VIRGINIA COMMUNITY FLOOD PREPAREDNESS FUND

GHENT TO HARBOR PARK FLOOD PROTECTION SYSTEM

PHASE 1A FLOODWALL COST-SHARE REQUEST

THE CITY OF NORFOLK

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION: VIRGINIA COMMUNITY FLOOD PREPARDNESS FUND GRANT

Application

Office of Resilience

City of Norfolk

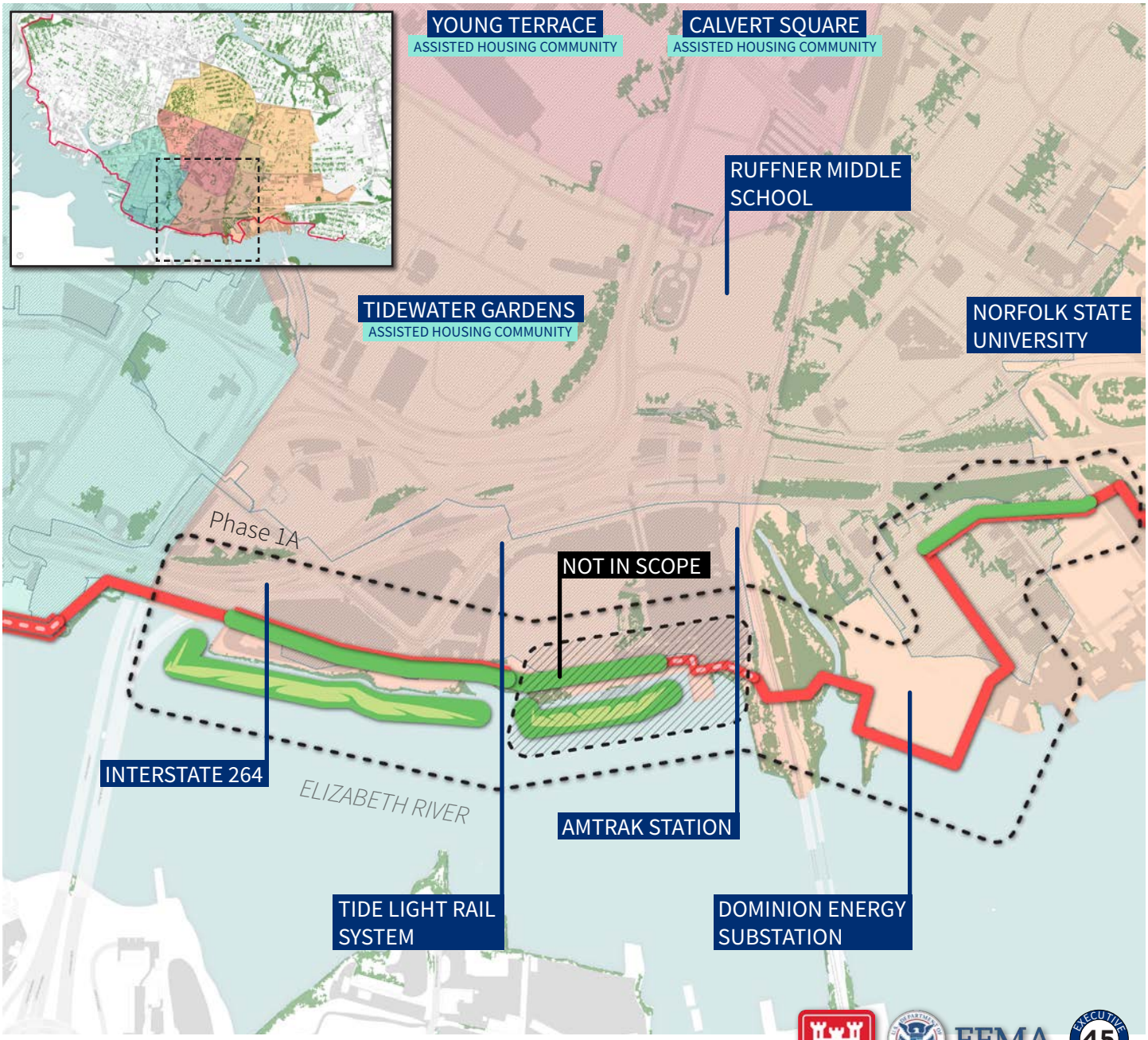
501 Boush Street

Norfolk, VA 23510

Contents

GRANT-FUNDED PROTECTION FOR VULNERABLE CITIZENS AND CRITICAL INFRASTRUCTURE

Phase 1A Protection Alignment and Protected Assets



PROTECTION FOR VULNERABLE RESIDENTS

- Communities with Social Vulnerability Rating Indexes from 2.2 to 4.5
- Six census tracts containing three assisted housing communities

PROTECTION FOR CRITICAL INFRASTRUCTURE

- Dominion Energy substation
- Amtrak station connecting Norfolk to the Northeast Regional rail line
- Interstate 264
- The Tide Light Rail System

FEMA

Phase 1A utilizes natural and nature-based protection measures to construct a hybrid flood barrier system that ensures Norfolk will meet protection requirements set forth by the US Army Corps of Engineers, FEMA, and the State of Virginia.

NORFOLK'S GHENT TO HARBOR PARK HYBRID BARRIER SYSTEM

Phase 1A Project Data and Funding

LOCATION
Norfolk, Virginia
Ghent to Harbor Park

OWNER
City of Norfolk

TOTAL SYSTEM COST
$627,668,000

STATUS
Federal funding secured March 30, 2022

VIRGINIA COMMUNITY FLOOD PROTECTION FUND GRANT REQUEST: $28,127,975

TOTAL PHASE 1A PROJECT COST:	**$160,731,286**
US Army Corps of Engineers Funding:	$104,475,336 (65%)
City of Norfolk Funding:	$28,127,975 (17.5%)
Commonwealth of Virginia Funding:	$28,127,975 (17.5%)

ANTICIPATED PROJECT BENEFITS

Prioritizing flood protection for the most vulnerable populations before all others (highest SVI census tracts).

NOTABLE CHARACTERISTICS

The City of Norfolk's Coastal Risk Management Study provides a good example of how to use benefit-cost analysis to evaluate and prioritize resilience projects.

COASTAL HAZARDS ADDRESSED

- SEA LEVEL RISE
- REGIONAL LAND SUBSIDENCE
- INCREASED RAINFALL EVENTS
- INCREASING STORM INTENSITIES
- CHRONIC HIGH-TIDE FLOODING

RESILIENCE STRATEGIES EMPLOYED

- NATURAL WETLANDS
- NATURE-BASED WAVE MITIGATION
- STRUCTURAL BARRIERS
- WATERSHED-LEVEL DESIGN

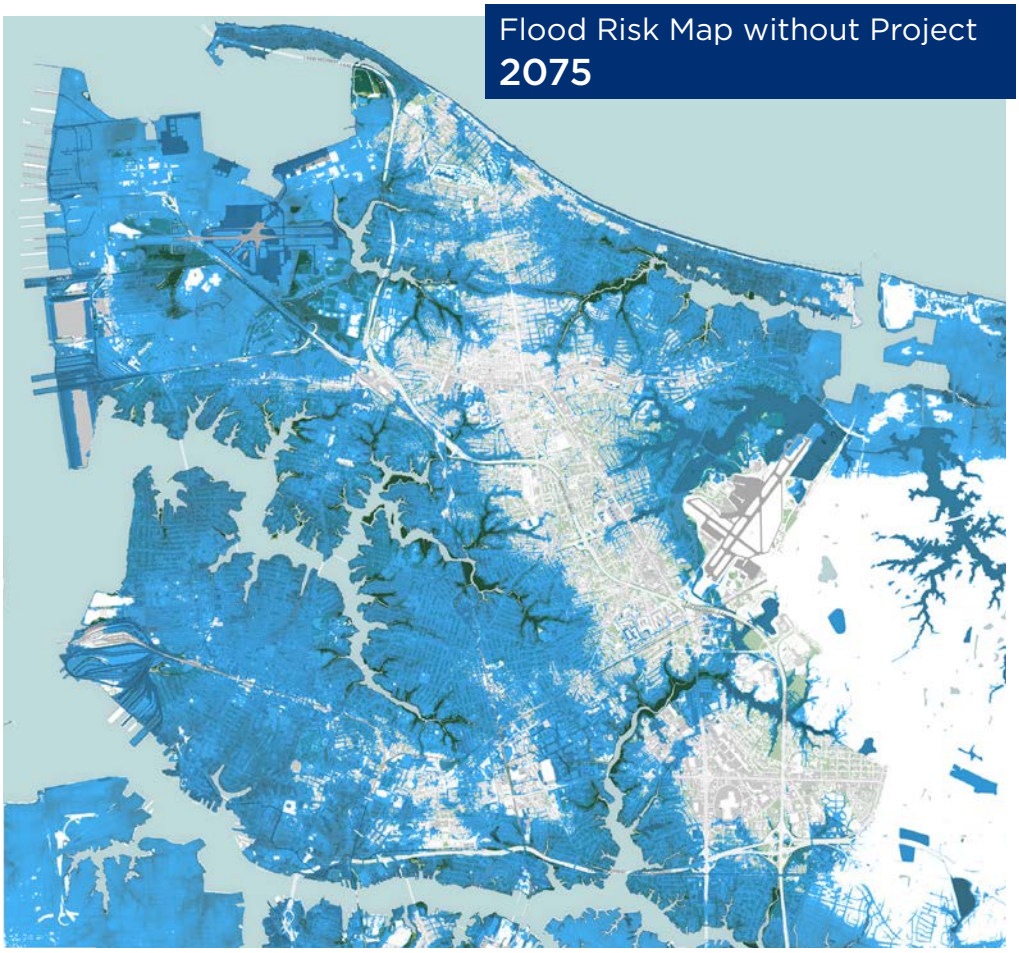
NORFOLK'S COASTAL STORM RISK MANAGEMENT SYSTEM

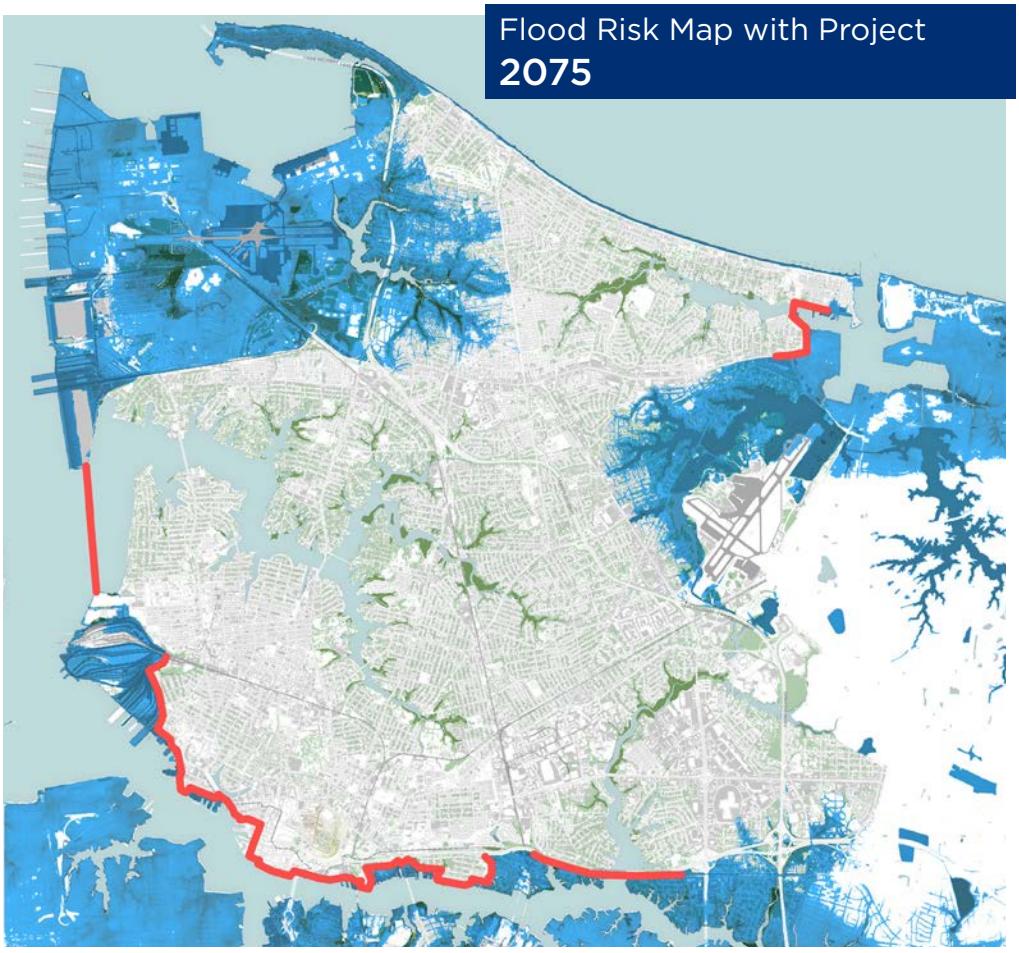
A Comprehensive System For Flood Protection

US ARMY CORPS OF ENGINEERS: NORFOLK COASTAL STORM RISK MANAGEMENT STUDY

A City-wide flood protection system to address:

- Sea Level Rise
- Regional Land Subsidence
- Increased Rainfall Events
- Increasing Storm Intensities
- Chronic High-Tide Flooding

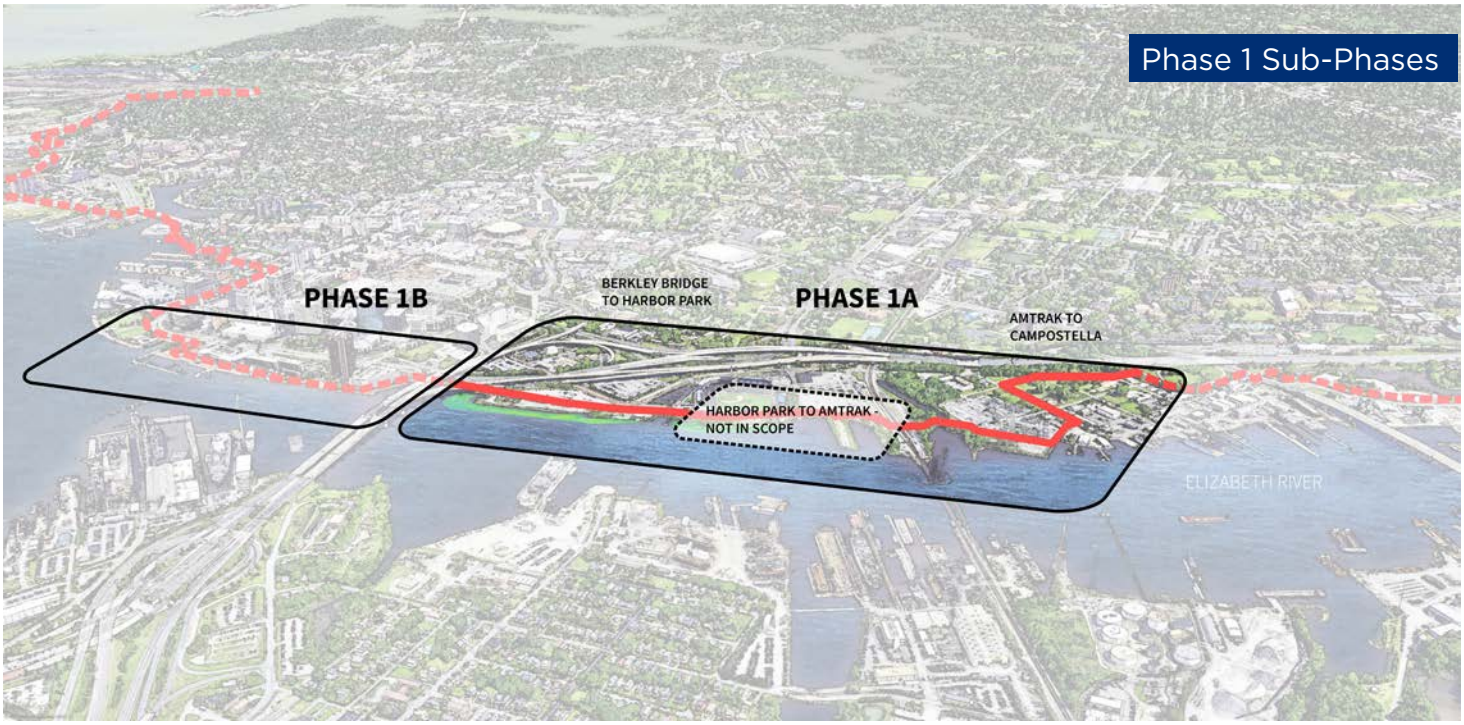


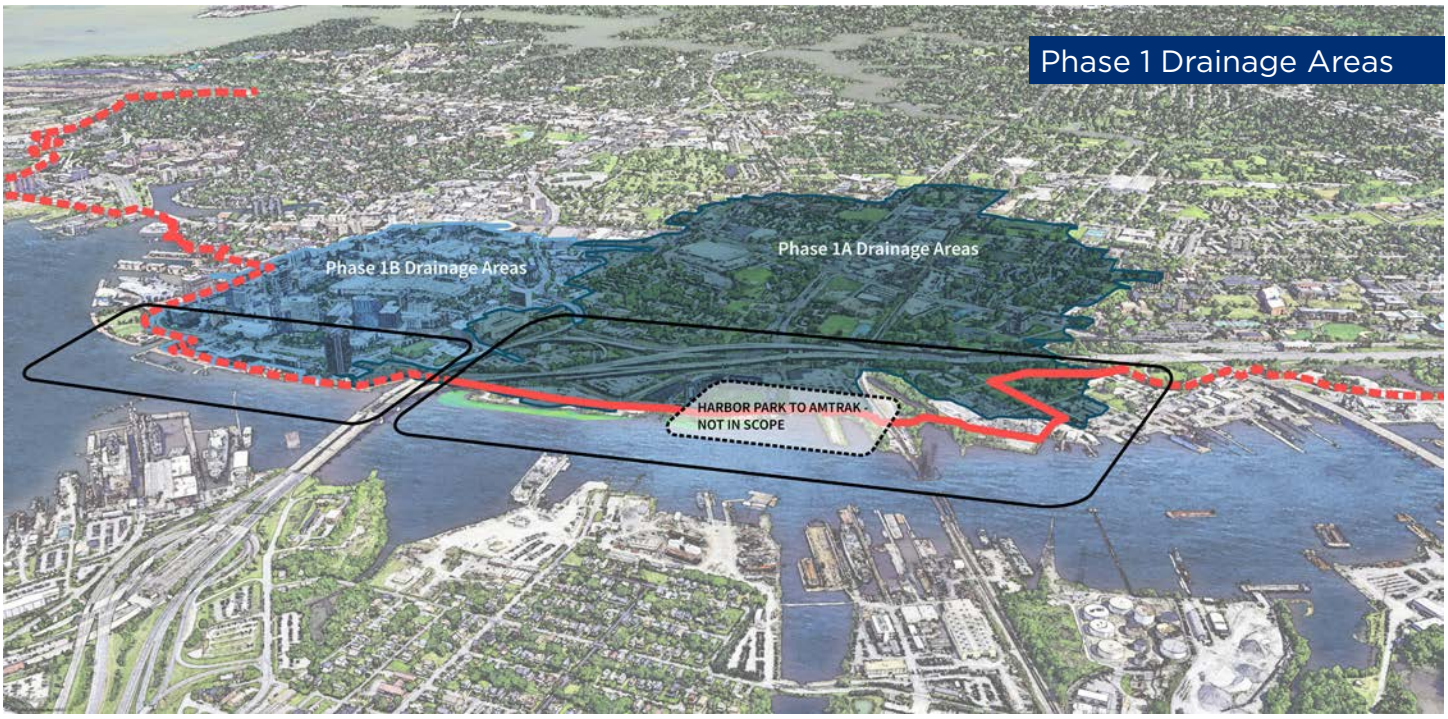


NORFOLK'S COASTAL STORM RISK MANAGEMENT SYSTEM

A Comprehensive System For Flood Protection

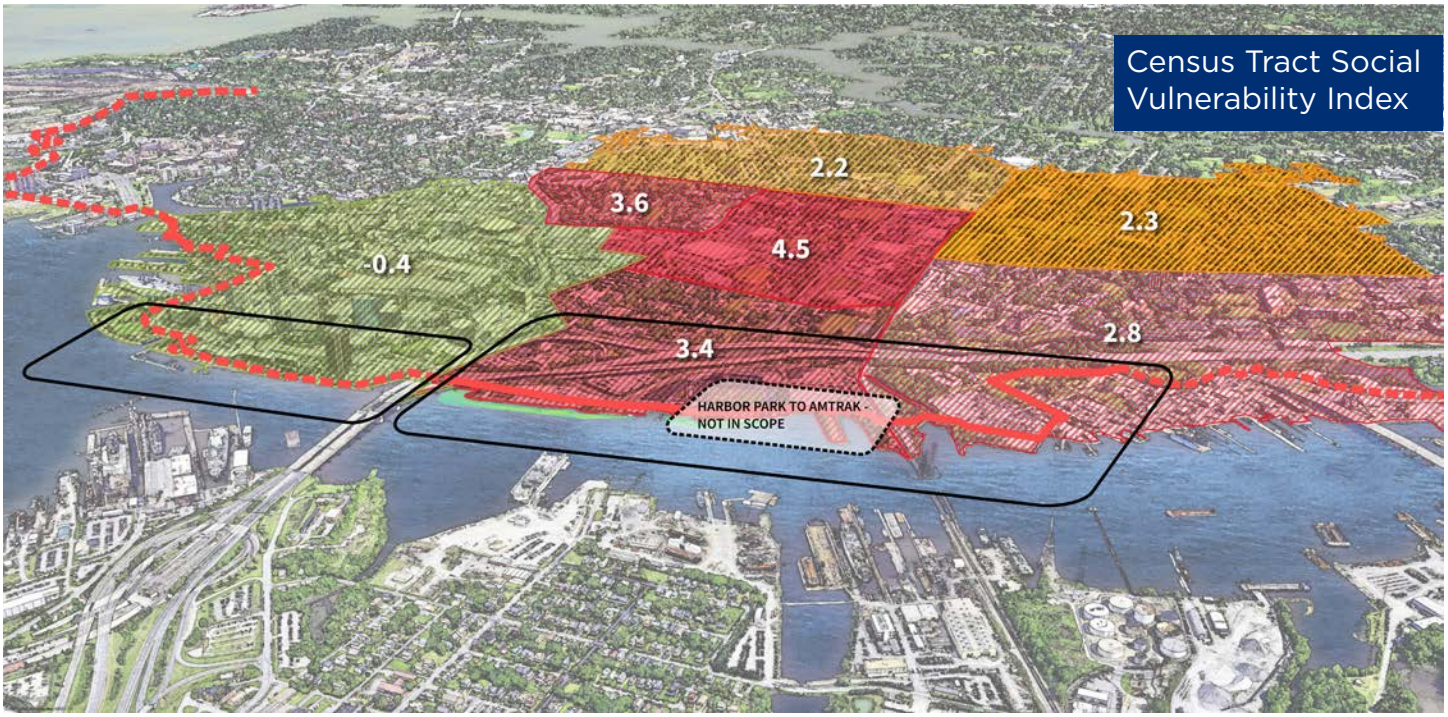
PROJECT PHASING AND DRAINAGE AREAS

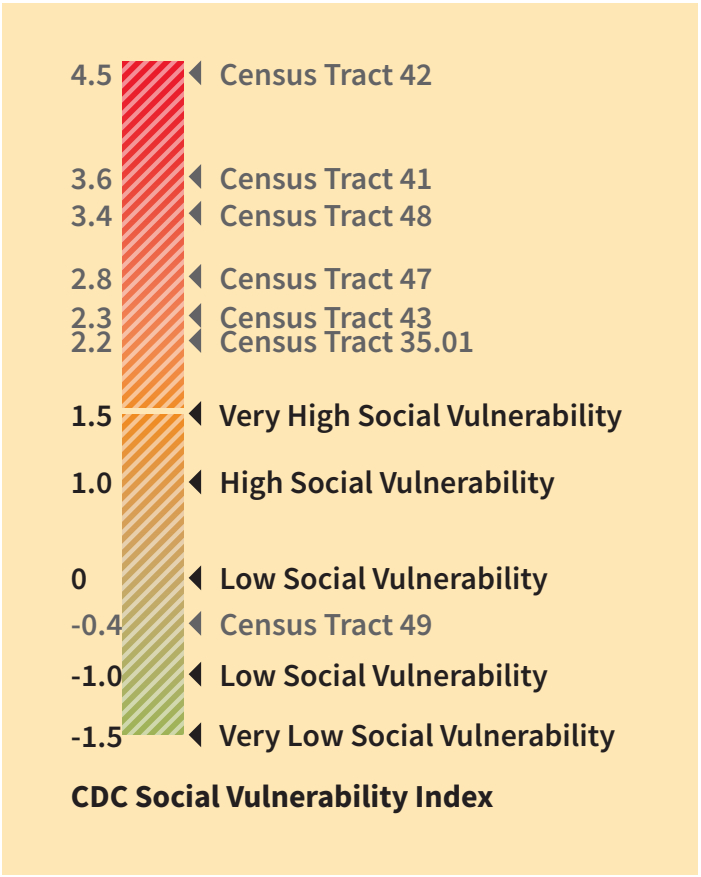




VIMS ADAPTVA SOCIAL VULNERABILITY INDEX

Protecting communities that are the most at-risk

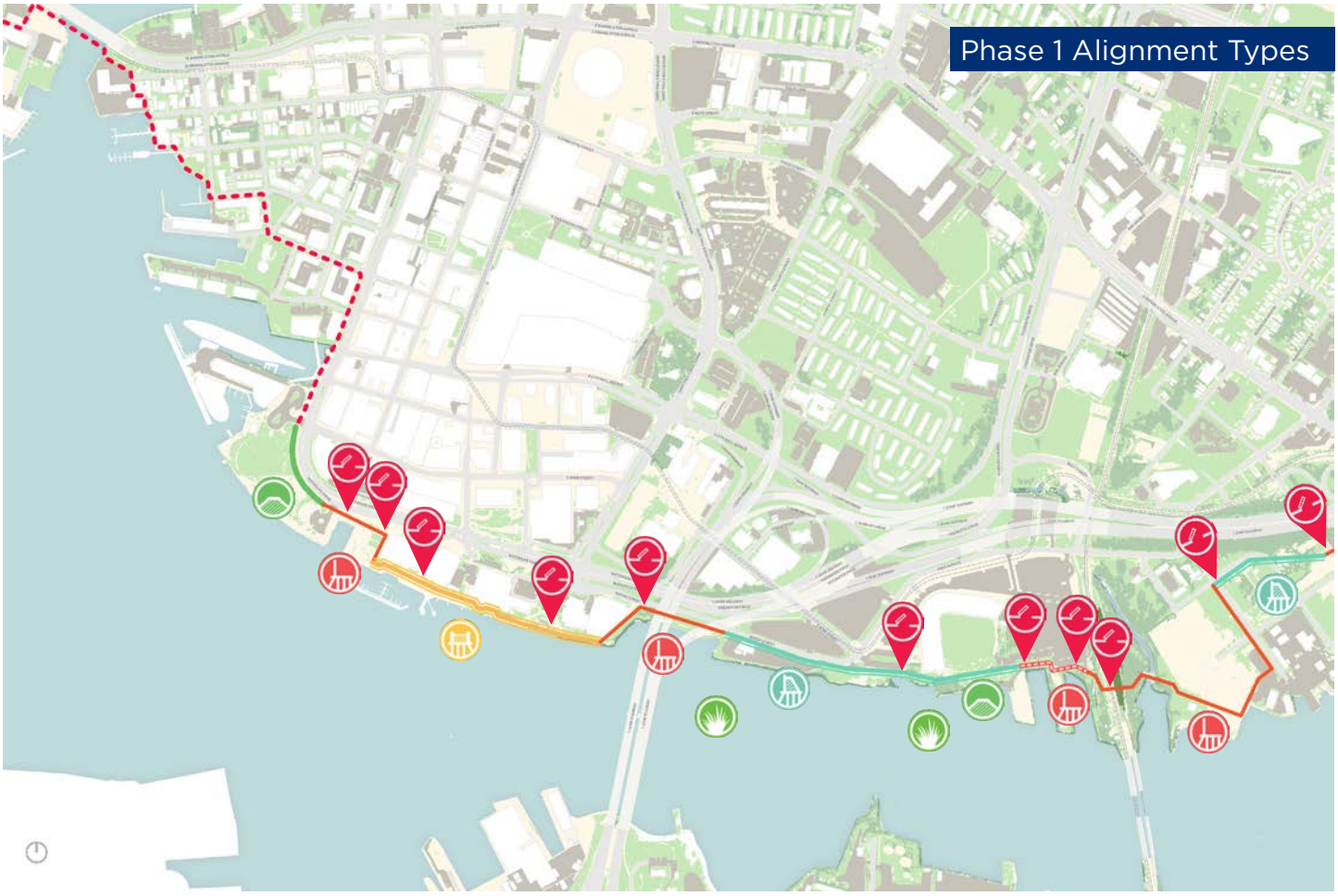




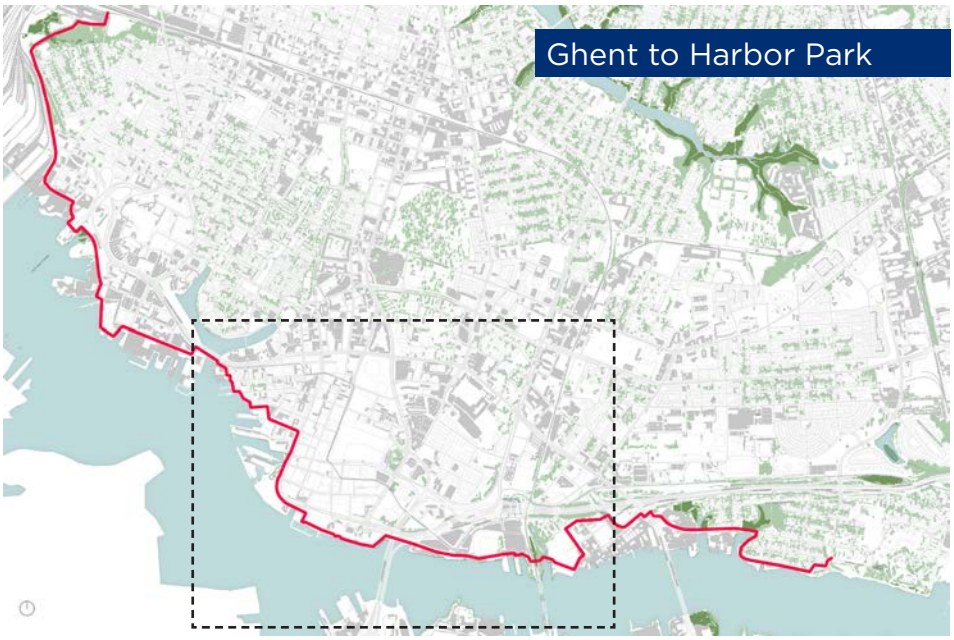
VIMS ADAPTVA SOCIAL VULNERABILITY INDEX

The Virginia Institute of Marine Science (VIMS) analyzes social and environmental factors to help emergency planners identify communities which will most likely need support leading up to, during, and following a hazardous event. The census tracts protected by the Phase 1A Hybrid Barrier System are all rated as vulnerable beyond the "Very High Social Vulnerability" index of 1.5.

