arrived in the Village to establish a post office and was hit with a raw oyster? Regardless of the name origin, the Oyster culture means a lot to the local community and is reflected in their loyalty to their home.

Before the establishment of Oyster Village, Indigenous groups in the area included the Kingdom of Accawmake and the Occohannocks. Relations between European colonists and Indigenous communities were peaceful until settlers began forcibly relocating Indigenous people to land reservations.

The early history of the built environment and communities of the Eastern Shore is minimal. The lack of physical connection to the Virginia mainland and general isolation are responsible for this lack of information. Transportation efficiency throughout the Eastern Shore increased throughout the late 19th and 20th centuries with the addition of railroads and a state highway.

Transportation expansion supported the growth of the tourism and seafood industries in the Eastern Shore. In the early 19th century, over 100 oyster boats traveled near Oyster Village for harvesting. The Oyster community expanded in the 1930s and 1940s, as nearby Hog Island residents evacuated due to destructive storms and the resulting flooding and island coastal sediment shifts. Hog Island residents brought their culture with them into Oyster Village and contributed to the already colorful community.

In 1950, a harbor was dredged to support the growth of oyster and clam harvesting operations. Soon after, in 1964, the completion of the Chesapeake Bay Bridge Tunnel connected Oyster and the Eastern Shore to Virginia. The seafood industry is strong today in Oyster Village and other Eastern Shore communities. Oyster Harbor provides the only public deep-water access between Willis Wharf at the northern end of Northampton County and Wise Point at the southern tip of the peninsula. In 2013, \$20.8 million worth of oysters were harvested in the commonwealth of Virginia.² This figure represents 12% of the total oyster production in the US.

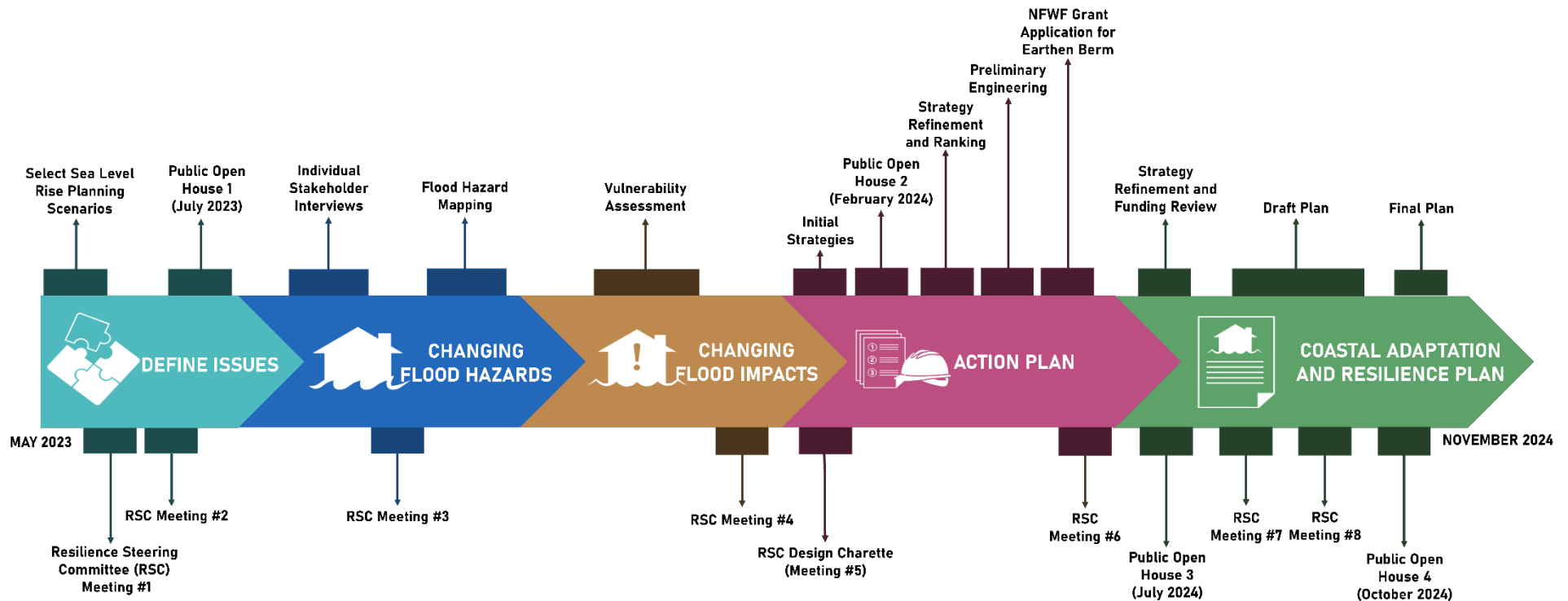


A HISTORIC HOUSE THAT WAS RELOCATED FROM HOG ISLAND.

² Eastern Shore of Virginia Regional Economic Development Plan (2017-2022). https://www.a-npdc.org/wp-content/uploads/2017/12/ESVA-Regional-Economic-Development-Plan_final-November-2017.pdf

PLAN DEVELOPMENT

The planning process included five key stages to advance from defining flooding issues within the community to developing the Plan. The RSC, formed at the onset of this project, included residents, local and regional government staff, TNC, and representatives from the aquaculture industry, the UVA Coastal Research Center, and Virginia Marine Resources Commission. The RSC provided critical input through all stages of the planning effort, and public open houses were held at key junctures to gather essential input and feedback, as shown below. An overview of each step of the process is displayed in the graphic below.





DEFINE ISSUES

Sea level rise planning scenarios were selected to characterize future flooding. A public open house was held to inform the community of the planning effort and gather input about critical assets and flooding concerns.



CHANGING FLOOD HAZARDS

Projected future coastal flooding conditions were mapped based on the selected sea level rise planning scenarios. Stakeholder interviews with residents, business owners, and university partners were conducted. These interviews provided insights into flooding challenges within the community and key actions that have been taken to help protect personal property and community assets.



CHANGING FLOOD IMPACTS

Potential future flooding impacts to residential homes, critical assets, and natural habitats were assessed. Demographic information was leveraged to characterize socially vulnerable populations in and around Oyster Village that may be disproportionately impacted by coastal flooding.



ACTION PLAN

The RSC participated in a design charette to identify and refine potential tangible strategies for the community to address current and future flooding challenges. Strategies were prioritized based on feedback from the community gathered at a second public open house and the RSC. Priority strategies were advanced to concept-level designs and presented to the community at a third public open house.



COASTAL ADAPTATION AND RESILIENCE PLAN

This plan synthesizes the approach and key findings of this multi-stage effort and fulfills the requirements of a resilience plan as defined by the Virginia Community Flood Preparedness Fund. Before finalizing the plan, a fourth public open house was conducted to preview the draft plan with the community.

At each public open house event, approximately 25% (around 30 participants) of residents attended from the community. The RSC, Oyster Community Group comprised of Oyster residents, and TNC played a critical role in promoting the events and encouraging community participation.



Oyster Village's history of participation in relevant local, regional, and state planning efforts provided a strong foundation upon which the plan could be built. Key findings from the following related planning efforts were leveraged throughout this process.

OYSTER VILLAGE VISION (2011)

The Oyster Village Vision was originally created through collaborative planning efforts of the citizens and Northampton County in 2004 and updated in 2011. The Vision emphasizes the strong culture of Oyster and the pride that residents feel when asked about their community and its future. The guiding statements of the Vision declare that while controlled change and adaptation to flooding are necessary, residents want to maintain the 'traditional village character' they know and love. The Vision is formally included in the County's Comprehensive Plan by reference, along with the Vision for Willis Wharf, and provides policy guidance for land use and development.



GATHERING FEEDBACK ON THE PROJECT AT PUBLIC-OPEN HOUSES.

EASTERN SHORE OF VIRGINIA CLIMATE ADAPTATION WORKING GROUP

The need for a Climate Adaptation Working Group was identified through assessments of global climate change impacts on the natural resources of the Eastern Shore and a participatory workshop with community stakeholders in 2010. Participants in this workshop identified many climate concerns affecting Oyster Village, including accelerated landward migration, loss of tidal salt marsh, and the flood inundation of residential property. This effort references a living shoreline project in Oyster and details the potential benefits of this coastal adaptation strategy. This further aligns with the community valuing the natural areas of Oyster and their interest in nature-based solutions. The importance of outreach and stakeholder involvement (including representatives from the UVA and TNC) is also detailed in the workshop report. The Working Group has been meeting quarterly since 2011 and consists of representatives from state and federal agencies, local government, academic partners, and non-profits. The Working Group has collaboratively advanced resilience projects, including the creation of TNC's online Virginia Eastern Shore Coastal Resilience Tool, which hosts data that supported analysis for the Oyster Village Coastal Adaptation and Resilience Plan.

2021 EASTERN SHORE OF VIRGINIA HAZARD MITIGATION PLAN (HMP)

The 2021 Eastern Shore of Virginia Hazard Mitigation Plan, developed by the Accomack-Northampton Planning District Commission (A-NPDC), provides extensive demographic information on Northampton County that helps provide context for Oyster Village and the surrounding developments. The HMP features information on sea level rise predictions and the adverse effects on coastal areas along the Eastern Shore. The plan also mentions the importance and relevance of FEMA's Special Flood Hazard Areas and associated Flood Insurance Rate Maps, which help to highlight the flood risk of properties in Oyster. The HMP's mitigation strategies for Northampton County feature actions relevant to potential funding opportunities for Oyster.

YOUR NORTHAMPTON COUNTY 2040 COMPREHENSIVE PLAN

The Northampton County 2040 Comprehensive Plan emphasizes the county-wide commitment to resilient coastal management and protection. Guidance for coastal management in the comprehensive plan is sourced from the Virginia Institute of Marine Science, which includes an in-depth look into the benefits and risks of different strategies. Sea level rise impacts from one to six ft are considered, encompassing and exceeding the range of sea level rise values used in the Oyster Village planning effort. The Comprehensive Plan emphasizes Northampton County's commitment to sustainability in its economy and business development along with environmental considerations.

NORTHAMPTON COUNTY RESILIENCE ADAPTATION FEASIBILITY TOOL (RAFT) AND CHECKLIST

The RAFT Checklist includes creating flood risk maps for Northampton County and maps of key County assets and resources that need protection. The maps produced as part of the Oyster Village planning effort align with these risk maps and can help inform County planning efforts. Additionally, the Checklist highlights the need for county-wide preparedness meetings and a task force for vulnerable populations. The RSC and Oyster Community Group, facilitated by TNC, have played a critical role in engaging the community in the coastal adaptation and resilience planning effort and could serve as important points of contact for future County outreach efforts.

VIRGINIA COASTAL RESILIENCE MASTER PLAN PHASE 1

The Virginia Coastal Resilience Master Plan (VACRMP) Phase 1 contains a dedicated section on planning within Rural Coastal Virginia, including Northampton County and Oyster Village. This section includes information on natural infrastructure, community resources, and flood hazards relevant to Oyster. The VACRMP references the Oyster Coastal Adaptation and Resilience Plan as a featured planning effort. Additional descriptions of other coastal resilience projects in Virginia contain strategies relevant to the work planned for Oyster.



CHANGING FLOOD HAZARDS

CHANGING FLOOD HAZARDS

Oyster Village, a long-established coastal community with deep ties to the water, is now facing increasing flood risks due to sea level rise. The Village is increasingly vulnerable to various flooding events, from high tides to hurricanes. This section outlines the current flood risks and how these threats might evolve. Supporting analysis is further described in the Flood Hazard and Impact Assessment section of the Technical Appendices.

SOURCES OF FLOODING

Oyster Village faces several types of flooding, including coastal flooding and rainfall-driven (pluvial) flooding. Coastal tides and storm surge are the biggest driver of flooding challenges experienced by the Oyster community. Sea level rise, high groundwater levels, and strong northeast winds exacerbate these hazards.

TYPES OF FLOODING



Tidal Flooding - Tidal flooding occurs when high tides inundate typically dry areas. As sea levels rise, tidal flooding will become more frequent, reaching further inland. This "nuisance flooding" may not pose immediate safety risks but can disrupt daily activities and damage infrastructure over time.



Storm Surge Flooding - Storm surge occurs when winds from storms such as hurricanes and nor'easters push ocean waters inland. The height and extent of storm surge depends on factors like wind speed and atmospheric pressure, as well as the shape of the coastline. As sea levels rise, storm surges will likely become more destructive.



Rainfall Flooding - Rainfall-driven flooding occurs when heavy rains overwhelm the land's ability to absorb water. In Oyster, high groundwater combined with coastal flooding makes it especially difficult for rainwater to drain. Over the last decade, the Chesapeake Bay Watershed has experienced increased intensity and frequency of extreme rainfall events, and these trends are expected to continue over the next several decades, increasing the risk of stormwater flooding and negative impacts to septic systems.