NORFOLK'S GHENT TO HARBOR PARK HYBRID BARRIER SYSTEM

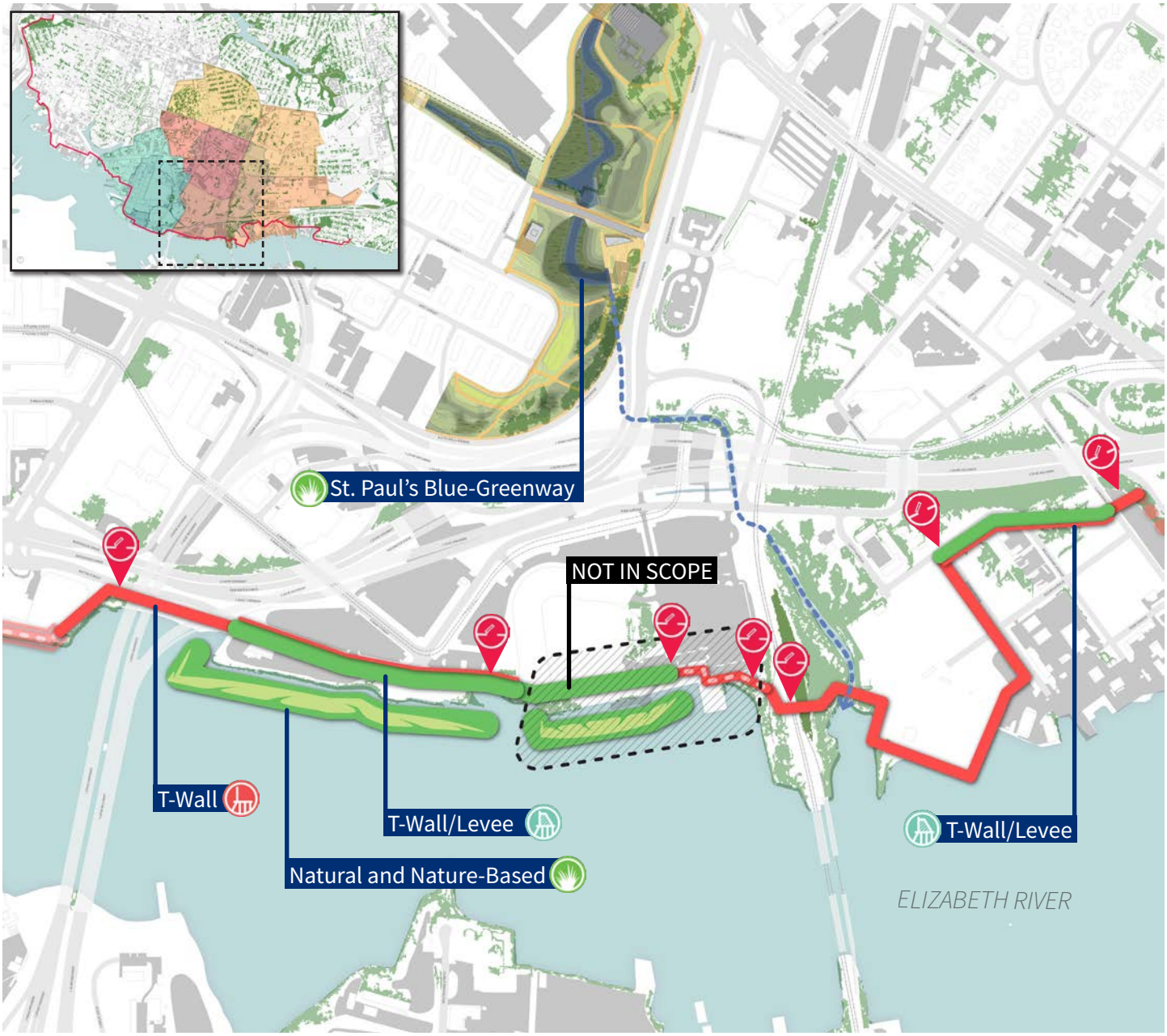


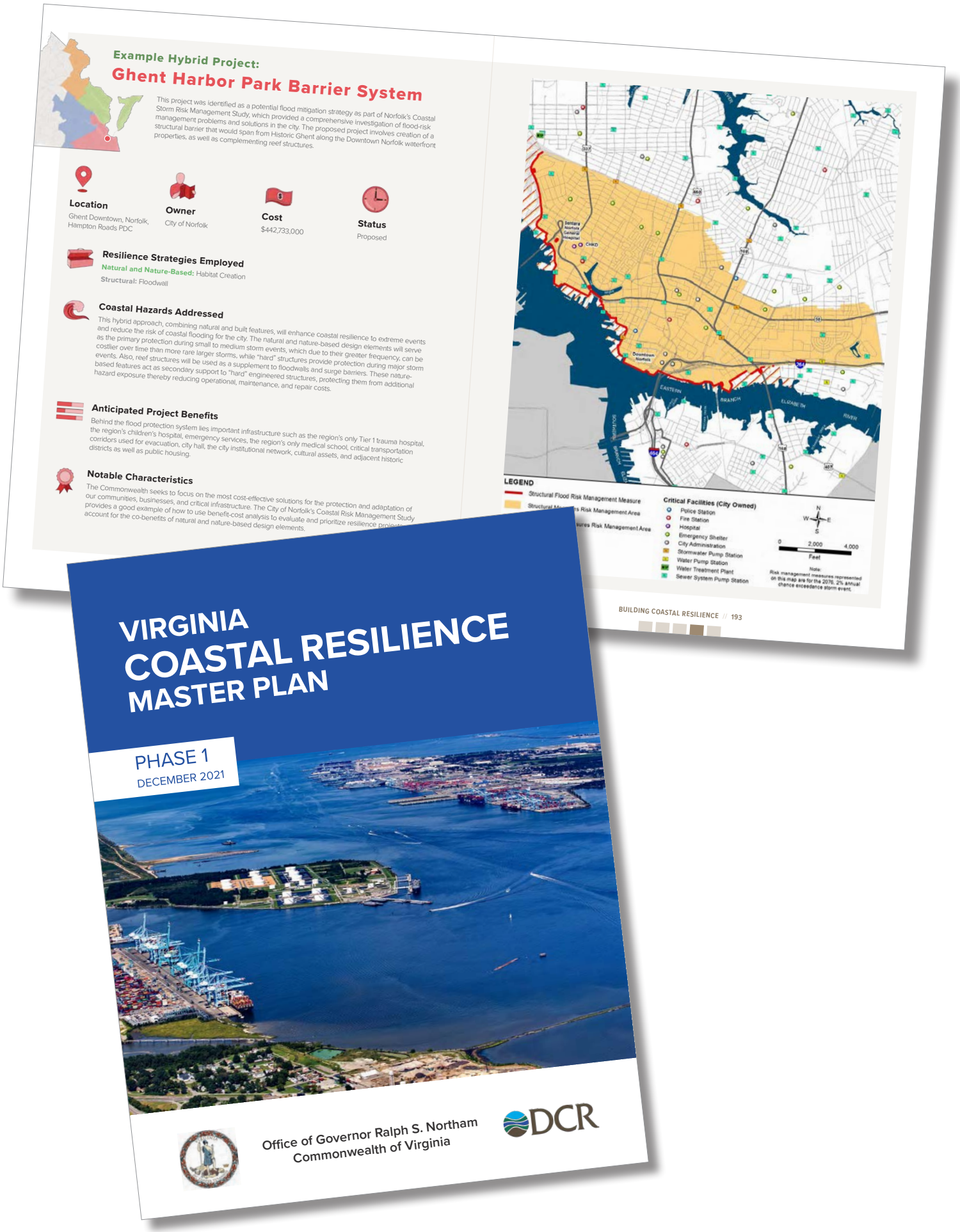
- **T-WALL**
- **BIN WALL**
- **LEVEE**
- **T-WALL/LEVEE**
- **NATURAL AND NATURE-BASED**
- **GATE**



FLOOD PROTECTION PLAN WITH VIGNETTES

Systems and Project Phases




Example Hybrid Project:
Ghent Harbor Park Barrier System
This project was identified as a potential flood mitigation strategy as part of Norfolk's Coastal Storm Risk Management Study, which provided a comprehensive investigation of flood-risk management problems and solutions in the city. The proposed project involves creation of a structural barrier that would span from Historic Ghent along the Downtown Norfolk waterfront properties, as well as complementing reef structures.
Location
Ghent Downtown, Norfolk, Hampton Roads PDC
Owner
City of Norfolk
Cost
$442,733,000
Status
Proposed
Resilience Strategies Employed
Natural and Nature-Based: Habitat Creation
Structural: Floodwall
Coastal Hazards Addressed
This hybrid approach, combining natural and built features, will enhance coastal resilience to extreme events and reduce the risk of coastal flooding for the city. The natural and nature-based design elements will serve as the primary protection during small to medium storm events, which due to their greater frequency, can be costlier over time than more rare larger storms, while "hard" structures provide protection during major storm events. Also, reef structures will be used as a supplement to floodwalls and surge barriers. These nature-based features act as secondary support to "hard" engineered structures, protecting them from additional hazard exposure thereby reducing operational, maintenance, and repair costs.
Anticipated Project Benefits
Behind the flood protection system lies important infrastructure such as the region's only Tier 1 trauma hospital, the region's children's hospital, emergency services, the region's only medical school, critical transportation corridors used for evacuation, city hall, the city institutional network, cultural assets, and adjacent historic districts as well as public housing.
Notable Characteristics
The Commonwealth seeks to focus on the most cost-effective solutions for the protection and adaptation of our communities, businesses, and critical infrastructure. The City of Norfolk's Coastal Risk Management Study provides a good example of how to use benefit-cost analysis to evaluate and prioritize resilience projects account for the co-benefits of natural and nature-based design elements.
LEGEND
Structural Flood Risk Management Measure
Critical Facilities (City Owned)
Police Station
Fire Station
Hospital
Emergency Shelter
City Administration
Stormwater Pump Station
Water Pump Station
Water Treatment Plant
Sewer System Pump Station
Feet
BUILDING COASTAL RESILIENCE // 193
VIRGINIA
COASTAL RESILIENCE
MASTER PLAN
PHASE 1
DECEMBER 2021
Office of Governor Ralph S. Northam
Commonwealth of Virginia
DCR

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION:
VIRGINIA COMMUNITY FLOOD PREPARDNESS FUND GRANT

Round 3

Application

City of Norfolk

CSRM Phase 1A – Ghent-Downtown-Harbor Park Flood Barrier System

Appendix A: Application Form for Grant Requests for All Categories

Virginia Department of Conservation and Recreation
Virginia Community Flood Preparedness Fund Grant Program

Name of Local Government: City of Norfolk

Category of Grant Being Applied for: Project

NFIP/DCR Community Identification Number (CID): 510104

Name of Authorized Official: Dr. Larry H. Filer II

Signature of Authorized Official: DocuSigned by: C45AA22E7D6047B... 4/7/2022 | 6:47 AM PDT

Mailing Address: 810 Union St, Suite 1101

City: Norfolk **State:** VA **Zip:** 23510

Telephone Number: 757-664-4242 **Email Address:** city.manager@norfolk.gov

Contact Person (If different from authorized official): Matthew Simons, AICP, CFM, Coastal Resiliency Manager, City Manager's Office of Resilience

Mailing Address: 501 Boush Street, Suite B

City: Norfolk **State:** VA **Zip:** 23510

Telephone Number: 757-334-8622 Cell Phone Number: 757-513-8185

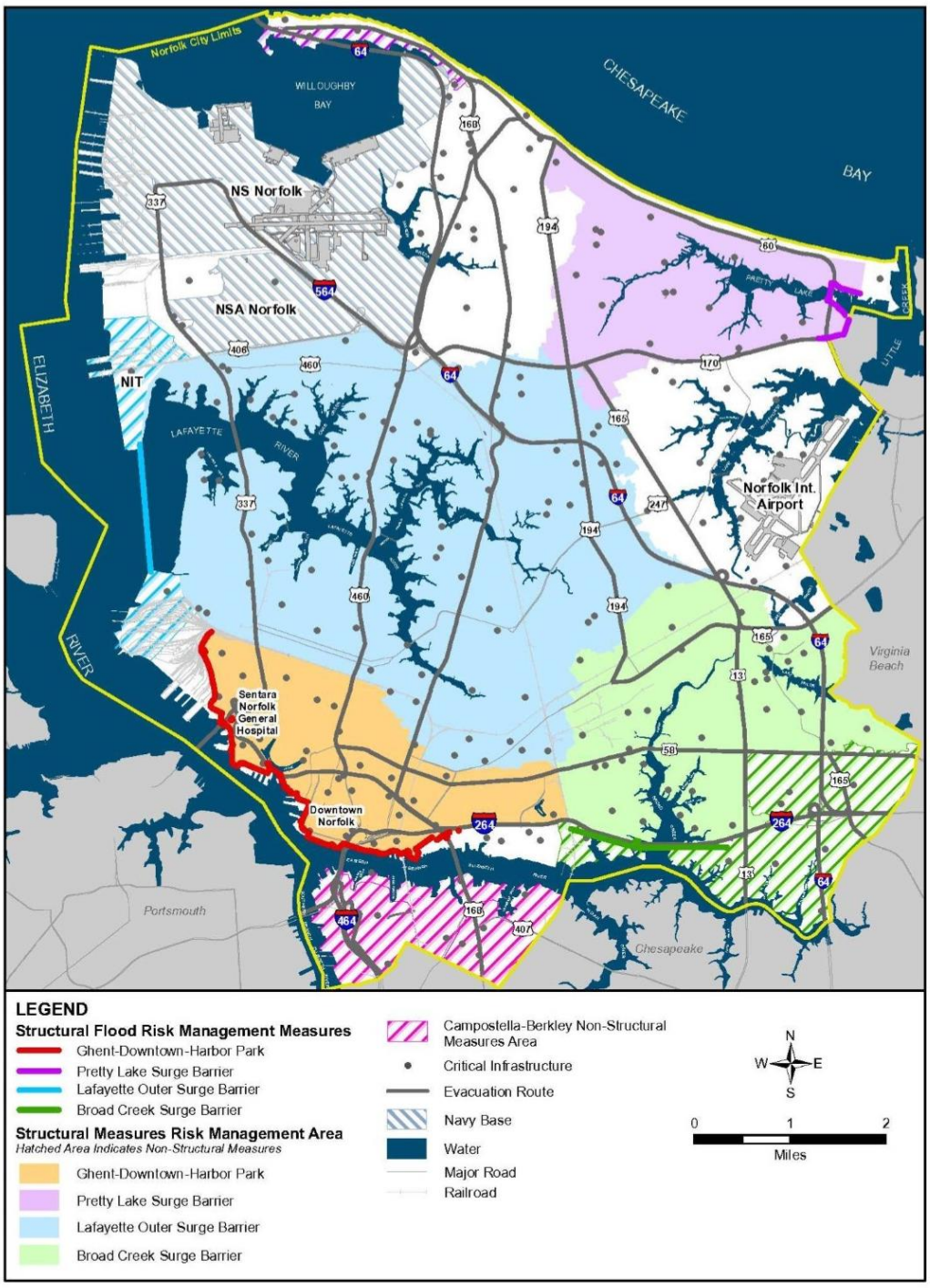
Email Address: matthew.simons@norfolk.gov

Is the proposal in this application intended to benefit a low-income geographic area as defined in the Part 1 Definitions? Yes __X_ No ____

Project Grants (Check All that Apply)

- ☐ Acquisition of property (or interests therein) and/or structures for purposes of allowing floodwater inundation, strategic retreat of existing land uses from areas vulnerable to flooding; the conservation or enhancement of natural flood resilience resources; or acquisition of structures, provided the acquired property will be protected in perpetuity from further development.
- ☑ Wetland restoration.
- ☐ Floodplain restoration.
- ☐ Construction of swales and settling ponds.
- ☑ Living shorelines and vegetated buffers.
- ☑ Structural floodwalls, levees, berms, flood gates, structural conveyances.
- ☑ Storm water system upgrades.
- ☐ Medium and large scale Low Impact Development (LID) in urban areas.
- ☐ Permanent conservation of undeveloped lands identified as having flood resilience value by *ConserveVirginia* Floodplain and Flooding Resilience layer or a similar data driven analytic tool.
- ☐ Dam restoration or removal.
- ☐ Stream bank restoration or stabilization.
- ☐ Restoration of floodplains to natural and beneficial function.
- ☐ Developing flood warning and response systems, which may include gauge installation, to notify residents of potential emergency flooding events.

Location of Project (Include Maps): Entire project encompasses various locations surrounding Norfolk (see map below).



Area of Focus for Grant Application: Project Area – Ghent-Downtown-Harbor Park

Area (in red) to the east of the Berkley Bridge

Figure 1 - First Feature Overview Map

NFIP Community Identification Number (CID#): 510104

Is Project Located in an NFIP Participating Community? ☑ Yes □ No

Is Project Located in a Special Flood Hazard Area? ☑ Yes □ No

Flood Zone(s) (If Applicable): VE, AE, Shaded X (500 year), X (low to moderate)

Flood Insurance Rate Map Number(s) (If Applicable): 51010400056H, 51010400057H, 51010400058H, 51010400059H

Total Cost of Project – Ghent-Downtown-Harbor Park Phase 1 (FY23 – FY32): $627,668,000

Total Cost of Phase 1A – Berkley Bridge to Campostella Road (FY23 – FY25): **$160,731,286**

Total Amount Requested (Phase 1A): $28,127,975

Appendix B: Scoring Criteria for Projects

Virginia Department of Conservation and Recreation
Virginia Community Flood Preparedness Fund Grant Program

Applicant Name:	**The City of Norfolk**	
Eligibility Information		
Criterion	**Description**	**Check One**
1. Is the applicant a local government (including counties, cities, towns, municipal corporations, authorities, districts, commissions, or political subdivisions created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth, or any combination of these)?		
Yes	Eligible for consideration	☑
No	Not eligible for consideration	
2. Does the local government have an approved resilience plan and has provided a copy or link to the plan with this application?		
Yes	Eligible for consideration under all categories	☑
No	Eligible for consideration for studies, capacity building, and planning only	
3. If the applicant is <u>not a town, city, or county</u>, are letters of support from all affected local governments included in this application?		
Yes	Eligible for consideration	N/A
No	Not eligible for consideration	
4. Has this or any portion of this project been included in any application or program previously funded by the Department?		
Yes	Not eligible for consideration	
No	Eligible for consideration	☑
5. Has the applicant provided evidence of an ability to provide the required matching funds?		
Yes	Eligible for consideration	☑
No	Not eligible for consideration	
N/A	Match not required	

Project Eligible for Consideration	☑ Yes ☐ No
Applicant Name: The City of Norfolk	

Scoring Information

Criterion	Point Value	Points Awarded
6. Eligible Projects (Select all that apply)		
Projects may have components of both 1.a. and 1.b. below; however, only one category may be chosen. The category chosen must be the primary project in the application.		
1.a. Acquisition of property consistent with an overall comprehensive local or regional plan for purposes of allowing inundation, retreat, or acquisition of structures.	**50**	**0**
☐ Wetland restoration, floodplain restoration ☑ Living shorelines and vegetated buffers. ☐ Permanent conservation of undeveloped lands identified as having flood resilience value by *ConserveVirginia* Floodplain and Flooding Resilience layer or a similar data driven analytic tool ☐ Dam removal ☐ Stream bank restoration or stabilization. ☐ Restoration of floodplains to natural and beneficial function. ☐ Developing flood warning and response systems, which may include gauge installation, to notify residents of potential emergency flooding events.	**45**	**0**
1.b. any other nature-based approach	**40**	**0**
All hybrid approaches whose end result is a nature-based solution	**35**	**35**
All other projects	**25**	**0**
7. Is the project area socially vulnerable? (Based on ADAPT VA's Social Vulnerability Index Score.)		
Very High Social Vulnerability (More than 1.5)	**15**	**15**
High Social Vulnerability (1.0 to 1.5)	**12**	**0**

Moderate Social Vulnerability (0.0 to 1.0)	**8**	**0**
Low Social Vulnerability (-1.0 to 0.0)	**0**	**0**
Very Low Social Vulnerability (Less than -1.0)	**0**	**0**
8. Is the proposed project part of an effort to join or remedy the community's probation or suspension from the NFIP?		
Yes	**10**	**0**
No	**0**	**0**
9. Is the proposed project in a low-income geographic area as defined in this manual?		
Yes	**10**	**10**
No	**0**	**0**
10. Projects eligible for funding may also reduce nutrient and sediment pollution to local waters and the Chesapeake Bay and assist the Commonwealth in achieving local and/or Chesapeake Bay TMDLs. Does the proposed project include implementation of one or more best management practices with a nitrogen, phosphorus, or sediment reduction efficiency established by the Virginia Department of Environmental Quality or the Chesapeake Bay Program Partnership in support of the Chesapeake Bay TMDL Phase III Watershed Implementation Plan?		
Yes	**5**	**5**
No	**0**	**0**
11. Does this project provide "community scale" benefits?		
Yes	**20**	**20**
No	**0**	**0**
Total Points		**85**

Executive Summary:

The City of Norfolk requests **$28,127,975** from the Virginia Community Flood Preparedness Fund (CFPF) to support 17.5% of the total costs to construct the first phase (Phase 1A) of the **Ghent-Downtown-Harbor Park Flood Protection Barrier System**. Phase 1A of the project will protect the most vulnerable populations within the Norfolk, assisted housing residents of the St. Paul's Transformation Area, which includes thousands of residents living in the Tidewater Gardens, Young Terrace, and Calvert Square low-income housing communities.

The project will construct a hybrid flood barrier system, consisting of a green levee extending eastward from the I-264 Berkley Bridge, beyond Harbor Park with hybrid I-/T-walls terminating at the soon to be completed Ohio Creek Watershed flood protection project - $112M HUD-funding resilience project to protect the historic African American community of Chesterfield Heights and assisted housing residents of Grandy Village.

Norfolk is identified globally as a pioneer for pushing the bounds of coastal and social resilience with bold action-oriented initiatives and incorporating the City's strategy of resilience-equity. As Norfolk continues to "Design the Coastal Community of the Future," Phase 1A is Norfolk's biggest step to-date towards merging these Resilience and Equity missions.

Phase 1A of the Ghent-Downtown-Harbor Park Flood Protection Barrier System is a new-start project in a $1.7B Coastal Storm Risk Management (CSRM) flood protection system being constructed in partnership with the Norfolk District of the U.S. Army Corps of Engineers (USACE). The Norfolk CSRM project was Authorized by Congress in the Water Resources Development Act, signed into law by the President in 2020.

With the passage of President Biden's Infrastructure Investment and Jobs Act (IIJA), USACE announced $399M of IIJA funding to support construction of the Norfolk CSRM, beginning with Phase 1A of the Ghent-Downtown-Harbor Park Flood Protection Barrier System. The City of Norfolk, as the nonfederal sponsor, is required to assemble a 35% nonfederal match prior to the commencement of each project phase.

Phase 1A will require $56M of nonfederal funds prior to the start of FY23. The City of Norfolk intends to meet its nonfederal obligation to USACE through a 50/50 split with the Commonwealth. A full award of this grant request would satisfy this requirement and allow Norfolk to complete the 3-year $160.7M project. There is a 10-year plan outlined in this application to fund the other phases of the Ghent-Downtown-Harbor Park Flood Protection Barrier System, and to fund the other major flood protection projects of the City-wide CSRM system. Phase 1A will provide protection from coastal storm surge flooding through construction of structural and non-structural flood protection. This phase provides the most natural and nature-based features (NNBFs) of any coastal flood protection project within the system and within any single project within the City's history.

The project is designed to meet the guidance of the Commonwealth's Executive Orders 24 & 45, with the flood protection provided beyond the minimum sea level rise guidance to year with 2100,

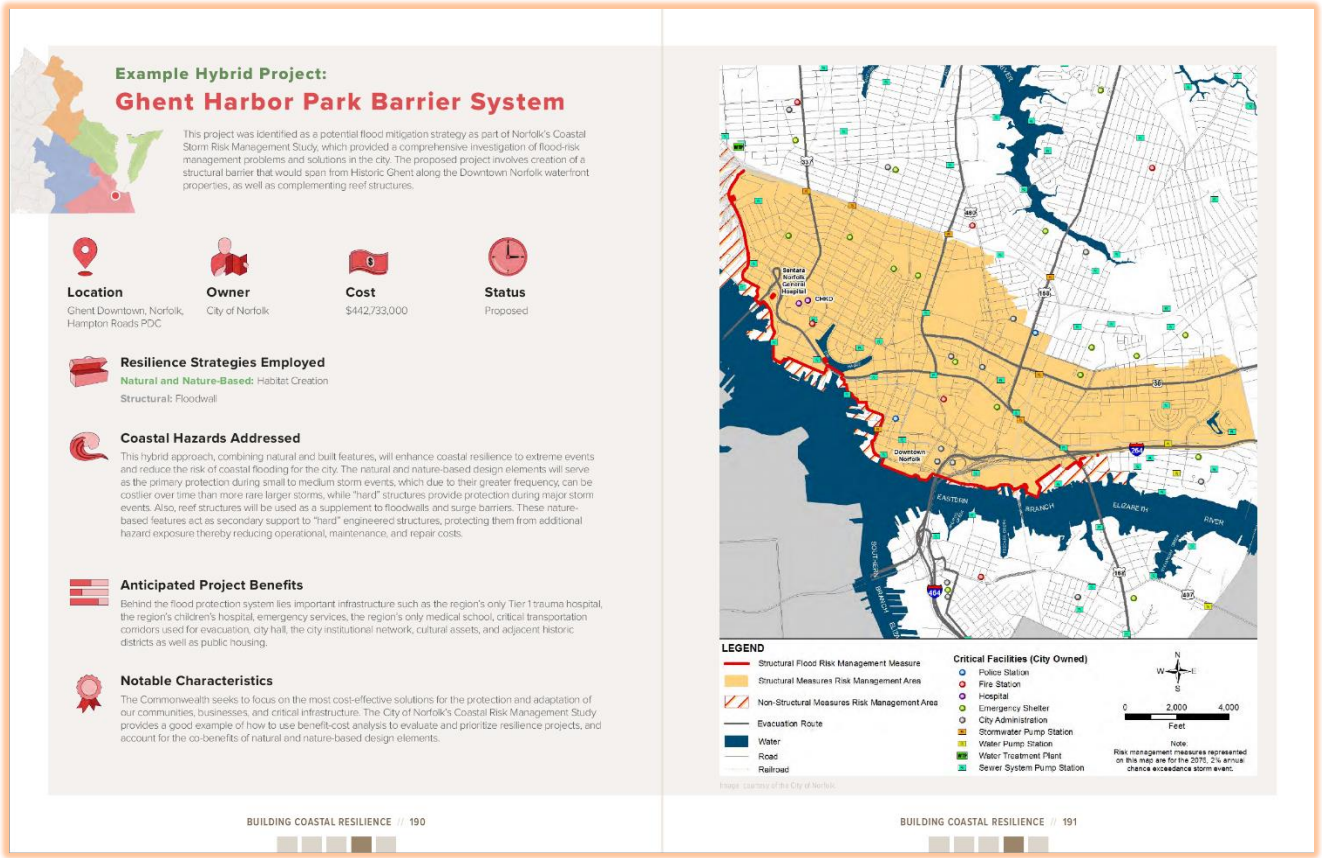
with more than 8 feet of freeboard above the FEMA Base Flood Elevation included in the system design. The project has a Benefit-Cost Ratio of 3.3 with annual net benefits of protection calculated at more than $46M per year over the course of the project's lifespan.

The principal benefit of this project is lives saved.

As the nation witnessed in 2021 when Hurricane Ida tracked over New Orleans on the 16th Anniversary of a hurricane Katrina, the post-Katrina USACE flood protection resulted in approximately 1,500 fewer lives being lost in Louisiana. Similarly, the City of Norfolk is committed to making Norfolk the most resilient urban coastal community in the world through these bold actions; before the big one strikes.

The Commonwealth seeks to focus on the most cost-effective solutions for the protection and adaptation of our communities, businesses, and critical infrastructure. The City of Norfolk's Coastal Risk Management Study provides a good example of how to use benefit-cost analysis to evaluate and prioritize resilience projects, and account for the co-benefits of natural and nature-based design elements.

- Virginia Coastal Resilience Master Plan, Ghent Harbor Park Barrier System (pg. 190).



Example Hybrid Project:

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Location
Ghent Downtown, Norfolk, Hampton Roads PDC

Owner
City of Norfolk

Cost
$442,733,000

Status
Proposed

Resilience Strategies Employed
Natural and Nature-Based: Habitat Creation
Structural: Floodwall

Coastal Hazards Addressed
This hybrid approach, combining natural and built features, will enhance coastal resilience to extreme events and reduce the risk of coastal flooding for the city. The natural and nature-based design elements will serve as the primary protection during small to medium storm events, which due to their greater frequency, can be costlier over time than more rare larger storms, while "hard" structures provide protection during major storm events. Also, reef structures will be used as a supplement to floodwalls and surge barriers. These nature-based features act as secondary support to "hard" engineered structures, protecting them from additional hazard exposure thereby reducing operational, maintenance, and repair costs.

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Notable Characteristics
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BUILDING COASTAL RESILIENCE // 190

LEGEND
Structural Flood Risk Management Measure
Structural Measures Risk Management Area
Non-Structural Measures Risk Management Area
Evacuation Route
Water
Road
Railroad

Critical Facilities (City Owned)
Police Station
Fire Station
Hospital
Emergency Shelter
City Administration
Stormwater Pump Station
Water Pump Station
Water Treatment Plant
Sewer System Pump Station

Feet

Note:
Risk management measures represented on this map are for the 2075, 2% annual chance exceedance storm event.

BUILDING COASTAL RESILIENCE // 191

1. Project Information:

a. Overview of Norfolk's social condition and flood risk background

The City of Norfolk is increasingly at risk from flooding and damage from coastal storms. Located in Southeastern Virginia, Norfolk is an urbanized, relatively flat, community with nearly all areas below elevation 15 feet (NAVD88). Established in 1682, Norfolk has a long and proud history as a national maritime trading, shipbuilding and military center. Today, a city of approximately 247,421, Norfolk is the commercial center of Hampton Roads which is a region of 1.7 million residents.

With a median household income of $53,253, Norfolk is defined as a low-income community compared to the rest of Virginia, which has a median household income of $76,448. Within the City's population, 13% have a household income of less than $15,000. 8.9% of the City's population has a household income of between $15,000 - $24,999. As a result, more than 20% of the City's population is living beneath the Federal Poverty Standard of $26,500. The City is classified as moderately socially vulnerable, with an overall score of 0.59, as identified by ADAPT VA's Social Vulnerability Index. The entire City is routinely impacted by flooding which is precipitated by various occurrences to include coastal flooding, stormwater impacts, and rainfall.

According to ADAPT VA's Social Vulnerability Index, the project area is classified very high social vulnerability with scores ranging from 2.8 to 4.5 (Attachment A). It is paramount the City prioritize flood mitigation for Norfolk's most vulnerable populations.

The low elevations and tidal connections to the Elizabeth River and Chesapeake Bay place a significant percentage of the city at risk of flooding from high tides, nor'easters, hurricanes and other storms. Exacerbating the flooding is the phenomenon of relative sea level rise (RSLR), which is the combination of water level rise and land subsidence. Norfolk is documented as having one of the highest rates of RSLR among Atlantic coastal communities.

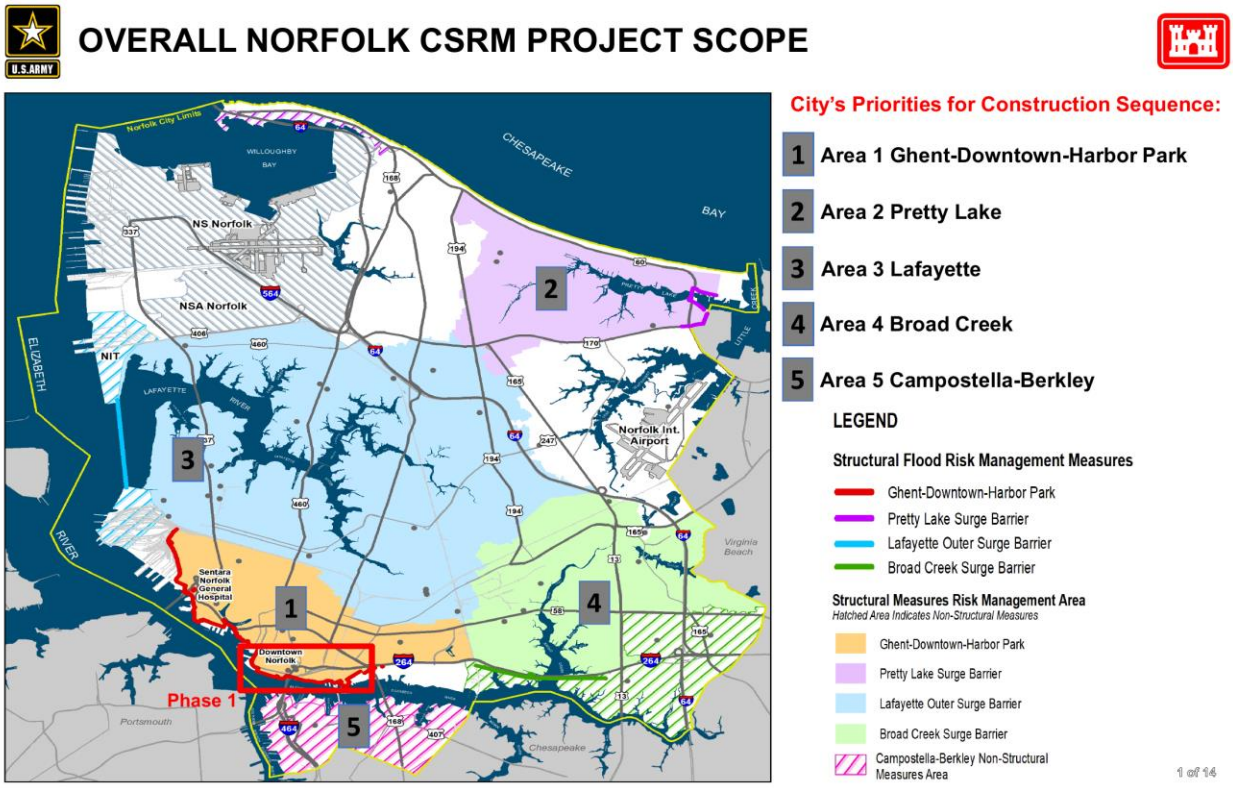
b. *U.S. Army Corps of Engineers (USACE) and NACCS*

The U.S. Army Corps of Engineers' (USACE) North Atlantic Comprehensive Coastal Study (NACCS), as well as studies by others, highlights the frequency of intense coastal storms and their associated water surface elevations. Add to this the predicted rate of RSLR, and it is clear that risks to the city are not static and will increasingly affect the city into the future. Economics are only a part of the picture. The USACE, along with the City of Norfolk, and engaged stakeholders, have also considered impacts to cultural resources, vulnerable populations, the environment, and national security, along with the more traditional economic evaluations.

In 2016, in response to increased flood risks, the USACE Norfolk District entered into an agreement with the City of Norfolk, the non-Federal Sponsor, to develop a Coastal Storm Risk Management integrated feasibility report and environmental impact statement (Norfolk CSRM IFR/EIS, or "Norfolk CSRM report"). The long-term strategy for resilience in Norfolk is a layered solution that includes elements executed by the non-Federal sponsor, other Federal agencies, the Commonwealth of Virginia or one of its agencies, and/or non-governmental organizations in addition to the recommendations for implementation by the USACE study. The Recommended Plan from the Norfolk CSRM report is the National Economic Development (NED) Plan and

incorporates structural, nonstructural, and natural and nature-based features (NNBF) measures that will reduce future flood risk for the City of Norfolk.

Figure 2 below shows an overview of the project alignment throughout the City of Norfolk.



The Norfolk Coastal Storm Risk Management Study identified construction sequence areas as follows:

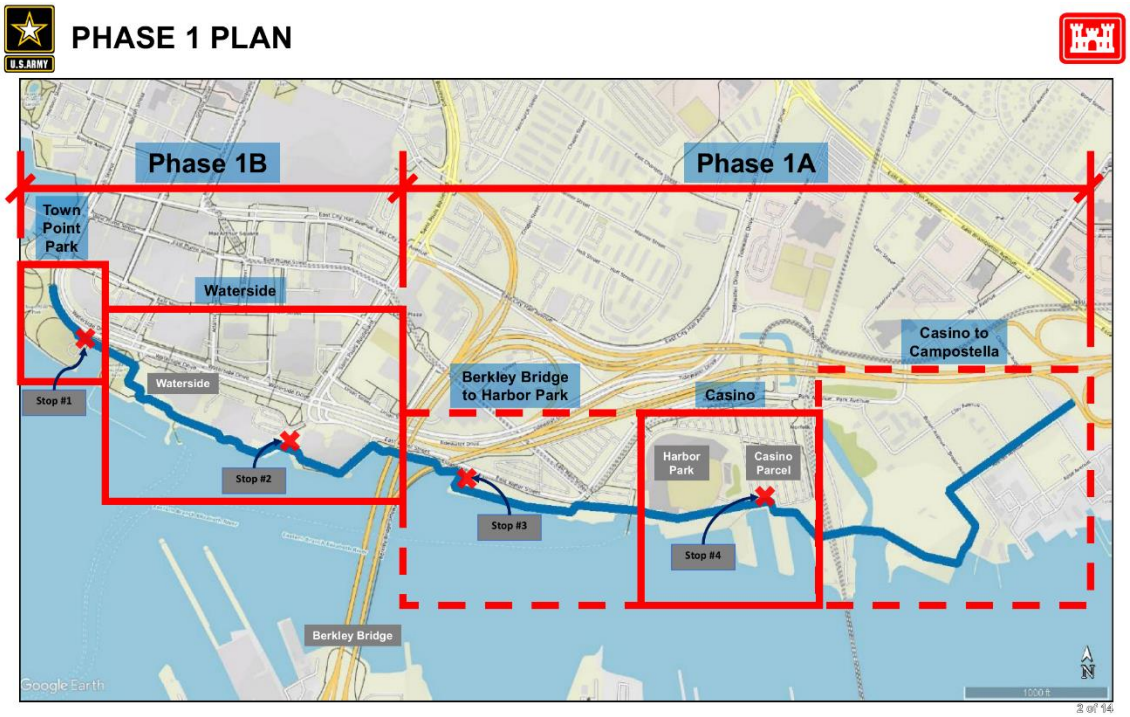
1. Area 1: Ghent-Downtown-Harbor Park
2. Area 2: Pretty Lake
3. Area 3: Lafayette River
4. Area 4: Broad Creek
5. Area 5: All Nonstructural areas; Campostella-Berkley, Willoughby Spit, and others.

In 2020, the project was authorized by Congress in the bipartisan Water Resources Development Act. On January 19, 2022, the United States Army Corps of Engineers (USACE) announced its plan for investing the $14 billion from President Biden's Bipartisan Infrastructure Law to strengthen port and waterway supply chains and bolster climate resilience. In this plan, the City of Norfolk will receive $249,331,000 to increase community resilience to flooding. On March 30, 2022, the United States Army Corps of Engineers (USACE) announced an additional $150,000,000 from President Biden's Infrastructure Investment & Jobs Act to support the Coastal Storm Risk Management (CSRM) project in the City of Norfolk. The project funding now totals $399,331,000 with an additional $215,000,000 required match of non-federal funds. The city will

use the funding for the design and construction of storm surge barriers, levees, and pump stations to reduce storm risk as part of a large-scale extension of the Downtown Norfolk Floodwall. The federal funding allocation for developing complete plans and specifications for extension northwards to the Midtown Tunnel and west towards the Campostella Bridge as well as a surge barrier at the Hague.

As a non-federal sponsor of the project, the City of Norfolk is responsible for providing a 35% cost-share match. The City is prioritizing this project due to the tremendous impact the project will have on flood mitigation in the City. Accordingly, the project was identified in the 2021 Virginia Coastal Resilience Master Plan as an example hybrid project.

With the authorized federal funding, the City of Norfolk and USACE are focusing on the Phase 1A of the Ghent-Downtown-Harbor Park flood barrier system. The project will provide flood risk reduction in the economic core of the city by providing a continuous project alignment from West Ghent through the Harbor Park area. The project is selected as the priority of major construction based on the economic value of the area as well as important infrastructure such as the region's only Tier 1 trauma hospital, the region's children's hospital, emergency services, the region's only medical school, critical transportation corridors used for evacuation, city hall, city institutional network, cultural assets, and adjacent historic districts as well as well as assisted housing.



Protecting this economic, social and cultural center of Norfolk is called for in the citizen-led *Vision2100* plan for Norfolk. The CSRM IFR/EIS report and the DCR-approved Resilience Plan for Norfolk includes *Vision2100* as a key document that reinforced the overarching vision for how Norfolk will adapt to rising seas over the remainder of this century. This project area is identified for "Enhancing Economic Engines" as its adaptation strategy. The highest priority action for such areas calls for Norfolk to "Expand the flood protection system."

In coordination with the USACE Norfolk District, the City has selected the first feature to be fully designed in the PED phase, and the first feature bid for construction, to be a portion of the recommended structural protection for the Ghent-Downtown-Harbor Park measure. The floodwall segment to be developed into full designs includes the eastern end of the floodwall alignment. This segment runs to the west behind the Harbor Park Baseball Stadium, underneath the Berkley Bridge, and continues to the existing downtown Norfolk floodwall, as shown in Figure 2. This includes approximately 2,600 linear feet of berm, 4,000 linear feet of floodwall and one pump station based on the conceptual alignment from the IFR/EIS. Future references to this area will be called the Harbor Park to Downtown Berm and Floodwall.

This alignment is a practical first element of construction for the following reasons:

• Real Estate considerations.
• The project will benefit the most vulnerable populations within Norfolk, meeting the City's goals of Resilience-Equity.

• Significant Natural and Nature-Based Features (NNBFs) are included in this initial phase, providing opportunities to incorporate innovative NNBF hybrid technologies being developed in concert with the GO Virginia-funded resilience accelerator, RISE Resilience Innovations.

The Scope of Work and Proposed Budget reflects the planned efforts to complete remaining feasibility level analyses required prior to the start of construction, collect required data, progress the development of Plans and Specifications for the Harbor Park to Downtown Berm and Floodwall, coordinate with project stakeholders, and complete project environmental compliance items.

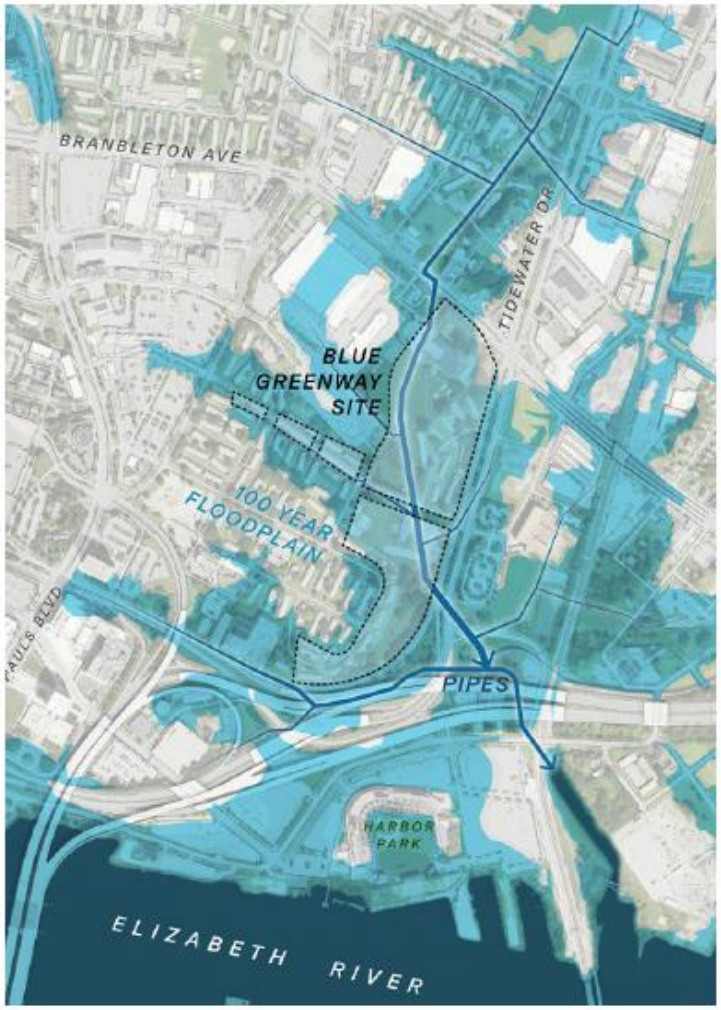
Major PED efforts to be completed before construction can occur include (Harbor Park to Downtown Berm and Floodwall footprint only):

• Topographic and utility surveys;
• Wetland, Mean High Water (MHW) line, and Mean Low Water (MLW) line delineations;
• Environmental permits;
• Refining the project alignment;
• Conducting geotechnical investigations;
• Conducting Phase I Hazardous Toxic and Radioactive Waste (HTRW) environmental site assessments on each affected parcel
• Surveying project areas for potential cultural resources;
• Completing interior drainage analysis and pump station sizing;
• Designing project elements and performing appropriate reviews, validations, and certifications;

• Finalizing Real Estate acquisition and/or Right-of-Entry agreements;
• Developing the Current Working Estimates (CWEs) and Independent Government Estimates (IGEs) for survey, design, and future construction contracts and
• Preparing bid packages for proposals.

This area has low lying elevation and is one of the most flooded areas of the city (see 100 Year Flood Plain and Existing Drainage System map below). Unfortunately, many of the flood events are underreported. This is an underreported area due to the high number of rentals in the area. The site is in Zone AE of the special flood hazard area as indicated on the FEMA flood insurance rate map for the City of Norfolk (CID 510104, FIRM/FIS eff. 2-17-17). The City of Norfolk has experienced flooding from all three types of storms (tropical storms, hurricanes, and nor'easters).

The storms that impact the City of Norfolk (and the greater Hampton Roads area) are occurring more frequently and are more intense based on the historical record data. The Sewells Point tide gauge shows that in the last 20 years storms are producing higher water surface elevations. This could also be result of sea level rise. The table displays the date of historical storm events where the water surface elevations reached over 4.0 feet NAVD 88, the type of storm, the peak water surfaces elevations, and cost. The peak water surface elevations were measured by the NOAA – Sewells Point tide gauge and reference to NAVD 88.



100 Year Flood Plain + Existing Drainage System
Flood risk aligns with historic creek

City of Norfolk Historical Storm Impacts: Table 3.9

Table 3.9 data provided by the National Flood Insurance Program.

	Storm Event: Date & Name	Type of Storm	Peak Water Surface Elevations (NAVD88)	Cost
1	August 1933 (No Name)	Hurricane	6.41	No data available
2	September 1933 (No Name)	Hurricane	4.51	No data available
3	September 1936 (No Name)	Hurricane	5.11	No data available
4	April 1956 (No Name)	Northeaster	4.71	No data available
5	March 1962 (Ash Wednesday)	Northeaster	5.61	No data available
6	April 1978 (No Name)	Northeaster	4.74	No data available
7	February 1998	Northeaster	4.93	$1,644,579
8	September 1999 (Floyd)	Hurricane	4.37	$1,234,972
9	September 2003 (Isabel)	Hurricane	6.28	$16,115,252
10	October-06	Northeaster	4.92	$923,711
11	November 2009 (Nor'Ida)	Northeaster	6.13	$23,382,942
12	December-09	Northeaster	4.50	$51,159
13	August 2011 (Irene)	Hurricane	5.94	$11,762,094
14	October 2012 (Sandy)	Hurricane	5.20	$2,581,008
15	October 2015 (Joaquin)	Hurricane	4.89	$330,054
16	September 2016 (Hermine)	Tropical Storm	4.55	$235,177
17	October 2016 (Matthew)	Hurricane	4.25	$4,951,161
Total:				$63,212,109

Figures 3.10 and 3.11 are plots of the water surface elevation (the predicted versus the verified water levels) measured at the NOAA – Sewells Point Gage, during some of the storm events shown in Table 3.9. The peaks shown in the figures are what is shown in the Table 3.9.

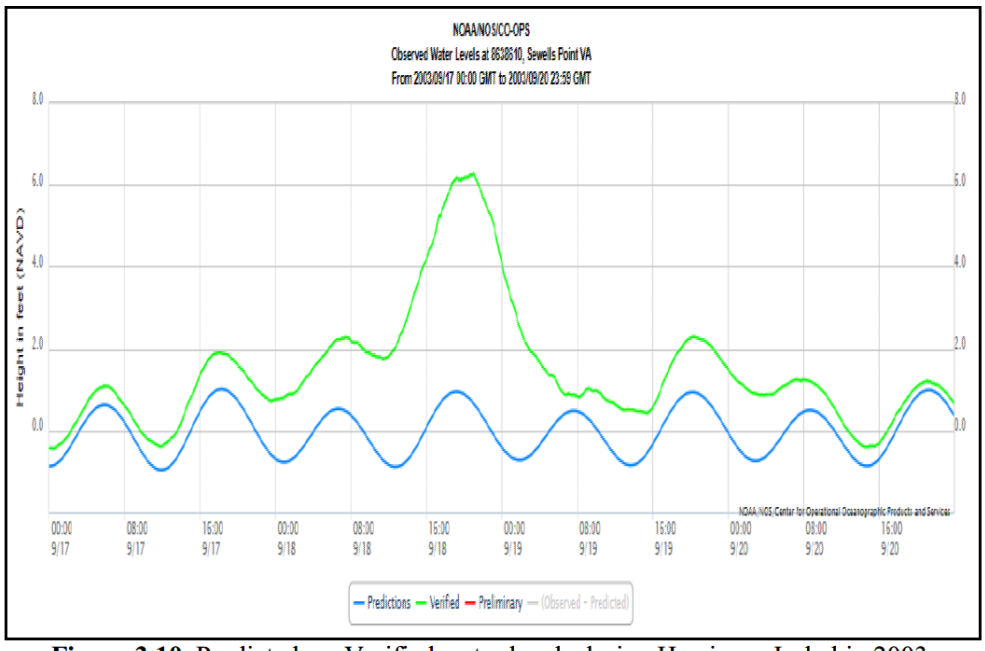


Figure 3.10. Predicted vs. Verified water levels during Hurricane Isabel in 2003.

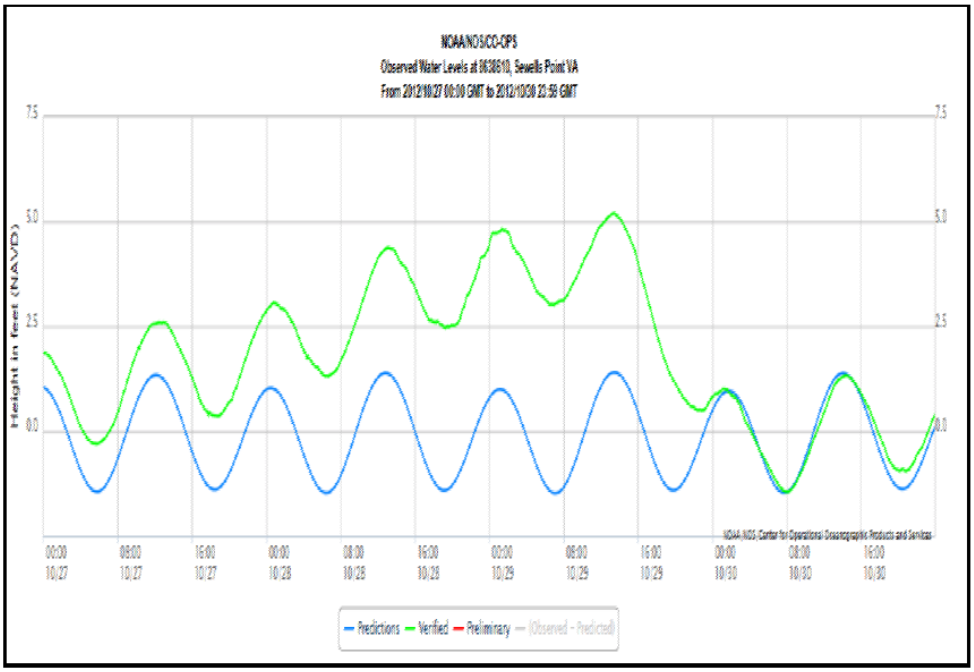


Figure 3.11. Predicted vs. Verified water levels during Hurricane Sandy in 2012.

2. Need for Assistance

The implementation of the floodwall will reduce impacts to critical infrastructure such as the industries mentioned above and ensure flood impacts are minimized.

Norfolk is home to the Port of Virginia's Norfolk International Terminals (NIT), one of Virginia's most significant economic assets with an impact of $60 billion in economic activity annually and port-related industries generating 374,000 jobs. The city is also home to multiple universities and key medical services supporting the region including Old Dominion University, Norfolk State University, Eastern Virginia Medical School, Sentara Norfolk General Hospital, and The Children's Hospital of the King's Daughters. Although the city has a formidable commercial, educational, militaristic, and healthcare focused industries, a significant amount of the city's population experiences severe economic hardship.

In comparison to other areas of Virginia, Norfolk is a low-income community, with median household income less than 80% of the statewide metric. The city has an average Social Vulnerability Index score of 0.59, ranking it as having Moderate Social Vulnerability as a whole. However, many of the densest population areas are concentrated in 25 census tracts listed as having High or Very High Social Vulnerability. An attached spreadsheet provides a summary of Social Vulnerability Index scores for each census tract in the city (Attachment B).

The entire project will provide city-wide impacts and the first proposed phase is focused on an area in which the annual median household income is $15,834 and categorized as Very High Social Vulnerability. In this area, 54% of households are identified as below the poverty level and there are 694 households without a vehicle (Attachment C).

In the project area, there are a myriad of residential and commercial structures that will be benefited by this project to include the St. Paul's Area. This Area is home to the region's highest concentration of assisted housing with 1,674 aging units that do not meet modern building standards in three adjacent family assisted housing communities. This area floods regularly, a problem worsened by increased frequency and duration of significant storm events. The City of Norfolk and Norfolk Redevelopment and Housing Authority are actively working to address these challenges through the St. Paul's Transformation project which is leveraging U.S. Department of Housing and Urban Development Choice Neighborhood Initiative (CNI) Implementation Grant for $30 million. The program will include a reimagined Newton's Creek that is daylighted to provide enhanced stormwater infiltration and storage as part of Phase 1A's interior drainage needs to support the St. Paul's Blue/Greenway, another highlighted example hybrid project from the Coastal Resilience Master Plan.

Tidal flooding on October 23, 1953, near Charlotte Street and Walke Street (NRHA)

Walke Street at Charlotte Street, Mid 20th Century and 2019 (NRHA, Google)

Recent flooding in Newton's Creek Historic Footprint within the Tidewater Gardens assisted housing community.

Alternatives

The City and USACE Norfolk District analyzed, developed, and recommended a myriad of alternative measures to the recommended plan. The measures were combined into alternative plans that would provide coastal storm risk management for large portions of Norfolk. To meet the objectives of the study all areas of the city were investigated for coastal storm risk management solutions. The formulation strategy sought a comprehensive project that would allow Norfolk to maintain critical infrastructure, evacuation routes, and cohesive neighborhoods. Also, by formulating a comprehensive, citywide alternative, socially vulnerable neighborhoods will receive the same, or similar, levels of risk reduction as wealthy or more valuable property areas.

Four types of alternatives were formulated: the No Action, the Structural Only, the Nonstructural Only, and the Structural / Nonstructural Combination Alternatives.

In all, ten alternative plans were developed; plus the No Action Alternative.

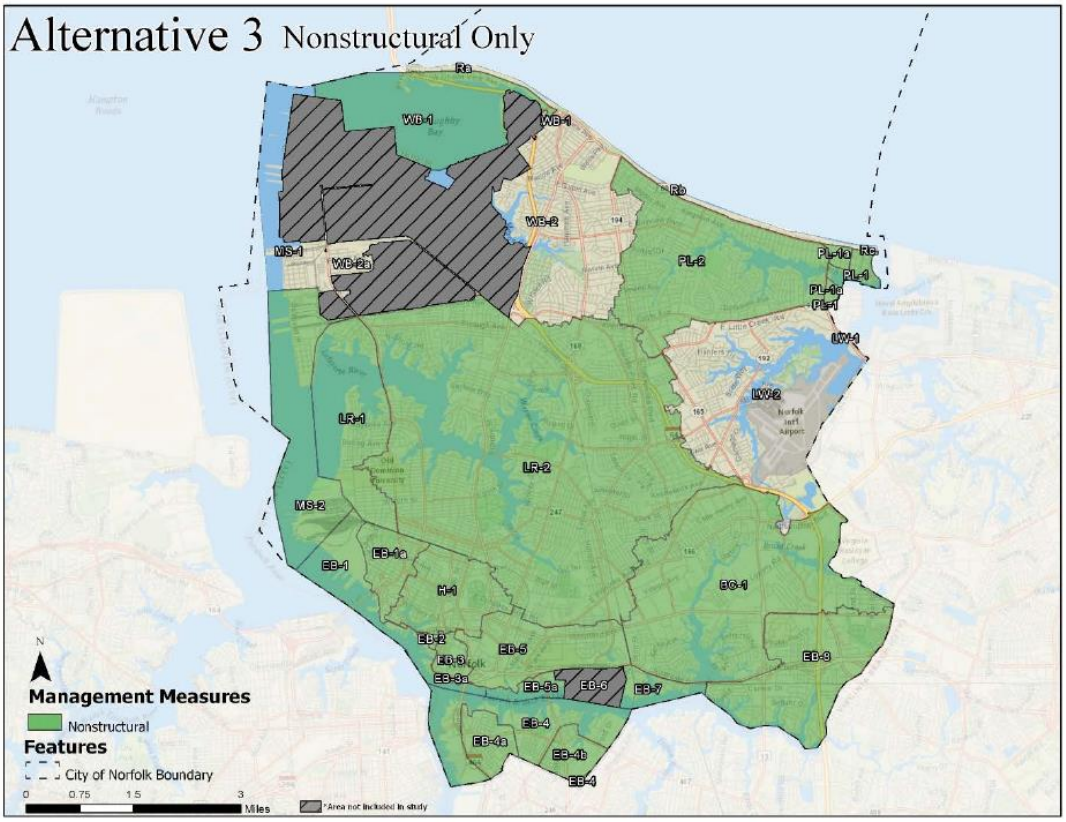
Each alternative plan has its own economic valuations based on its component measures. These alternative plans include some measures that were later found to be not cost-justified, at which point re-formulation of the focused array was necessary; plans are shown in the table below.

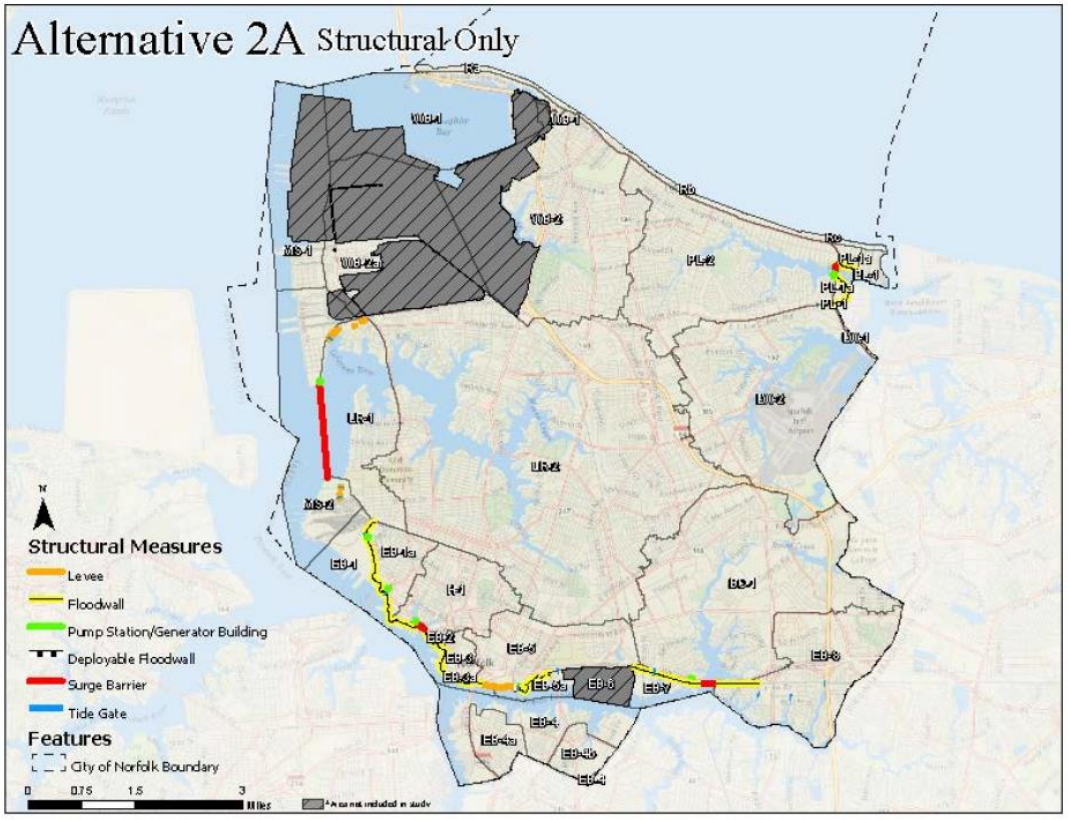
Focused Array of Alternatives					
Alternative Plan	**Total Avg. Annual Costs ($1000's)**	**Annual Benefits ($1000's)**	**Annual Net Benefits ($1000's)**	**BCR**	**Total Project Cost ($1000's)**
Alternative 1 (No Action)	$0	$0	$0	$0	$0
Alternative 2a - Structural Only (LR-1a)	$52,000	$123,000	$71,000	2.4	$ 1,369,000
Alternative 2b - Structural Only (LR-1b)	$49,000	$ 123,000	$75,000	2.5	$ 1,278,000
Alternative 2c - Structural Only (LR-2 S)	$37,000	$ 83,000	$46,000	2.3	$978,000
Alternative 3- Nonstructural Only (All reaches)	$88,000	$ 152,000	$64,000	1.7	$ 2,319,000
Alternative 4a - Combination Structural and Nonstructural (LR-1a)	$72,000	$ 162,000	$90,000	2.2	$ 1,903,000
Alternative 4b - Combination Structural and Nonstructural (LR-1b)	$69,000	$ 162,000	$93,000	2.7	$ 1,811,000
Alternative 4c - Combination Structural and Nonstructural (LR-2 S)	$64,000	$ 163,000	$99,000	2.6	$1,688,000
Alternative 4d - Combination Structural and Nonstructural (LR-1a), Berkley and Campostella Nonstructural	$72,000	$ 162,000	$90,000	2.3	$1,891,000
Alternative 4e - Combination Structural and Nonstructural (LR-1b), Berkley and Campostella Nonstructural	$68,000	$ 162,000	$94,000	2.4	$ 1,799,000
Alternative 4f - Combination Structural and Nonstructural (LR-2 S), Berkley and Campostella Nonstructural	$64,000	$ 163,000	$100,000	2.6	$ 1,676,000

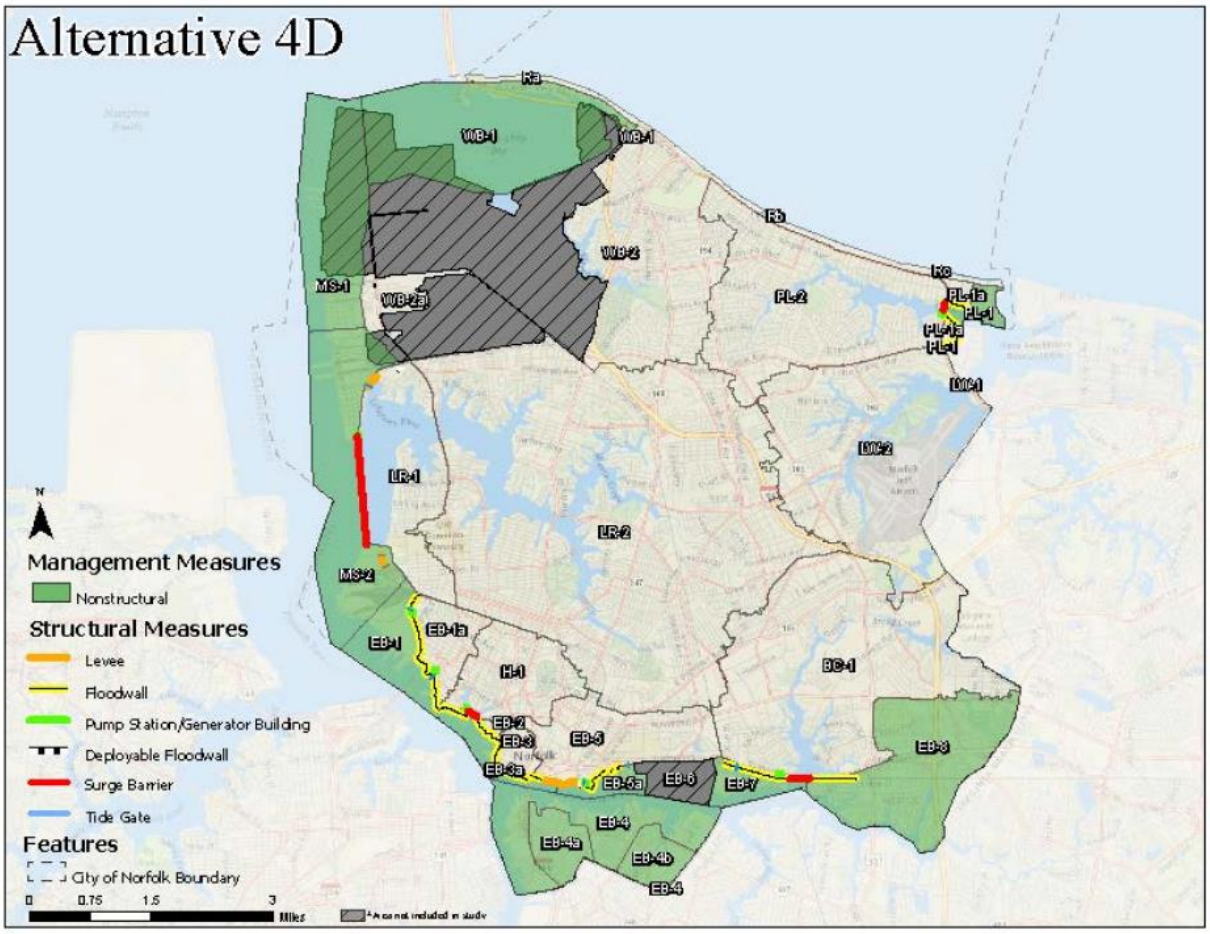
Final Array of Alternatives						
Alternative Plan	**Description**	**Total Avg. Annual Costs ($1000's)**	**Annual Benefits ($1000's)**	**Annual Net Benefits ($1000's)**	**BCR**	**Total Project Cost ($1000's)**
Alternative 1	No Action	0	0	0	0	0
Alternative 2a	Structural Only in All Reaches with the Outer Lafayette SSB, NNBF	$46,000	$136,000	$91,000	3.0	$1,231,000
Alternative 3	Nonstructural and Ringwalls Only in All Reaches	$108,000	$143,000	$35,000	1.3	$2,933,000
Alternative 4d	Structural and Nonstructural Combination, Outer Lafayette SSB, Campostella/Berkley Nonstructural, NNBF	$66,000	$168,000	$102,000	2.5	$1,787,000

Measures in Each Alternative Plan	
Alternative Plan	**Description**
Alternative 1	No Action
Alternative 2a	PL-2S, LR-1aS, EBS, BC-1S
Alternative 3	BC-1N, EB-1N, EB-1aN, EB-2N, EB-3N, EB-3aN, EB-4N, EB-4aN, EB-4bN, EB-5N, EB-5aN, EB-7N, EB-8N, H-1N, LR-1N, LR-2N, MS-2N, PL-1N, PL-1aN, PL-2N, WB-1N
Alternative 4d	PL-2S, LR-1aS, EBS, BC-1S, EB-1N, EB-4N, EB-4aN, EB-4bN, EB-5aN, EB-7N, EB-8N, MS-2N, PL-1N, WB-1N

The following environmental consequences were each analyzed individually against the Final Array of Alternatives (No Action, Structural Only Alternative, Nonstructural Alternative, 4d Recommended Plan): land use, geology and soils, coastal hydraulics, water quality, floodplains, wetlands and mudflats, submerged aquatic vegetation, terrestrial wildlife and upland vegetation, benthic resources, plankton, fish and fishery resources, special status species, passage/trapping effects, turbidity, vessel interactions, cumulative effects, cultural resources, recreational resources, visual resources, socioeconomics, hazardous materials and wastes, safety, transportation and navigation, utilities, noise, and climate change (see Chapter 11 of the Norfolk CSRM study).


Alternative 3 Nonstructural Only
Management Measures
Nonstructural
Features
City of Norfolk Boundary
0 0.75 1.5 3 Miles
*Area not included in study


Alternative 2A Structural Only
Structural Measures
Levee
Floodwall
Pump Station/Generator Building
Deployable Floodwall
Surge Barrier
Tide Gate
Features
City of Norfolk Boundary
0 0.75 1.5 3 Miles



This study considered a range of nonstructural and structural measures to reduce the risk of storm damage in the study area. Through an iterative planning process, potential coastal storm risk management measures were identified, evaluated, and screened. Those remaining were developed into defined coastal storm risk management alternatives that composed a focused array of alternatives. The alternatives and measures of the focused array then underwent further screening and comparison to reduce the list of alternatives to final array of alternatives. Based on an evaluation of the costs and benefits of the final array of alternatives, including potential environmental impacts, Alternative 4d was identified as the **Tentatively Selected Plan (TSP)**. The TSP is the identified plan at the 3% ACE water level. After identification of the TSP, the plan was evaluated at the 10% and the 1.4% ACE water levels to better optimize the plan for costs and benefits.

3. Goals and Objectives:

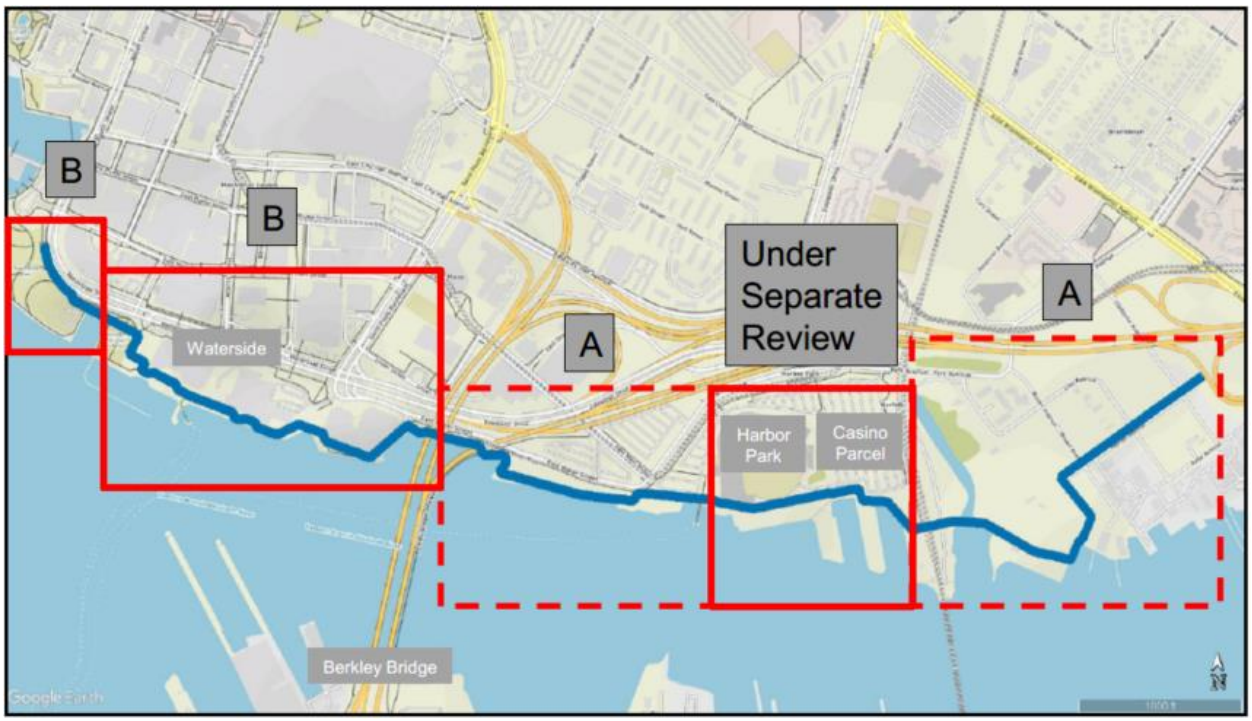
Within the Recommended NED Plan, Alternative 4d of the Norfolk CSRM IFR/EIS recommends multiple floodwalls, surge barriers, tide gates, levees, pump stations and nonstructural measures such as home elevations, buyouts, and basement fills.

Phase 1A of the Ghent-Downtown-Harbor Park Barrier System Addresses the first project segment with a hybrid green levee living shoreline focus, providing projection for the most socially vulnerable population within Norfolk.

This project covers the majority of Harbor Park in Downtown Norfolk along with areas of the City to the east of Harbor Park. Surrounding areas are characterized by a protective floodwall measure that runs from the West Ghent neighborhood to just past the Harbor Park area. Within the Harbor Park area, a levee will be constructed that ties in the eastern extent of the Harbor Park and future development area for a casino to and a levee with living shorelines within the western extent of Phase 1A; interior drainage analyses were developed. There is sufficient right-of-way to allow the construction of this feature where in other parts walls are used because of limited space.

The proposed project offers numerous unparalleled benefits for the residents, existing infrastructure, and transportation. Through the mitigation of ongoing flooding impacts, these elements will be protected through the creation of the protective flood measures.

Map overview of Phase 1:



4. Approach, Milestones, and Deliverables:

The City of Norfolk and USACE have determined a strategic schedule for the project. Focusing on the first phase of the comprehensive project will yield definitive deliverables in alignment with the scope of work. The City and USACE will execute the project in 3 years. The draft Project Partnership Agreement (PPA) is prepared. The PPA will identify all sources of nonfederal match, including this grant once awarded, and then the PPA will be signed with project commencement by the start of FY23 (October 1). The PPA is unable to be signed until all funding sources are confirmed.

The first 15 months will include finalizing 100% design for the entire project phase. This effort also includes the process of securing contractor, value engineering process, independent cost estimate, independent external peer review, and a constructability review all prior to the request for proposal (RFP) process and bids being received. Construction is scheduled to begin in January 2024 and all work completed by September 30, 2025. Milestones will be tracked through quarterly reports and ongoing project status updates which define the funding expended, project accomplishments and activities, and anticipated next steps to meet the project implementation deadline.