EXACERBATING FACTORS



Sea Level Rise - Long-term data from nearby tidal stations show that sea levels in Virginia have been rising by 5.63 mm annually since 1978, equating to an increase of 1.85 ft over the past century. This trend is expected to worsen over the next century. Various factors contribute to this, including melting glaciers, shifts in ocean circulation, and land subsidence—a significant contributor to sea level rise in Virginia due to natural geological shifts and groundwater withdrawals.



Groundwater Rise - Oyster's groundwater table is already near sea level. As sea levels rise, the groundwater will follow, affecting local septic systems and threatening water quality. This interaction between rising groundwater and aging infrastructure can introduce bacteria, viruses, and excess nutrients into local waterways, harming water quality and public health.



Wind-Driven Tides - Strong northeast winds are known to push water into Oyster Harbor and surrounding marshlands, exacerbating the potential for tidal and storm surge flooding.

HISTORIC AND CURRENT FLOODING CHALLENGES

Over the years, Oyster Village has experienced increasing flooding, from nuisance tidal flooding to major storm events. Residents have noted a significant rise in flooding frequency and identified the following flood-prone areas, which are used as a reference in this document for assessing changes in flood exposure over time:

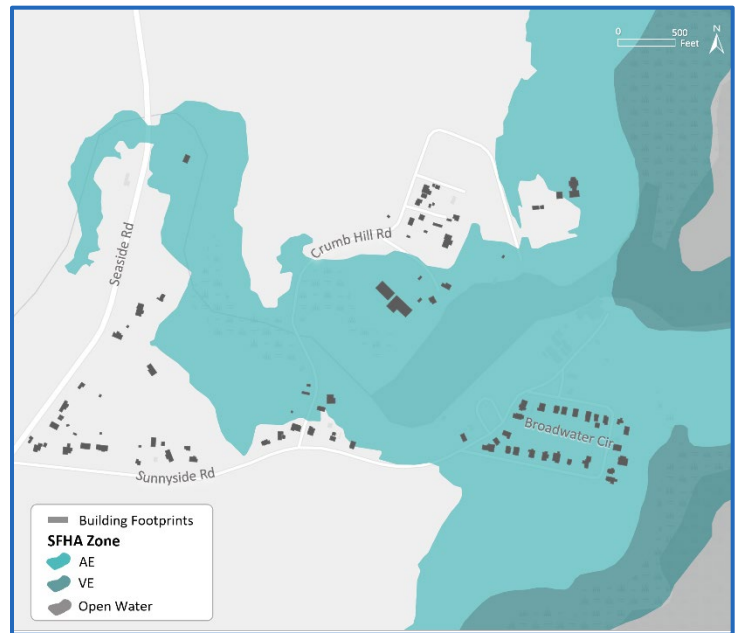
1. **Sunnyside Road:** The end of this road experiences frequent tidal flooding, with an observed increase in flooding incidents over the years.
2. **Working Waterfront:** During major storm events, floodwaters lead to damage and roadway access challenges on Oyster's working waterfront.
3. **Broadwater Circle:** This is the most low-lying area of the community. It was heavily damaged by Hurricane Isabel, and it is susceptible to impacts from extreme high tide and heavy rainfall events.
4. **Crumb Hill Road:** This is a primary thoroughfare and access point known to flood during nor'easters. This can disrupt access and isolate the northern section of the Village.
5. **UVA Coastal Research Center and R&C Seafood:** These critical community assets at the end of Cliffs Road were severely flooded during Hurricane Isabel.
6. **Oyster Public Boat Ramp:** A key access point to Oyster Harbor for local anglers and boaters, which is also prone to flooding.
7. **Seaside Road:** This road is vulnerable to coastal and rainfall-driven flooding, and has flooded during past storms, including Hurricane Isabel.



REFERENCE LOCATIONS FOR CHANGES IN FLOOD EXPOSURE. FLOOD CONDITIONS SIMILAR TO HURRICANE ISABEL (THE 2% ANNUAL CHANCE FLOOD EVENT) ARE SHOWN ON THE MAP.

“Wind from the northeast direction will bring water into the harbor....there is no month of the year when flooding could not happen” - Oyster Resident

A substantial portion of Oyster Village has also been mapped within the Federal Emergency Management Agency (FEMA) regulatory floodplain, or Special Flood Hazard Area (SFHA). The SFHA represents the area that has a 1% chance of flooding each year from a major storm event. As shown in the map at right, all of Broadwater Circle, the working waterfront, and portions of Sunnyside Road and Crumb Hill Road are within the SFHA (Zone AE), but not likely to experience wave heights larger than 3 ft (Zone VE). Any new development or redevelopment within the SFHA must follow specific building regulations as defined by the Northampton County floodplain management ordinance. These regulations promote responsible building practices to help mitigate potential flood damage. It is important to note that flood risk is not limited to the SFHA, especially when considering potential rainfall impacts and future sea level rise.



MAP OF THE CURRENT FEMA REGULATORY FLOODPLAIN (EFFECTIVE STUDY DATE OF 2015)

HURRICANE ISABEL

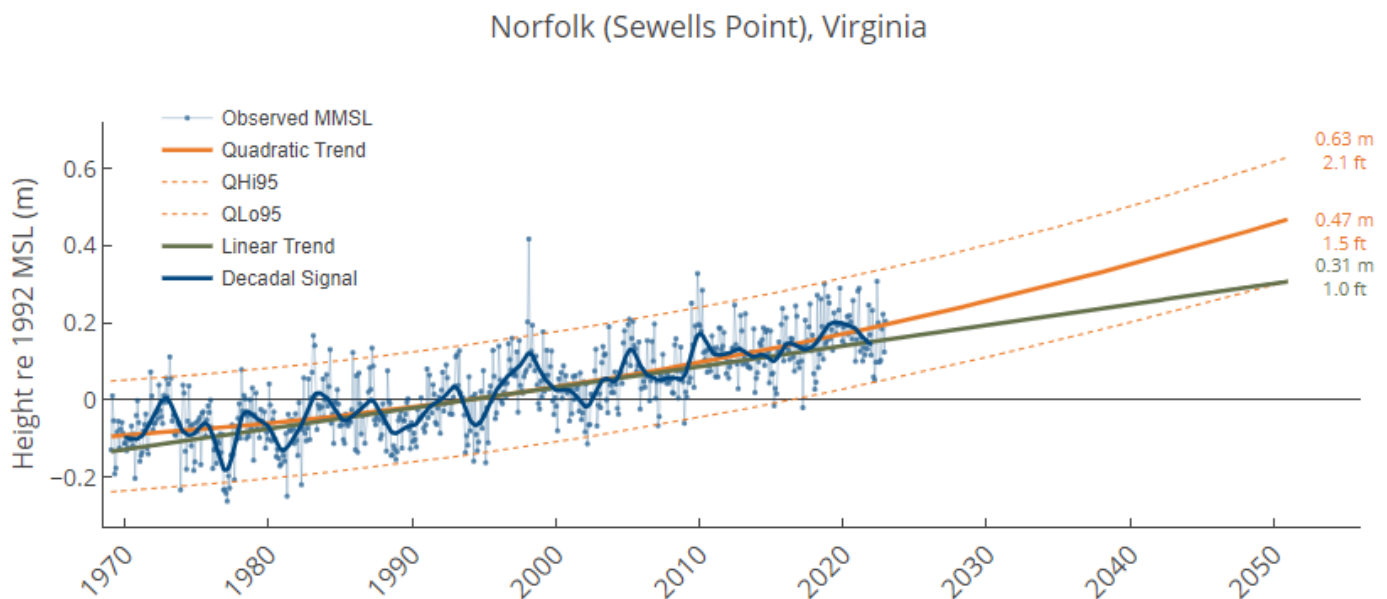
Hurricane Isabel, a Category 2 storm that struck in 2003, remains one of the most significant flood events in Oyster Village and stands as a benchmark for understanding future flood risks. During Isabel, water levels reached 7.9 ft (relative to the North American Vertical Datum of 1988). This elevation is consistent with a 2% annual chance storm surge event (1:50 odds any given year) under current sea level conditions. The storm caused extensive flooding of homes and community assets. Data from that event and recent flood models show that future storm events could bring more severe flooding.

CHARACTERIZING FUTURE FLOODING

Potential flood conditions were characterized by identifying a range of reference flood events across different sea level rise scenarios and planning horizons. Projected floodplains for each of these hypothetical events show how wide and deep flooding would be for each condition and were used to determine likely trends and impacts.

SEA LEVEL RISE PLANNING HORIZONS

Given changing conditions, flood risk planning must recognize and incorporate future sea level conditions. Sea level rise scenarios were established for this study by reviewing historical trends, observing changes in those trends, and referencing regional and state program guidance. In coordination with the RSC, the Hampton Roads Planning District Commission sea level rise scenario guidance was adopted for the study³. Sea level trends at Wachapreague (the closest federal water level observing station to Oyster referenced to ground elevations) and Sewells Point, VA (federal and regional water level station for projections) were similar, supporting this choice. While sea levels have been slowly rising over the last century, more recently, the rate of rise has increased. The figure below shows trends of accelerating sea level, which provides for observation-based projections of approximately 1.5 ft of sea level rise by 2050.



ANALYSIS BY THE VIRGINIA INSTITUTE OF MARINE SCIENCE (VIMS) BASED ON MODERN WATER LEVEL OBSERVATIONS PROJECTS A 1.5 FT INCREASE IN SEA LEVEL BY 2050, AS COMPARED TO 1992⁴.

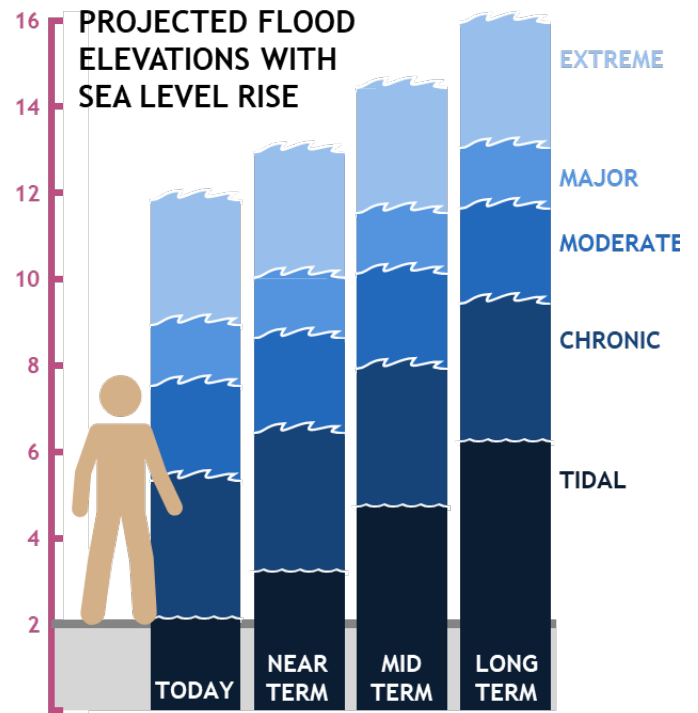
³ Hampton Roads Planning District Commission Sea Level Rise Planning Policy and Approach, 2018.

⁴ Virginia Institute of Marine Science, Sea Level Rise Report Cards, Norfolk Virginia, accessed October 24, 2024. <https://www.vims.edu/research/products/slrc/localities/nova/>

This projection only considers what the existing water level record shows today. Additional warming and glacial ice melt are being observed, which will lead to increased acceleration in the rate of sea level rise. As such, the following scenarios adopted for the plan may be considered minimally viable planning scenarios, and actual conditions may be higher. The three adopted scenarios include:

- Near-term (2040 to 2050): 1.5 ft rise⁵
- Mid-term (2050 to 2080): 3.0 ft rise⁵
- Long-term (2080 to 2100): 4.5 ft rise⁵

Updated sea level projections should be monitored for any significant changes to best inform ongoing planning and projects in the community.



FLOODING FREQUENCY

Modeling future tidal and storm surge events combines sea level rise projections with storm conditions, ranging from commonly occurring to rare and extreme events. Events are most often characterized by their likelihood, expressed in terms of an annual exceedance probability (AEP), the probability that a flood event will occur in a given year. Flood events used for this study are shown in the following table along with their odds of occurrence under current conditions.