Each design milestone will incur a deliverable at 35%, 65%, 100% from USACE Norfolk District and the City. Quality control assessment reports will be provided for each milestone. The anticipated schedule is defined below:

Deliverable	Description	Date
35% Submittal & Value Engineering	Plans, outline specifications, design analysis, cost estimate	10/5/22 - 12/27/22
65% Submittal	Plans, redline specifications, design analysis, cost estimate, draft 1354, bid schedule	10/5/22 - 5/4/23
100% Submittal	Plans, typed specifications, design analysis, cost estimate, draft 1354, bid schedule	5/5/23 - 11/5/23
Backcheck Submittal	Includes revisions to all design documents until comments are closed	
Virginia DEQ Submittal Documents	Prepare and submit the required documents for DEQ review after the 65% resolution meeting	8/3/23 - 10/31/23
Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Design Submittal	The value of BCOES reviews is based on minimizing problems during the construction phase through effective checks performed by knowledgeable, experienced personnel prior to advertising for a contract. Biddability, constructability, operability, environmental, and sustainability requirements must be emphasized throughout the planning and design processes for all programs and projects, including during planning and design charrettes. This will help to ensure that the government's contract requirements are clear, executable, and readily understandable by private sector bidders or	11/6/23- 12/26/23

	proposers. It will also help ensure that the construction may be done efficiently and in an environmentally sound manner, and that the construction activities and projects are sufficiently sustainable. Finally, effective BCOES reviews of design and contract documents will reduce risks of cost and time growth, unnecessary changes and claims, as well as support safe, efficient, sustainable operations and maintenance by the facility users and maintenance organization after construction is complete.	
Ready To Advertise (RTA) Submittal	At RTA, the design analysis is not a contract document, but rather a final documentation of the basis of design for the Resident Engineer, and digital archival document for Engineering Division. The design analysis should be developed from Concept Design to include a discussion of any new or unfamiliar products, critical product features, critical milestones that may require designer consultation, items of particular customer interest revealed in design meetings, shop drawings of particular interest or criticality, anticipated difficult construction features.	12/27/23-12/30/23
Geotechnical report	Outlines the content of subsurface investigations, geotechnical design reports, geotechnical design analyses, and geotechnical data for inclusion in design and contract documents.	12/27/23-12/30/23
Construction	Site work begins until completion.	1/1/24- 8/31/25

The City of Norfolk is partnering with the USACE to complete the project and has developed a strategy for implementation. Supporting funds for the project include federal funding and local state/government funding. The federal funding is provided through the appropriated funding from the Infrastructure Investment and Jobs Act (IIJA). To continue to move the project forward, the Commanding U.S. Army Colonel of the USACE Norfolk District provided the City with a letter of funding confirmation (Attachment D).

The City of Norfolk's Office of Resilience has an extensive history of successfully managing state and federal grant funds for resilience projects. As a major city, the City of Norfolk manages a large operating budget, including a fee to address and support resilience projects, and demonstrates excellent in fiscal responsibility. The City of Norfolk has exemplary and committed staff members to support, implement, and execute grants on schedule and within budget. This project will be managed through the City of Norfolk's Office of Resilience and the USACE Norfolk District.

In addition to Resilience's staff and consultants, the team members will include Norfolk staff from the Department of Public Works. Proposed team members are noted below:

Table 1 – City of Norfolk and USACE Project Team

Name	Title	Department
Kyle Spencer, GISP, CFM	Acting Chief Resilience Officer	Resilience
Matthew Simons, AICP CFM	Coastal Resiliency Manager	Resilience
Stephanie Daniel	Management Analyst	Resilience
John White	City Stormwater Engineer	Stormwater
Tammy Halstead, PE	Civil Engineer IV	Public Works
Richard Klein, PE	Chief, Programs and Civil Works Branch	USACE Norfolk District
Walt Trinkala	Project Manager/Engineer	USACE Norfolk District
Jack Wall	Project Manager	USACE Norfolk District
Matthew McKeehan, PE	Levee Safety Program Mgr.	USACE Norfolk District
Dan Hughes	Planning Resource Section Chief	USACE Norfolk District
Kathy Purdue	Environmental	USACE Norfolk District
John Haynes	Cultural Resources	USACE Norfolk District
Doug Hessler	GIS	USACE Norfolk District
Robin Williams	H&H Chief	USACE Norfolk District
Wayne Miller	Structural, Chief	USACE Norfolk District
Todd Waldman	District Counsel	USACE Norfolk District
Mark Haviland	PAO, Chief	USACE Norfolk District

5. Relationship to Other Projects:

The project is directly tied to the City of Norfolk and USACE's Coastal Storm Risk Management Study (CSRM) that was finalized in 2019. The recommendations for this project are derived from the extensive feasibility study conducted by the USACE. Furthermore, this project is the beginning of a comprehensive City-wide effort to implement the CSRM recommendations to reduce the ongoing challenges of flooding. In September 2021, the City of Norfolk was awarded funding from the first round of the Community Flood Preparedness Grant Fund to support additional coastal process calculations and value engineering efforts for the continued design of infrastructure features identified in the Norfolk Coastal Storm Risk Mitigation (CSRM) Feasibility Study and Integrated EIS (FS/EIS).

6. Nonfederal Sponsor Responsibilities and Operations & Maintenance:

As the non-Federal project partner, the City of Norfolk must comply with all applicable Federal laws and policies and other requirements, including but not limited to:

A. In a cost sharing coordination with the Federal Government, who shall provide 65% of the initial project cost, provide 35% of the costs of project construction:
   1. Provide all lands, easements, rights of way and relocations (LERR), including suitable borrow areas, uncontaminated with hazardous and toxic wastes, and perform or ensure performance of any relocations determined by the Federal Government to be necessary for the initial construction, operation, and maintenance of this project.

2. Perform, or cause to be performed, any investigations for hazardous substances as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law (PL) 96-510, as amended, 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the construction, operation, and maintenance of the Project. However, for lands that the Federal Government determines to be subject to the navigational servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal project partner with prior specific written direction, in which case the non-Federal project partner shall perform such investigations in accordance with such written direction.
3. Coordinate all necessary cleanup and response costs of any CERCLA-regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, or maintenance of the project.
4. Cost-share of the cost of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project.

B. For fifty years, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and any specific directions prescribed by the Government in the Operations, Maintenance, Replacement, Repair and Rehabilitation (OMRR&R) manual and any subsequent amendments thereto.

C. Provide the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal project partner, now or hereafter, owns or controls for access to the project for the purpose of inspection, and, if necessary after failure to perform by the non- Federal project partner, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall operate to relieve the non-Federal project partner of responsibility to meet the non-Federal project partner's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance.

D. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors.

E. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the Project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal regulations (CFR) Section 33.20.

F. As between the Federal Government and the non-Federal project partner, the non-Federal project partner shall be considered the operator of the project for the purpose of CERCLA

liability. To the maximum extent practicable, operate, maintain, repair, replace and rehabilitate the project in a manner that will not cause liability to arise under CERCLA.

G. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1790, Public Law 91-646, as amended by Title IV of the Surface Transportation and Unifom1 Relocation Assistance Act of 1987 (Public Law 100-17),and the Unifom1 Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the construction, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.
H. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense directive 5500.11 issued pursuant thereto, as well as Army regulation 600- 7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."
I. Participate in and comply with applicable Federal flood plain management and flood insurance programs and comply with the requirements in Section 402 of the Water Resources Development Act of 1986, as amended.
J. Not less than once each year inform affected interests of the extent of storm risk management afforded by the project.
K. Publicize flood plain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with the degree of storm risk management provided by the project.
L. Prevent obstructions of or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) which might hinder its operation and maintenance, or interfere with its proper function, such as any new development on project lands or the addition of facilities which would degrade the benefits of the project.
M. Provide and maintain necessary access roads, parking areas, and other public use facilities, open and available to all on equal terms.
N. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal project partner has entered into a written agreement to furnish its required cooperation for the project or separable element.
O. Quarterly and after storm events, perform surveillance of the project to determine project maintenance or repair needs and provide the results of such surveillance to the Federal Government.

The City of Norfolk is actively preparing for ongoing and lifetime maintenance costs of the project. Annual Operations and Maintenance (O&M) costs for the entire Ghent-Downtown-Harbor Park Barrier System are anticipated to cost $585,000 annually (2019 estimate). The O&M costs of the

project will be financed by the City of Norfolk through increased allocations to the City's general fund beginning in fiscal year 2026.

Accordingly, portions of the proposed project will experience reduced annual O&M costs over the lifespan of the project due to the construction of NNBF's such as oyster reefs, which will reduce the impacts of wind generated wave hazards by approximately 20%-50% according to the CSRM feasibility study completed by the USACE.

A Project Partnership Agreement between the City of Norfolk and USACE will be in place to establish the requirement for annual and ongoing O&M appropriations. O&M costs for determining were based on parametric costs developed in the North Atlantic Coast Comprehensive Study (NACCS). Parametric costs were then adjusted based on the length and type of measure. The following assumptions were applied to operation and maintenance estimates:

- $2 per linear foot plus $10,000 per drain for floodwalls and levees.
- 0.5% of total costs for wetlands and living shorelines.
- 1% of total costs for groins, breakwaters, and revetments.
- 0.5% of total costs for storm surge barriers.
- 1% of total costs for beach restoration with renourishment interval of 4 years.

After computation of the total costs, costs were annualized using the FY2017 (October 2016) discount rate of 2.875% for a 50-year life cycle of the project. Repair, replacement, and rehabilitation cost will be completed during optimization phase and are not expected to impact plan selection.

Once the project has been constructed and turned over, USACE will provide an operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) manual which will be written specifically for the City of Norfolk. The City will have the primary responsibility for operating and maintaining the project. The intent of the manual is to provide the City with some clear and comprehensive guidance on the operation and maintenance of levees, floodwalls, and other flood control structures. It will describe how to plan and prepare for high water and storm events, and lays out steps to take during emergencies that will help reduce the threat of flooding. The manual will also explain the types of assistance that the U.S. Army Corps of Engineers can provide to a community before, during, and after a flood. Monitoring and inspections will occur to ensure that the project functions as designed and that the local sponsor confirms to all OMRR&R recommendations and requirements that will assist in functionality of the project.

USACE will inspect the project each year with the City of Norfolk. USACE conducts two types of levee and floodwall inspections: Routine Inspection and Periodic Inspection. Routine Inspection is a visual inspection to verify and rate levee/floodwall system operation and maintenance. It is typically conducted each year for all levees/floodwalls in the USACE Levee Safety Program. Periodic Inspection is a comprehensive inspection conducted by a USACE multidisciplinary team that includes the local sponsor and is led by a professional engineer. USACE typically conducts

this inspection every five years on the federally authorized levees in the USACE Levee Safety Program.

Periodic Inspections include three key steps: (1) Data collection - A review of existing data on operation and maintenance, previous inspections, emergency action plans and flood fighting records; (2) Field inspection - Similar to the visual inspection for a Routine Inspection, but with additional features; (3) Final report development - A report including the data collected, field inspection findings, an evaluation of any changes in design criteria from the time the levee was constructed, and additional recommendations as warranted, such as areas that need further evaluation. Both Routine and Periodic Inspections result in a final inspection rating for operation and maintenance. The rating is based on the levee/floodwall inspection checklist, which includes 125 specific items dealing with the operation and maintenance of levee embankments, floodwalls, interior drainage, pump stations, and channels. Each levee/floodwall segment receives an overall segment inspection rating of Acceptable, Minimally Acceptable, or Unacceptable. USACE also shares the results with FEMA, to help inform decisions about levee accreditation for flood insurance purposes. The inspection ratings are available in the National Levee Database.

7. Criteria*:*

1. **Is the applicant a local government (including counties, cities, towns, municipal corporations, authorities, districts, commissions, or political subdivisions created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth, or any combination of these or a recognized state or federal Indian tribe?**

   The City of Norfolk is an independent city in the Commonwealth of Virginia.

2. **Does the local government have an approved resilience plan meeting the criteria as established by this grant manual? Has it been attached or a link provided?**

   The City of Norfolk submitted a Resilience Plan package in July 2021 and received approval of the plan from Virginia Department of Conservation and Recreation on August 11, 2021 (Attachment E).

3. **For local governments that are not towns, cities, or counties, have letters of support been provided from affected local governments?**

   The City of Norfolk is an independent city in the Commonwealth of Virginia.

4. **Has the applicant provided evidence of an ability to provide the required match funds?**

   Yes, the required match is provided by federal and local funding with details included as an attachment.

5. **Has the applicant demonstrated to the extent possible, the positive impacts of the project or study on prevention of flooding?**

   The project benefit for the entire city is unparalleled. With the first phase of implementation funding that is requested in this application, it will establish Norfolk's

commitment to foster and encourage resilience. The expected impacts of implementing this effort will create 27,236 feet of floodwall protection, 7,200 lf. of NNBF living shoreline, 5,250 lf. of NNBF Oyster Reef, and 3,800 lf. of mitigation linear shoreline in addition to t-walls, pump stations, surge barriers, miter gates, and tide (sluice) gates. This will provide the City with essential flood protection as flooding events continue to increase in frequency and intensity.

8. Budget Narrative

Based upon multiple metrics, the project area is defined as a low-income area. As a result, the City of Norfolk seeks 17.5% grant funding to support the construction of Phase 1A of the Ghent-Downtown-Harbor Park flood barrier system. The City proposes to fund 82.5% match through a combination of local funds (17.5%) and federal funds (65%) recently awarded to the City of Norfolk for this project. In January 2022, the U.S. Army Corps of Engineers (USACE) announced that $249,331,000 of federal funding has been appropriated from Infrastructure Investments and Jobs Act (IIJA) for Phase 1A of this CSRM project. On March 30, 2022, USACE announced that the remaining $150,000,000 of federal support needed to complete all of the Ghent-Downtown-Harbor Park Barrier System (CSRM Phase 1 – ph. 1A through 1D) has been appropriated in the USACE FY23 work plan (Attachment F).

The City of Norfolk and its State partners must provide the necessary 35% match ($215,024,385) to unlock the $399,331,000 appropriated from USACE for this project ($614,335,385 total).

Phase 1A is the discrete 3-year first start project which is the subject of this CFPF grant application. The costs to finish design and construction for Phase 1A is $160,731,286. The City of Norfolk is requesting $28,127,975 (17.5%) to be matched with the same amount from the City of Norfolk to meet the City's 35% nonfederal match obligation by the start of Fiscal Year 2023. All match funding will go towards developing final USACE-approved designs, and construction. The tables below summarize project costs. Funds proposed as match are authorized through existing approved budgets and verified on the attached, signed City Manager Transmittal Form outlining grant and match funds for the current Community Flood Preparedness Fund grant cycle. Upon award of grant funds, the City sets up a special revenue account that includes approved match funds and cash funds to cover awarded grant funding until reimbursement is received. This allows Norfolk to move through projects without delays for reimbursement requests.

Cost Breakdown

Project Tasks	Grant Funds (17.5%)	Match Funds (82.5%)	Total
Task I Final Design	$667,500	$3,146,786	$3,814,286
Task II Construction	$27,460,475	$129,456,525	$156,917,000
Total Project Costs:	$28,127,975	$132,603,311	$160,731,286

		Project Tasks		
	Budget Categories:	**Task 1:** Final Design	**Task 2:** Construction	**TOTAL:**
Direct Costs	Personnel	$0	$0	$0
	Fringe Benefits	$0	$0	$0
	Travel	$0	$0	$0
	Equipment	$0	$0	$0
	Supplies	$0	$0	$0
	Contractual	$3,814,286	$156,917,000	$160,731,286
	Other:	$0	$0	$0
Total Direct Costs:		$3,814,286	$156,917,000	$160,731,286
Indirect Costs:		$0	$0	$0
Total Grant Funding:		$667,500	$27,460,475	$28,127,975
Matching Funds:		$3,146,786	$129,456,525	$132,603,311
Total Budget:		$3,814,286	$156,917,000	$160,731,286

Budget Breakdown:

100% of estimated total project costs provided (low-income geographic area designation)

Task I: Final Design ($3,814,286): The City will work with USACE to complete the project design along with the selected consultant(s). The City is requesting $667,500 from the fund to support this effort. USACE will adhere to required procurement processes and regulations to procure a qualified consultant to assist the City with this effort. USACE tracks all expenses in a near identical way as a typical contractor. All services from USACE and their contractors will be reported to DCR as contractual expenses. Given that the City of Norfolk and federal match for this grant is well above the minimum required by the CFPF grant manual, the City of Norfolk will not be submitting any request for CFPF match credit from work-in-kind expenditures. However, the City of Norfolk will track all work-in-kind expenses (personnel, etc.) for submission to the federal government, and will agree to provide this information to DCR upon request.

Task II: Construction ($156,917,000): The City of Norfolk and USACE will fund project construction in six project reaches as delineated below (listed from West to East). The City is requesting $27,460,475 from the fund to support this effort. These construction reaches are not constructed sequentially; construction may begin simultaneously, and construction activities will likely overlay.

1. **Phase 1a | Berkley Bridge Levee:** Construction will commence with the creation of a levee, T-wall, closures, and living shorelines. A levee will be a standard berm/levee geometry of a 10-foot wide crest covered with 6 inches of aggregate base, 3H: 1V side slopes, and 2 feet of riprap on the waterside. An inspection or key trench is excavated into existing ground along the berm/levee alignment. The inspection trench is 10 feet wide at the bottom with 1H: 1V sides slopes. For a berm/levee height less than 6 feet, the depth of the inspection trench is equal to the height of the levee. For a berm/levee height of 6 feet or greater, the depth of the inspection trench is 6 feet. The inspection trench is backfilled with compacted embankment fill material, which is also used to construct the levee. T-Walls will be traditional concrete stem walls with pile supported bases. Gate closures are designed into a floodwall system where passage through the floodwall is needed during non-flooding periods. Typically gate closures are designed to accommodate automobile traffic where a floodwall is designed across a roadway. Gate closures can also be designed for pedestrian traffic. The gates are closed during flooding periods and so disruptions to traffic should be considered. The existing Norfolk floodwall utilizes gate closures and the closures envisioned for this study are likely to be similar in design and function. Living Shorelines will provide erosion protection for coastal flood defense structures while creating new habitat and improving ecological functions of the Elizabeth River. The levee will transition to a T-wall/L-wall at the Berkley Bridge Pump Station, directly beside the southwest corner of Harbor Park ballfield.

2. **Phase 1a | Berkley Bridge Pump Station**: A pump station will be constructed in the project area. Upgrades to the subsurface drainage system as well as construction of coastal flood protection will necessitate the installation of pump stations to discharge stormwater into the Elizabeth River.

Drainage system upgrades and additional water storage areas aim to reduce the need for pumping and the number of pump stations needed.

3. **Phase 1a | Harbor Park and Railroad Gate:** As the levee transitions to a T-wall/L-wall structure at the Berkley Bridge Pump Station, the T-wall/L-wall extends eastward along the backside of the Harbor Park ballfield. This portion of Phase 1A will be located on private property currently under development. As part of the current development, the developer has sought to construct this portion of the flood protection system ahead of the USACE. As such, the developer is working directly with USACE and the City of Norfolk to construct this portion of the flood protection system on their site. This portion of the project is not part of this grant application and is shown in the attached exhibits as "Not in Scope." No portion of the CFPF grant would be utilized for this portion of the Phase 1A system. The eastern edge of this private development terminates at the Norfolk Amtrak station. This is where the Phase 1A system would tie into the developer's private flood protection system. At this location the flood protection system will cross the Amtrak rail line, and rail lines owned/operated by Norfolk Southern with a large at-rail flood gate crossing. This gate crossing will be a significant structure that leads to eastward to Newton's Creek.

4. **Phase 1a | Newton's Creek Closure:** Construction will continue with the creation of a tide gate and T-wall. A tide gate structure will be integrated into the coastal flood protection. It will restore ecological function to the wetlands and protect the site from tidal events.

5. **Phase 1a | Newton's Creek Pump Station**: A pump station will be constructed in the project area. Upgrades to the subsurface drainage system as well as construction of coastal flood protection will necessitate the installation of pump stations to discharge stormwater into the Elizabeth River. Drainage system upgrades and additional water storage areas aim to reduce the need for pumping and the number of pump stations needed.

6. **Phase 1a | Newton's Creek to Campostella:** This effort will include the construction of T-Walls and closures. T-Walls will be traditional concrete stem walls with pile supported bases. Gate closures are designed into a floodwall system where passage through the floodwall is needed during non-flooding periods. Typically gate closures are designed to accommodate automobile traffic where a floodwall is designed across a roadway. Gate closures can also be designed for pedestrian traffic. The gates are closed during flooding periods and so disruptions to traffic should be considered. The existing Norfolk floodwall utilizes gate closures and the closures envisioned for this study are likely to be similar in design and function.

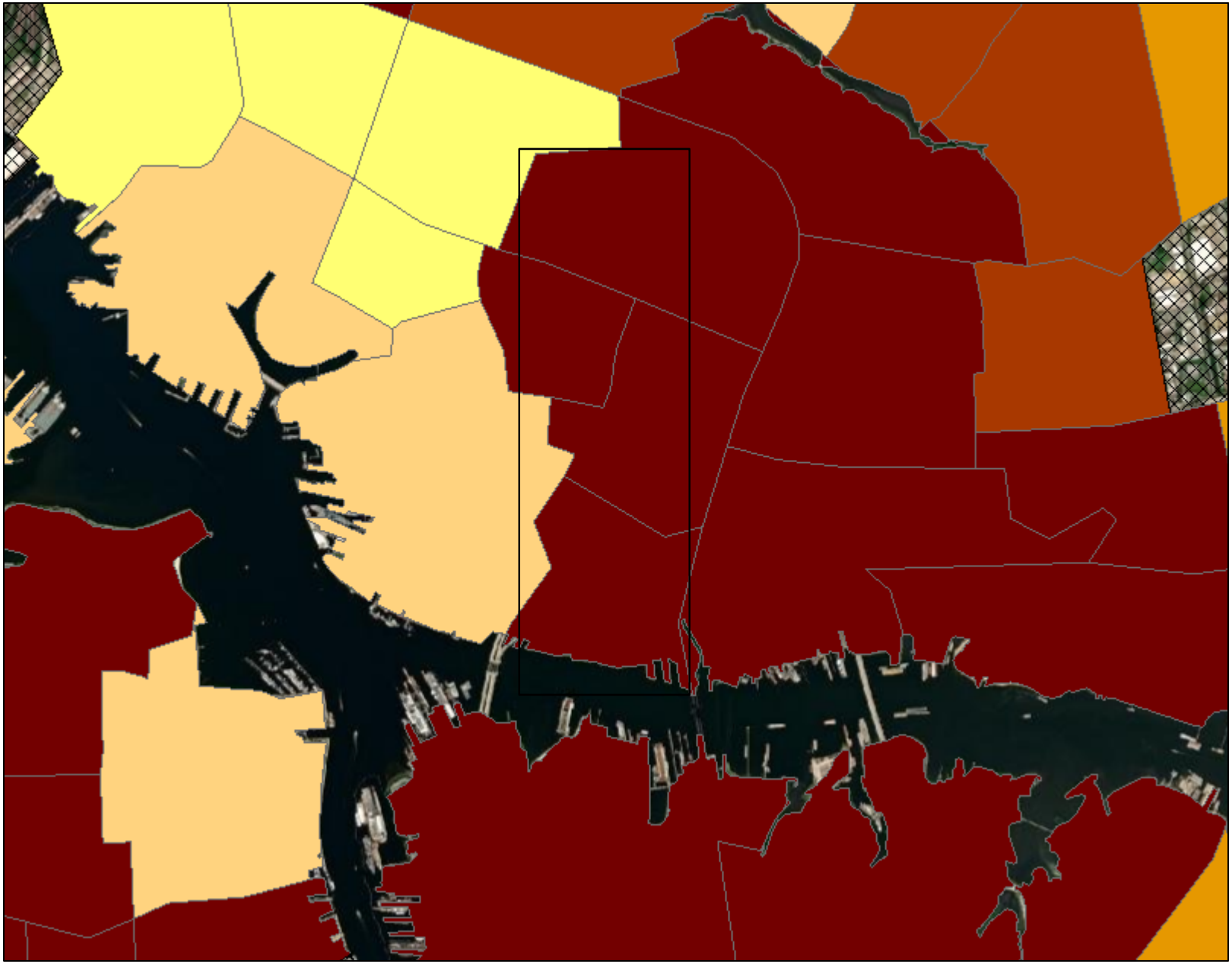
Attachments

Attachment A

EBS 1

Social Vulnerability Index Score

- Very Low Social Vulnerability
- Low Social Vulnerability
- Moderate Social Vulnerability
- High Social Vulnerability
- Very High Social Vulnerability
- Not inlcuded in the analysis



March 28, 2022

1:36,112

0 0.2 0.4 0.8 mi

0 0.35 0.7 1.4 km

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Center for Coastal Resources Management
Virginia Institute of Marine Science

ADAPT VA

Created from the Virginia Vulnerability Viewer

Key Facts

City of Norfolk

Area: 54.25 square miles

City of Norfolk

KEY FACTS

247,421

Population

31.3

Median Age

2.4

Average Household Size

$53,253

Median Household Income

EDUCATION

12%

No High School Diploma

25%

High School Graduate

33%

Some College

30%

Bachelor's/Grad/Pr of Degree

BUSINESS

7,274

Total Businesses

123,760

Total Employees

EMPLOYMENT

63%

White Collar

22%

Blue Collar

15%

Services

9.7%

Unemployment Rate

INCOME

$53,253

Median Household Income

$27,724

Per Capita Income

$41,051

Median Net Worth

Households By Income

The largest group: $50,000 - $74,999 (20.1%)

The smallest group: $200,000+ (3.6%)

Indicator ▲	Value	Diff
<$15,000	13.7%	+7.3%
$15,000 - $24,999	8.9%	+1.7%
$25,000 - $34,999	11.3%	+4.4%
$35,000 - $49,999	12.4%	+2.5%
$50,000 - $74,999	20.1%	+2.1%
$75,000 - $99,999	13.1%	+0.2%
$100,000 - $149,999	11.8%	-9.5%
$150,000 - $199,999	5.3%	-4.9%
$200,000+	3.6%	-3.6%

Bars show deviation from Chesapeake city

This infographic contains data provided by Esri, Esri and Data Axle. The vintage of the data is 2021, 2026.

Source: This infographic contains data provided by Esri, Esri, Esri and Data Axle. The vintage of the data is 2021, 2026, 2021.

Attachment B

Norfolk Social Vulnerability Index Score

Census Tract Name	Social Vulnerability Index Score
Census Tract 25, Norfolk city, Virginia	1.69
Census Tract 27, Norfolk city, Virginia	1.71
Census Tract 29, Norfolk city, Virginia	1.37
Census Tract 31, Norfolk city, Virginia	1.40
Census Tract 34, Norfolk city, Virginia	2.33
Census Tract 35.01, Norfolk city, Virginia	2.25
Census Tract 41, Norfolk city, Virginia	3.62
Census Tract 42, Norfolk city, Virginia	4.47
Census Tract 43, Norfolk city, Virginia	2.28
Census Tract 44, Norfolk city, Virginia	1.37
Census Tract 45, Norfolk city, Virginia	1.83
Census Tract 46, Norfolk city, Virginia	2.34
Census Tract 47, Norfolk city, Virginia	2.84
Census Tract 48, Norfolk city, Virginia	3.44
Census Tract 50, Norfolk city, Virginia	1.66
Census Tract 51, Norfolk city, Virginia	2.44
Census Tract 57.01, Norfolk city, Virginia	1.20
Census Tract 59.01, Norfolk city, Virginia	1.22
Census Tract 69.02, Norfolk city, Virginia	1.63
Census Tract 20, Norfolk city, Virginia	1.48
Census Tract 26, Norfolk city, Virginia	0.15
Census Tract 28, Norfolk city, Virginia	0.50
Census Tract 32, Norfolk city, Virginia	1.08
Census Tract 33, Norfolk city, Virginia	1.38
Census Tract 57.02, Norfolk city, Virginia	1.17
Census Tract 58, Norfolk city, Virginia	1.33
Census Tract 62, Norfolk city, Virginia	0.90
Census Tract 64, Norfolk city, Virginia	0.89
Census Tract 70.02, Norfolk city, Virginia	1.28
Census Tract 9.01, Norfolk city, Virginia	0.26
Census Tract 1, Norfolk city, Virginia	-0.42
Census Tract 11, Norfolk city, Virginia	0.00
Census Tract 12, Norfolk city, Virginia	-0.48
Census Tract 13, Norfolk city, Virginia	0.29
Census Tract 14, Norfolk city, Virginia	0.75
Census Tract 15, Norfolk city, Virginia	-0.51
Census Tract 16, Norfolk city, Virginia	0.55
Census Tract 17, Norfolk city, Virginia	0.28
Census Tract 2.01, Norfolk city, Virginia	0.01
Census Tract 2.02, Norfolk city, Virginia	0.38

Census Tract 21, Norfolk city, Virginia	-0.27
Census Tract 22, Norfolk city, Virginia	-0.93
Census Tract 23, Norfolk city, Virginia	-1.28
Census Tract 24, Norfolk city, Virginia	-1.16
Census Tract 3, Norfolk city, Virginia	-0.21
Census Tract 30, Norfolk city, Virginia	-0.08
Census Tract 36, Norfolk city, Virginia	-1.10
Census Tract 37, Norfolk city, Virginia	-1.29
Census Tract 38, Norfolk city, Virginia	-1.31
Census Tract 4, Norfolk city, Virginia	-0.08
Census Tract 40.01, Norfolk city, Virginia	-1.96
Census Tract 40.02, Norfolk city, Virginia	-0.95
Census Tract 49, Norfolk city, Virginia	-0.44
Census Tract 5, Norfolk city, Virginia	0.15
Census Tract 55, Norfolk city, Virginia	0.11
Census Tract 56.01, Norfolk city, Virginia	0.24
Census Tract 56.02, Norfolk city, Virginia	0.23
Census Tract 59.02, Norfolk city, Virginia	0.26
Census Tract 59.03, Norfolk city, Virginia	0.26
Census Tract 6, Norfolk city, Virginia	0.12
Census Tract 60, Norfolk city, Virginia	0.58
Census Tract 61, Norfolk city, Virginia	0.60
Census Tract 65.01, Norfolk city, Virginia	0.43
Census Tract 65.02, Norfolk city, Virginia	-0.56
Census Tract 66.01, Norfolk city, Virginia	-0.18
Census Tract 66.02, Norfolk city, Virginia	0.33
Census Tract 66.03, Norfolk city, Virginia	0.10
Census Tract 66.04, Norfolk city, Virginia	0.69
Census Tract 66.05, Norfolk city, Virginia	0.64
Census Tract 66.06, Norfolk city, Virginia	-0.03
Census Tract 66.07, Norfolk city, Virginia	0.54
Census Tract 68, Norfolk city, Virginia	-0.07
Census Tract 69.01, Norfolk city, Virginia	0.57
Census Tract 7, Norfolk city, Virginia	-0.17
Census Tract 70.01, Norfolk city, Virginia	0.01
Census Tract 8, Norfolk city, Virginia	-0.31
Census Tract 9.02, Norfolk city, Virginia	-0.32
Norfolk Average Social Vulnerability Index Score	**0.59**

Attachment C

Key Facts

Tidewater Harbor Park Newton's Creek East

Area: 0.81 square miles

City of Norfolk

KEY FACTS

3,818

Population

25.6

Median Age

2.8

Average Household Size

$15,834

Median Household Income

EDUCATION

35%

No High School Diploma

31%

High School Graduate

26%

Some College

8%

Bachelor's/Grad/Pr of Degree

BUSINESS

139

Total Businesses

2,497

Total Employees

EMPLOYMENT

White Collar 47%

Blue Collar 25%

Services 28%

18.5%

Unemployment Rate

INCOME

$15,834

Median Household Income

$10,625

Per Capita Income

$9,541

Median Net Worth

Households By Income

The largest group: <$15,000 (48.1%)

The smallest group: $150,000 - $199,999 (0.0%)

Indicator ▲	Value	Diff
<$15,000	48.1%	+34.4%
$15,000 - $24,999	15.3%	+6.4%
$25,000 - $34,999	10.8%	-0.5%
$35,000 - $49,999	8.1%	-4.3%
$50,000 - $74,999	12.0%	-8.1%
$75,000 - $99,999	2.3%	-10.8%
$100,000 - $149,999	2.1%	-9.7%
$150,000 - $199,999	0.0%	-5.3%
$200,000+	1.3%	-2.3%

Bars show deviation from Norfolk city

This infographic contains data provided by Esri, Esri and Data Axle. The vintage of the data is 2021, 2026.

Source: This infographic contains data provided by Esri, Esri, Esri and Data Axle. The vintage of the data is 2021, 2026, 2021.

Demographic and Income Comparison Profile

Tidewater Harbor Park Newton's Creek East
Area: 0.81 square miles

Prepared by Esri

Census 2010 Summary	
Population	3,871
Households	1,354
Families	912
Average Household Size	2.71
Owner Occupied Housing Units	169
Renter Occupied Housing Units	1,185
Median Age	24.2
2021 Summary	
Population	3,818
Households	1,303
Families	865
Average Household Size	2.77
Owner Occupied Housing Units	175
Renter Occupied Housing Units	1,128
Median Age	25.6
Median Household Income	$15,834
Average Household Income	$30,271
2026 Summary	
Population	3,786
Households	1,286
Families	852
Average Household Size	2.78
Owner Occupied Housing Units	182
Renter Occupied Housing Units	1,104
Median Age	26.1
Median Household Income	$17,187
Average Household Income	$33,167
Trends: 2021-2026 Annual Rate	
Population	-0.17%
Households	-0.26%
Families	-0.30%
Owner Households	0.79%
Median Household Income	1.65%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

March 21, 2022

Demographic and Income Comparison Profile

Tidewater Harbor Park Newton's Creek East
Area: 0.81 square miles

Prepared by Esri

2021 Households by Income	Number	Percent
<$15,000	627	48.1%
$15,000 - $24,999	199	15.3%
$25,000 - $34,999	141	10.8%
$35,000 - $49,999	105	8.1%
$50,000 - $74,999	157	12.0%
$75,000 - $99,999	30	2.3%
$100,000 - $149,999	27	2.1%
$150,000 - $199,999	0	0.0%
$200,000+	17	1.3%
Median Household Income	$15,834	
Average Household Income	$30,271	
Per Capita Income	$10,625	

2026 Households by Income	Number	Percent
<$15,000	582	45.3%
$15,000 - $24,999	203	15.8%
$25,000 - $34,999	148	11.5%
$35,000 - $49,999	108	8.4%
$50,000 - $74,999	163	12.7%
$75,000 - $99,999	33	2.6%
$100,000 - $149,999	30	2.3%
$150,000 - $199,999	0	0.0%
$200,000+	19	1.5%
Median Household Income	$17,187	
Average Household Income	$33,167	
Per Capita Income	$11,552	

Data Note: Income is expressed in current dollars.

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

March 21, 2022

Demographic and Income Comparison Profile

Tidewater Harbor Park Newton's Creek East
Area: 0.81 square miles

Prepared by Esri

2010 Population by Age	Number	Percent
Age 0 - 4	538	13.9%
Age 5 - 9	462	11.9%
Age 10 - 14	350	9.0%
Age 15 - 19	329	8.5%
Age 20 - 24	306	7.9%
Age 25 - 34	475	12.3%
Age 35 - 44	362	9.4%
Age 45 - 54	402	10.4%
Age 55 - 64	269	7.0%
Age 65 - 74	189	4.9%
Age 75 - 84	130	3.4%
Age 85+	61	1.6%

2021 Population by Age	Number	Percent
Age 0 - 4	459	12.0%
Age 5 - 9	417	10.9%
Age 10 - 14	381	10.0%
Age 15 - 19	329	8.6%
Age 20 - 24	292	7.6%
Age 25 - 34	496	13.0%
Age 35 - 44	394	10.3%
Age 45 - 54	311	8.1%
Age 55 - 64	314	8.2%
Age 65 - 74	213	5.6%
Age 75 - 84	150	3.9%
Age 85+	63	1.6%

2026 Population by Age	Number	Percent
Age 0 - 4	455	12.0%
Age 5 - 9	400	10.6%
Age 10 - 14	353	9.3%
Age 15 - 19	322	8.5%
Age 20 - 24	305	8.1%
Age 25 - 34	481	12.7%
Age 35 - 44	407	10.8%
Age 45 - 54	309	8.2%
Age 55 - 64	288	7.6%
Age 65 - 74	240	6.3%
Age 75 - 84	162	4.3%
Age 85+	62	1.6%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

March 21, 2022

2010 Race and Ethnicity	Number	Percent
White Alone	69	1.8%
Black Alone	3,730	96.4%
American Indian Alone	5	0.1%
Asian Alone	2	0.1%
Pacific Islander Alone	3	0.1%
Some Other Race Alone	15	0.4%
Two or More Races	47	1.2%
Hispanic Origin (Any Race)	98	2.5%

2021 Race and Ethnicity	Number	Percent
White Alone	78	2.0%
Black Alone	3,644	95.4%
American Indian Alone	5	0.1%
Asian Alone	2	0.1%
Pacific Islander Alone	4	0.1%
Some Other Race Alone	21	0.5%
Two or More Races	65	1.7%
Hispanic Origin (Any Race)	122	3.2%

2026 Race and Ethnicity	Number	Percent
White Alone	77	2.0%
Black Alone	3,612	95.4%
American Indian Alone	5	0.1%
Asian Alone	2	0.1%
Pacific Islander Alone	4	0.1%
Some Other Race Alone	21	0.6%
Two or More Races	65	1.7%
Hispanic Origin (Any Race)	122	3.2%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

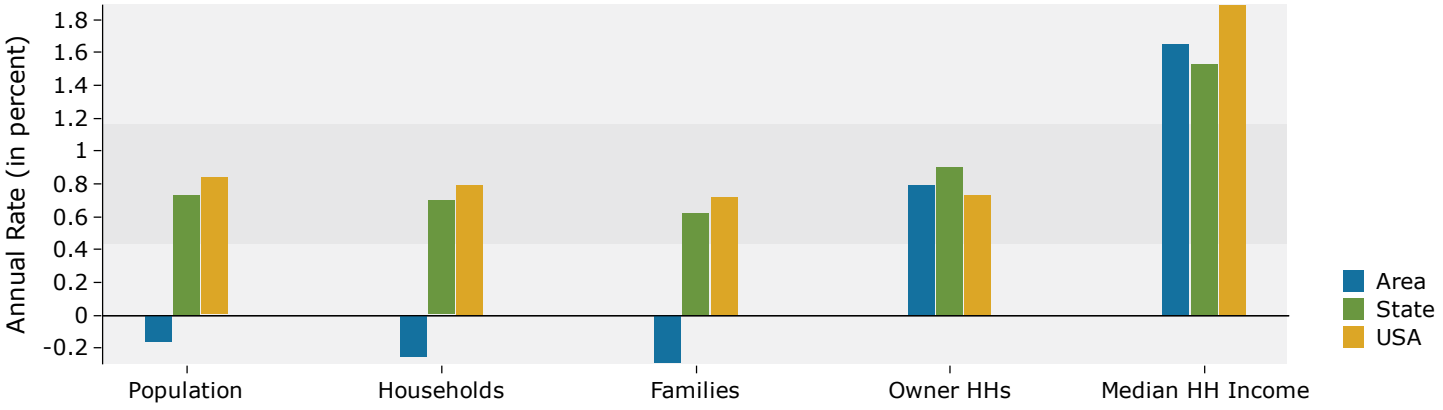
March 21, 2022

Demographic and Income Comparison Profile

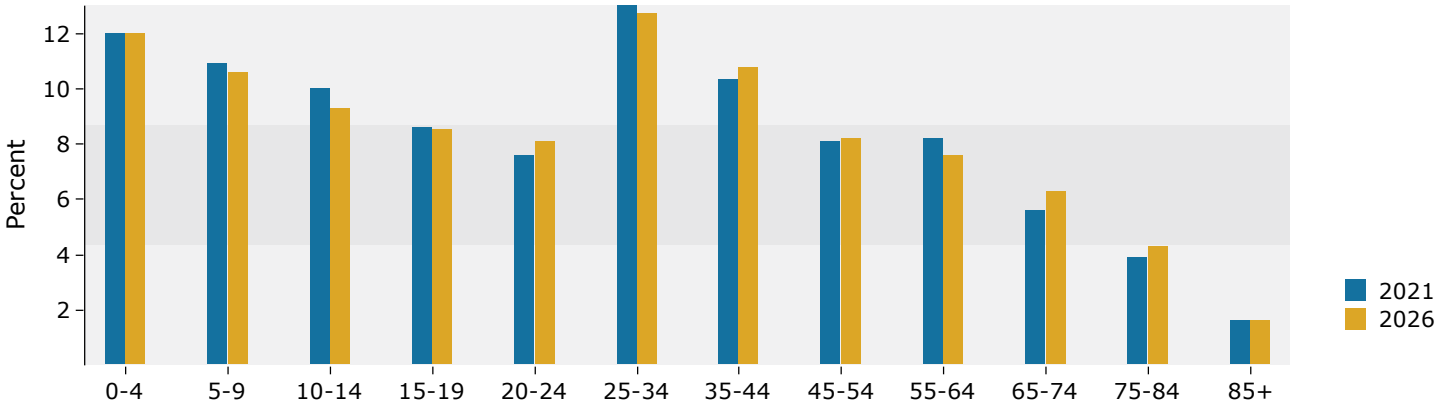
Tidewater Harbor Park Newton's Creek East
Area: 0.81 square miles

Prepared by Esri

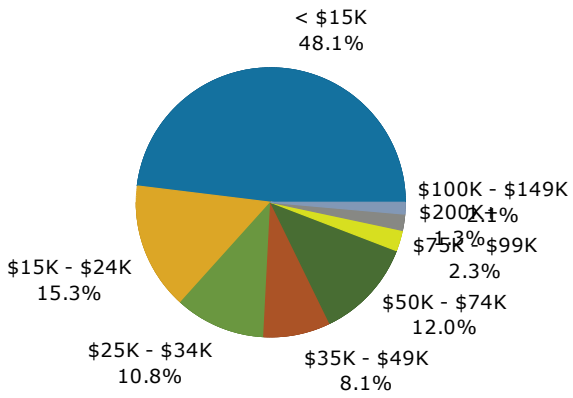
Trends 2021-2026



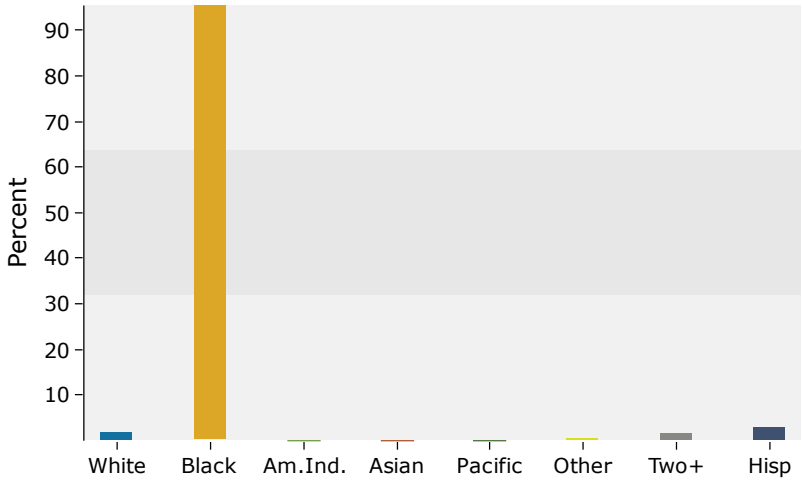
Population by Age



2021 Household Income



2021 Population by Race



Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026.

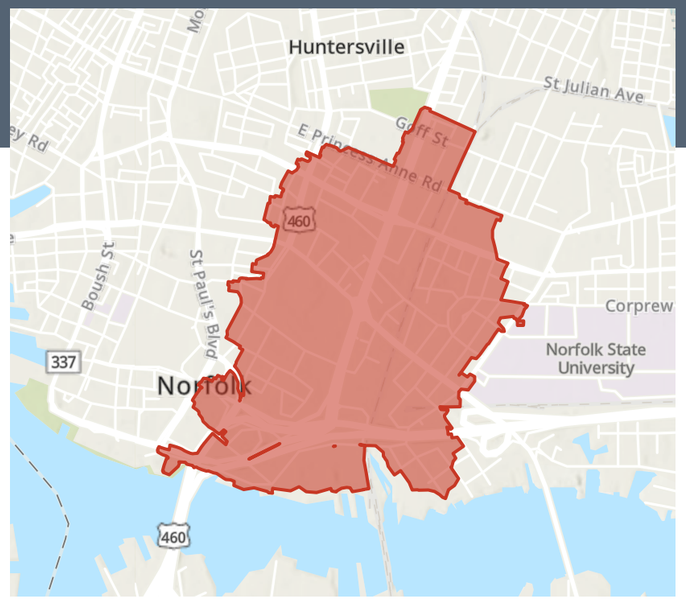
March 21, 2022

At Risk Population

Tidewater Harbor Park Newton's Creek East

Area: 0.81 square miles

City of Norfolk



AT RISK POPULATION PROFILE

Tidewater Harbor Park Newton's Creek East

Area: 0.81 square miles

3,818	1,303	2.77	25.6	$15,834	$222,321	22	43	15
Population	Households	Avg Size Household	Median Age	Median Household Income	Median Home Value	Wealth Index	Housing Affordability	Diversity Index

AT RISK POPULATION

516	424	694
Households With Disability	Population 65+	Households Without Vehicle

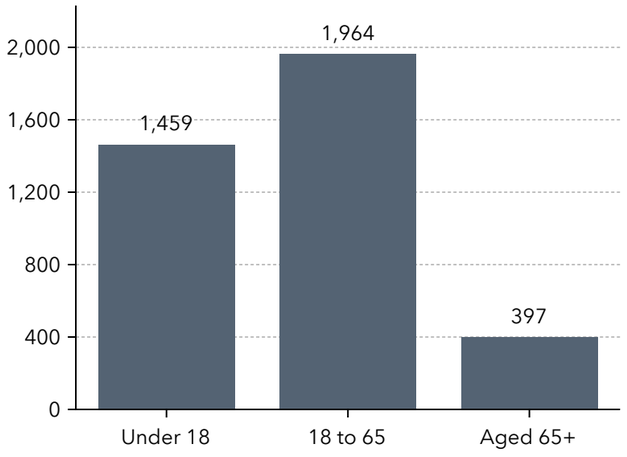
POVERTY AND LANGUAGE

54%	751	0
Households Below the Poverty Level	Households Below the Poverty Level	Pop 65+ Speak Spanish & No English

POPULATION AND BUSINESSES

4,610	139	2,497
Daytime Population	Total Businesses	Total Employees

POPULATION BY AGE



Language Spoken (ACS)	Age 5-17	18-64	Age 65+	Total
English Only	1,264	1,766	413	3,443
Spanish	27	171	0	198
Spanish & English Well	27	42	0	69
Spanish & English Not Well	0	129	0	129
Spanish & No English	0	0	0	0
Indo-European	0	2	5	7
Indo-European & English Well	0	2	5	7
Indo-European & English Not Well	0	0	0	0
Indo-European & No English	0	0	0	0
Asian-Pacific Island	0	0	0	0
Asian-Pacific Isl & English Well	0	0	0	0
Asian-Pacific Isl & English Not Well	0	0	0	0
Asian-Pacific Isl & No English	0	0	0	0
Other Language	0	31	0	31
Other Language & English Well	0	31	0	31
Other Language & English Not Well	0	0	0	0
Other Language & No English	0	0	0	0

Source: **Esri forecasts for 2021**, U.S. Census Bureau **2015-2019 American Community Survey** (ACS) Data,

Version 1.8 © 2022 Esri

Source: This infographic contains data provided by Esri, Esri, American Community Survey (ACS), Esri and Data Axle. The vintage of the data is 2021, 2026, 2015-2019, 2021.

Community Profile

Tidewater Harbor Park Newton's Creek East

Area: 0.81 square miles

City of Norfolk

COMMUNITY PROFILE

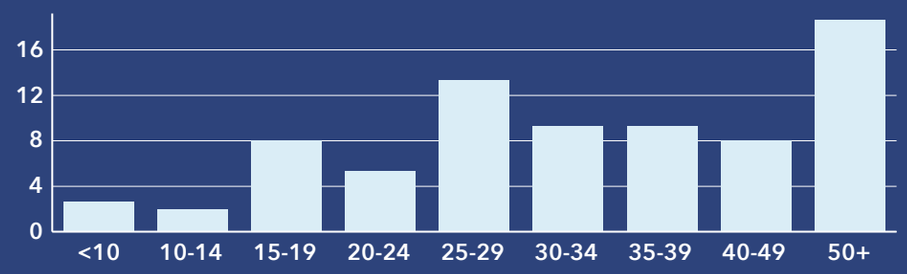
3,818	-0.1%	2.77	14.5	25.6	$15,834	$222,321	$9,541	38.2%	51.5%	8.8%
Population Total	Population Growth	Average HH Size	Diversity Index	Median Age	Median HH Income	Median Home Value	Median Net Worth	Under 18	Ages 18-65	Aged 66+

34.8% Services

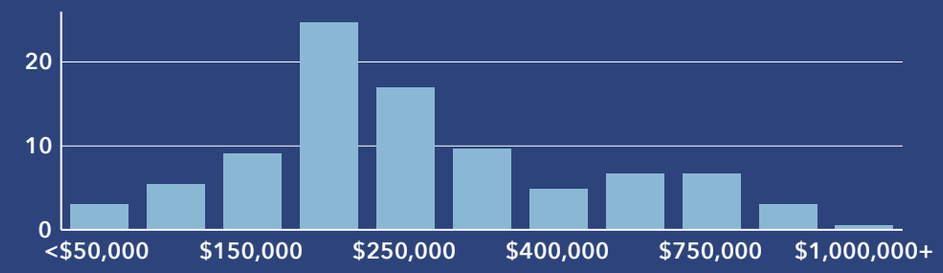
25.1% Blue Collar

40.1% White Collar

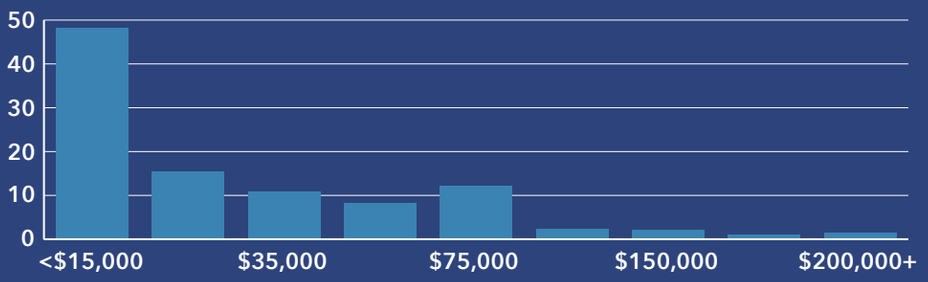
Mortgage as Percent of Salary



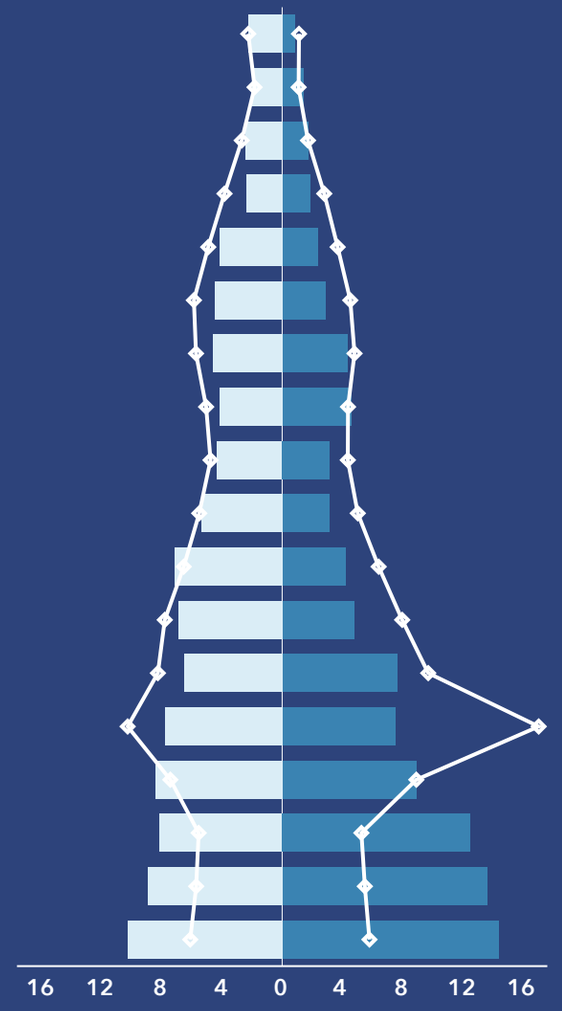
Home Value



Household Income

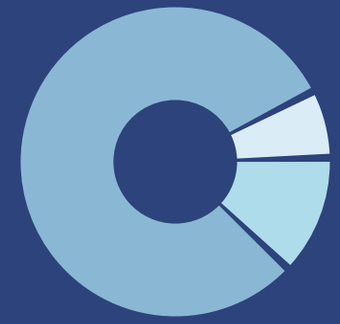


Age Profile: 5 Year Increments



Dots show comparison to Norfolk city

Home Ownership

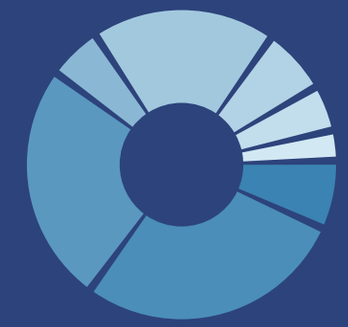


Owner Renter Vacant

Housing: Year Built

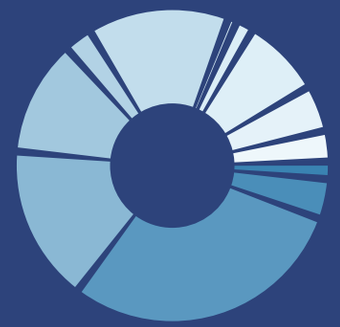
<1939 1940-49 1950-59
1960-69 1970-79 1980-89
1990-99 2000-09 2010-13
2014+

Educational Attainment



< 9th Grade No Diploma
HS Diploma GED
Some College Assoc Degree
Bach Degree Grad Degree

Commute Time: Minutes



< 5 5-9 10-14
15-19 20-24 25-29
30-34 35-39 40-44
45-59 60-89 90+

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2021 and 2026. Version 1.2

esri THE SCIENCE OF WHERE

Source: This infographic contains data provided by Esri, American Community Survey (ACS). The vintage of the data is 2021, 2015-2019, 2026.

Attachment D

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT CORPS OF ENGINEERS
FORT NORFOLK 803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

Executive Office

Dr. Larry Filer
City Manager
City of Norfolk
810 Union Street, Suite 1101
Norfolk, Virginia 23510

Subject: City of Norfolk Coastal Storm Risk Management (CSRM) Project

Dear Dr. Filer,

The purpose of this letter is to provide you and your staff an update on the Corps of Engineers funding plan for the City of Norfolk CSRM Project. The project has a total estimate of approximately $1.78 billion and would be cost shared between the Corps and the City at percentages of 65% Federal, 35% Non-Federal.

We are in the third year of the Preconstruction Engineering and Design (PED) phase, with a budget of $8.3 million. The Federal share of 65% is fully funded by allocations we have received to date of $5.4 million. The non-Federal (City) share of the PED phase is approximately $2.9 million.

As you know for the Construction phase, the project received approval for $399.3 million of Infrastructure Investment and Jobs Act (IIJA) funding, in the FY 2022, IIJA Construction Work Plan, copy attached. Last month the project received an initial allocation of $100,000 from the IIJA funding to support the transition to the construction phase. Receipt of the initial funding amount is a prerequisite for entering into the Project Partnership Agreement (PPA) between the Corps and the City. One of the important next steps is to develop the PPA.

While we continue to await IIJA program guidance that would address procedures for additional funding allocations, we do expect the IIJA program will be treated as a supplemental program, with funds managed by our Headquarters and issued to the Norfolk District on an as-needed basis. In this regard my staff will continue to work with the City staff to develop an appropriate Federal – Non-Federal multi-year funding schedule that will match the City's financial capabilities. The Federal – Non-Federal funding schedule will be a supporting document to the PPA package.

Please refer questions regarding the Norfolk CSRM project to Mr. Walter Trinkala, Project Manager, at (757) 201-7715 or email Walter.a.Trinkala@usace.army.mil.

Sincerely,

Digitally signed by Brian P. Hallberg
Date: 2022.04.03 22:57:22 -04'00'

BRIAN P. HALLBERG, PMP
Colonel, U.S. Army
Commanding

ARMY CIVIL WORKS PROGRAM
INFRASTRUCTURE INVESTMENT AND JOBS ACT, 2022
CONSTRUCTION SPEND PLAN - ADDENDUM

State	Division	Business Program 1/	Program Name	FY22	Summary of Work to Be Accomplished with Allocation	Addendum	Summary of Work to Be Accomplished with Allocation
NM	SPD	EI	RURAL ARIZONA, NEVADA, MONTANA, IDAHO, NEW MEXICO, UTAH, AND WYOMING, AZ, NV, MT, ID, NM, UT & WY	2,800,000	Remove debris and contaminants from storm flows and incorporated flood projection measures in Rio Rancho, NM.		
NM	SPD	EI	RURAL ARIZONA, NEVADA, MONTANA, IDAHO, NEW MEXICO, UTAH, AND WYOMING, AZ, NV, MT, ID, NM, UT & WY	1,500,000	Design and construct water tanks in the Village of Cuba, NM.		
NY	NAD	EI	NEW YORK CITY WATERSHED, NY	1,500,000	Execute PPAs to implement NYC Watershed Projects		
OH	LRD	FDRR	MAGNOLIA LEVEE, BOLIVAR DAM, OH			7,700,000	Initiate, physically complete and fiscally close out project
OH	LRD	EI	OHIO & NORTH DAKOTA ENVIRONMENTAL INFRASTRUCTURE, OH & ND (SECTION 594)			2,497,000	Execute and complete multiple Environmental Infrastructure projects in the State of Ohio
OH & ND	LRD	EI	OHIO & NORTH DAKOTA ENVIRONMENTAL INFRASTRUCTURE, OH & ND (SECTION 594)	7,000,000	Execute and complete multiple Environmental Infrastructure projects in the State of Ohio		
PA	LRD	EI	ALLEGHENY COUNTY, PA	3,358,000	Sec 313 - Allegheny County - ALCOSAN - Spring Garden Sewershed 1 of 3		
PA	LRD	NIH	UPPER OHIO, ALLEGHENY AND BEAVER COUNTIES, PA	857,708,000	Phyically complete all construction work at Montgomery Lock and Dam	77,000,000	Design and physically complete construction at Emsworth Lock and Dam
PR	SAD	AER	CANO MARTIN PENA ECOSYSTEM RESTORATION, PR	163,287,000	Physically complete and fiscally close out project.		
PR	SAD	NHD	SAN JUAN HARBOR IMPROVEMENT, PR	45,561,000	Initiate, physically complete and fiscally close out project.		
SC	SAD	EI	ENV INFRASTRUCTURE SPRING ST/FISHBURNE ST DRAINAGE, CHARLESTON, SC			4,000,000	Initiate the implement stormwater control measures and storm sewer improvements at the Spring Street/Fishburne Street drainage project in Charleston, South Carolina.
TX	SPD	EI	EL PASO COUNTY, TX (SEC 219)	3,825,000	Construction for the Clardy Fox Pump Station		
TX	SPD	EI	EL PASO COUNTY, TX (SEC 219)	4,050,000	Design and Construction of Northgate Diversion Channel		
TX	SWD	NHD	BRAZOS ISLAND HARBOR, TX			68,000,000	Initiate, physically complete, and fiscally closeout the construction project.
TX	SWD	FDRR	CENTRAL CITY, UPPER TRINITY RIVER, TX	403,000,000	Complete design and award first construction contract		
TX	SWD	NHD	GALVESTON HARBOR CHANNEL EXTENSION, HOUSTON - GALVESTON NAVIGATION CHANNELS, TX			10,781,000	Initiate, physically complete, and fiscally closeout the construction project.
TX	SWD	NHD	HOUSTON SHIP CHANNEL, TX	142,515,000	Initiate and complete construction of Segment 3 - Barbour's Cut Channel		
TX	SWD	EI	WATERLOO GREENWAY PO (CREEK DELTA), TX	2,500,000	Waterloo Greenway PO (Creek Delta) Construction		
TX	SWD	EI	WATERLOO GREENWAY PO (CREEK DELTA), TX			6,525,000	Waterloo Greenway PO (Creek Delta) Construction
TX	SWD	AER	WESTSIDE CREEKS ECOSYSYSTEM RESTORATION, SAN ANTONIO, TX	75,042,000	Initiate, physically complete, and fiscally closeout the construction project, including all future monitoring and adaptive management.		
UT	SPD	EI	RURAL ARIZONA, NEVADA, MONTANA, IDAHO, NEW MEXICO, UTAH, AND WYOMING, AZ, NV, MT, ID, NM, UT & WY	50,000	Upgrade well house for safety complianced in Southbear Lake, UT		
VA	LRD	EI	EASTERN SHORE AND SOUTHWEST VIRGINIA, VA	281,295	Complete Design		
VA	LRD	EI	EASTERN SHORE AND SOUTHWEST VIRGINIA, VA	2,200,000	Initiate Construction of Wastewater Infrastructure Plan		
VA	NAD	FDRC	CITY OF NORFOLK, VA	249,331,000	Complete Plans and Specs for the project and initiate construction of the project.	150,000,000	Funding would be used for the remaining segments of phase 1, the downtown Norfolk to Ghent floodwalls with gates at The Hague, for continuing designs for phases within other portions of the city, and starting on the non-structural flood neighbor components of the project.
VA	NAD	NHD	NORFOLK HARBOR AND CHANNELS, VA (DEEPENING)	69,331,000	Physically complete and fiscally close out project.	72,371,000	Physically complete and fiscally close the project to include the dredging of Meeting Area #1 widener at Thimble Shoal Channel West ($40M) and complete the remaining features of the project ($32.371M), including the Atlantic Ocean Channel and Channel to Newport News.
VI	SAD	FDRR	SAVAN GUT PHASE II, ST. THOMAS, VI	51,710,000	Initiate, physically complete and fiscally close out project.		
VT	NAD	EI	LAKE CHAMPLAIN WATERSHED INITIATE,VT	250,000	Lake Champlain Sec 542 Projects- General Management		
WA	NWD	AER	COLUMBIA RIVER FISH MITIGATION, WA, OR & ID	36,016,000	Fund the highest priority work as determined the expert panel established in response to the Sept 1, 2021 interim injunction order, in the effort to yield a no jeapordy opinion for Chinook salmon and Steelhead.		
WA	NWD	FDRR	HOWARD HANSON DAM, WA			220,000,000	Complete PED and initiate construction.
WI	LRD	EI	NORTHERN WISCONSIN ENVIRONMENTAL ASSISTANCE, WI	450,000	Continue City of Superior - Hill Avenue Interceptor Rehabilitation Project		
WI	LRD	EI	NORTHERN WISCONSIN ENVIRONMENTAL ASSISTANCE, WI	625,000	Continue City of Bayfield - Apostle Islands Marina Breakwall Restoration Project		

Attachment E

Matthew J. Strickler
Secretary of Natural and Historic Resources and Chief Resilience Officer

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

Rochelle Altholz
Deputy Director of Administration and Finance

Nathan Burrell
Deputy Director of Government and Community Relations

Darryl M. Glover
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith
Deputy Director of Operations

August 9, 2021

Matt Simons, AICP CZA CFM
Principal Planner and Floodplain Administrator
Department of Planning and Community Development
810 Union St, Suite 508
Norfolk, VA 23510

RE: City of Norfolk Resilience Plan Second Submission - CFPF

Dear Mr. Simons:

Thank you for providing an overview of your Resilience Plan, and informing DCR of the various plans that the City of Norfolk will be utilizing to fulfill the Resilience Plan submission requirements. After careful review and consideration, the Virginia Department of Conservation and Recreation has deemed the Plan complete and meets all the criteria outlined in the June 2021 Community Flood Preparedness Grant Manual. This approval will remain in effect for a period of three years, ending on August 8, 2024.

The following elements were evaluated as part of this review:

1. **Element 1: It is project-based with projects focused on flood control and resilience. DCR RESPONSE**

    a. Project-based: Nine watersheds—each with a defined geographic area, analysis of community social and environmental characteristics, types of flooding, and a tailored flood resilience strategy divided into 15 project areas, each with discrete projects identified.

    b. Projects focused on flood control and resilience included city-wide and various coastal projects and a specific project in Chesterfield Heights.

2. **Element 2: It incorporates nature-based infrastructure to the maximum extent possible. DCR RESPONSE**

    a. Natural and nature-based flood management measures are identified for use in projects throughout the city in the *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*, the *Combined Coastal and Precipitation Flooding Master Plan*, the *Hampton Roads Mitigation Plan* and *A Green Infrastructure Plan for Norfolk: Building Resilient Communities*.

3. **Element 3: It includes considerations of all parts of a locality regardless of socioeconomics or race. DCR RESPONSE**

    a. All parts of a locality: Locality divided into 9 watersheds, with 90 planning districts covering the entirety of the jurisdictional boundary.

    b. Social vulnerability: Social implications of flood hazards and analysis of populations at-risk documented in the USACE *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*, the *Combined Coastal and Precipitation Flooding Master Plan* and in *PlaNorfolk 2030*.

    c. Demographic Analysis: Demographic Analysis conducted by USACE, utilizing U.S. Census Bureau, Bureau of Labor and Statistics, Virginia Employment Commision, and other information from local planning agencies, and incorporated into the *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*.

4. **Element 4: It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation. DCR RESPONSE**

    a. Coordination with other projects, plans, and activities: Contains the planning processes and frameworks which outline local and regional plans used by the City and address resilience; and how they have been integrated for flood adaptation planning.

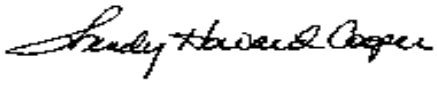
    b. Clearly articulated timeline or phasing for plan implementation: 5 year timeline presented in the *Combined Coastal and Precipitation Flooding Master Plan*. Phased time-line for completion found within *PlaNorfolk 2030, Vision2100*, and *A Green Infrastructure Plan for Norfolk: Building Resilient Communities*. Phased approach for project implementation contained within the Fugro Atlantic *Norfolk Preliminary City-wide Coastal Flooding Mitigation Concept Evaluation and Master Plan Development*. Program phases clearly articulated and an impact statement completed in USACE *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*.

5. **Element 5: Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.**

    a. Technically backed water-resources analysis, sea level rise projections, storm surge, and climate change incorporated into the strategic approach presented in the *Hampton Roads Hazard Mitigation Plan*, the *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study / Environmental Impact Statement*.

VA DCR looks forward to working with you as you work to make the City of Norfolk a more resilient community. If you have questions or need additional assistance, please contact us at cfpf@dcr.virginia.gov. Again, thank you for your interest in the Community Flood Preparedness Fund.

Sincerely,



Wendy Howard Cooper, Director
Dam Safety and Floodplain Management

cc: Darryl Glover, DCR

Resilience Planning Overview for the City of Norfolk

In response to the resilience planning requirements of the **Community Flood Preparedness Fund** ("the CFPF" or "Fund") outlined within the 2021 CFPF Grant Manual (Appendix G: Elements of Resilience Plans), the City of Norfolk ("the City") has prepared the following Resilience Planning Overview of formal and relevant plans utilized for resilience planning efforts by the City to prioritize potential projects and to assist the City is its efforts to secure funding for such critical resilience plans, studies and projects.

The **Elements of Resilience Plans** taken from Appendix G of the 2021 CFPF Grant Manual, from which communities are expected to highlight the stated resilience planning contents as they related to CFPF grant applications, are as follows:

1. *It is project-based with projects focused on flood control and resilience.*
2. *It incorporates nature-based infrastructure to the maximum extent possible.*
3. *It includes considerations of all parts of a locality regardless of socioeconomics or race.*
4. *It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation.*
5. *Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.*

Norfolk's resilience planning elements are not contained within an adopted "stand alone" plan. However, Norfolk's utilizes various plans within a resilience repertoire, which altogether serve multiple needs for various audiences; from technical to public-facing to operational. This Resilience Planning Overview will expressly identify to the grant reviewer, and to the public, how various resilience planning documents of the City of Norfolk satisfy all the CFPF Resilience Plan elements.

The following plans for the City of Norfolk will contribute to this Resilience Planning Overview:

- ***plaNorfolk2030*** (2013, as amended)
- ***Vision2100*** (2016)
- ***Hampton Roads Hazard Mitigation Plan*** (2017)
- ***Combined Coastal and Precipitation Flooding Master Plan*** (2017)
    - Appendix A: ***Norfolk Preliminary City-wide Coastal Flooding Mitigation Concept Evaluation and Master Plan Development*** **(Fugro Atlantic)**
    - Appendix B: ***City-wide Drainage and Watershed Master Plan*** **(Timmons Group)**
- ***A Green Infrastructure Plan for Norfolk*** (2018, as amended)
- ***USACE Coastal Storm Risk Management (CSRM) Feasibility Study and Environmental Impact Statement*** (2019)
- ***Zoning Ordinance of the City of Norfolk*** (2018, as amended)
- ***Development of an Urban Resilience Analysis Framework with Application to Norfolk, VA*** (2016)

Responses are provided below in red based on the various Norfolk plans for the following example resilience elements outlined in Appendix G of the 2021 CFPF Grant Manual:

- ***Equity based strategic polices for local government-wide flood protection and prevention.***
  The ***Hampton Roads Hazard Mitigation Plan*** recommends the highest priority of protection to be reserved towards protection projects for severe repetitive loss areas (Mitigation Actions 8 &

11) in Norfolk. Research in Norfolk has shown that these areas are often places where the most vulnerable residents are housed.

Additionally, Mitigation Action 12 recommends Norfolk begin risk/hazard mitigation efforts equitably by first implementing a major flood control project within the historically black community of Chesterfield Heights; implementation of a $112M HUD project awarded through the National Disaster Resilience Competition (construction currently underway).

- **Proposed projects that enables communities to adapt to and thrive through natural or human hazards.**
  The ***Combined Coastal and Precipitation Flooding Master Plan*** (Norfolk's "Flooding Master Plan") is based on a major multi-year study effort supported by technical analyses and recommendations from Fugro Atlantic within the ***Norfolk Preliminary City-wide Coastal Flooding Mitigation Concept Evaluation and Master Plan Development*** (the "Fugro report"). The Flooding Master Plan is also supporting by a thorough analysis and priority ranking technical guide of the City's drainage conveyance system, ***City-wide Drainage and Watershed Master Plan*** by Timmons Group.