Flood Event Type	Event Likelihood	Annual Odds of Occurrence	Example Event / Storm
Tidal	Mean High Water	Inundated Daily	Daily high tide
Chronic	50% AEP	1 in 2	Gale, smaller coastal storm
	20% AEP	1 in 5	
Moderate	10% AEP	1 in 10	Tropical storm, Nor'easter
	4% AEP	1 in 25	
Major (FEMA Floodplain)	2% AEP	1 in 50	Strong Nor'easter, Category 2 hurricane
	1% AEP	1 in 100	
Extreme	0.2% AEP	1 in 500	Category 3+ hurricane

⁵ Note that the sea level rise values are relative to the year 1992, which is the reference year for current water level datums (National Tidal Datum Epoch).

FLOOD EXPOSURE TRENDS

Rising seas will lead to more regular and widespread flood inundation across Oyster. These trends can be viewed from the perspective of increases in the areas and assets exposed to a given flood event type, as well as increased severity and frequency of flooding at a given location. Flood exposure data was accessed from Virginia DCR's Flood Resilience Open Data Portal⁶ and aligned with this study's scenarios.

The table below highlights changes in flood exposure for seven reference locations, indicating how frequent flooding will be at a given location across each sea level rise scenario. Some places that flood only rarely today are projected to experience chronic or even daily flooding by mid-century.

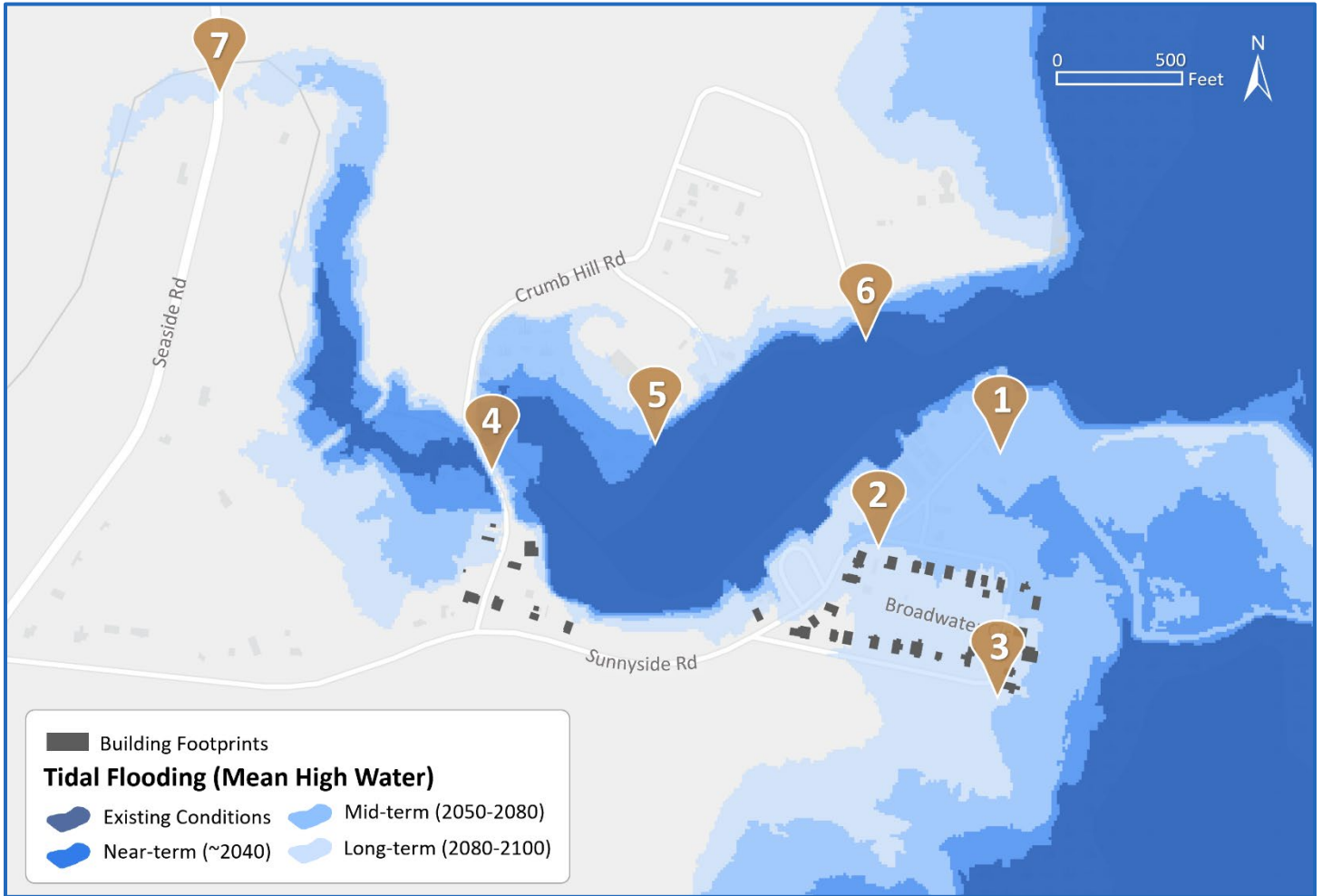
Location	Present	Near-Term	Mid-Term	Long-Term
1 End of Sunnyside Road	Chronic	Inundated Daily	Inundated Daily	Inundated Daily
2 Working Waterfront	Moderate	Chronic	Chronic	Inundated Daily
3 Broadwater Circle	Moderate	Chronic	Chronic	Inundated Daily
4 Crumb Hill Road	Moderate	Moderate	Chronic	Chronic
5 UVA Research Center and R&C Seafood	Moderate	Moderate	Chronic	Inundated Daily
6 Oyster Public Boat Ramp	Moderate	Moderate	Chronic	Chronic
7 Seaside Road	Major	Moderate	Moderate	Chronic

Low Frequency  High Frequency

⁶ Virginia DCR. (2021). Flood Resilience Open Data Portal. <https://crmp-vdcr.hub.arcgis.com/>

GROWING TIDAL FLOOD EXPOSURE

Areas exposed to tidal flood conditions will expand over the century. Within the study area, nearly 300K additional acres of land will be threatened by daily high tides by the end of the century, putting many homes and assets at risk. The map below shows how the tidal boundary, defined as mean high water (MHW), is projected to increase across planning horizons.



PROJECTED TIDAL FLOODING EXTENTS WITH SEA LEVEL RISE FOR EACH PLANNING HORIZON.

GROWING STORM SURGE EXPOSURE

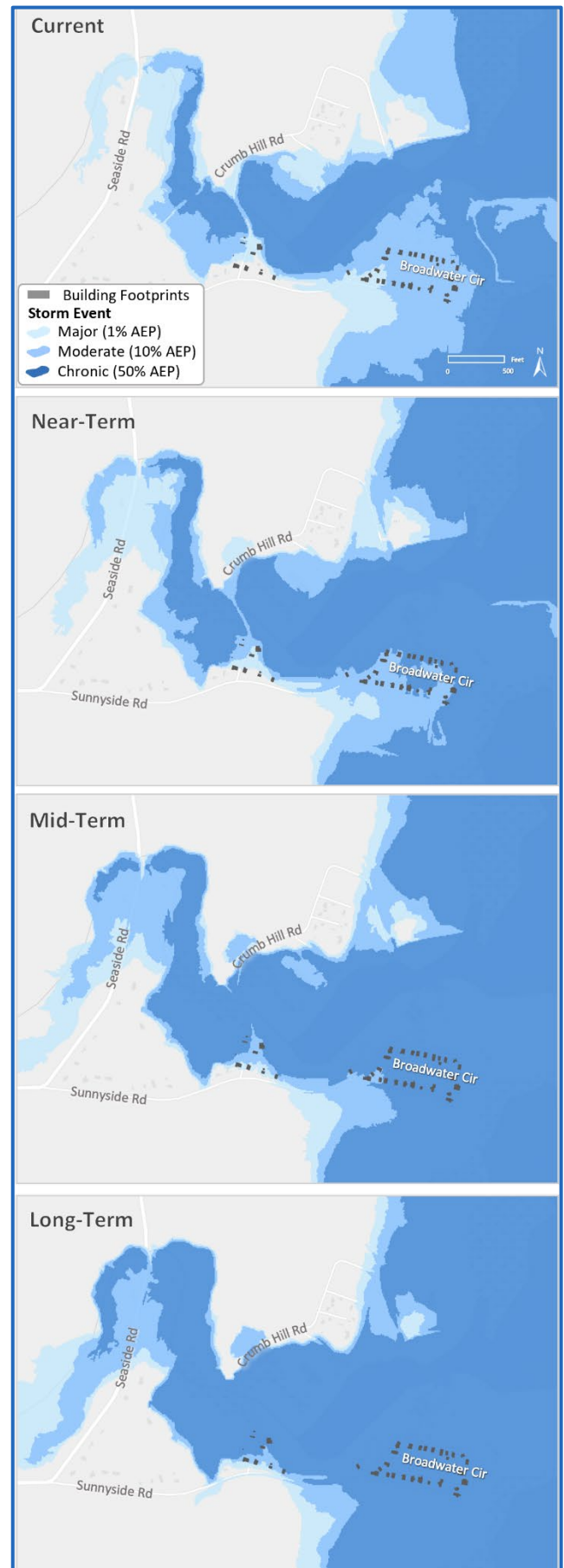
Areas exposed to more severe storm-driven floods are also projected to increase. The maps below show how the inundation extents of chronic, moderate, and major flood event types are projected to change over time. FEMA uses the major (1% AEP) event for regulatory floodplain management boundaries. The inundation extent of this event type does not grow as much as others but will expand farther up Cobb Mill Creek behind Seaside Road. By the end of the century, all residences on the southern portion of Oyster Harbor, including those near Crumb Hill Road, are projected to be within the extent of the 1% AEP floodplain.

INCREASING FREQUENCY OF FLOODING

As another way to look at these patterns, severe flood conditions that are considered rare now will become more common.

For example, an event with the same conditions as Hurricane Isabel (defined by having the same flood depth and inundation extent) has a 1-in-50 chance of occurring in any given year under current conditions—also known as having a 2% AEP. As sea levels rise, this magnitude of event is projected to have a 1-in-4 chance of occurring annually in the mid-term (2050-2080) planning horizon. Similarly, a more extreme 1% AEP flood event of today will go from having a 1-in-100 chance of occurrence today to a 1-in-12 chance of occurring in that same period.

These shifting patterns will mean flooding occurs more frequently at any flood-prone location.



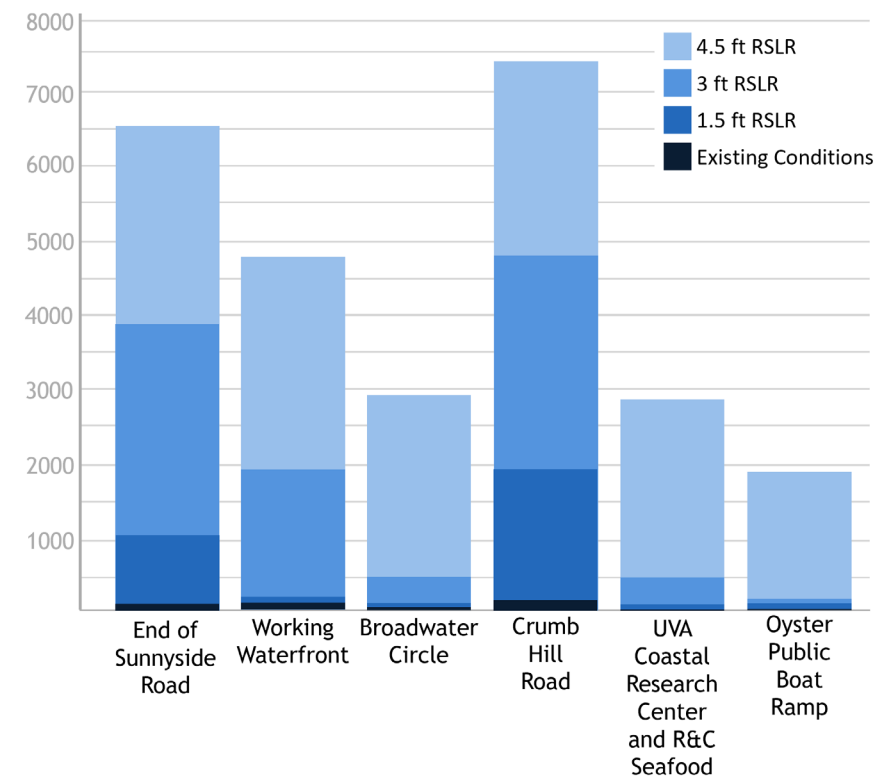
PROJECTED FLOODING FROM CURRENT AND FUTURE STORM EVENTS WITH SEA LEVEL RISE

INCREASING DURATION OF FLOODING

For the areas expected to be exposed to tidal/chronic flooding, the frequency and duration of "sunny day" inundation are also likely to increase. Tidal flood frequency hours measure how long key locations may flood under future conditions. These inundation hours are estimated using the NOAA Inundation Analysis tool, which determines the frequency and duration at which high waters may exceed a specific elevation. The tool uses observational water level station data to inform these estimates. The closest station to Oyster available in the tool is in Wachapreague, Virginia. Based on historic water levels over a 10-year period and projected future water levels with sea level rise, tidal flood frequency and duration changes were calculated over time for discrete

locations across Oyster. In the near-term (2040-2050), the end of Sunnyside Road (Reference Point #1) on and the lowest point along Crumb Hill Road (Reference Point #4) are projected to have periodic flooding near-daily (approximately 1,000-2,000 hours on average of flooding per year). By the mid-term (2050-2080), the working waterfront (Reference Point #2) is also anticipated to reach this frequency of flooding. By the end of the century, all six locations shown at right are projected to experience this level of flooding or greater, with the Crumb Hill Road (Reference Point #4) location reaching greater than 7,000 hours on average of flooding per year. Not only are more areas likely to be exposed to flooding, but they will also be flooding more frequently and for longer durations.

ANNUAL INUNDATION HOURS BY LOCATIONS





CHANGING FLOOD IMPACTS

CHANGING FLOOD IMPACTS

Flooding in Oyster Village affects its social, economic, and environmental well-being as well as that of the Eastern Shore due to the facilities present in this community. This section describes our understanding of current and projected flood impacts. These projections help guide decisions on flood mitigation strategies by illustrating the potential economic impact of doing nothing.

STRUCTURE VULNERABILITY

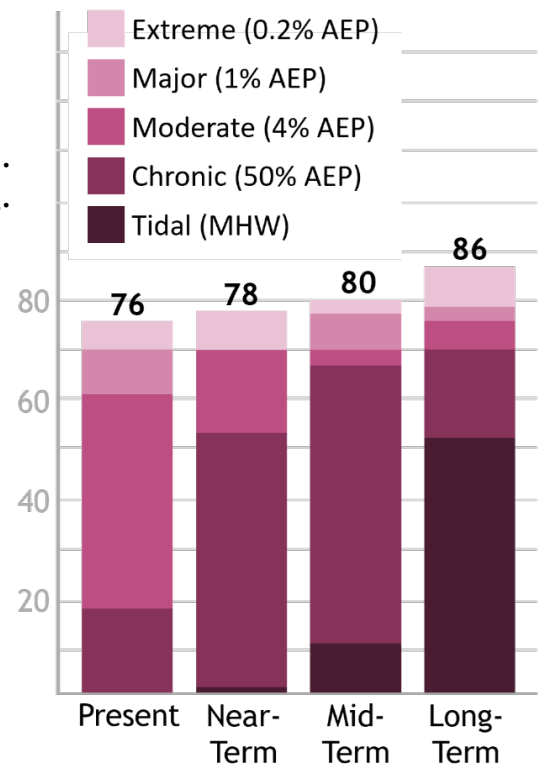
Oyster Village has 153 buildings, including residential, commercial, and accessory structures. Currently, about half of these structures are exposed to flooding during extreme events (0.2% AEP, or 1:500 odds of occurring any given year). As sea levels rise, more will be exposed to frequent flooding. Some notable milestones include:

- **Near-term** - 45% of buildings will face *moderate flooding* with 1.5 ft of sea level rise.
- **Mid-term** - 44% of structures will experience *chronic flooding* with 3 ft of sea level rise.
- **Long-term** - 34% of buildings will face *daily high tides* with 4.5 ft of sea level rise, compared to just one building today.

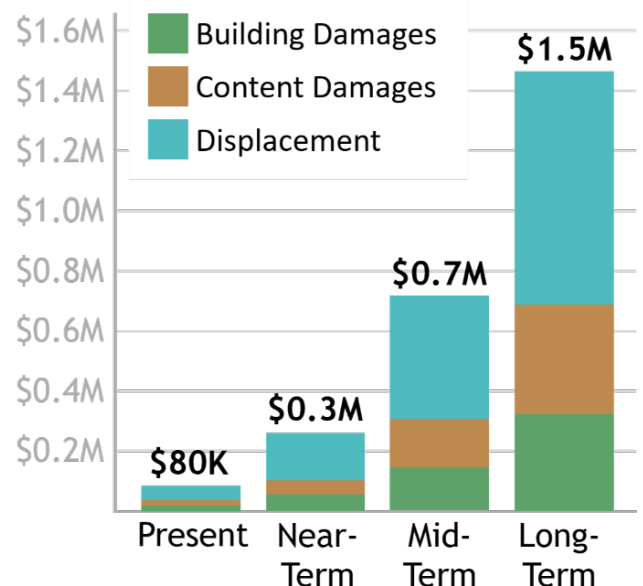
Flood exposure shows which buildings are affected but not the extent of damage. Each building's first finished floor elevation is compared to projected flood depths when estimating flood damage. This analysis results in an Average Annualized Loss (AAL), representing expected damages to structures and contents in any given year. A detailed analysis was conducted for the Broadwater Circle and Crumb Hill Road area using FEMA's Hazus FAST tool. This tool calculates building, content, and displacement losses across flooding scenarios. In the Broadwater Circle and Crumb Hill Road area:

- **Near-term** - Flood losses are expected to triple, reaching \$340,000 with 1.5 ft of sea level rise.
- **Mid-term** - Losses could increase ninefold to \$882,000 with 3 ft of sea level rise.
- **Long-term** - Losses may rise to \$1.77 million, 18 times higher than current estimates.

STRUCTURE EXPOSURE BY FLOOD TYPE



STRUCTURE-RELATED LOSSES BY TYPE



CRITICAL ASSET VULNERABILITY

Through public meetings and interviews, several critical community assets were identified. A description and analysis of flood exposure are provided below.

1. **Horse Island Trail** - A 0.7-mile trail popular for birdwatching and walking. The trail is managed by TNC, maintained by resident volunteers, and frequented by residents and visitors alike.
2. **Southern Harbor Working Waterfront:**
 - **Cherrystone Aquaculture** - A commercial shellfish nursery and economic driver along the working waterfront. It operates seasonally and supplies water to the nearby TNC facility.
 - **TNC Habitat Restoration Facility** - A curing facility for eelgrass seeds. The seeds are collected in the spring and broadcast in the fall to aid in the restoration of seagrasses in Virginia's coastal bays.



LOCATIONS OF CRITICAL COMMUNITY ASSETS IN OYSTER VILLAGE

3. **Travis Chapel** - A historic former United Methodist Church, which could serve as a gathering place for residents in the community.
4. **UVA Research Lab** - A research laboratory and dormitory facility that supports university partner researchers and students. The research center focuses on the study of various seaside natural resources and includes a laboratory, housing, and a boat ramp.
5. **R&C Seafood** - A wholesale distributor of oysters and clams. It includes a clam house and cold storage facilities.
6. **Public Boat Ramp** - A crucial water access point for recreational fishers and boaters with three launches and a separate dock for kayakers that is currently only accessible by Crumb Hill Road. This boat ramp is also of regional importance as the only public, deep-water access between Willis Wharf to the north and Wise Point to the south.

Each asset was evaluated for its exposure to flooding. In the near-term, all assets will be vulnerable to a 10% AEP flood event, with some, like Cherrystone Aquaculture and the TNC Restoration Facility along the working waterfront and Horse Island Trail, facing daily tidal flooding. In the long-term, all will be exposed to chronic or daily tidal flooding. Changes in flood hazards will also impact roadways, which could impact access to critical assets in the future.

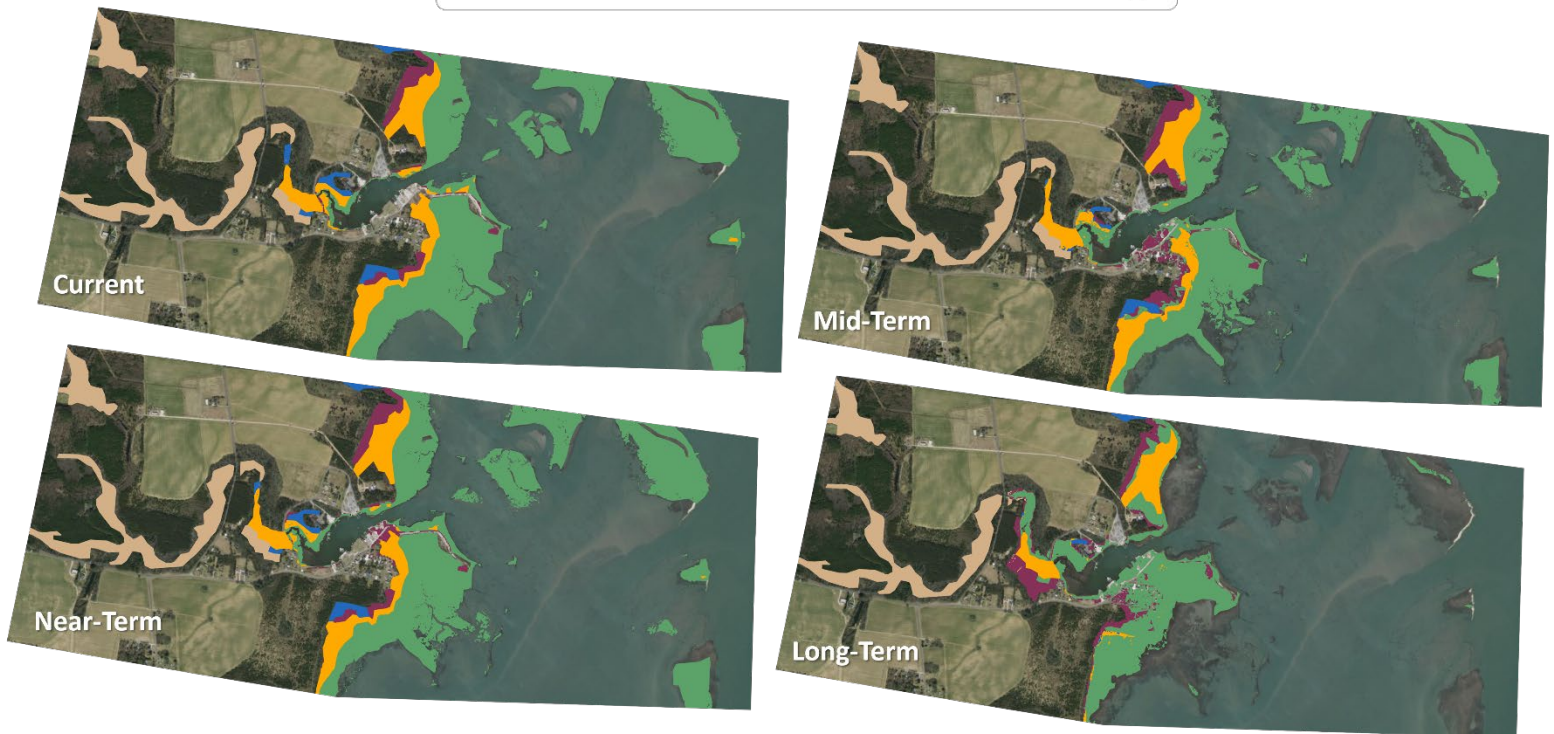
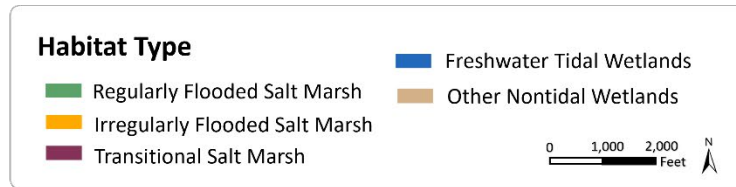
Location	Present	Near-Term	Mid-Term	Long-Term
1 Horse Island Trail (Trail head)	Inundated Daily	Inundated Daily	Inundated Daily	Inundated Daily
2 Southern Harbor Working Waterfront	Chronic	Inundated Daily	Inundated Daily	Inundated Daily
3 Travis Chapel	Moderate	Moderate	Chronic	Chronic
4 R&C Seafood	Moderate	Chronic	Chronic	Inundated Daily
5 UVA Research Lab	Moderate	Moderate	Chronic	Chronic
6 Public Boat Ramp (Parking Area)	Moderate	Moderate	Chronic	Chronic

Low Frequency  High Frequency

Several asset owners have implemented measures to mitigate the impact of flooding. These mitigation measures help increase the adaptive capacity of the facility and its ability to maintain function under changing flood conditions. Mitigation measures vary by asset - for example, Cherrystone Aquaculture has elevated utilities and added a generator, while other assets have taken little to no action. The UVA Research Lab was built above the base flood elevation in 2006, and preliminary discussions on long-term adaptation strategies are being held.