  Together, with this technical supporting documentation, the Flooding Master Plan provides the framework for Norfolk to intelligently review and prioritize flood protections project to enable Norfolk to adapt and thrive to current and future flood threats.

- **Documentation of existing social, economic, natural, and other conditions present in the local government.**
  Sandia National Laboratories provided an analysis framework (***Development of an Urban Resilience Analysis Framework with Application to Norfolk, VA***) for conceptualizing the resilience needs for Norfolk, including vulnerability assessments for critical infrastructure with the context of local economic and logistical impacts. The findings of which have been incorporated into other resiliency plans such as the USACE Coastal Storm Risk Management Study.

  The ***USACE Coastal Storm Risk Management*** **(CSRM)** ***Feasibility Study and Environmental Impact Statement*** presents a robust analysis of the best recommendations for City-wide flood protection measures for the City of Norfolk. This report includes 10% engineered designs for the various flood protection measures recommended throughout the entire community, and a preliminary Environmental Impact Statement is included outlining the existing social, economic, natural conditions, vulnerabilities and stressors within the natural and social environment, as well as proposed impacts. See the various CSRM appendices for these detailed conditions and impact reports.

- **Review of the vulnerabilities and stressors, both natural and social in the local government.**
  See CSRM comment above. Additional overview of the vulnerabilities and stressors can be found in the ***Hampton Roads Hazard Mitigation Plan***.

- **Forward-looking goals, actionable strategies, and priorities through as seen through an equity-based lens.**
  Norfolk remains committed to presenting all action plans through an equity-based lens, as found within the actionable strategies of ***A Green Infrastructure Plan for Norfolk*** and the ***Hampton Roads Hazard Mitigation Plan***. Both plans are tactical, and recommendation are based on a 5-year forward-looking outlay. Recommendations of the Fugro report are based on a 50-year outlay, and recommendations of ***Vision2100*** geared towards the year 2100.

- **Strategies that guides growth and development away from high-risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government.**
  Vision2100 is serves a land use guide for the City. The plan divides Norfolk up into four main areas by which the City will focus new investments and make necessary steps to prepare for a changing environment:
  - ✓ Purple: Low Flood Risk / Low Degree of Civic Assets: Establishing Neighborhoods of the Future
  - ✓ Green: Low Flood Risk / High Degree of Civic Assets: Designing New Urban Centers
  - ✓ Yellow: High Flood Risk / Low Degree of Civic Assets: Adapting to Rising Waters
  - ✓ Red: High Flood Risk / High Degree of Civic Assets: Enhancing Economic Engines (protect!)

- **Proposed acquisition of land or conservation easements or identification of areas suitable for conservation particularly areas identified as having high flood attenuation benefit by *ConserveVirginia* or similar data driven tools.**
  Vision2100 provides the framework for selecting the areas suitable for conservation easements. The ***Norfolk Zoning Ordinance*** provides the mechanism for purchasing land conservation easement credits from the Coastal Resilience Overlay through transferring Resilient Quotient points to the Upland Resilience Overlay (requires extinguishment of a density unit – developable dwelling unit). The conservation easement, while recorded on the deed and kept on file with the Planning Department, can be held by the property owner, the Zoning Ordinance also permits it to be placed in a land trust.

- **Identification of areas suitable for property buyouts in frequently flooded areas.**
  See ***Vision2100*** "Yellow" areas (High Flood Risk / Low Degree of Civic Assets: Adapting to Rising Waters) and Coastal Resilient Overlay areas on the Norfolk Zoning Map.

- **Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.**
  A list of all critical facilities is contained within the *Norfolk Emergency Operations Manual* (2020). See Mitigation Action 5 from ***Hampton Roads Hazard Mitigation Plan***: "Purchase and install generators or other continuous power sources for critical facilities and infrastructure. This action may include, but is not limited to pump stations, EOC (Emergency Operations Center), shelters, underpasses and important traffic signals." The critical facilities list is available upon request.

- **Identified ecosystems/wetlands/floodplains suitable for permanent protection.**
  See ***A Green Infrastructure Plan for Norfolk***, this includes an *Action Plan Appendix for Threatened and Endangered Species* within critical floodplain habitats, as well as a detailed ecological inventory with recommendations for floodplain protection measures within an connected open space corridor network.

- **Identified incentives for restoring riparian and wetland vegetation.**
  - The City's Public Works Division of Stormwater Management offers the **Stormwater Fee Reduction Program** for homeowners and businesses who opt to implement water quality improvements on their private property including riparian buffer and shoreline management improvement.
  - **Environmental Conservation Consulting** – Norfolk annually funds a contract to coordinate with residential property owners for implementation of water quality improvements on their private property including riparian buffer and shoreline management improvement through a cost-share program. Property owners get a percentage of the project paid through the contractor via the Environmental Conservation Consulting services contract.
  - Norfolk regularly applies for grants to partner with community organizations for implementation of green infrastructure of public lands – projects are reviewed by the **Watershed Management Task Force** to ensure that projects are furthering the goals and objectives of the adopted ***Green Infrastructure Plan for Norfolk***.

- **A framework for implementation, capacity building and community engagement.**
  The **Watershed Management Task Force** and the recently created Program for Public Information committee are two groups made up of joint staff/citizen/technical expert members, which collectively drive the City's ongoing programing for green infrastructure projects and flood mitigation messaging. Capital Improvement Project funding recommendations from the ***Green Infrastructure Plan for Norfolk*** are also reviewed monthly by the Watershed Management Task Force.

- **Strategies for creating knowledgeable, inclusive community leaders and networks.**
  The 12-member Norfolk Coastal Management Review Board (CMRB) provides recommendations to the 7-member Erosion Advisory Commission, which is partially comprised of members of the CMRB. The CMRB is made up of elected leaders, civic league presidents/community leaders and technical experts from the Virginia Institute of Marine Science, Virginia Marine Resources Commission, Army Corp of Engineers, Old Dominion University Department of Ocean, Earth and Atmospheric Sciences, and city technical staff, providing workshops, seminars and project assessments of coastal mitigation and erosion projects; specifically intended to build grassroots technical capabilities and citizen champions within the community. The Norfolk CMRB and Erosion Advisory Commission is established by City Code and guided by the City's adopted Sand Management Plan.

- **A community dam safety inventory and risk assessment posed by the location and condition of dams.**
  Not applicable in Norfolk – not at dam risk.

- **A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather.**
  This general characterization is well documented within the general/comprehensive plan for the City of Norfolk – ***plaNorfolk2030***. This includes dozens of resiliency recommendations for flood risk reduction and communication.

- **Strategies to address other natural hazards that would cause, affect or result from flooding events including:**
  - **Earthquakes.**
  - **Storage of hazardous materials**
  - **Landslides/mud/debris flow/rock falls.**
  - **Prevention of wildfires that would result in denuded lands making flooding, mudslides or similar events more likely.**
  - **Preparations for severe weather events including tropical storms or other severe storms, including winter storms.**

  The ***Hampton Roads Hazard Mitigation Plan*** is a FEMA-accredited all-hazards plan.

Attachment F

ARMY CIVIL WORKS PROGRAM
INFRASTRUCTURE INVESTMENT AND JOBS ACT, 2022
CONSTRUCTION SPEND PLAN - ADDENDUM

State	Division	Business Program 1/	Program Name	FY22	Summary of Work to Be Accomplished with Allocation	Addendum	Summary of Work to Be Accomplished with Allocation
NM	SPD	EI	RURAL ARIZONA, NEVADA, MONTANA, IDAHO, NEW MEXICO, UTAH, AND WYOMING, AZ, NV, MT, ID, NM, UT & WY	2,800,000	Remove debris and contaminants from storm flows and incorporated flood projection measures in Rio Rancho, NM.		
NM	SPD	EI	RURAL ARIZONA, NEVADA, MONTANA, IDAHO, NEW MEXICO, UTAH, AND WYOMING, AZ, NV, MT, ID, NM, UT & WY	1,500,000	Design and construct water tanks in the Village of Cuba, NM.		
NY	NAD	EI	NEW YORK CITY WATERSHED, NY	1,500,000	Execute PPAs to implement NYC Watershed Projects		
OH	LRD	FDRR	MAGNOLIA LEVEE, BOLIVAR DAM, OH			7,700,000	Initiate, physically complete and fiscally close out project
OH	LRD	EI	OHIO & NORTH DAKOTA ENVIRONMENTAL INFRASTRUCTURE, OH & ND (SECTION 594)			2,497,000	Execute and complete multiple Environmental Infrastructure projects in the State of Ohio
OH & ND	LRD	EI	OHIO & NORTH DAKOTA ENVIRONMENTAL INFRASTRUCTURE, OH & ND (SECTION 594)	7,000,000	Execute and complete multiple Environmental Infrastructure projects in the State of Ohio		
PA	LRD	EI	ALLEGHENY COUNTY, PA	3,358,000	Sec 313 - Allegheny County - ALCOSAN - Spring Garden Sewershed 1 of 3		
PA	LRD	NIH	UPPER OHIO, ALLEGHENY AND BEAVER COUNTIES, PA	857,708,000	Phyically complete all construction work at Montgomery Lock and Dam	77,000,000	Design and physically complete construction at Emsworth Lock and Dam
PR	SAD	AER	CANO MARTIN PENA ECOSYSTEM RESTORATION, PR	163,287,000	Physically complete and fiscally close out project.		
PR	SAD	NHD	SAN JUAN HARBOR IMPROVEMENT, PR	45,561,000	Initiate, physically complete and fiscally close out project.		
SC	SAD	EI	ENV INFRASTRUCTURE SPRING ST/FISHBURNE ST DRAINAGE, CHARLESTON, SC			4,000,000	Initiate the implement stormwater control measures and storm sewer improvements at the Spring Street/Fishburne Street drainage project in Charleston, South Carolina.
TX	SPD	EI	EL PASO COUNTY, TX (SEC 219)	3,825,000	Construction for the Clardy Fox Pump Station		
TX	SPD	EI	EL PASO COUNTY, TX (SEC 219)	4,050,000	Design and Construction of Northgate Diversion Channel		
TX	SWD	NHD	BRAZOS ISLAND HARBOR, TX			68,000,000	Initiate, physically complete, and fiscally closeout the construction project.
TX	SWD	FDRR	CENTRAL CITY, UPPER TRINITY RIVER, TX	403,000,000	Complete design and award first construction contract		
TX	SWD	NHD	GALVESTON HARBOR CHANNEL EXTENSION, HOUSTON - GALVESTON NAVIGATION CHANNELS, TX			10,781,000	Initiate, physically complete, and fiscally closeout the construction project.
TX	SWD	NHD	HOUSTON SHIP CHANNEL, TX	142,515,000	Initiate and complete construction of Segment 3 - Barbour's Cut Channel		
TX	SWD	EI	WATERLOO GREENWAY PO (CREEK DELTA), TX	2,500,000	Waterloo Greenway PO (Creek Delta) Construction		
TX	SWD	EI	WATERLOO GREENWAY PO (CREEK DELTA), TX			6,525,000	Waterloo Greenway PO (Creek Delta) Construction
TX	SWD	AER	WESTSIDE CREEKS ECOSYSYSTEM RESTORATION, SAN ANTONIO, TX	75,042,000	Initiate, physically complete, and fiscally closeout the construction project, including all future monitoring and adaptive management.		
UT	SPD	EI	RURAL ARIZONA, NEVADA, MONTANA, IDAHO, NEW MEXICO, UTAH, AND WYOMING, AZ, NV, MT, ID, NM, UT & WY	50,000	Upgrade well house for safety complianced in Southbear Lake, UT		
VA	LRD	EI	EASTERN SHORE AND SOUTHWEST VIRGINIA, VA	281,295	Complete Design		
VA	LRD	EI	EASTERN SHORE AND SOUTHWEST VIRGINIA, VA	2,200,000	Initiate Construction of Wastewater Infrastructure Plan		
VA	NAD	FDRC	CITY OF NORFOLK, VA	249,331,000	Complete Plans and Specs for the project and initiate construction of the project.	150,000,000	Funding would be used for the remaining segments of phase 1, the downtown Norfolk to Ghent floodwalls with gates at The Hague, for continuing designs for phases within other portions of the city, and starting on the non-structural flood neighbor components of the project.
VA	NAD	NHD	NORFOLK HARBOR AND CHANNELS, VA (DEEPENING)	69,331,000	Physically complete and fiscally close out project.	72,371,000	Physically complete and fiscally close the project to include the dredging of Meeting Area #1 widener at Thimble Shoal Channel West ($40M) and complete the remaining features of the project ($32.371M), including the Atlantic Ocean Channel and Channel to Newport News.
VI	SAD	FDRR	SAVAN GUT PHASE II, ST. THOMAS, VI	51,710,000	Initiate, physically complete and fiscally close out project.		
VT	NAD	EI	LAKE CHAMPLAIN WATERSHED INITIATE,VT	250,000	Lake Champlain Sec 542 Projects- General Management		
WA	NWD	AER	COLUMBIA RIVER FISH MITIGATION, WA, OR & ID	36,016,000	Fund the highest priority work as determined the expert panel established in response to the Sept 1, 2021 interim injunction order, in the effort to yield a no jeapordy opinion for Chinook salmon and Steelhead.		
WA	NWD	FDRR	HOWARD HANSON DAM, WA			220,000,000	Complete PED and initiate construction.
WI	LRD	EI	NORTHERN WISCONSIN ENVIRONMENTAL ASSISTANCE, WI	450,000	Continue City of Superior - Hill Avenue Interceptor Rehabilitation Project		
WI	LRD	EI	NORTHERN WISCONSIN ENVIRONMENTAL ASSISTANCE, WI	625,000	Continue City of Bayfield - Apostle Islands Marina Breakwall Restoration Project		

Appendix D: Checklist All Categories

Scope of Work Narrative	
Supporting Documentation	**Included**
Detailed map of the project area(s) (Projects/Studies)	☑ Yes □ No □ N/A
FIRMette of the project area(s) (Projects/Studies)	☑ Yes □ No □ N/A
Historic flood damage data and/or images (Projects/Studies)	☑ Yes □ No □ N/A
A link to or a copy of the current floodplain ordinance	☑ Yes □ No □ N/A
Non-Fund financed maintenance and management plan for project extending a minimum of 5 years from project close	☑ Yes □ No □ N/A
A link to or a copy of the current hazard mitigation plan	☑ Yes □ No □ N/A
A link to or a copy of the current comprehensive plan	☑ Yes □ No □ N/A
Social vulnerability index score(s) for the project area from ADAPT VA's Virginia Vulnerability Viewer	☑ Yes □ No □ N/A
If applicant is not a town, city, or county, letters of support from affected communities	□ Yes □ No ☑ N/A
Completed Scoring Criteria Sheet in Appendix B, C, or D	☑ Yes □ No □ N/A
Budget Narrative	
Supporting Documentation	**Included**
Authorization to request funding from the Fund from governing body or chief executive of the local government	☑ Yes □ No □ N/A
Signed pledge agreement from each contributing organization	☑ Yes □ No □ N/A

Required & Supporting Documents: Links

FIRM Maps: https://drive.google.com/drive/folders/1zISYqMWhmwSFTz1-5gWA61RVpD1GRy45?usp=sharing

USACE/City of Norfolk Project Maintenance Plan (Final Coastal Storm Risk Management Report): https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/8557

Moffatt & Nichol Downtown to Harbor Park Interior Drainage Hydrology & Hydraulic Analysis: https://drive.google.com/file/d/1JEzcGsRmS5ztu4v3-K6YXCPOkYVce7az/view?usp=sharing

St. Paul's Blue-Greenway Synthesis Document: https://drive.google.com/file/d/1pWfcUOUWzgMh9aDKC9_GdzcJ5QMcE8YD/view?usp=sharing

Comprehensive Plan (plaNorfolk2030): https://www.norfolk.gov/DocumentCenter/View/2483

Vision2100: https://www.norfolk.gov/DocumentCenter/View/27768

Hampton Roads Hazard Mitigation Plan: https://www.hrpdcva.gov/library/view/620/2017-hampton-roads-hazard-mitigation-plan-and-appendices/

Norfolk Floodplain Ordinance: https://www.norfolkva.gov/norfolkzoningordinance/#Norfolk-ZO/3_9_Overlay_Districts_and_Designations.htm#_Toc502655724?TocPath=Article%25203%253A%2520Zoning%2520Districts%257C3.9%2520Overlay%2520Districts%2520and%2520Designations%257C_____7

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THE CITY OF NORFOLK

DOCUMENT TRANSMITTAL FORM

Use for All City Documents Which Require the City Manager's Staff Approval

DS AMS

For CM Office use only:
DTS # _____

*** PLEASE INDICATE IF THERE IS A LEGITIMATE DUE DATE BY WHICH THE CITY MANAGER MUST RESPOND *** **Due Date: ____4/8/2022__ Return Completed Document To: __Stephanie Daniel, Office of Resilience_**	
DEPARTMENT	Resilience & Stormwater
A. TO BE COMPLETED FOR CONTRACTS, AGREEMENTS, RFPS, AND GRANTS:	
TITLE	DCR Community Flood Preparedness April 2022 Application (2 applications): Riverside Memorial Park Project and USACE Floodwall Project
PARTY (Company and principal's names with which the City is entering into the agreement.)	Virginia Department of Conservation and Recreation (DCR)
EFFECTIVE DATES (Start & end dates)	Upon award with 36-month performance period
TOTAL DOLLAR VALUE	**Riverside Memorial Park Project:** $1,900,000 ($1,520,000 grant request; $380,000 match) **USACE Floodwall Project:** $160,731,286 ($28,127,975 grant request; local match of $28,127,975 and federal match of $104,475,336)
FUNDING SOURCE (Operating or capital budget; budget year; grant or other source. Show account information)	**RIVERSIDE MEMORIAL PARK PROJECT FUNDING SOURCE:** STORMWATER **ACCOUNT:** 2300 35 4305 5583 FY23 ($380,000 for Riverside Memorial Park Project) **USACE FLOODWALL MATCH:** FY23 CIP Funding $28,127,975 and federal match of $104,475,336
TYPE (New or extension)	New Grant Application
SUMMARY OF SCOPE OF SERVICE/ PROGRAM	The City is applying for funds to support the City's USACE Floodwall Project Federal Authorization (Resilience) match requirement and for a project to support shoreline work at Riverside Memorial Park (Stormwater).
CALL OUTS (Indicate any unique circumstances regarding provisions such as procurement protest pending, emergency purchase or other time sensitivity, so forth, along with any other pertinent information)	The grant submission package is due electronically to DCR by 4/8/22 by 4pm EST.
B. TO BE COMPLETED FOR HUMAN RESOURCES DOCUMENTS:	
TYPE OF DOCUMENT:	N/A
BRIEF DESCRIPTION: N/A	

Certificate of Satisfaction: *I (We) hereby certify that all reasonable due diligence has been performed to sufficiently develop the contents and implications of the attached document in a manner to protect and account to the public.* ***Further, all City policies and procedures have been adhered to and therefore, I (we) recommend the City Manager execute this document.***

Justin Shaw 4/4/22
Document Owner Date

DocuSigned by: Richard Broad 4/5/2022 | 8:57 AM EDT
EB3D3D3E47F1434...
Department Head Signature Date

Matt Simons 4/4/22
Document Owner Date

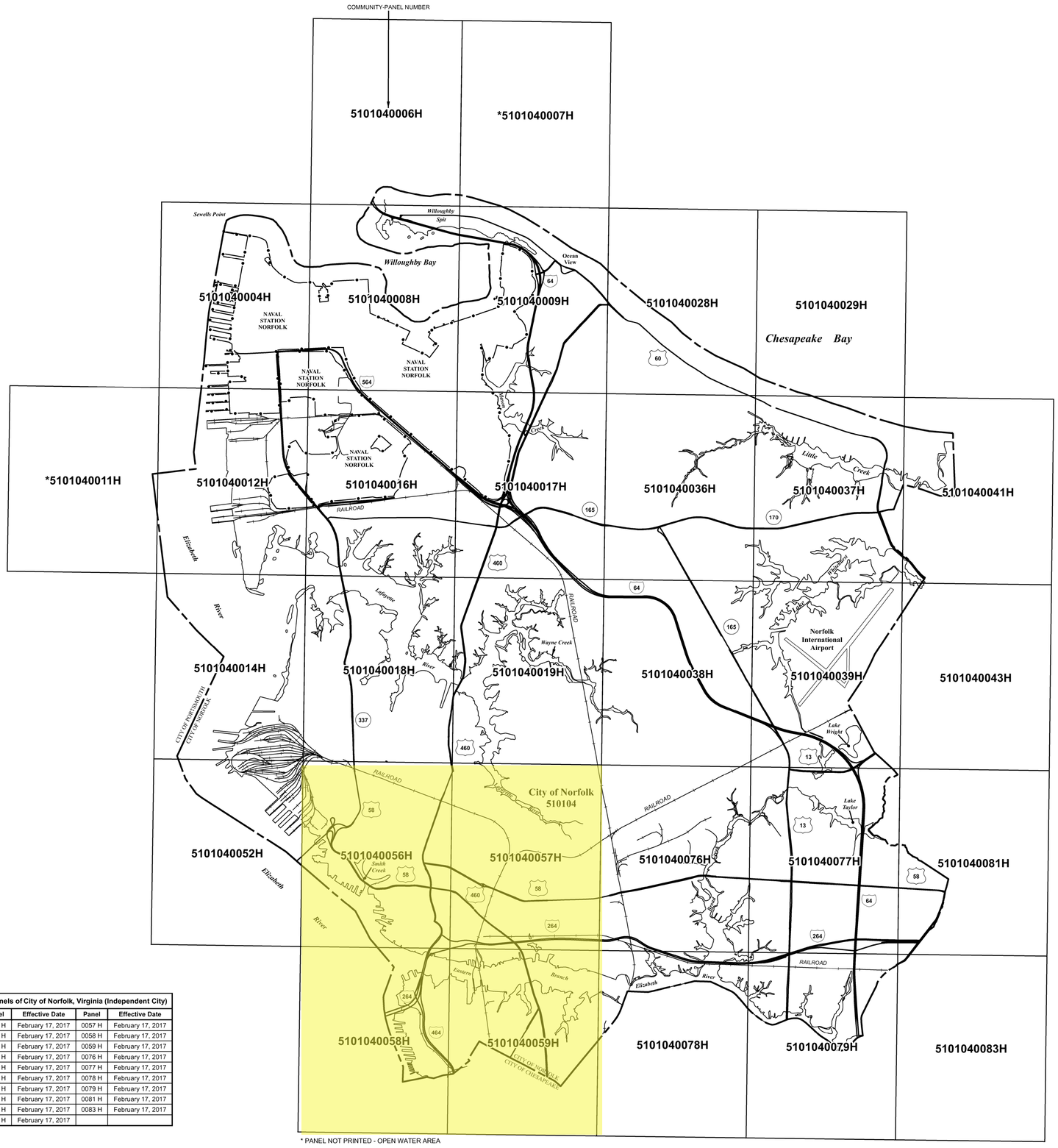
Kyle W. Spencer 4/4/22
Department Head Signature Date

Review by DCM **Approve** ☐ **Disapprove** ☐

DocuSigned by: Patrick Roberts 4/7/2022 | 7:35 AM EDT
AE9580A303EB478...
Deputy City Manager Date

Review by CM **Approve** ☐ **Disapprove** ☐

DocuSigned by: Ty Hill II 4/7/2022 | 6:47 AM PDT
C45AA22E7D6047B...
City Manager Date



* PANEL NOT PRINTED - OPEN WATER AREA

FIRM Panel Dates For Printed Panels of City of Norfolk, Virginia (Independent City)					
Panel	Effective Date	Panel	Effective Date	Panel	Effective Date
0004 H	February 17, 2017	0028 H	February 17, 2017	0057 H	February 17, 2017
0006 H	February 17, 2017	0029 H	February 17, 2017	0058 H	February 17, 2017
0008 H	February 17, 2017	0036 H	February 17, 2017	0059 H	February 17, 2017
0009 H	February 17, 2017	0037 H	February 17, 2017	0076 H	February 17, 2017
0012 H	February 17, 2017	0038 H	February 17, 2017	0077 H	February 17, 2017
0014 H	February 17, 2017	0039 H	February 17, 2017	0078 H	February 17, 2017
0016 H	February 17, 2017	0041 H	February 17, 2017	0079 H	February 17, 2017
0017 H	February 17, 2017	0043 H	February 17, 2017	0081 H	February 17, 2017
0018 H	February 17, 2017	0052 H	February 17, 2017	0083 H	February 17, 2017
0019 H	February 17, 2017	0056 H	February 17, 2017		

MAP DATES

This FIRM Index displays the map date for each FIRM panel at the time that this Index was printed. Because this Index may not be distributed to unaffected communities in subsequent revisions, users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center (MSC) website at http://msc.fema.gov, or by calling the FEMA Map Information eXchange (FMIX) at 1-877-336-2627.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index.These may be ordered directly from the Map Service Center at the number listed above.

MAP REPOSITORY
(Maps available for reference only, not for distribution.)

Planning Department
810 Union Street, Suite 508
Norfolk, Virginia 23510

NATIONAL FLOOD INSURANCE PROGRAM

MAP INDEX

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
NORFOLK,
VIRGINIA
INDEPENDENT CITY

MAP INDEX

PANELS PRINTED: 4, 6, 8, 9, 12, 14, 16, 17, 18, 19, 28, 29, 36, 37, 38, 39, 41, 43, 52, 56, 57, 58, 59, 76, 77, 78, 79, 81, 83

MAP NUMBER
510104IND0C

MAP REVISED
FEBRUARY 17, 2017

Federal Emergency Management Agency

Commonwealth of Virginia

CFPF, rr <cfpf@dcr.virginia.gov>

City of Norfolk Office of Resilience CFPF Round 3 grant submission - USACE Phase 1A

1 message

Simons, Matthew <Matthew.Simons@norfolk.gov> Fri, Apr 8, 2022 at 3:31 PM
To: "cfpf@dcr.virginia.gov" <cfpf@dcr.virginia.gov>
Cc: "matthew.wells@dcr.virginia.gov" <matthew.wells@dcr.virginia.gov>

To whom it may concern,

Attached is a Community Flood Preparedness Fund Round 3 grant request for **$28,127,975** to support the first phase of a $1.8B Coastal Storm Risk Management flood protection project in partnership with the City of Norfolk and U.S. Army Corps of Engineers.

Let me know if you have any questions about the application.

Thank you.

Matthew Simons, AICP CFM

Coastal Resiliency Manager

City of Norfolk – Office of Resilience

757-334-8622 (cell)

THE CITY OF NORFOLK

City Hall Building

501 Boush Street, Suite B

Norfolk, VA 23510

Connect with us:

www.norfolk.gov

CID510104_CityofNorfolk_CFPF-1.pdf
13634K

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION: VIRGINIA COMMUNITY FLOOD PREPARDNESS FUND GRANT

CSRM Phase 1A – Ghent-Downtown-Harbor Park Flood Barrier System

Supplemental Response

CFPF-22-03-47

Office of Resilience

City of Norfolk

501 Boush Street

Norfolk, VA 23510

Ms. Wendy Howard-Cooper
Department of Conservation and Recreation
600 East Main Street, 24th floor
Richmond, VA 23219

November 30, 2022

Re: City of Norfolk | Community Flood Preparedness Fund Supplemental Response CFPF-22-03-47

Dear Ms. Howard-Cooper:

The City of Norfolk is pleased to submit supplemental responses to our initial CSRM Phase 1A – Ghent-Downtown-Harbor Park Flood Barrier System Community Flood Preparedness Fund application for consideration. The Community Flood Preparedness Fund (CFPF) grant funding is critical to realizing Norfolk's long-term resilient revitalization plans and flood reduction efforts. **Phase 1A of the project will protect the most vulnerable populations within the Norfolk**, assisted housing residents of the St. Paul's Transformation Area, which will include thousands of residents returning to the Tidewater Gardens community, as those currently residing in the Young Terrace, and Calvert Square low-income housing communities. The project will construct a hybrid flood barrier system, consisting of a green levee extending eastward from the I-264 Berkley Bridge, beyond Harbor Park with hybrid I-/T-walls terminating at the soon to be completed Ohio Creek Watershed flood protection project - $112M HUD-funding resilience project to protect the historic African American community of Chesterfield Heights and assisted housing residents of Grandy Village.

Phase 1A of the Ghent-Downtown-Harbor Park Flood Protection Barrier System is a new-start project in a ~~$1.7B~~ $2.3B[1] Coastal Storm Risk Management (CSRM) flood protection system being constructed in partnership with the Norfolk District of the U.S. Army Corps of Engineers (USACE). The Norfolk CSRM project was Authorized by Congress in the Water Resources Development Act, signed into law by the President in 2020.

With the passage of President Biden's Infrastructure Investment and Jobs Act (IIJA), USACE announced $399M of IIJA funding to support construction of the Norfolk CSRM, beginning with Phase 1A of the Ghent-Downtown-Harbor Park Flood Protection Barrier System. The City of Norfolk, as the nonfederal sponsor, is required to assemble a 35% nonfederal match prior to the commencement of each project phase.

Phase 1A will require ~~$56M~~ $72.8M of nonfederal funds prior to the start of FY23. **The City of Norfolk intends to meet its nonfederal obligation to USACE through a 50/50 split with the Commonwealth.** A full award of this grant request would satisfy this requirement and allow

[1] Note, the CFPF application submitted in May 2022 cited the total project cost as $1.7 billion. The project cost is being updated by the U.S. Army Corps of Engineers and is expected to be certified next week at the revised figure ($2.3 billion).

Norfolk to complete the 3-year ~~$160.7M~~ $222M project. There is a 10-year plan outlined in this application to fund the other phases of the Ghent-Downtown-Harbor Park Flood Protection Barrier System, and to fund the other major flood protection projects of the City-wide CSRM system. Phase 1A will provide protection from coastal storm surge flooding through construction of structural and non-structural flood protection. This phase provides the most natural and nature-based features (NNBFs) of any coastal flood protection project within the system and within any single project within the City's history.

The project is designed to meet the guidance of the Commonwealth's Executive Orders 24 & 45, with the flood protection provided beyond the minimum sea level rise guidance to year with 2100, with **more than 8 feet of freeboard above the FEMA Base Flood Elevation** included in the system design. The project has a Benefit-Cost Ratio of 3.3 with annual net benefits of protection calculated at more than $46M per year over the course of the project's lifespan.

Encompassed in the supplemental application are responses that address the following questions:

1. **Additional information on the severability of project deliverables.**
   Information has been provided on six severable project elements, with a proposed cost-share provided for each. Priority project elements include the two pump stations and tide gate.

2. **Additional information on the potential impacts to vulnerable populations.**
   Information has been provided for the three public housing communities, including the Tidewater Gardens community undergoing the St. Paul's Transformation CNI project with HUD. This information includes population characteristics and vulnerabilities and how this project benefits Norfolk's most vulnerable residents.

3. **Additional information on the potential impacts to neighboring localities.**
   An analysis from Moffatt & Nichol, Norfolk's coastal engineering consultant, has been included which explains Norfolk's approach to evaluating the potential of induced flooding being caused by the CSRM flood protection project. The approach is based on a similar analysis performed for the New York – New Jersey Harbor and Tributaries CSRM Feasibility Study and would be performed as a condition of Norfolk receiving CFPF funds if requested by DCR.

4. **Additional information on the flood reduction benefits of economic development portions of project.**
   The casino development will include flood protection that will tie-in to this project and is required to meet the same level of protection. The design of the casino's flood protection is currently being reviewed by USACE. This grant will not be used to support any portion of the casino flood protection project.

1. **Grant Application Identifier:** CFPF-22-03-47

2. **Funding Requested:**
   CFPF Amount Requested: ~~$28,127,950.00~~ $36,401,050.00
   Match Amount Required: ~~$15,145,833.00~~ $19,600,565.38
   Total Project Cost: ~~$43,273,807.69~~ $56,001,615.38

3. **Location:** City of Norfolk, Virginia

4. **Contacts:**

   a. **Project Director:**
   Matthew Simons, AICP, CFM
   City of Norfolk's City Manager's Office of Resilience
   Coastal Resiliency Manager
   501 Boush Street, Norfolk, VA 23510
   Phone: 757.334.8622
   E-mail: matthew.simons@norfolk.gov

   b. **Highest Elected Official:**
   Mayor Kenneth Cooper Alexander, Ph.D.
   City of Norfolk
   810 Union Street, Norfolk, VA 23510
   Phone: 757.664.4679
   E-mail: mayor@norfolk.gov

   c. **City Manager**
   Dr. Larry H. Filer, II
   City of Norfolk
   810 Union Street, Norfolk, VA 23510
   Phone: 757-664-4242
   E-mail: city.manager@norfolk.gov

Thank you for your consideration of our application and supplemental responses. We look forward to continuing to work with the Department of Conservation and Recreation to advance flood mitigation in the City of Norfolk. Thank you.

Sincerely,

Kyle W. Spencer

Kyle Spencer, CFM, Chief Resilience Officer, City of Norfolk

Supplemental Responses

CFPF-22-03-47

THE CITY OF NORFOLK

RESILIENT NORFOLK

COASTAL STORM RISK MANAGEMENT

3rd Bay and Pretty Lake Avenues

15th View Street

48th Street Dead End

Mowbray Arch

10
05
00
-05
-10

OVERVIEW

The city of Norfolk is increasingly at risk of flooding and damage from coastal storms. Norfolk has one of the highest rates of relative sea level rise (RSLR) among Atlantic coastal communities. The Coastal Storm Risk Management (CSRM) Project will protect the city from coastal flooding and damage from nor'easters, hurricanes, and other significant storm events.

PARTNERSHIP

The Norfolk Coastal Storm Risk Management Plan is a collaboration between the USACE and city of Norfolk.

THE CITY OF NORFOLK OFFICE OF RESILIENCE

US Army Corps of Engineers

WWW.RESILIENTNORFOLK.COM

THE CITY OF NORFOLK

PROJECT TIMELINE

Design Phase Federally Funded

Construction Phase Federally Funded

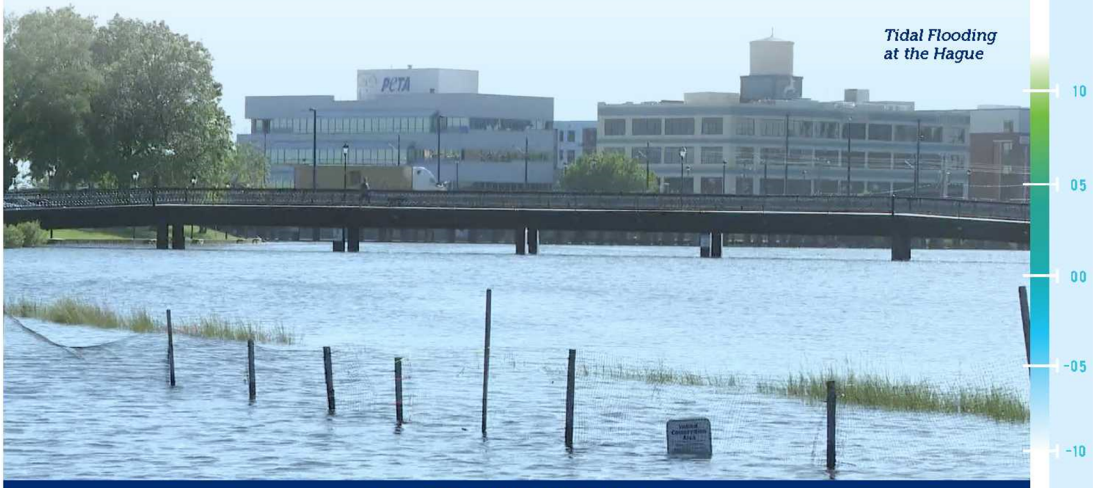
PHASE	LOCATION	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1A	Berkley Bridge to Campostella											
1B	Town Point Park/Waterside											
1C	Ghent to Town Point Park											
1D	Downtown Floodwall											
2	Pretty Lake Surge Barrier											
3	Lafayette Outer Surge Barrier											
4	Broad Creek Surge Barrier											
5	Campostella/Willoughby/ Elizabeth Park (Nons tructural)											

PROJECT AT A GLANCE

The $1.8 billion project features storm-surge barriers, nearly 8 miles of floodwalls, nearly 1 mile of levees, 11 tide gates, and ten pump stations, along with a series of nonstructural projects that include home elevations, basement fills, and commercial floodproofing.