NATURAL HABITAT VULNERABILITY

Coastal wetlands are vital in protecting Oyster Village from floods and erosion. They also provide habitat for wildlife, including shellfish, which are crucial to the Northampton County economy and provides additional protection to the Oyster Village community. However, rising sea levels are leading to a loss of these habitats. Using data from TNC's Coastal Resilience Tool, projections show a significant loss of wetlands, with approximately 42% of the total marsh and wetland habitat in the study area projected to be lost by the end of the century. This habitat loss includes a 54% decline in regularly flooded salt marsh, the study area's most significant wetland habitat type. Transitional salt marsh habitats may expand inland by up to 11 acres (nearly 90% increase). However, this depends on land use and the availability of non-developed spaces for this habitat type to expand into. These projections don't account for future restoration efforts, highlighting the



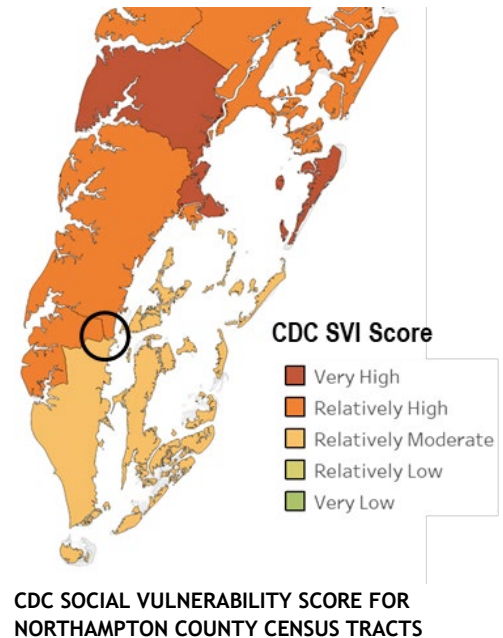
PROJECTED CHANGES IN MARSH AND WETLAND HABITAT ACROSS PLANNING HORIZONS

importance of incorporating nature-based solutions into resilience planning.

SOCIAL VULNERABILITY AND COMMUNITY CAPACITY

Oyster Village's vulnerability goes beyond physical risks—it's also shaped by the community's ability to cope with worsening conditions. Social vulnerability refers to how well residents can prepare for, endure, and recover from disasters based on factors like income, education, and age. Communities with higher social vulnerability are more likely to experience human suffering and financial loss during events like floods.

Oyster Village is split into multiple census tracts across southern and eastern Northampton County. Although Oyster Village represents only a small area, the communities within these census tracts benefit from Oyster's contributions to the local economy. Therefore, it is important to consider the larger socioeconomic challenges of the region. The census tract that captures the southern portion of Oyster includes the majority of flood-exposed residents. This census tract extends west to Bay Ridge and Down to the southern border of Northampton. Within this tract, 62% of residents are white, 26% are Black, 8% are Hispanic or Latino, and 2% identify as multiracial. This area has a high rate of low-income residents, with 69% of households earning less than twice the federal poverty level. Additionally, 22% of adults lack a high school diploma, making access to crucial resources more difficult. The community also has a high proportion of elderly residents, with over 25% of the population aged 65 or older—more than twice the state average—making them especially vulnerable during disasters.



According to the CDC's Social Vulnerability Index (SVI), the southern part of Oyster is considered "Relatively Moderate" in social sensitivity. This SVI ranking is based on socioeconomic status, household characteristics, racial and ethnic minority status, and housing type and transportation information. This area is also marked as "disadvantaged" by the federal Climate and Economic Justice Screening Tool (CEJST), ranking in the 93rd percentile for expected building loss due to natural hazards. This designation highlights the community's disproportionate environmental burdens, allowing for preferential treatment and prioritization for some federal support programs.

A community's resilience capacity relates to its ability to take necessary actions to mitigate harm before and after a disaster. Due to its unincorporated status, Oyster may face difficulties implementing resilience projects without significant support from regional governments and partners. Communities require resources and capacity in the form of staff time, financial capital, and expertise to apply for funding, manage grant processes, and plan and maintain infrastructure projects. Oyster's small population and lower economic valuation of assets may also hinder its ability to secure needed mitigation or resilience funding, as federal sources often consider property density and values. Many Oyster residents have deep and longstanding roots in the area, fostering strong community ties. These connections increase the likelihood of residents investing in ways to protect their community and support each other during disasters. However, coastal flooding may threaten this community cohesion if residents are forced to relocate due to limited ability to stay.

Oyster Village Coastal Adaptation & Resilience Plan

Station 3: Action Plan

Priority Projects

Based on feedback from the community through this planning process, 5 priority strategies have been selected for the action plan (in no particular order):

- 1 Install hybrid and green infrastructure flood risk reduction measures
- 2 Adapt docks
- 3 Elevate



STRATEGY FRAMEWORK

STRATEGY FRAMEWORK

The strategy framework presents the key themes and typologies guiding the coastal adaptation and resilience action plan. This framework incorporates the community's strategy preferences within the context of priority values identified through stakeholder engagement.

KEY THEMES

Oyster Village has a rich history and culture of being connected to the water. During the initial phases of the planning process, the RSC and the public were asked to share their ideas on what they hope the community will look like 20 years into the future. The adaptation strategy framework was designed around the following four core planning themes based on community feedback gathered at the first public open house. These align with the community's vision for the future of Oyster Village as a thriving community of people and wildlife that is safe and cohesive and maintains a working waterfront for research and commercial and recreational fishing.



Conserve Natural Resources

Strategies that protect, restore, and create natural habitat support the vision of a thriving community of people and wildlife.



Protect the Working Waterfront

Strategies that reduce flood risk along the working waterfront and adjacent residential areas support the vision of a community with a working waterfront for research and commercial and recreational fishing.



Maintain a Connected Community

Strategies that reduce flood risk in residential areas and help maintain critical roadway access support the vision of a safe and cohesive community.



Adapt at Risk Areas

Strategies that make room for flood waters, relocate high flood-risk assets, or avoid building in high flood-risk areas can be achieved through physical and policy measures.

STRATEGY TYPOLOGIES

Various strategies to support coastal adaptation were explored for Oyster Village. Structural approaches included gray infrastructure, such as seawalls and bulkheads, green and natural infrastructure, and hybrid infrastructure which combines green and gray approaches. Non-structural approaches included accommodating areas that flood, avoiding flooded areas, and relocation. The following strategy typologies received the most support from the community:

- **Green and Natural Infrastructure:**

Restoring natural floodplain function through conservation, restoration, and creation of natural areas.



- **Hybrid Infrastructure:**

Combining green/natural and structural methods, such as wetland plantings with a concrete wall.



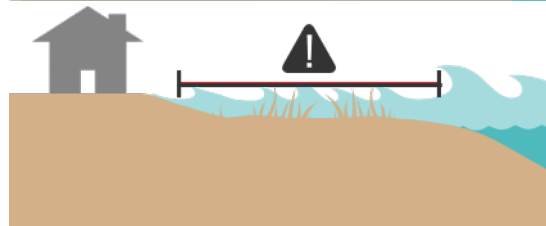
- **Accommodate Areas that Flood:**

Making room for floodwaters by adjusting existing structures, like elevating a home.



- **Avoid Flooded Areas:**

Prioritize building outside of areas with high flood risk, such as establishing a new road in a lower flood risk area.



STRATEGY PRIORITIZATION

Strategy alternatives for the key issues faced by the community were presented to the RSC in a design charrette. The RSC discussed and rated specific strategy options regarding their social, technical, legal, economic, and environmental feasibility. A total of ten strategies covering Broadwater Circle, Crumb Hill Road, working waterfront, and northern harbor areas were evaluated through this process. These strategies were then presented to the public at the second open house meeting to gather feedback and additional options.

During the public open house, community members progressed through a series of stations to understand flood issues and then provide verbal and written feedback (positive or negative) on the strategies. An online survey was also made available to those unable to attend to share their level of agreement with different strategy elements. The community expressed the most significant support for green/natural strategies, including wetland plantings, marsh restoration, oyster habitat creation, adapting septic systems, and elevating homes.



COLLECTING INPUT ON POTENTIAL STRATEGIES AT THE SECOND PUBLIC OPEN HOUSE

For each strategy alignment, a map was presented showing the proposed project location in the community, along with general information about the level of flood protection, complexity, and maintenance the strategy provides. These terms are defined as follows:

- **Flood Protection:** The flood conditions the project is designed to withstand. For example, a strategy that protects from frequent tidal flooding has a lower level of flood protection than one that protects from a major storm event.
- **Complexity:** The relative level of engineering effort compared to other resilience and adaptation actions.
- **Maintenance:** The effort required to maintain flood protection, including if active set-up is needed to put equipment in place before a storm event.



DISCUSSING HISTORIC FLOOD IMPACTS AT THE FIRST PUBLIC OPEN HOUSE

Five priority projects emerged after the public open house and additional input from the RSC. These were advanced to conceptual design and are presented in detail in the following chapter, Coastal Adaptation and Resilience Action Plan. The conceptual-level designs were also shared with the community through a third public open house before inclusion in the action plan.



COASTAL ADAPTATION AND RESILIENCE ACTION PLAN

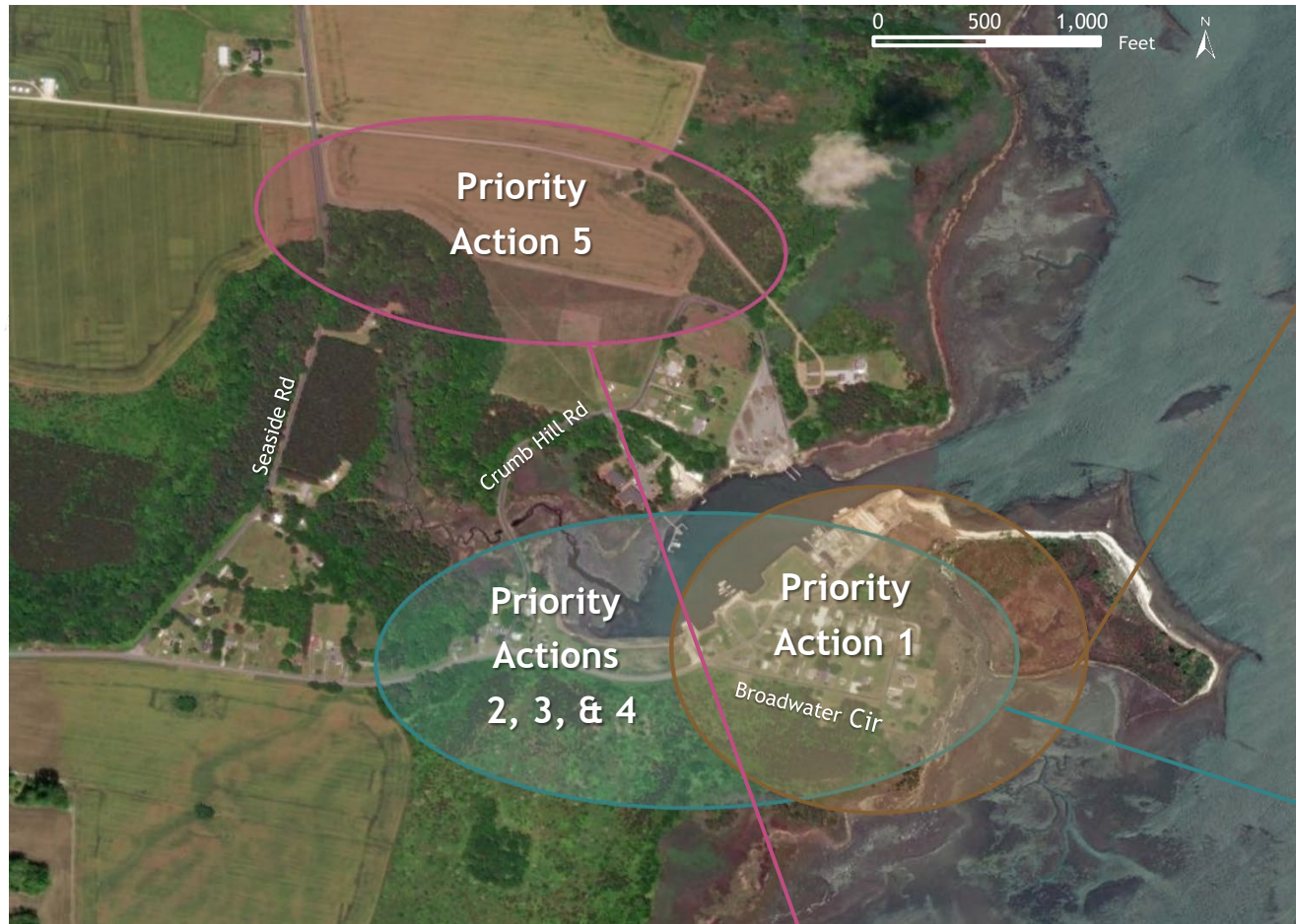
COASTAL ADAPTATION AND RESILIENCE ACTION PLAN

Through the collaborative planning process, the community of Oyster Village identified five priority coastal adaptation and resilience actions, as shown below in no particular order:

PRIORITY ACTIONS

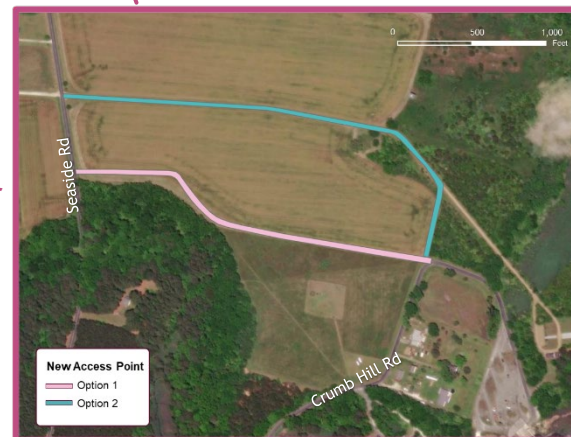
- 1. Protect the Shoreline with Earthen Berm and Stem Wall/Sheet Pile Wall:** Create an earthen berm with wetland plantings and offshore breakwaters to offer coastal protection to the Broadwater Circle area. To complete this flood risk reduction system, a sheet pile wall and stem wall is included in the concept design along the working waterfront of Oyster Harbor.
- 2. Install Floating Docks:** Replace existing fixed docks as they age out with floating docks along Oyster Harbor.
- 3. Explore Opportunities for Home Elevation:** Examine options to elevate homes that have not already been elevated within the Broadwater Circle and Crumb Hill Road Areas.
- 4. Adapt Septic Systems:** Adapt septic systems to changing flood conditions by leveraging existing and emerging technologies.
- 5. Establish a New Access Point for Crumb Hill Road:** Establish a new access point for Crumb Hill Road along higher elevation ground to maintain access to the north side of the harbor.

These projects primarily focus on actions that can be taken to offer flood protection in the near-term (2040-2050) or mid-term (2050-2080). Policy and longer-term relocation strategy considerations are also presented, along with other strategies explored during earlier phases of this planning effort, in the Additional Considerations section of this Plan. Supporting concept-design details are provided in the Evaluation of Priority Adaptation Strategies section of the Technical Appendices.



GENERAL LOCATION OF PRIORITY ACTION PROJECTS
THROUGHOUT OYSTER VILLAGE

5. Establish a New Access Point for
Crumb Hill Road



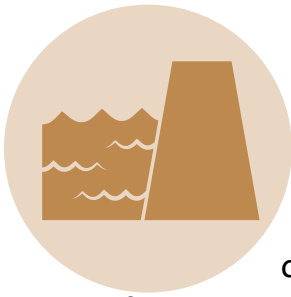
1. Protect the Shoreline with Earthen
Berm and Stem Wall / Sheet Pile Wall



2. Install Floating Docks

3. Explore Opportunities for
Home Elevation

4. Adapt Septic Systems



PROTECT THE SHORELINE WITH EARTHEN BERM AND STEM WALL/SHEET PILE WALL

The Broadwater Circle area and working waterfront side of the harbor are targeted with this strategy because these areas have the highest vulnerability to flooding based on the analyses presented in earlier sections of this document. The main components of the Broadwater Circle area's hybrid and green infrastructure coastal protection measures include an earthen berm alignment with wetland plantings and offshore breakwaters to the east and south of the harbor and the stem wall/sheet pile installation along the working waterfront. These elements are designed to protect the working waterfront and Broadwater Circle area from flooding by keeping water out and reducing the force of incoming waves during storms. The marsh enhancement will also provide additional protection against erosion. A stormwater pump system would also be needed to convey any overtopped water or rainfall runoff to the unprotected side of the berm and stem wall/sheet pile wall. This is done by creating a storage pond and properly sizing a pump to move this water away from assets.

Strategy Type	Green and natural infrastructure, hybrid infrastructure
Flood Protection	Designed to protect homes and businesses from the near-term (2040-2050) 10% annual coastal flood event (stillwater elevation of +8.5 ft NAVD88)
Considerations	Site investigation is needed to evaluate stormwater drainage, soil types, and seepage control. Design and value engineering will determine more accurate costs.
Maintenance	Routine structural inspections. Stormwater pump included in the design.
Cost Range	\$16.7 million to \$35.9 million⁷
Timeline	Near-Term Actions

Community Feedback:

- Numerous positive comments appreciating the nature-based components. Concerns with restricting marsh migration and requests to adjust slopes to better accommodate this process. The concept design team notes that optimized marsh migration can be considered when the project design moves forward but would increase the project footprint and/or costs.
- Concerns about the concept's resiliency to storm surge. The team notes that the berm was designed to protect from nuisance flooding and would be overtopped by events higher than the design elevation.
- Drainage issues for rainfall behind the berm or delayed drainage of floodwaters if a large event overtopped the berm. The team modeled drainage impacts and found that up to 2 ft of water could pool behind the berm under heavy rainfall conditions. Flap gates, one-way valves for stormwater, could be installed to drain rainfall runoff in combination with the already identified stormwater pump.
- Concerns that the concept did not extend around all vulnerable properties in the inner harbor area. The team notes that the initial design focused on flood mitigation for the most vulnerable/lowest-lying properties in Broadwater Circle.

⁷ Cost estimate based on concept level design. \$10.9 million to \$23.3 million estimated for the earthen berm, marsh enhancement, wetland plantings, and stormwater pump. \$5.9 million to \$12.6 million estimated for the stem wall/sheet pile wall. The presented range is -30% to 50% of actual costs. Further design and value engineering will determine more accurate costs.

EARTHEN BERM ALIGNMENT

The alignment of the berm was carefully chosen to avoid encroaching upon critical habitats, such as the existing wetlands and stream to the east. The berm's alignment was heavily influenced by existing features such as the viewing platform, parking lot, stream, and private properties. The earthen berm has an elevation of 8.5 ft with reference to North American Vertical Datum 1988 (NAVD88) with an 8 ft wide crest. This elevation results in an average berm height of 4.5 ft above existing ground. This design elevation was established to protect against the 10% AEP event in the near-term (2040-2050). The berm ties directly into the stem wall/sheet pile at the northernmost point to ensure a continuous flood barrier. The berm's core would be constructed of impenetrable clay to prevent seepage and ensure long-term structural integrity. Native plantings would be established on the berm's slopes to promote ecological integration and enhance erosion control.



STEM WALL/SHEET PILE WALL

In combination with the berm, the stem wall/sheet pile wall is designed to prevent frequent flooding along Sunnyside Road and protect commercial businesses along the waterfront. This hybrid structure transitions between sheet pile wall and stem wall sections, aligning with existing shoreline protection. Stem walls were proposed in areas with existing revetments, while sheet pile walls were chosen where bulkheads were present. As this design advances, nature-based shoreline stabilization treatments will also be considered for shorelines in the southwest of the harbor.

A primary design consideration was minimizing ecological impact, particularly on the existing bulkhead and revetment, which serve as vital oyster and mussel habitats. The alignment of the wall prioritizes placement behind existing structures to preserve these habitats wherever possible. In a few instances, building constraints and constructability concerns necessitated positioning the wall in front of the existing bulkhead. The western end of the wall was strategically designed to the elevation of +8.2 ft NAVD88, ensuring effective flood protection in vulnerable areas. The wall's eastern end aligns with the endpoint of the existing bulkhead and transitions to the beginning of the proposed berm, creating a continuous barrier against floodwaters and maintaining the integrity of the shoreline protection system.⁸



STEM WALL/SHEET PILE WALL PERSPECTIVE VIEW

⁸ Images presented in perspective view sourced from <https://bocaratonretainingwalls.com/> and <https://encrypted-tbn2.gstatic.com/images?q=tbn:AND9GcQ1wNQZBJ3gl7k4RL5Cb3eaOA9T8WaEqpOrYs5f4TMmMVP2E>



EXPLORE OPPORTUNITIES FOR HOME ELEVATION

Following the significant flooding impacts of Hurricane Isabel in 2003, many homes were elevated through federal grant funding. However, not every vulnerable property was addressed, and some did not meet the FEMA cost-benefit requirements then. Since 2003, FEMA's requirements for home elevation have changed in recognition of more benefits and the option to include future flood conditions. These changes mean that 21 properties along Broadwater Circle, Crumb Hill Road, and Sunnyside Road are likely eligible for elevation. Nearly all of these structures are residential, except for the historic Travis Chapel.

Strategy Type	Accommodate areas that flood
Flood Protection	The target elevation for raising homes accounts for the near-term (2040-2050) 10% annual chance coastal flood event
Considerations	Coordination and support from Northampton County and A-NPDC will be needed for implementation.
Maintenance	Flood insurance may be required for properties with a federally-backed mortgage
Cost Range	\$30,000 to \$650,000 per structure⁹
Timeline	Near-Term Actions

Community Feedback:

- Multiple residents expressed positive interest in the strategy.
- Questions on the potential timeline. The team notes that the timeline depends on community interest and funding availability. The A-NPDC was receptive to advancing FEMA grant applications for interested residents.
- Some questions arose about how this strategy may be applied in combination with the berm and sheet pile/stem wall around lower Broadwater Circle. The team notes that the elevation of homes would avoid flooding from larger magnitude events and may provide better long-term resilience to increasing flood threats.

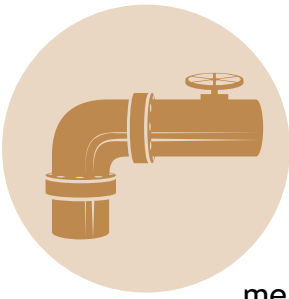
A multi-step assessment process was used to determine the feasibility and cost-effectiveness of elevating these properties. The assessment process included estimating the elevation project costs, pre- and post-project damages, and social benefits to determine each property's total benefit-cost ratio.

⁹ Final costs would be determined on a structure-by-structure basis by selected contractors.

Based on the Benefit Cost Analysis, more than half of the 21 properties were cost-effective to elevate with a BCR greater than 1.0. Recent updates to FEMA BCA guidance indicate that all remaining structures are cost-effective, even without a BCR of at least 1.0. These structures cost less than \$1,000,000 to elevate or are in the 100-year floodplain and cost less than \$228,000 to elevate. This should be coordinated with Northampton County and A-NPDC to explore grant funding opportunities. A-NPDC is interested in supporting grant applications in the future.



ELEVATED AND NON-ELEVATED HOMES ALONG BROADWATER CIRCLE AND SUNNYSIDE ROAD IN OYSTER VILLAGE



ADAPT SEPTIC SYSTEMS

Within the Broadwater Circle and Crumb Hill Road area of Oyster Village, all homes (approximately 30) are served by septic systems. Rising sea levels compounded with high groundwater levels pose challenges to functioning septic systems. Data from VIMS estimates the groundwater table in the Broadwater Circle area and portions of Crumb Hill Road will be within 3 ft of mean sea level by 2080¹⁰. The RSC encouraged the exploration of alternative septic options that are more resilient to flood risk. Initial alternatives for an improved septic system included two commercial options: a community-scale vacuum septic system and an elevated onsite septic treatment system. Because the technology for an onsite treatment system was not available at the time of writing this Plan, the vacuum system is detailed here.

A vacuum system provides an alternative to traditional septic tanks in areas with subsurface challenges, such as high groundwater tables. Gravity lines from houses carry wastewater into a valve pit sump, which then propels wastewater into a vacuum main. The vacuum main connects to a vacuum station where the wastewater enters a collection tank. The wastewater can then be pumped from the tank to a treatment plant for processing or a septic drainage field.

Strategy Type	Accommodate areas that flood
Flood Protection	Flood risk of the system would depend on the location and land elevation of the vacuum pump station and drainage field.
Considerations	A community-scale approach can save costs. Placement of pump station, drain field siting, and maintenance would need to be determined.
Maintenance	Continuous pump operation and routine maintenance are required for vacuum sewer systems. Annual maintenance costs would be about \$250 for each connected household. Some major components would require replacement after 10 to 15 years.
Cost Range	\$1.1 million ¹¹
Timeline	Near-Term Actions

Community Feedback:

- Overall, community feedback was positive and in support of the strategy.
- A resident expressed that the system should only support existing residences and not encourage increased development in the community.
- Residents had questions as to who would maintain and run the system and where the pump station and drain field would be located. The community would need to address these aspects of the project if the project were to move forward.