BUILDING RESILIENCY

With one of the highest rates of RSLR, the city of Norfolk's increased risk of flooding and damage during a coastal storm proves a resilience strategy is critical to strengthen our coastal community for the future.

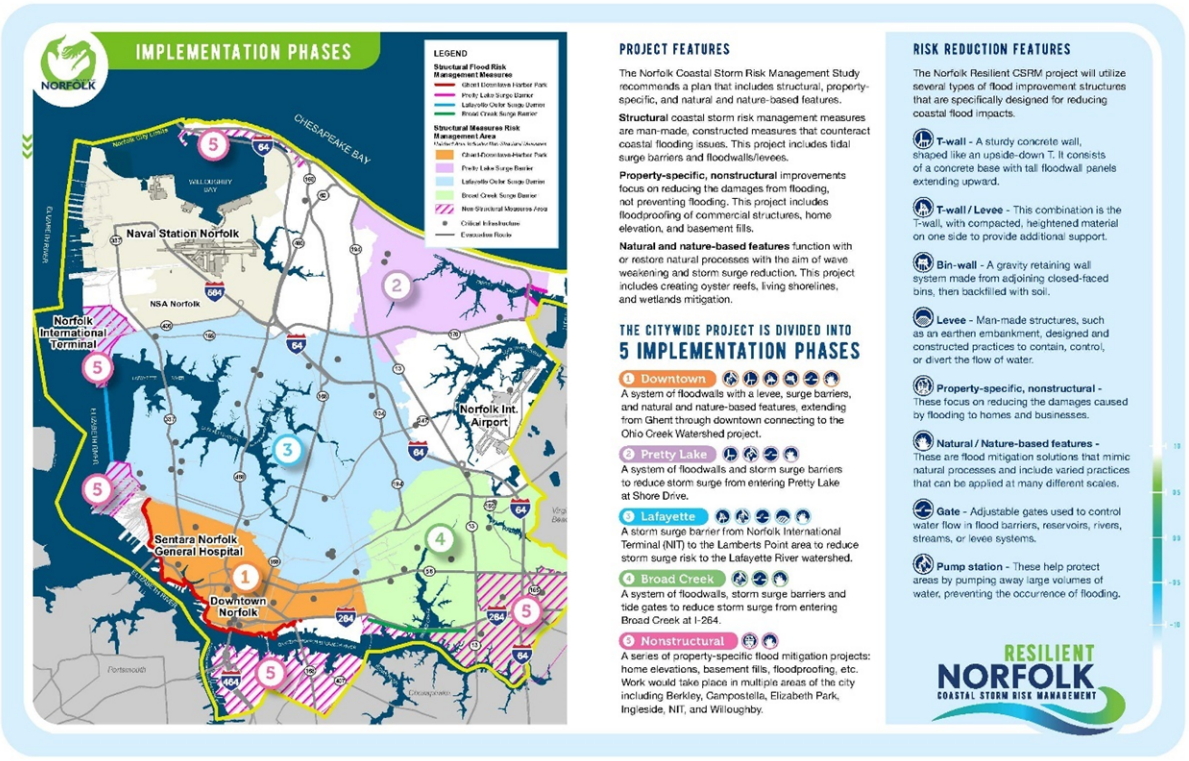


Tidal Flooding at the Hague

WWW.RESILIENTNORFOLK.COM

FOR MORE INFORMATION CONTACT
norfolkrc@norfolk.gov
757-453-5558

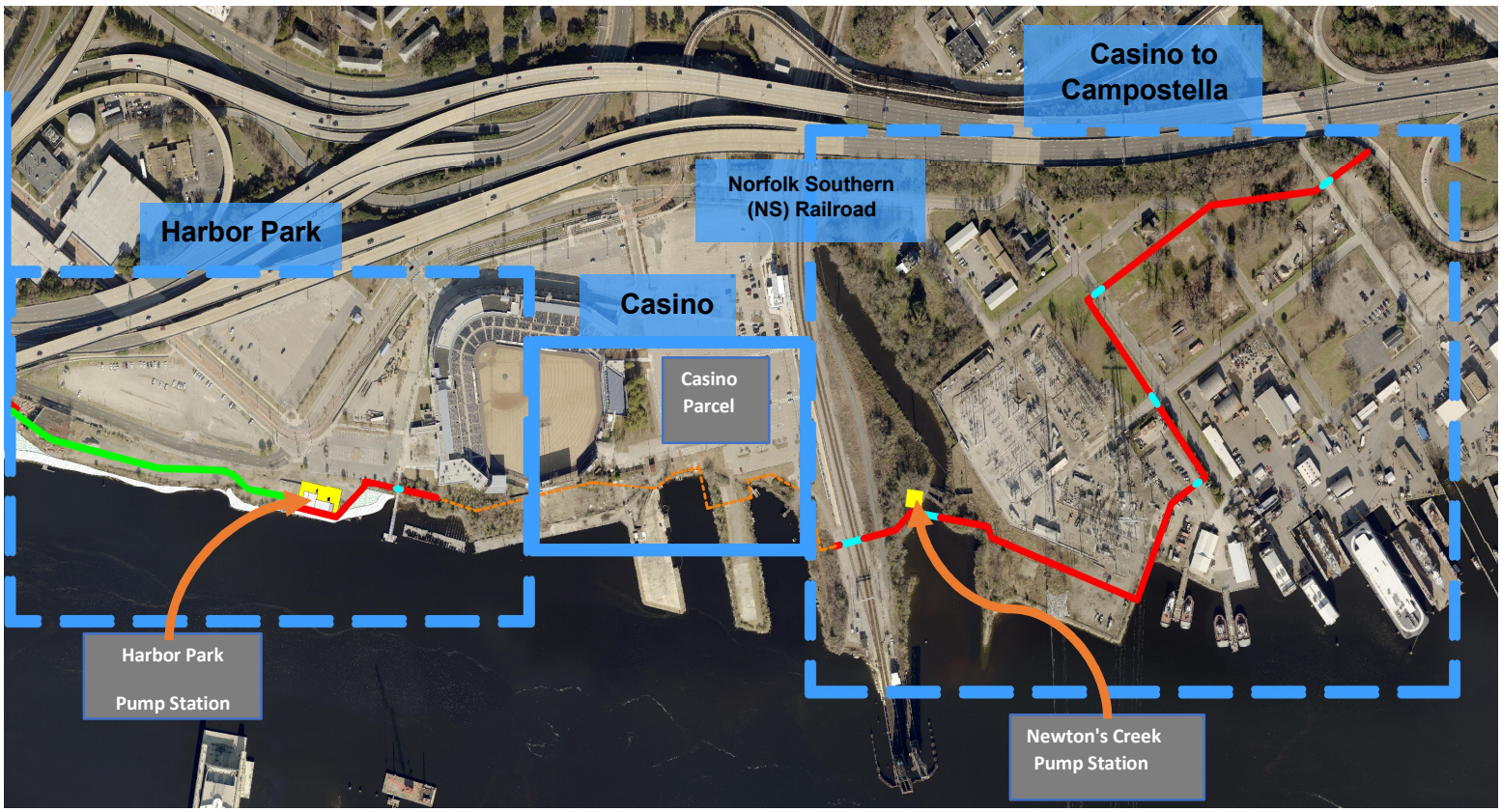
RESILIENT NORFOLK
COASTAL STORM RISK MANAGEMENT


IMPLEMENTATION PHASES
LEGEND
Structural Flood Risk Management Measures
Structural Measures Risk Management Area
CHESAPEAKE BAY
Naval Station Norfolk
NSA Norfolk
Norfolk International Terminal
Norfolk Int. Airport
Sentara Norfolk General Hospital
Downtown Norfolk
Portsmouth
PROJECT FEATURES
The Norfolk Coastal Storm Risk Management Study recommends a plan that includes structural, property-specific, and natural and nature-based features.
Structural coastal storm risk management measures are man-made, constructed measures that counteract coastal flooding issues. This project includes tidal surge barriers and floodwalls/levees.
Property-specific, nonstructural improvements focus on reducing the damages from flooding, not preventing flooding. This project includes floodproofing of commercial structures, home elevation, and basement fills.
Natural and nature-based features function with or restore natural processes with the aim of wave weakening and storm surge reduction. This project includes creating oyster reefs, living shorelines, and wetlands mitigation.
THE CITYWIDE PROJECT IS DIVIDED INTO
5 IMPLEMENTATION PHASES
1 Downtown
A system of floodwalls with a levee, surge barriers, and natural and nature-based features, extending from Ghent through downtown connecting to the Ohio Creek Watershed project.
2 Pretty Lake
A system of floodwalls and storm surge barriers to reduce storm surge from entering Pretty Lake at Shore Drive.
3 Lafayette
A storm surge barrier from Norfolk International Terminal (NIT) to the Lamberts Point area to reduce storm surge risk to the Lafayette River watershed.
4 Broad Creek
A system of floodwalls, storm surge barriers and tide gates to reduce storm surge from entering Broad Creek at I-264.
5 Nonstructural
A series of property-specific flood mitigation projects: home elevations, basement fills, floodproofing, etc. Work would take place in multiple areas of the city including Berkley, Campostella, Elizabeth Park, Ingleside, NIT, and Willoughby.
RISK REDUCTION FEATURES
The Norfolk Resilient CSRM project will utilize several types of flood improvement structures that are specifically designed for reducing coastal flood impacts.
T-wall - A sturdy concrete wall, shaped like an upside-down T. It consists of a concrete base with tall floodwall panels extending upward.
T-wall / Levee - This combination is the T-wall, with compacted, heightened material on one side to provide additional support.
Bin-wall - A gravity retaining wall system made from adjoining closed-faced bins, then backfilled with soil.
Levee - Man-made structures, such as an earthen embankment, designed and constructed practices to contain, control, or divert the flow of water.
Property-specific, nonstructural - These focus on reducing the damages caused by flooding to homes and businesses.
Natural / Nature-based features - These are flood mitigation solutions that mimic natural processes and include varied practices that can be applied at many different scales.
Gate - Adjustable gates used to control water flow in flood barriers, reservoirs, rivers, streams, or levee systems.
Pump station - These help protect areas by pumping away large volumes of water, preventing the occurrence of flooding.
RESILIENT NORFOLK
COASTAL STORM RISK MANAGEMENT

Supplemental Response

Severability of Project Deliverables

CFPF-22-03-47



Funding timeline for each project element in Phase 1A – Design and Construction Costs

Projects			Design Phase						Construction Cost	Full Cost
			FY22		FY23					
Sub-Phase	Location	Design Description	Q3	Q4	Q1	Q2	Q3	Q4	FY24-FY26	
1a	Berkley Bridge Levee	Levee, T-Wall, Living Shoreline	$3,700,000						$34,100,000	$37,800,000
1a	Berkley Bridge Pump Station	Pump Station	$1,350,000						$16,538,000	$17,888,000
1a	Harbor Park and NS Railroad Gate	Closure, T-Wall	$600,000						$5,260,000	$5,860,000
1a	Newton's Creek Closure	Tide Gate, T-Wall	$500,000						$33,555,000	$34,055,000
1a	Newton's Creek Pump Station	Pump Station	$1,350,000						$56,543,000	$57,893,000
1a	Newton's Creek to Campostella	T-Wall, Closures	$6,900,000						$62,010,000	$68,910,000
			$14,400,000						**$208,006,000**	**$222,406,000**

Funding broken down by Federal (65%) and Nonfederal (35%) with Norfolk's CFPF Grant Request

			Full Cost Breakdown (minus design costs)		
Projects			Federal Cost of Construction	City Allocation	CFPF Grant Request
			65%	17.50%	17.50%
Sub-Phase	Location	Design Description			
1a	Berkley Bridge Levee	Levee, T-Wall, Living Shoreline	$22,165,000	$5,967,500	$5,967,500
1a	Berkley Bridge Pump Station	Pump Station	$10,749,700	$2,894,150	$2,894,150
1a	Harbor Park and NS Railroad Gate	Closure, T-Wall	$3,419,000	$920,500	$920,500
1a	Newton's Creek Closure	Tide Gate, T-Wall	$21,810,750	$5,872,125	$5,872,125
1a	Newton's Creek Pump Station	Pump Station	$36,752,950	$9,895,025	$9,895,025
1a	Newton's Creek to Campostella	T-Wall, Closures	$40,306,500	$10,851,750	$10,851,750
			$135,203,900	**$36,401,050**	**$36,401,050**
					$18,661,300

Highlighted items reflect project features in dire need of funding assistance.

The City of Norfolk altogether requests to split the required nonfederal match (35%) with the State through the CFPF grant. This would divide the nonfederal cost of phase 1A into equal halves (17.5% each). The City of Norfolk would exceed the goal of the CFPF program requirements by covering half of the nonfederal match in a low-income geographic area.

The City of Norfolk requests $36,401,050[2] from the CFPF Round 3 grant, which is equal to half of the nonfederal costs required for the $222M Army Corps flood protection project (17.5% of the total cost minus design).

Recognizing that with more accurate cost estimates now available from the Army Corps, this request is greater than the amount originally requested in May. Therefore, the City of Norfolk has highlighted the items of most need, items critical to the launch of the project. 17.5% cost of these items total $18,661,300. CFPF funding for these items of greatest need would allow the project to move forward on the 3-year schedule as proposed while gap financing is sought.

[2] The City of Norfolk has removed the cost of design from the analysis per the request of Virginia DCR staff. The City of Norfolk has already spent City funds on design, which is currently underway. This brings the total cost of phase 1A to $208M

Supplemental Response

Potential Impacts to Vulnerable Populations

CFPF-22-03-47

What are the impacts of the CSRM project on vulnerable populations?

Phase 1A of the Ghent-Downtown-Harbor Park Flood Protection Barrier System in the Coastal Storm Risk Management (CSRM) Project will provide flood protection to some of the City's most vulnerable populations located in obsolete three public housing communities (Tidewater Gardens, Calvert Square, and Young Terrace) in the St. Paul's Area. The St. Paul's area is the region's highest concentration of poverty. The area in its current form suffers from chronic poverty, is physically isolated, lacks amenities and does not present a community of opportunity despite its location next to downtown. To address these concerns, the City is in the process of implementing a $30 Million Dollar Choice Neighborhood Initiative Grant provided by the U.S. Department of Housing and Urban Development. The goal of the St. Paul's Transformation is to transform the area into a mixed-income, mixed-use community of opportunity that offers first class mixed income rental and for sale housing where families and residents from all socioeconomic backgrounds can live, learn, work, and thrive. The City's Department of Community Housing and Development has identified three critical paths in implementing the transformative vision with resilience and water management encompassed in the first critical path:

Critical Paths

Resilience, Water Management, Park Design

Street Framework

CNI Housing Plan

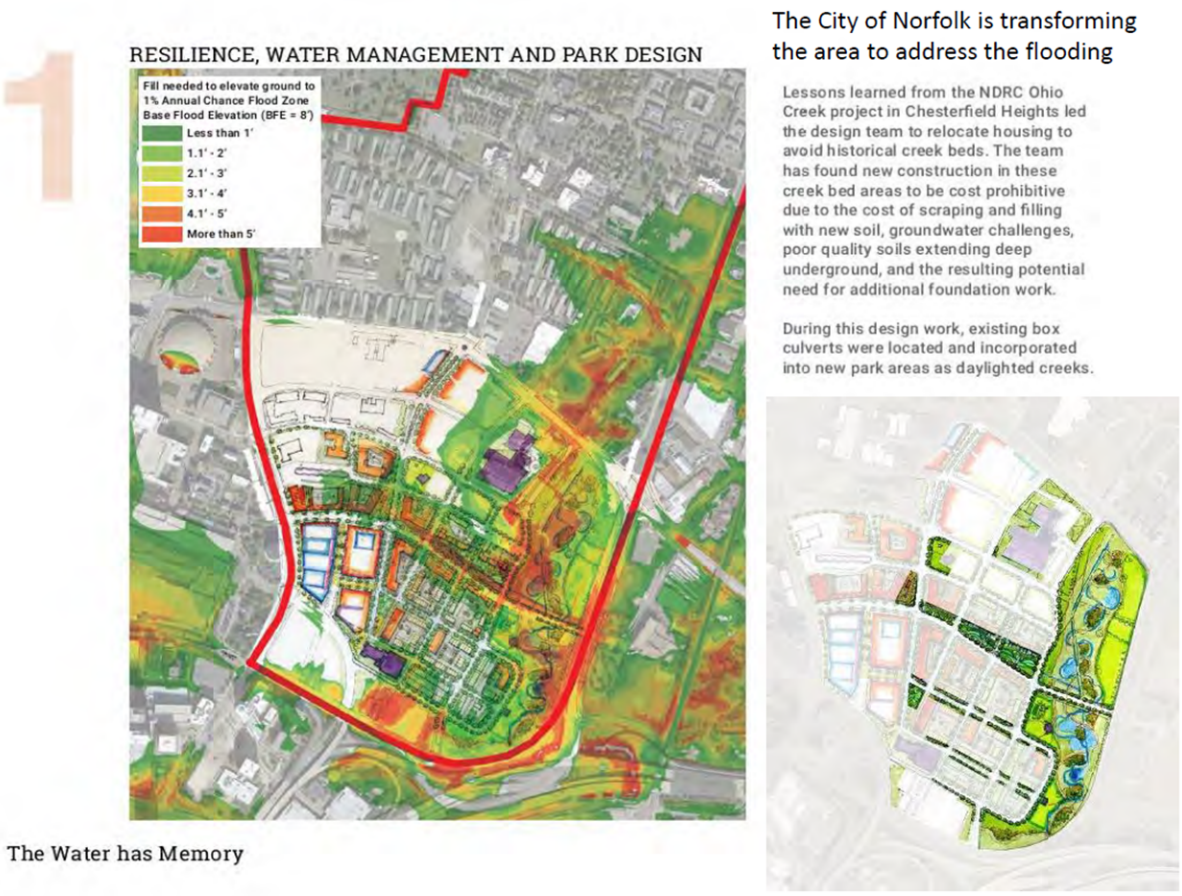


Figure 1: St. Paul's Redevelopment Project & Blue/Greenway Resilient Park

In a recent community engagement opportunity, residents of the public housing complexes identified flooding as a primary concern. With the creation of the CSRM flood mitigation measures, this area will receive enhanced flood protection from coastal flooding and sea level rise flooding. In figure 1, the St. Paul's Transformation Project Area is delineated. As demonstrated in the figure below (figure 2), the St. Paul's Transformation project is in direct proximity to the flood mitigation measures and will receive substantial flood risk reduction.

Direct benefits of the CSRM Project for the vulnerable populations of the St. Paul's Transformation Project

Figure 2: CSRM Project area proximity to the St. Paul's Redevelopment Project & Blue/Greenway Park

The entire CSRM project will provide critical flood protection for vulnerable populations throughout the City. As noted in Figure 3 below, in Phase 1A of the CSRM project, there are many areas of vulnerable populations which will benefit from this project.

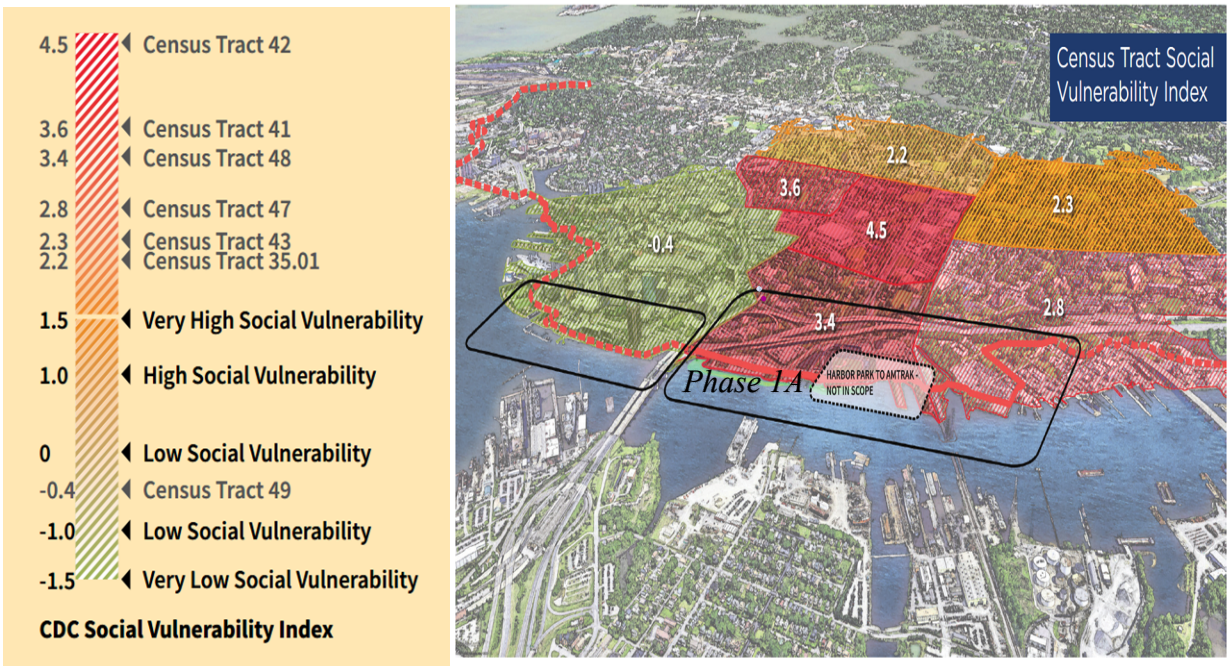
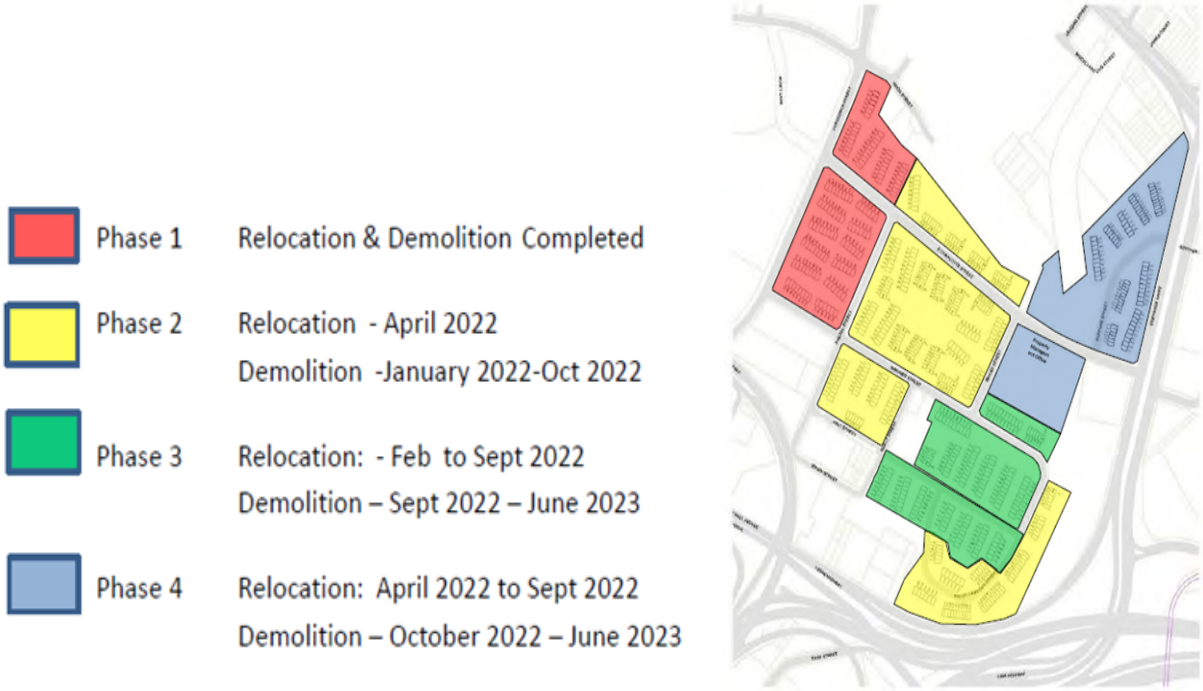


Figure 3: Census Tract Social Vulnerability Index – CSRM Phase 1A

The St. Paul's Transformation Project: Prioritizing Residents and Area Revitalization

The City of Norfolk is advancing the St. Paul's Transformation Project and prioritizing the well-being and equity of residents. In considering the first phase of the project, the Tidewater Gardens relocation effort is a multi multi-phase, multi multi-year effort with Urban Strategies Inc., and the Norfolk Redevelopment and Housing Authority (NRHA) coordinating relocation services. In 2019 Urban Strategies Inc., was hired by the City of Norfolk to implement People First Services including mobility counseling. Residents have both a case management and mobility specialist to assist them in the relocation process. Support is provided before, during and post relocation. Residents will also have "right to return" for the new replacement and affordable units. NRHA is demolishing the Tidewater Gardens community through a multi-phase program:

Figure 4: Tidewater Gardens Relocation & Demolition Phases



Within the redevelopment strategy, the City and NRHA have ensured replacement units, and Low-Income Housing Tax Credit (LIHTC)-affordable units are most of the units being built. The City and NHRA are building back a mixed income community. The City has 13 block designs to include a senior-living area for seniors 55 years of age and up and multiple four-story buildings consisting of a total of 714 units. Each apartment will include in-unit laundry, dishwasher, refrigerator, range/oven, range hood, and microwave. Phone and cable/TV connectivity, and hardwired high speed internet capabilities will be provided in every unit. The buildings will be Enterprise Green Communities certified, with Energy Star-rated appliances and water conserving fixtures. There are 28 fully accessible UFAS units throughout the buildings and 11 units for hearing or sight impaired residents. All units meet visitability standards. The first three phases have completed design and phase 4 anticipates final design to be complete by the end of the year. For on-site housing, here are 260 replacement units with direct rental assistance as part of the unit, 238 affordable units, and 216 market rate apartments. For off-site housing, there are 70 replacement apartments in privately developed LIHTC projects. The City and NHRA will offer 288 Housing Choice Vouchers for families who choose private housing. Figure 5 demonstrates the planned design for replacement units, LIHTC-affordable units, and market rate units.

Figure 5: St. Paul's Transformation Building Unit Design Designations

Units	Bedroom Size					
	1	2	3	4	5	Total
Replacement Units	49	112	72	24	3	**260**
LIHTC-Affordable Units	89	108	37	4	0	**238**
Market Rate Units	61	127	28	0	0	**216**
Total Units	**199**	**347**	**137**	**28**	**3**	**714**

Based upon the planned design, the City has committed 69% of units as replacement or LIHTC-affordable units. Included in the design are neighborhood improvements to include open spaces and play areas, commercial and non-residential spaces, public spaces and plazas, Resilient Park with flood mitigation, and enhanced connectivity with key new pedestrian crossings and realigned road infrastructure. The included renderings below demonstrate the City and NRHA's visioning for the area's revitalization.

COMMUNITY BUILDINGS & COMMUNITY GREEN SPACE

BLUE GREEN WAY

COMMUNITY BUILDINGS

COMMUNITY GREEN SPACE

PLAZA

PLAYGROUND / TOT LOT

FARMERS MARKET

COMMUNITY GARDEN / URBAN FARMING

TREE SAVE

ST. PAUL'S - TIDEWATER GARDENS
NORFOLK | VIRGINIA
CHOICE NEIGHBORHOOD IMPLEMENTATION

Supplemental Response

Potential Impacts to Neighboring Localities

CFPF-22-03-47

MEMORANDUM

Project:	*Norfolk Coastal Storm Risk Management Design*
From:	*Brian Joyner, PE*
Date:	*November 30, 2022*
Subject:	*Approach to Evaluate Induced Flooding Potential and Mitigation Concepts*
M&N Job No.:	*11150-06*

Background and Purpose of Memo

Moffatt & Nichol is supporting the City of Norfolk (City) with implementation of its Coastal Storm Risk Management (CSRM) projects, in partnership with Norfolk District US Army Corps of Engineers (USACE). As part of the City's stakeholder coordination, questions have arisen regarding the potential for CSRM features – such as floodwall and levee segments along the City's waterfront – to have adverse effects on the flooding hazard in adjacent communities. For the purposes of this memo, such adverse flooding effects are termed "induced flooding" and are defined as an increase in flood levels resulting from the proposed CSRM projects. An increase in flooding may take the form of increased flooding depths or durations, or expansion of flooding into areas not previously subject to flooding. The City has requested that M&N advise and assist to coordinate on this aspect of the CSRM project design.

The purpose of this memo is to outline an approach that has been successfully completed by M&N and New York District USACE to evaluate this potential for CSRM features to induce flooding and to develop and evaluate mitigation actions (if warranted).

Outline of Approach to Evaluating Induced Flooding Potential

The need to evaluate the potential for induced flooding was recognized and addressed as part of the recent New York – New Jersey Harbor and Tributaries (NY/NJ HATS) CSRM Feasibility Study. The USACE website documenting the NY/NJ HATS[3] studies is provided in the footnote below. The primary documents referencing the induced flooding evaluation and mitigation approach are the *Shore-Based Measures Sub-Appendix (Sub-Appendix B1, September 2022)* and the *Shore-Based Measures Sub-Appendix: Annex B – Induced Flooding Analysis and Induced Flooding Maps (Annex B1.B, September 2022)*. The reader is referred to those documents for more detail on the results of that study and the specific mitigation features developed to address its findings.

[3] https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/

A brief summary of the NY/NJ HATS study's approach to evaluating induced flooding is provided here:

1. The ADvanced CIRCulation (ADCIRC) models developed as part of the North Atlantic Coast Comprehensive Study (NACCS)[4] (USACE, 2015) were run with the CSRM project alternatives in place, to evaluate the storm surge flooding hazard at various annual exceedance probabilities (AEP).

   It is noted that the NACCS models utilized a set of 1,050 synthetic tropical storms to evaluate storm surge still water levels for flood hazard analysis. The ADCIRC modeling for evaluating induced flooding was run for 20 of those storms, which were selected to represent the annual exceedance probability curves within the study area.

2. Stage-frequency statistics were computed from the ADCIRC modeling, and the stage-frequency results for the with-project condition were compared with those for the without-project condition.

3. Locations where the CSRM features would potentially induce additional flooding were mapped as shown in the example in Figure 1 below. The figure is a copy of information from Figure B-4 of the NY/NJ HATS CSRM Feasibility Study Appendix B, Sub-appendix B1.B. The figure illustrates an interpolation of 1% AEP (100-year return period) water level at points where induced flooding is expected to occur, comparing without-project condition to with-project condition. The yellow and orange shaded areas represent locations where the with-project condition would cause six inches or more of additional flooding when compared to the statistics for the without-project condition.

   Maps similar to Figure 1 were developed for each of the with-project alternative sets of projects that were considered in the NY/NJ HATS CSRM Feasibility Study.

4. Based on the ADCIRC modeling, stage-frequency analysis and the resulting induced flooding location maps, additional CSRM project features were evaluated to mitigate the induced flooding. The additional project features are called Induced Flooding Mitigation Features (IFFs). IFFs are similar kinds of features as would normally be included in a CSRM project alternative, i.e. IFFs may be additional floodwalls, levees, pumping stations, etc. They are called IFFs because they are included specifically to address the indicated induced flooding potential.

[4] https://www.nad.usace.army.mil/CompStudy/

Application to the Norfolk CSRM Implementation Phase

The Norfolk CSRM program has not yet conducted a detailed analysis or modeling of the potential for induced flooding in areas adjacent to the CSRM project features. The Norfolk CSRM process is well beyond the feasibility study phase, which means that a single set of project features has been selected and authorized. An evaluation of induced flooding potential could be conducted on the authorized set of project features, using the same NACCS ADCIRC modeling framework that was used in the example from the NY/NY HATS CSRM Feasibility Study.

M&N worked directly with the New York District USACE and with USACE's Engineer Research and Development Center (ERDC) to complete the NY/NJ HATS induced flooding analysis and mitigation options development, and M&N is available to assist with a similar evaluation for the Norfolk CSRM if it is determined that this level of detailed analysis is warranted.

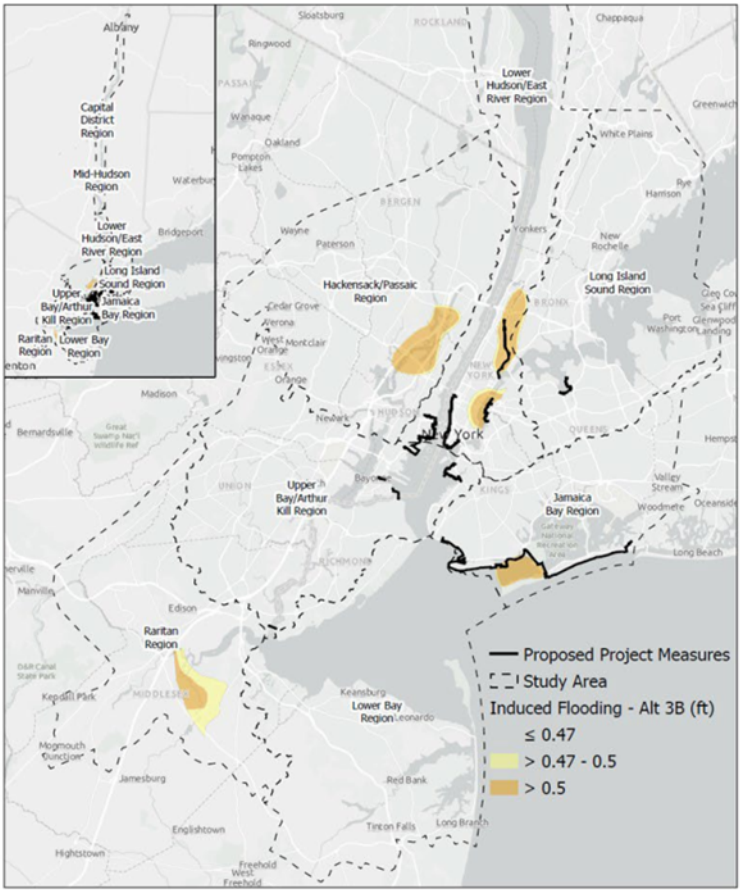


Figure 1. Example of induced flooding evaluation map, extracted from NY/NJ HATS Sub-appendix B1.B (Figure B-4). Figure illustrates linear interpolation of 1% AEP water level at points where induced flooding is expected to occur, comparing without-project condition to with-project condition.

Supplemental Response

Flood Reduction Benefits of Economic Development Portions of Project

CFPF-22-03-47

The economic development portion of the project refers to the Headwaters Resort and Casino development located directly east of the Harbor Park stadium. The shoreline between Harbor Park and the Norfolk Southern railroad right-of-way will be developed by the casino developer on a similar timeline of the construction of Phase 1A of the CSRM.