¹⁰ Virginia Wastewater Data Viewer by VIMS Center for Coastal Resources Management.

<https://experience.arcgis.com/experience/4c8fea3204fd47cc842df6b0de92ee3f/page/Map/>

¹¹ This cost is based on a complementary conceptual design provided by Airvac. This initial cost estimate is subject to change with further design modifications and resolution of pump station and drain field siting.

The RSC and project team members visited an Airvac facility site in Cape Charles, Virginia that has 550 properties served by vacuum septic and connects to a local wastewater treatment plant. If this system were to be implemented in Oyster Village, it would need to connect to a septic drainage field, which currently does not exist. The vacuum septic system has salt-tolerant valves and controllers to operate underwater, and all vacuum systems are sealed. A single vacuum pump station could likely serve all 30 homes in the Broadwater Circle and Crumb Hill Road area. The question of who would maintain the vacuum septic system is an essential consideration for the community when considering implementation steps for this project.



AIRVAC SYSTEM WITHIN A VACUUM STATION IN CAPE CHARLES, VA THAT IS OPERATED BY VIRGINIA AMERICAN WATER

An onsite elevated septic treatment system would provide an alternative to a community-scale vacuum sewer system. This elevated septic treatment would eliminate the need for a drainage field but still require septic tanks. The technology connects septic tanks to an elevated unit that treats the wastewater and then stores it in a water-holding tank for reuse in a safe manner (such as irrigation or flushing toilets). Triangle Environmental was piloting this elevated onsite septic treatment system at the time of the Plan development in the Northern Neck area of Virginia. This pilot is part of a Community Resilience Innovation Challenge associated with the non-profit RISE in conjunction with GoVirginia and Virginia Sea Grant. Given that this technology is still in development, a concept-level design was not produced for the community, but it is noted for future consideration.



INSTALL FLOATING DOCKS

Oyster residents and businesses rely on the docks for vessel safety, commercial shellfish harvesting, and recreational fishing. While the public boat ramp is a floating dock, the remaining stationary docks around the harbor are at extreme risk for damage and loss of function resulting from storm surge and coastal flooding. Replacing stationary docks with floating docks will allow the structures to adapt to fluctuating water levels, ensuring that function is maintained following flood events and potential future sea level rise.

Strategy Type	Accommodate areas that flood
Flood Protection	Designed to withstand the mid-term (2050-2080) 4% annual chance coastal flood event. Roadway access challenges during and after major storms are an important consideration that are not addressed by this project.
Considerations	Site investigation is needed to evaluate demolition and connection of docks. Design and value engineering will determine more accurate costs.
Maintenance	No active set-up required for storm events.
Cost Range	\$700,000 to \$1.5 million¹²
Timeline	Mid-Term Actions

Community Feedback:

- The concept for floating docks was initiated by the RSC and separately suggested by the community at the first public open house.
- While limited feedback was provided on the concept-level design, one resident noted they liked the strategy.

The three docks proposed for floating conversion are Anglers Dock, the R&C Seafood Dock, and the UVA Coastal Research Lab Dock. All three designs ensure that the docks can be usable with projected sea level rise in the mid-term (2050-2080) and flood elevations associated with 4% (25-year) storms. The strategic placement of piles ensures stability and controlled vertical movement in response to changing water levels to support continued function during storms and floods. Each dock design prioritizes maximizing vessel capacity while maintaining safe and efficient vessel navigation. Recommendations for dock sizes were based on guidance from the American Society of Civil Engineers, which provides industry-standard recommendations for efficient and safe dock design.

- **Anglers Dock:** The concept design proposes 12 slips, including 4 double slips and 2 single slips. Additional vessel parking is proposed along the end of the dock.

¹² Cost estimate based on concept level design. Range is -30% to 50% of actual costs. Further design and value engineering will determine more accurate costs.

- **R&C Seafood Dock:** The concept design proposes 3 slips, including 1 single and 1 double. This design accommodates more vessels than the existing dock and includes vessel parking on the backside.
- **UVA Coastal Research Lab:** The concept design proposes 8 slips, including 4 double slips. The backside of the floating dock design allows for additional vessel parking.

The design includes gangways connecting the stationary dock entrance to the beginning of the floating dock platform. Once constructed, the gangways would remain intact under extreme weather conditions up to those associated with a Category 3 hurricane.¹³



FLOATING DOCKS PERSPECTIVE VIEW FOR OYSTER HARBOR

¹³ Image presented in perspective view sourced from https://thedockdoctors.com/client_media/images/slideshows/municipal/Municipal-waterfront-projects-13.jpg



ESTABLISH NEW ACCESS POINT FOR CRUMB HILL ROAD

By building outside current or future flood-prone areas, flood risk can be avoided for homes, businesses, and infrastructure. In Oyster Village, Crumb Hill Road is the only public access road for several residential areas, the UVA Research Center, and the Oyster Public Boat Ramp. At present, the road floods during more significant events. Sea level rise projections over the coming years predict an increase in flooding that will impact the intersection of Crumb Hill Road and Cobb Mill Creek and create challenges for traversing the low-lying section of Crumb Hill Road. While the existing Crumb Hill Road will remain intact, this design intends to provide a complementary new access point to Crumb Hill Road on higher elevation ground. The new access point also addresses public concerns about truck and trailer traffic on this narrow road to the north side boat launch.

Strategy Type	Avoid flooded areas
Flood Protection	The roadway design options are located outside the current and projected 1% annual coastal flood event floodplain conditions by end of century.
Considerations	Right-of-way acquisition and stormwater management will need to be addressed based on route selection.
Maintenance	Routine roadway maintenance will be needed; however, tidal flooding should not be a concern for roadway access.
Cost Range	\$1.56 million (Option 1) to \$1.86 million (Option 2)¹⁴

Timeline

Mid-Term Actions

Community Feedback:

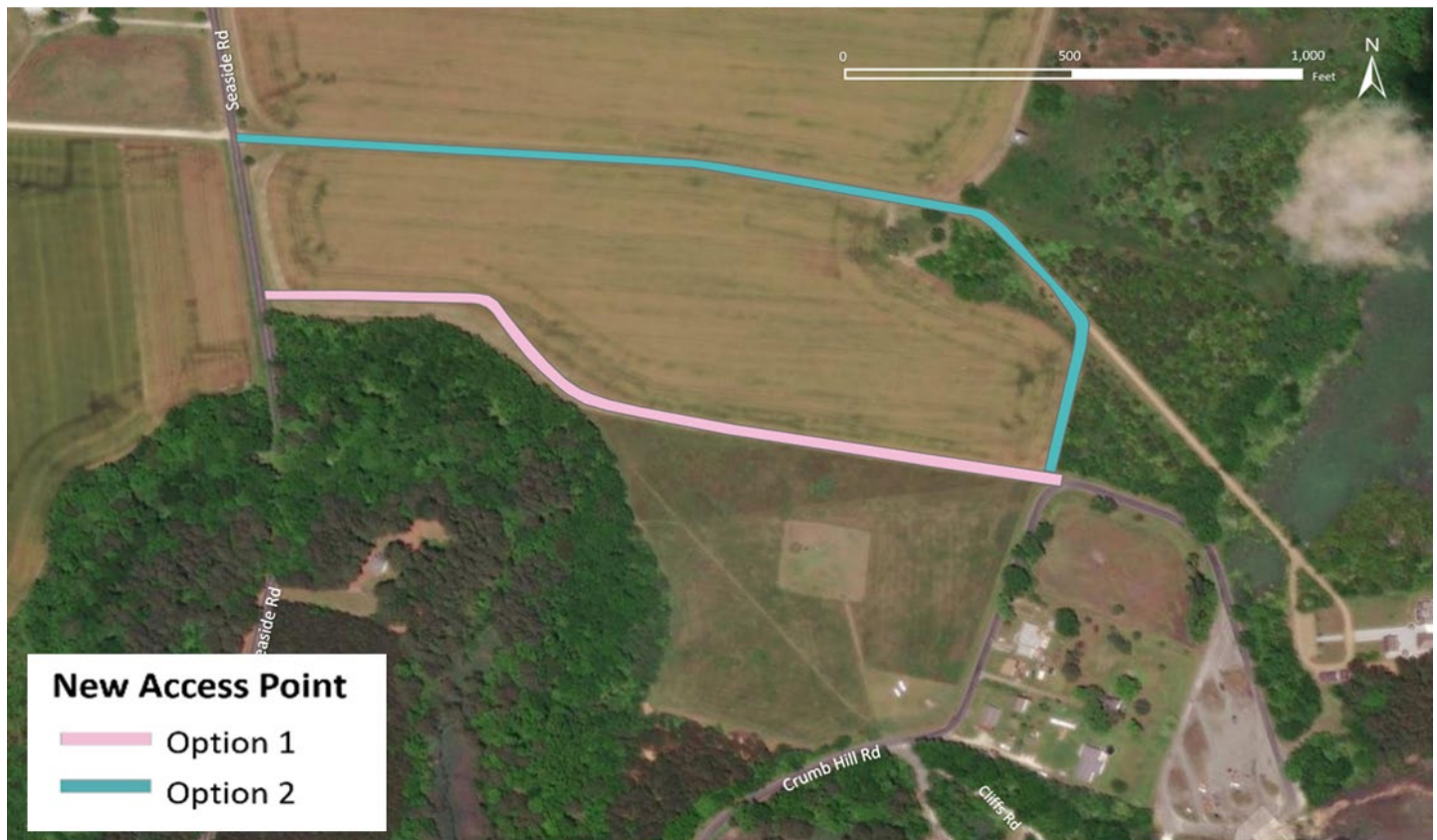
- The community expressed support for both options, with a slight preference for Option 1.
- Several community members noted that the options would provide improved access to the boat ramp and would be easier for trailering boats to navigate.
- It was noted that adjusting the footprint to a single property would ease the process.
- It was noted that there are raised banks at the tie-in to Seaside Road for Option 1, which may impact site lines.

¹⁴Concept screening estimate. Expected accuracy of -20% to 50% of actual costs. Further design and value engineering will determine more accurate costs.

Two alternative routes for Crumb Hill Road were advanced to concept-level designs. These routes will maintain the existing Crumb Hill Road location while creating secondary access along higher elevation ground.

Option 1 presents a new roadway, running westbound from Crumb Hill Road to Seaside Road. This roadway would be located between the TNC and UVA land parcels, with a connection to the Oyster Public Boat Ramp access road. This option would require clearing and grading, as well as new sight distance easements, on Seaside Road.

Option 2 considers extending Crumb Hill Road to the north, which would involve claiming and improving the private access road on the property of Cobb Island Holdings for public use. This option has the same access benefits as Option 1 but would avoid creating a new access point to Seaside Road. The extension would be considered a rural local road system with a speed limit of 25 mph.



TWO OPTIONS FOR NEW ROAD ACCESS TO CRUMB HILL ROAD

Regardless of which option is pursued, this project would be designed following standards provided by the Virginia Department of Transportation (VDOT), the American Association of State Highway and Transportation Officials (AASHTO) policy, and the Manual on Uniform Traffic Control Devices (MUTCD). Erosion control measures would be implemented to prevent sediment from escaping the construction site. Stormwater management structures would also be required to direct stormwater to appropriate outfall points. One stormwater detention facility would likely be needed regardless of the option pursued. Right-of-way acquisition would be necessary for construction on either option, as the project will impact the property of both TNC and UVA.

ADDITIONAL CONSIDERATIONS

The five projects presented in this Plan highlight projects that gained community support and align with the future vision for Oyster Village. As the community advances towards implementation, coordination and partnerships with Northampton County, the A-NPDC, TNC, and other entities will be vital to success. The following summarizes additional project, funding, policy, and long-term strategy considerations for Oyster Village.

OTHER ALTERNATIVE PROJECTS

While the five priority projects identified span different strategy types and locations throughout the Village, additional flood projection projects were considered as part of the plan development process. These include:

- Deployable flood logs that would close off areas along the working waterfront from floodwaters during storm events.
 - Further consideration noted that the operational logistics of this strategy may pose challenges to its effectiveness.
- A seawall along the eastern portion of the harbor to protect against storm surge. This could also include an in-water miter gate that prevents flood waters from reaching inland channels and creeks during storm surge events.
 - The overall cost of this strategy would be prohibitive for implementation, and the grey nature of the project may not be fully compatible with Oyster Village culture and aesthetics. It may also limit the use of the harbor.
- Elevating the lowest portion of Crumb Hill Road.
 - Creating a new access point was prioritized based on community input. Due to the narrow footprint and curves on the existing Crumb Hill Road, a new access point was preferred for trailering of boats to the north side of the harbor.
- An earthen berm with deployable flood barriers surrounding the UVA Coastal Research Center and R&C seafood.
 - The UVA facility is already elevated, creating some protection from flood waters. Further, moving the facility to nearby higher-elevation land is being considered as a potential long-term strategy.

Community members recommended several strategies that were not fully explored during the study process. These include:

- Considering a berm, or other protection strategy for houses at the southwest corner of the harbor.
- Removing the Crumb Hill Road causeway and restoring it to marsh habitat or upgrading the size of the existing culvert to allow wildlife passage. There was also

conflicting input on whether to widen Crumb Hill Road, which was addressed by the new access point strategy.

- Continued protection of zoning for the community to discourage further development.
- Underground burying of electric utilities.
- Improving community stormwater drainage.

COMMUNITY IDEAS FOR SUSTAINABILITY AND GROWTH OF OYSTER VILLAGE

Through the planning process, community members voiced multiple ideas for improvements, growth, and sustainability of Oyster Village, captured below:

- Promoting a safe and cohesive community:
 - Increasing community events.
 - Restoring Travis Chapel and using it as a community center or museum.
 - Improving enforcement of speed limits, penalties for litter, and better disposal of animal carcasses.
 - Improving harbor navigation, including dredging of the migrating channel and better securing of navigation markers that move in storms.
 - Preserving the existing buildings and protect access to views, waterways, aquaculture, roads, and drinking water.
 - Exploring glass recycling as a sand source for community needs.
 - Exploring tree planting.
 - Establishing central sewer and water utilities, or a sewer lift station.
- Exploring economic development and recreational opportunities that align with and maintain community character:
 - Exploring an eco-tourism center.
 - Adding a kayak launch to the harbor.
 - Making aesthetic improvements to relict clam processing area on the working waterfront.
 - Using the old post office as an information center.
 - Making improvements to Horse Island trail and expand the path to create a full circle with marsh walkways.
 - Creating bike paths and walking trails down to working waterfront and boat ramps.
 - Creating and maintaining a walking trail to the south of Broadwater Circle on TNC land.

These ideas are noted for future reference as the community advances the vision of this Plan and complementary efforts.

LIMITATIONS AND FUTURE DESIGN NEEDS

Items that will require further investigation as projects advance towards implementation are noted here. Although this list is not comprehensive, it reflects considerations raised by the community during the planning process.

- Concerns were expressed about shoreline erosion in the western and southwestern areas of the harbor along Sunnyside Road, and especially Crumb Hill Road as it transitions to the causeway. Future efforts should recognize this issue and consider mitigation actions, such as nature-based living shoreline treatments that may also provide wave attenuation to landward areas.
- Travis Chapel may not qualify for federal grants for structural elevation as a religious-owned building. Additional options would need to be explored for alternative flood mitigation options in coordination with the faith group.
- Further analysis will be needed for infrastructure design to meet permitting requirements and ensure no adverse impacts to flooding in adjacent areas of the community would be caused if implemented.

POLICY CONSIDERATIONS

As an unincorporated community of Northampton County, Oyster Village must coordinate with the County to implement policy changes. The Northampton County comprehensive planning process provides an opportunity for alignment between the resilience strategies for the Village and the long-term planning and land use goals for the County. In the current Northampton County 2040 Comprehensive Plan, visions for the Villages of Willis Wharf and Oyster are adopted as an Appendix. Further, the comprehensive plan supports resilience planning by classifying the Village as a Waterfront Community where development "must consider availability of natural resources, potential for sea-level rise and 500-year storm events, and protection of area waters for continued aquaculture, fishing, and other marine industries."¹⁵

It is recommended that Northampton County consider adopting the Oyster Village Coastal Adaptation and Resilience Plan as part of the next Comprehensive Plan update. Additional discussion would be needed to identify whether this replaces the existing Oyster Village portion of the document or is adopted as an additional Appendix. A potential conflict with retaining the existing Oyster Village Vision occurs for the areas north of Broadwater Circle. The Oyster Village Vision map has vacant parcels zoned for residential use that would be incompatible with the future projected flood risk with sea level rise in this area.

Updates to the Eastern Shore of Virginia HMP also provide an opportunity to advance resilience and coastal adaptation strategies for the County and the Village. The current HMP was adopted in 2021 and will be updated in 2026. In the 2026 HMP update, Northampton County and the A-NPDC could consider adding an action item to identify properties within Oyster Village that qualify for federal home elevation funding and coordinate with homeowners to pursue grant funding opportunities to

¹⁵ Your Northampton County 2040 Comprehensive Plan. (2021). "Waterfront Communities Use and Design Criteria". pg. 38.

implement home elevation projects. Explicitly listing home elevation projects for Oyster Village in the HMP will support opportunities to qualify for federal funding.

LONG-TERM STRATEGIES

The priority strategies discussed in the action plan are designed to provide flood protection to more frequent events for the near-term (2040 - 2050) and earlier years of the mid-term time horizon (2050 - 2060). In the long term (2080 - 2100), sea level rise will result in high flood exposure for the Village, with anticipated daily tidal flooding for low-lying areas around the harbor. Given this, relocation, or managed retreat must be a long-term consideration. The goal of coastal managed retreat is to proactively relocate people, buildings, and infrastructure away from harm, allowing the shoreline to move inland.

Relocation is a part of the history of Oyster Village, as residents from Hog Island moved to the Village to escape destructive storms and flooding challenges. To help identify what managed retreat options could be viable for Oyster Village in the future, several critical questions for consideration are:

- How often would flooding have to occur for relocation to be of interest?
- What land is suitable for potential relocation?
- Would relocation occur at a community scale or on an individual house basis?
- What partnerships would be available to support relocation?
- What sources of funding are most relevant?

Throughout this planning process, initial conversations around these key questions have occurred. Managed retreat is a long-term strategy. No commitments have been made to implement managed retreat within the community, and the community would lead any future decisions regarding relocation. Continued dialogue, informed by updated sea level projections, should be engaged in by community stakeholders and residents on a periodic basis to re-assess the need and priority for relocation.



CONCLUSION AND FUTURE DIRECTION

CONCLUSION AND FUTURE DIRECTION

Oyster Village has strong ties to the water through its history and culture as a working waterfront community. As coastal flood conditions continue to change with sea level rise and other compounding environmental factors, the community of Oyster Village recognizes the importance of starting to plan now for future flooding.

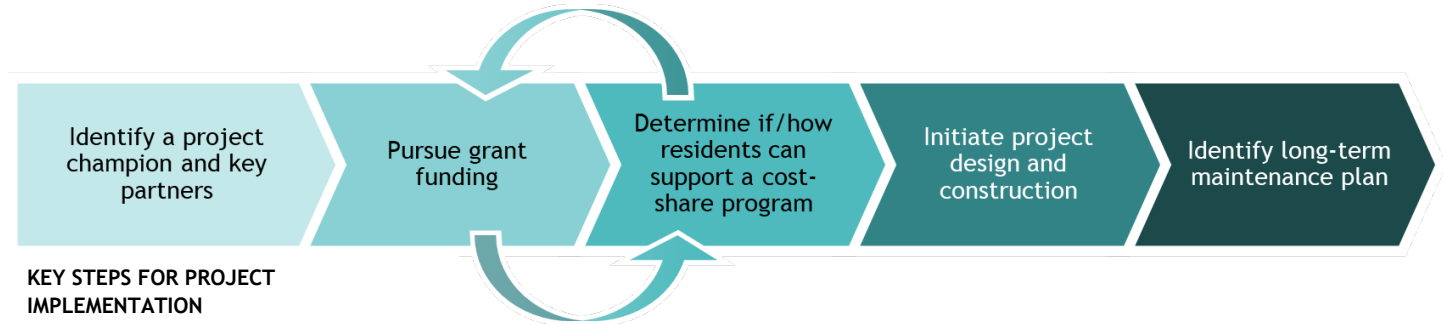
The RSC ranked the five projects identified by the community in the action plan to help identify priorities for implementation, as shown below. The timing of implementing these projects will largely depend on available funding opportunities and identifying project champions.

ACTION		PRIORITY RANKING
Near-Term Actions		
	Explore Opportunities for Home Elevation	★★★★
	Adapt Septic Systems	★★★★
	Protect the Shoreline with Earthen Berm and Stem Wall/Sheet Pile Wall	★★★☆
Mid-Term Actions		
	Install Floating Docks	★★☆☆
	Establish New Access Point for Crumb Hill Road	★★☆☆

While the five priority projects represent the initial phases of implementation, the community could integrate other longer-term projects, policy, and relocation strategies in additional implementation phases.

CONTINUED COORDINATION

Although this Plan provides an important first step, securing funding and continued coordination with community partners will be critical to advance priority projects. Key implementation steps are shown below:



It is important to note that these steps are not comprehensive; rather, they provide a generalized approach to track milestone achievements along the pathway to project implementation. The existing Oyster Village Community Group facilitated by TNC provides a potential vehicle for residents to continue convening and collaborating to advance projects towards implementation.

Multiple strategies identified in this Plan will require ongoing annual maintenance. The Village residents and stakeholders may need to consider using the existing Public Service Authority or forming a community association through a 501(c) or 501(c)3 that will allow them to collect periodic payments from community members to pay for short- and long-term maintenance costs.

POTENTIAL FUNDING OPPORTUNITIES

Grant funding programs are an important tool to help the community identify pathways to implementation. Potential funding sources for priority projects are presented below. While the identified opportunities are not comprehensive, this list is intended to provide a starting place that can be further explored. Projects within Oyster Village are likely to be prioritized by these programs since the community can qualify for disadvantaged and rural community set-asides.

Strategy	Key Funding Opportunities
Earthen Berm and Marsh Enhancement	<ul style="list-style-type: none"> • NFWF National Coastal Resilience Fund (applied) • US. Fish and Wildlife Services National Coastal Wetlands Conservation Grant • Virginia Community Flood Preparedness Fund Grant (CFPF) • FEMA's Hazard Mitigation Grant Program (HMGP) • FEMA's Flood Mitigation Assistance (FMA) Program • FEMA Building Resilient Communities and Infrastructure (BRIC) Program
Bulkhead Improvements	<ul style="list-style-type: none"> • Virginia Community Flood Preparedness Fund Grant (CFPF) for design • FEMA's Hazard Mitigation Grant Program (HMGP) • FEMA's Flood Mitigation Assistance (FMA) Program
New Access Point	<ul style="list-style-type: none"> • VDOT Economic Development Access Program • VDOT Recreational Access Program
Vacuum Septic System	<ul style="list-style-type: none"> • Virginia's Clean Water Revolving Loan Fund • Virginia Department of Housing and Community Development (DHCD) Community Development Block Grant (CDBG) Construction-Ready Water and Sewer Fund or Virginia DHCD Indoor Plumbing Rehabilitation Program • Virginia SERCAP Technical Assistance, Facilities Development, and Indoor Plumbing & Rehabilitation Flex (IPR-Flex) programs • USDA Rural Decentralized Water Systems Grant Program • Virginia Department of Health (VDH) American Rescue Plan Act (ARPA) Well and Septic Funding • Virginia DEQ Nonpoint Source Management Program • Rural Community Assistance Partnership
Home Elevation	<ul style="list-style-type: none"> • FEMA's Hazard Mitigation Grant Program (HMGP) • FEMA's Flood Mitigation Assistance (FMA) Program • FEMA Building Resilient Communities and Infrastructure (BRIC) Program • Virginia Community Flood Preparedness Fund Grant (CFPF) • Matching Funds: Resilient Virginia Revolving Fund (RVRF)

THE PATH FORWARD

As an unincorporated community, Oyster Village must work closely with Northampton County and additional partners to advance projects toward implementation. Representatives from Northampton County, A-NPDC, TNC, and the University of Virginia have been engaged in the RSC throughout this planning process, and they are actively involved in other resilience initiatives along the Eastern Shore of Virginia. Through continued coordination with these partners, Oyster Village can identify opportunities to partner on grant funding proposals and leverage relevant data and resources. For example, TNC is well-positioned to support securing funds for the earthen berm alignment, and the A-NPDC has experience pursuing home elevation grant funding. Regular plan updates, such as the Northampton County Comprehensive Plan and Eastern Shore of Virginia HMP, also offer continued opportunities for Oyster Village to collaborate regionally on resilience efforts.

Achieving the vision of this Plan will be an ongoing and iterative process. Residents of Oyster Village value its history, working waterfront, natural beauty, and sense of camaraderie. These characteristics define Oyster Village, and through continued commitment and collective action by the community and its partners, these qualities can shape a resilient future.