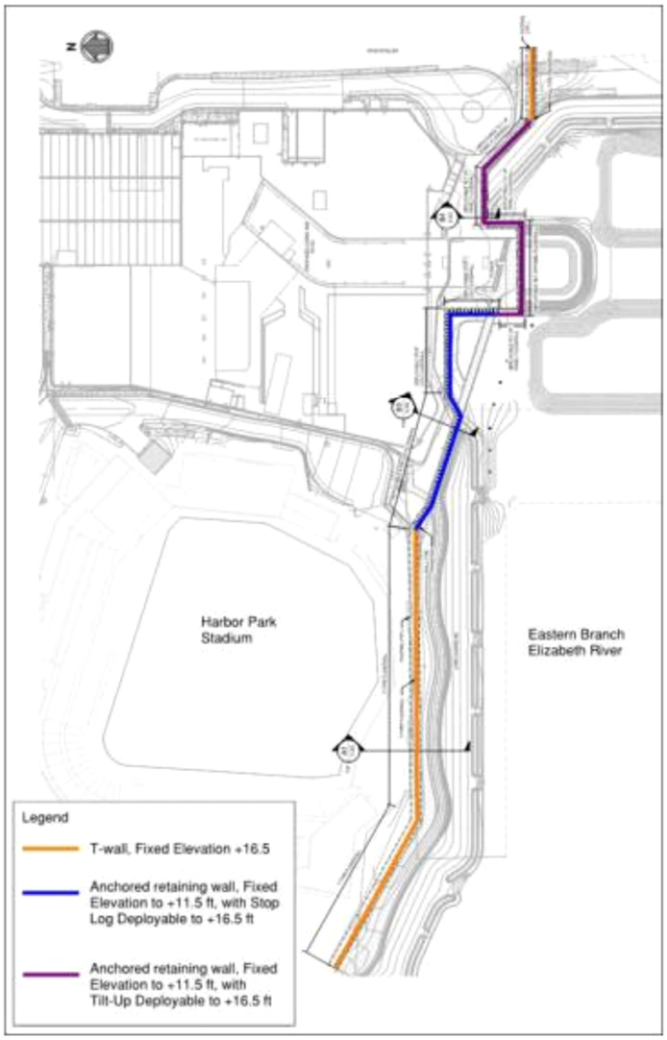


Figure 2-2: Alignment of Harbor Park and HRC Reach Floodwall Types

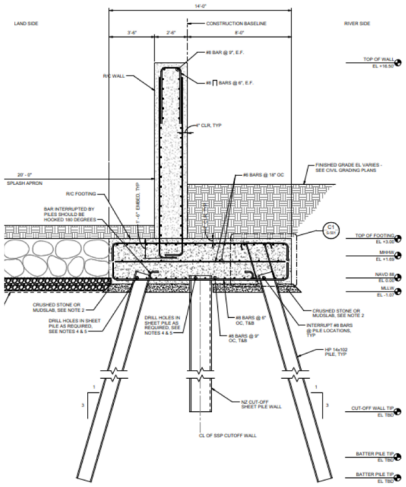
Excerpt from Design Documentation Report of 1A2 Reach

The casino developer is responsible for developing the flood protection reach along the casino properties. The minimum flood reduction benefits provided along the casino development are required to meet the same USACE standards as the portion being constructed by the Corps. This

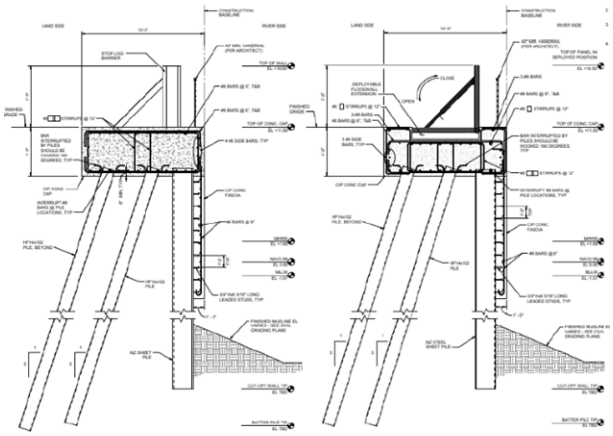
requirement is codified in the Land Disposition and Development Contract between the City of Norfolk and the casino developer. Engineered designs for the casino's floodwall have been submitted to USACE and reviewed by USACE at the 65% design milestone and are currently nearing the 95% design milestone.

The benefit of this approach for the casino is that it gives the developer more flexibility to pursue an accelerated construction schedule and design flexibility to maneuver the flood protection across the site in a way that integrates well with the developer's outdoor plaza. The benefit this affords to the City is that it requires the casino developer to cover the cost to construct this reach of the flood protection. This ensures the City that the casino developer does not benefit from any State funding assistance that might be provided for the rest of Phase 1A.

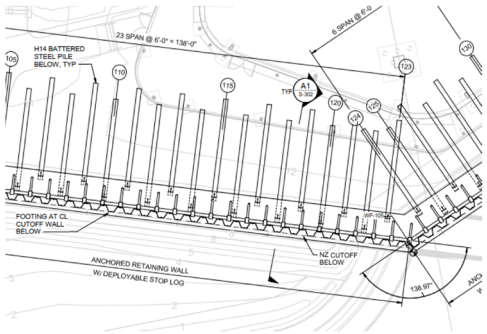
Additional design details for casino reach that will integrate into the USACE designs for Phase 1A are included below:



Floodwall Section [Excerpt from Drawing S-301]



Anchored Retaining Wall Section [Excerpt from Drawing S-302]



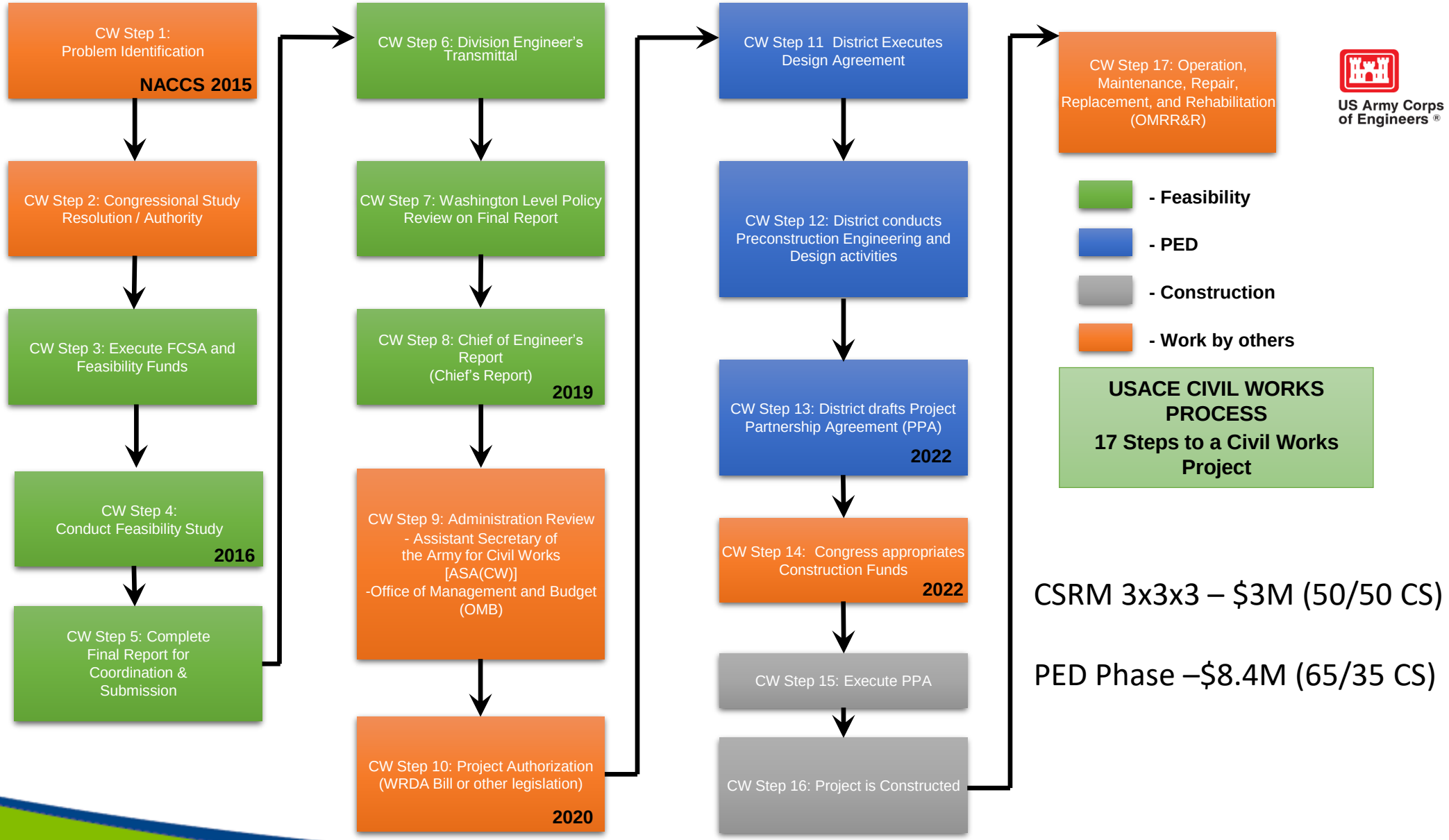
Anchored Retaining Wall (Stoplog) Plan [Excerpt from Drawing S-103]

Community Flood Preparedness Fund

Round 3 Supplemental Information

November 10, 2022

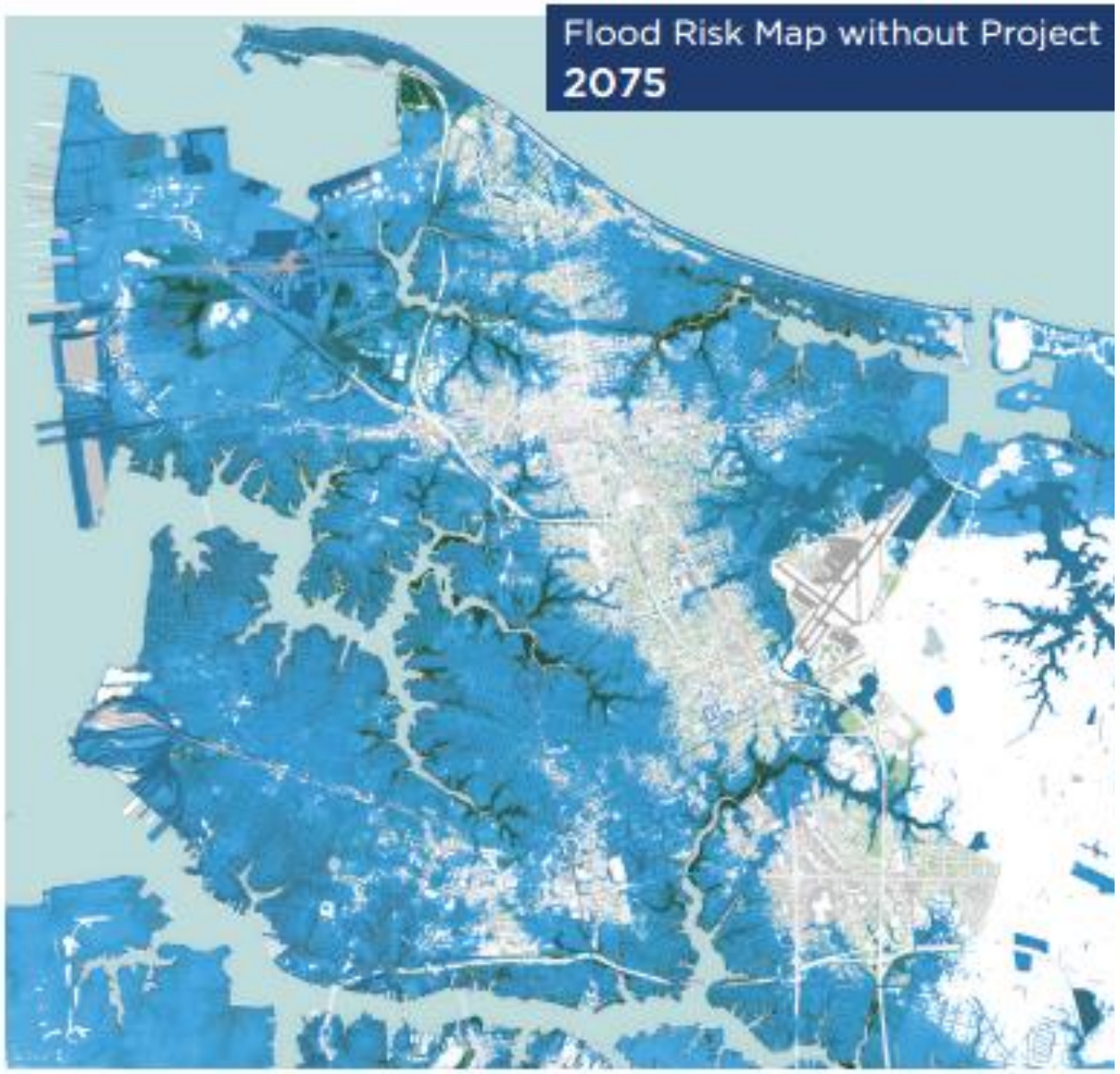
USACE Coastal Storm Risk Management Process

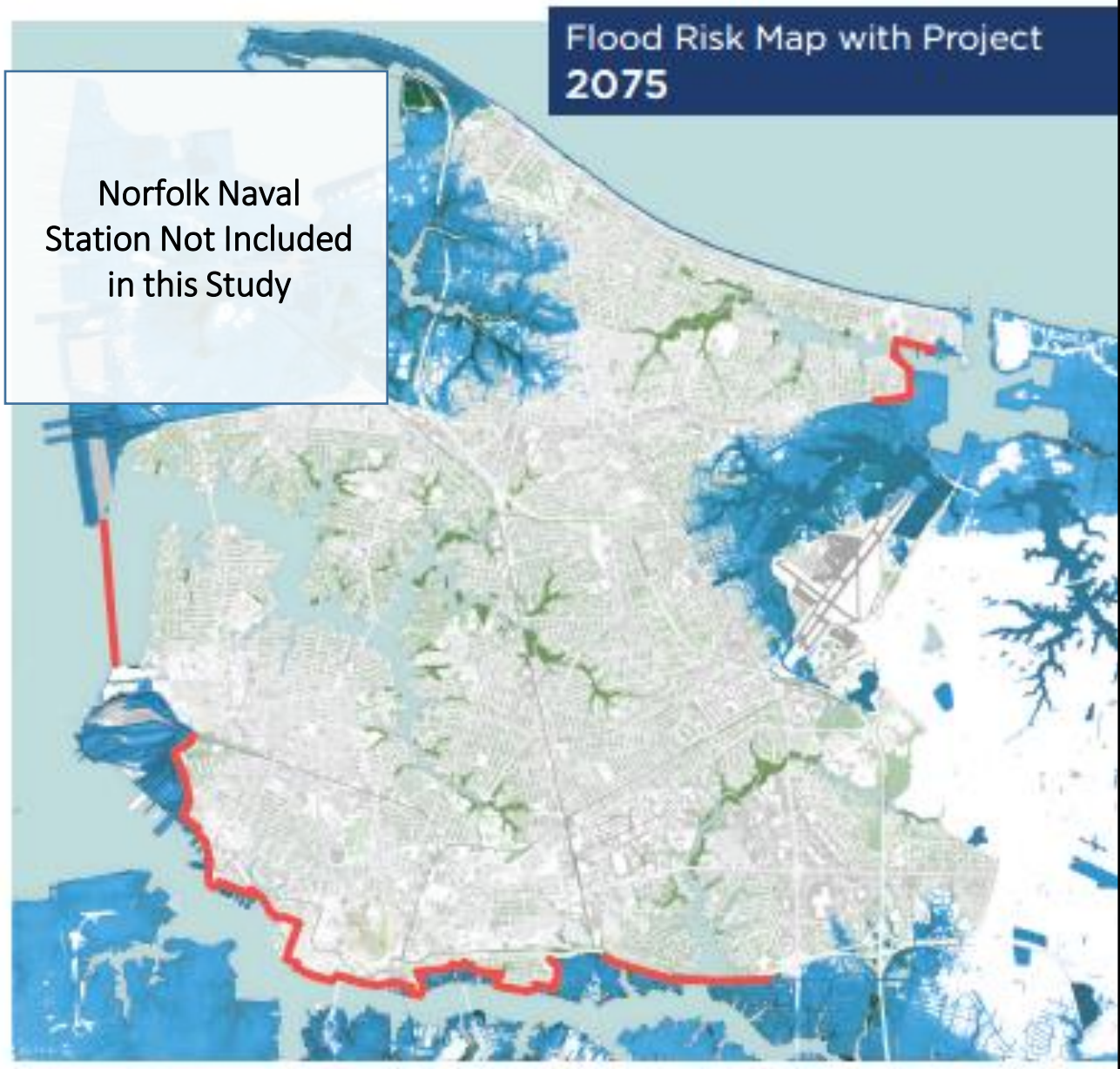


CSRM 3x3x3 – $3M (50/50 CS)

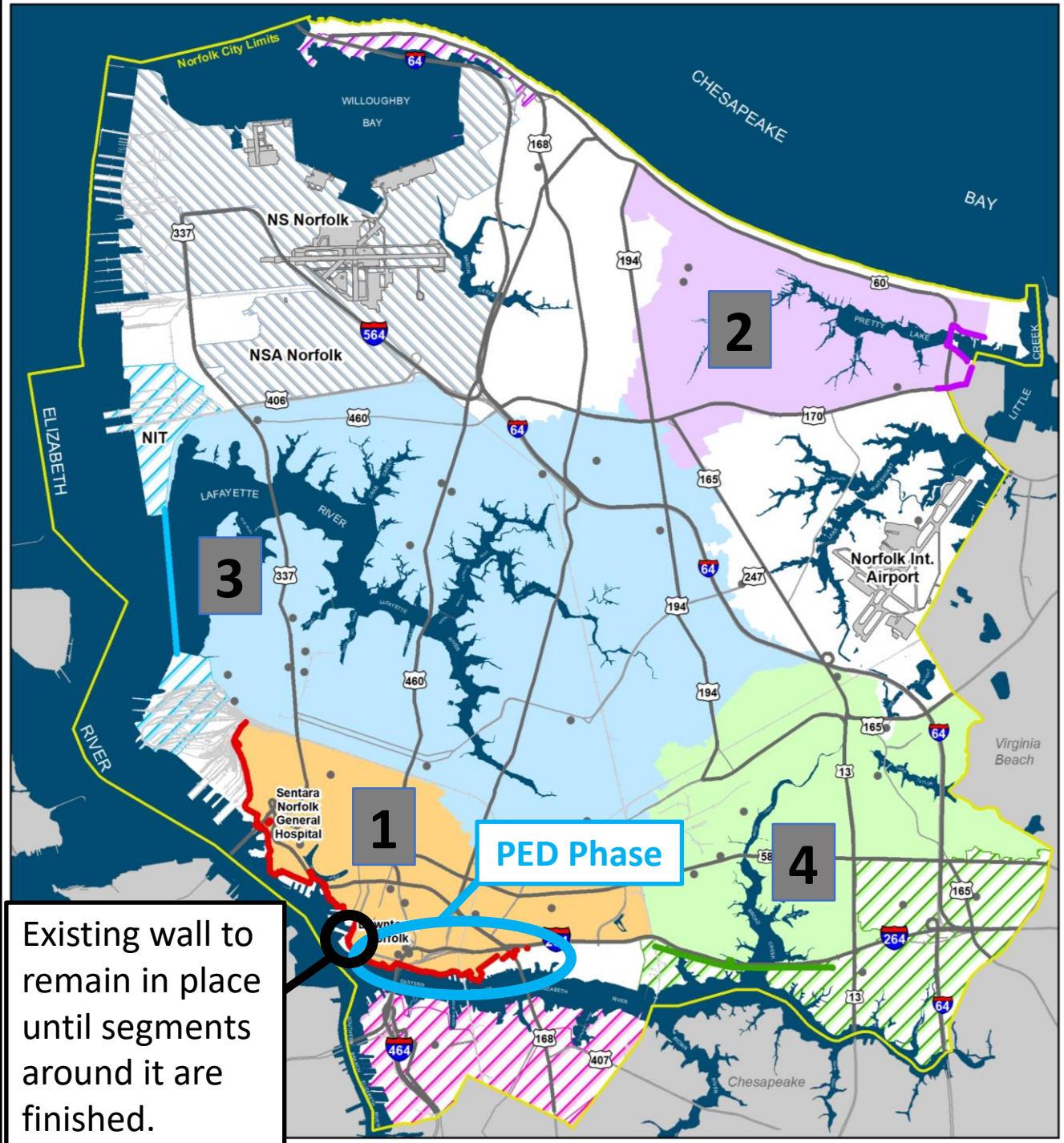
PED Phase –$8.4M (65/35 CS)

Norfolk's Coastal Storm Risk Management System





CSRM Recommended Plan ($1.8B)



LEGEND

Structural Flood Risk Management Measures

- Ghent-Downtown-Harbor Park
- Pretty Lake Surge Barrier
- Lafayette Outer Surge Barrier
- Broad Creek Surge Barrier

Structural Measures Risk Management Area

Hatched Area Indicates Non-Structural Measures

- Ghent-Downtown-Harbor Park
- Pretty Lake Surge Barrier
- Lafayette Outer Surge Barrier
- Broad Creek Surge Barrier

Non-Structural (concurrent to other work)

- Total Federal Share - $1.2B, Non-Federal Share - $600M
- Norfolk CSRM Project received New Start in IIJA
  - Federal share 65% - $400M
  - Non-Federal Share 35% - approximately $215M
- Current Project Value - **$615,000,000**
  - Develop Plans and Specs
  - Begin Construction of City-wide Plan

FULL PLAN – 10-YEAR – DRAFT

SECTIONS				TIMELINE
Phase	Sub-Phase	Location	Design Description	
1	1a	Berkley Bridge to Campostella	Levee, T-Wall, Pump Station, Living Shoreline	$222,406,000
1	1b	Town Point Park/Waterside	Levee, T-wall, Bin Wall, Pump Station	$120,952,000
1	1c	Ghent to Town Point Park	Surge Barrier, T-wall, I-wall	$320,773,000
1	1d	Downtown Floodwall	Replace 1970s I-Wall with T-Wall	$29,640,000
2		Pretty Lake Surge Barrier	Surge Barrier, Floodwalls, Pump Stations, Living Shoreline	$114,328,000
3		Lafayette Outer Surge Barrier	Surge Barrier, T-wall, I-wall, Pump Station, Tide Gate, Oyster Reefs	$554,024,000
4		Broad Creek Surge Barrier	Surge Barrier, Floodwalls, Pump Stations, Living Shoreline	$229,479,000
5		Campostella/Willoughby/ Elizabeth Park (Non-Structural)	Elevations, Floodproofing, Buyouts, Basement Fills, Critical Infrastructure	$261,624,000

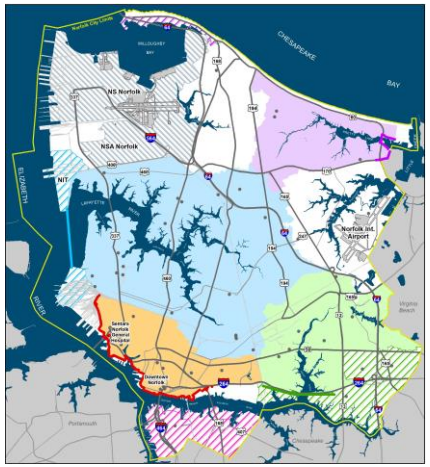
TIMELINE: 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 (Q1 Q2 Q3 Q4 each year)

Pilot project

Full design + construction

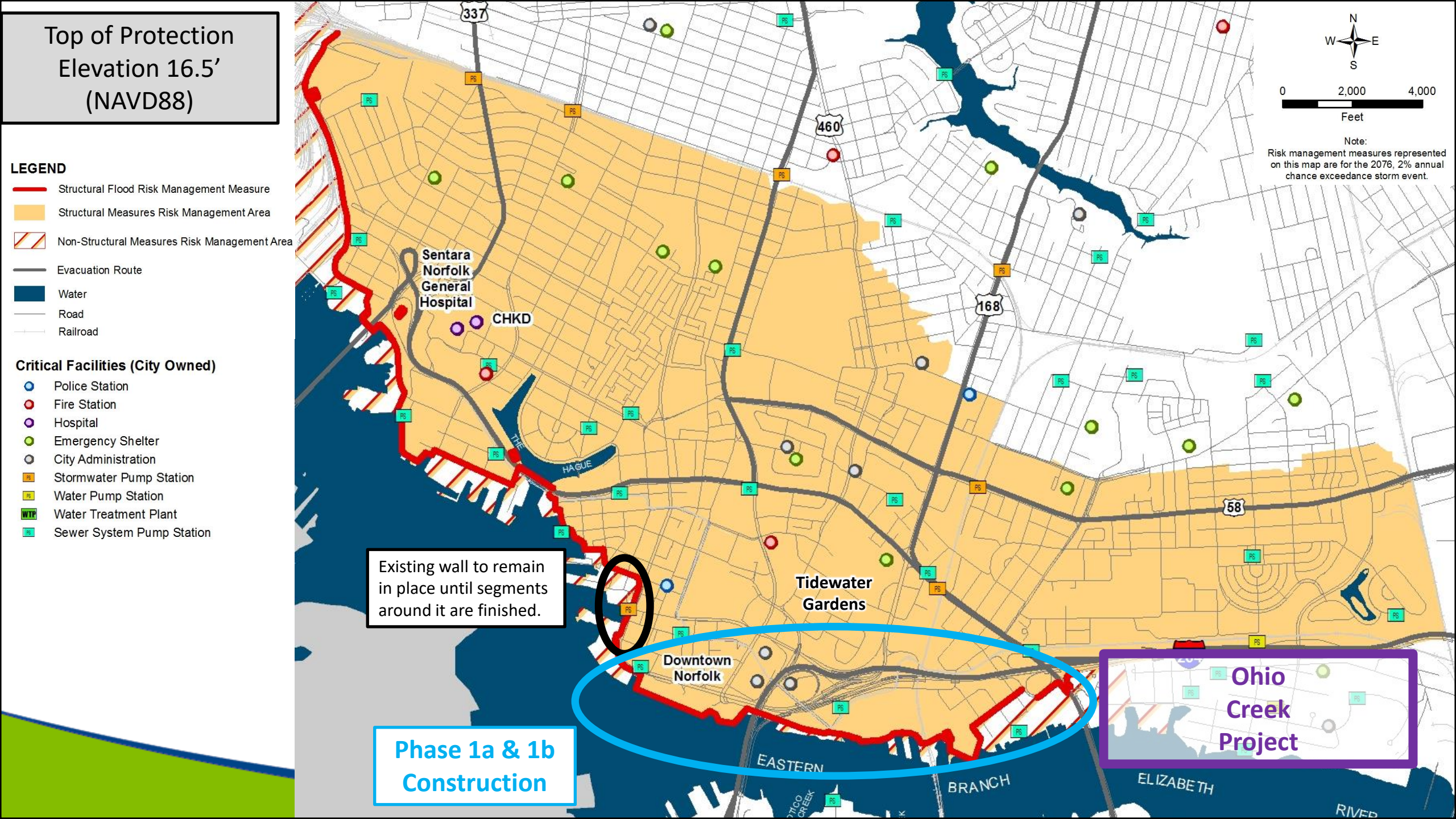
Funding Source	Ghent to HP Barrier System	Pretty Lake Surge Barrier	Lafayette Outer Surge Barrier	Broad Creek Surge Barrier	Non-structural	Totals
Federal	$407,984,200	$74,313,200	$360,115,600	$149,161,350	$170,055,600	$1,161,629,950
Nonfederal (City)	$109,841,900	$20,007,400	$96,954,200	$40,158,825	$45,784,200	$312,746,525
Nonfederal (State)*	$109,841,900	$20,007,400	$96,954,200	$40,158,825	$45,784,200	$312,746,525
	$627,668,000	**$114,328,000**	**$554,024,000**	**$229,479,000**	**$261,624,000**	**$1,787,123,000**

*Seeking a State match (17.5%) for non-federal costs (35%)

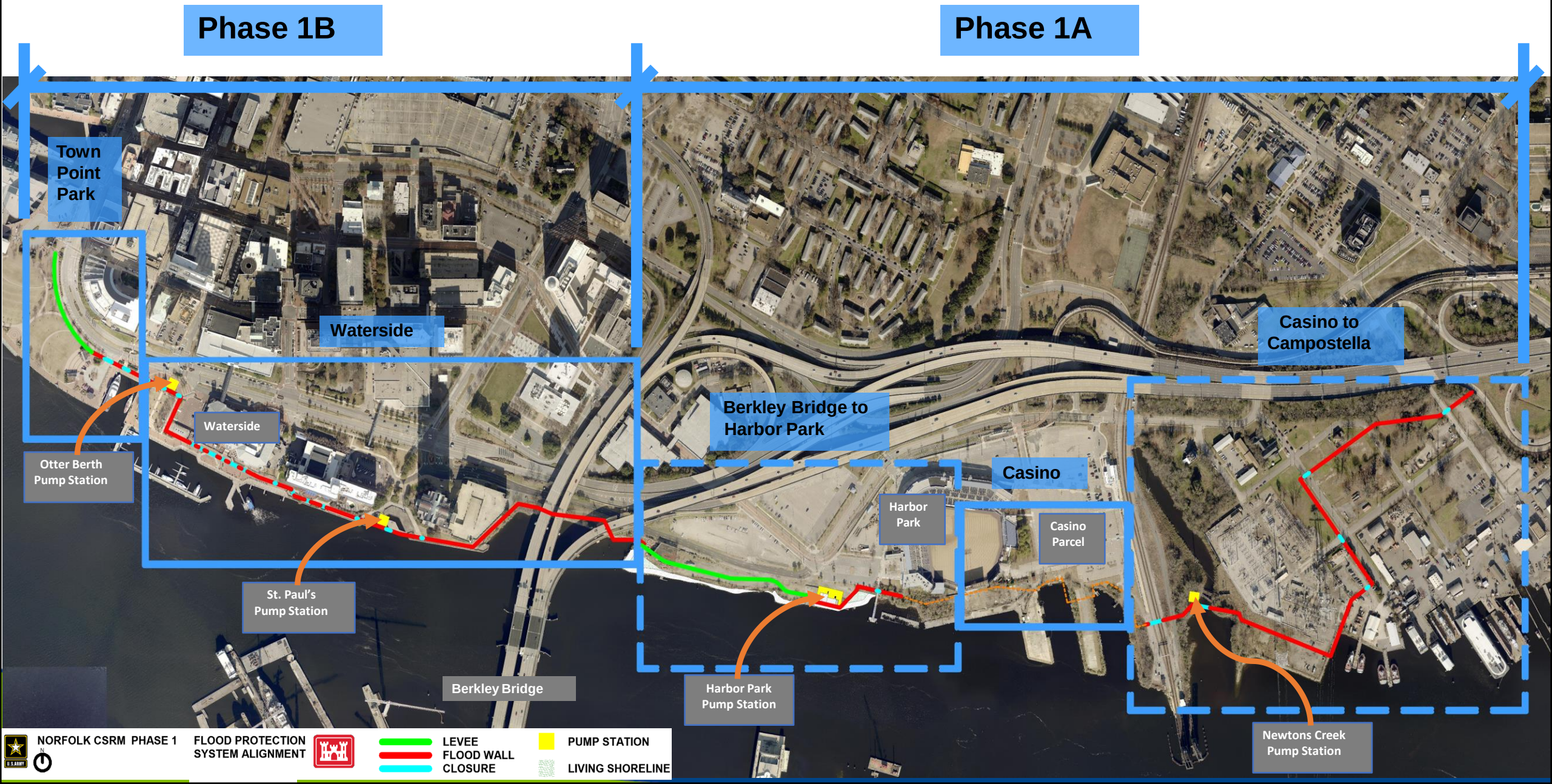


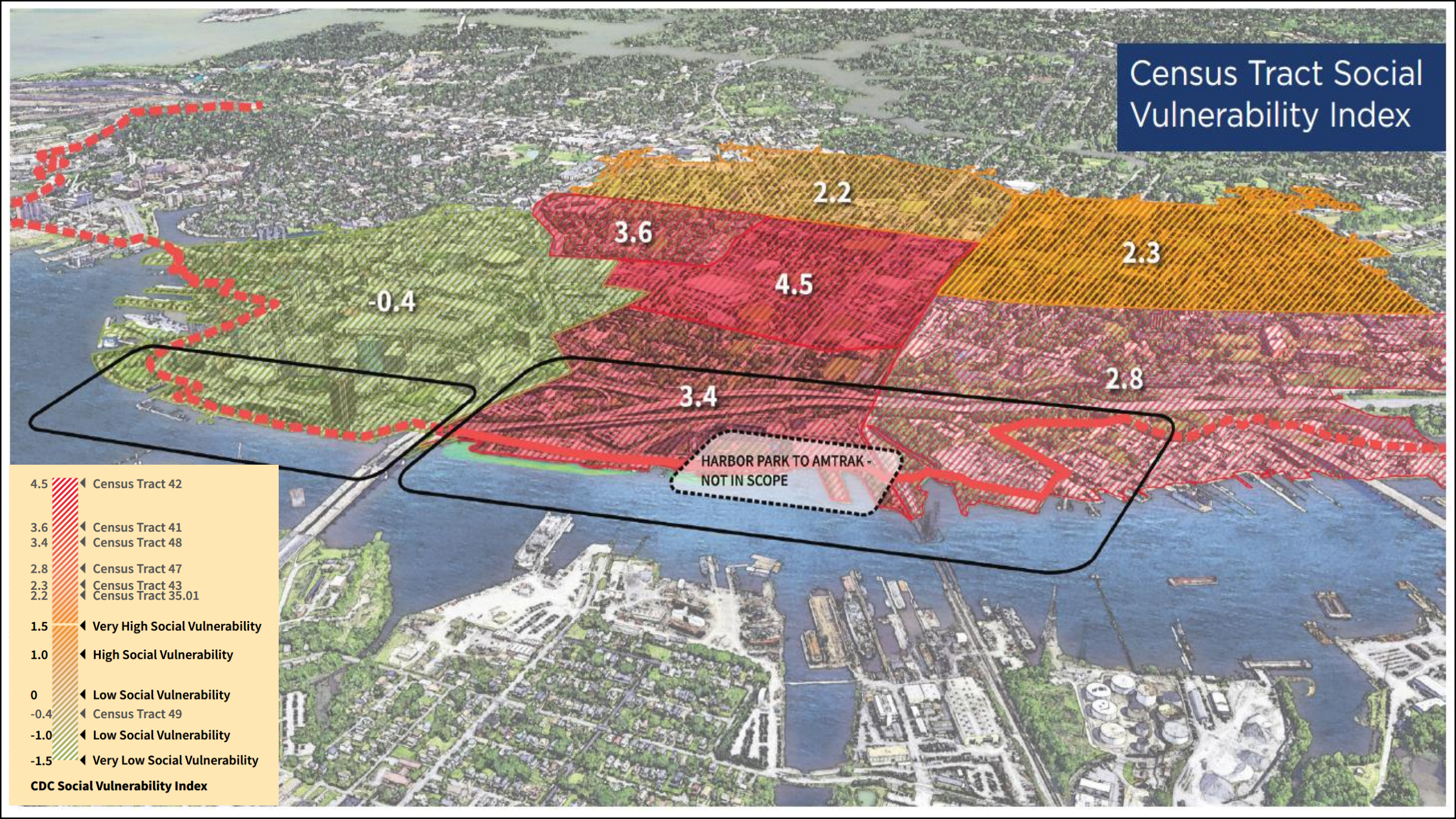
Project Phase Map

Top of Protection Elevation 16.5’ (NAVD88)

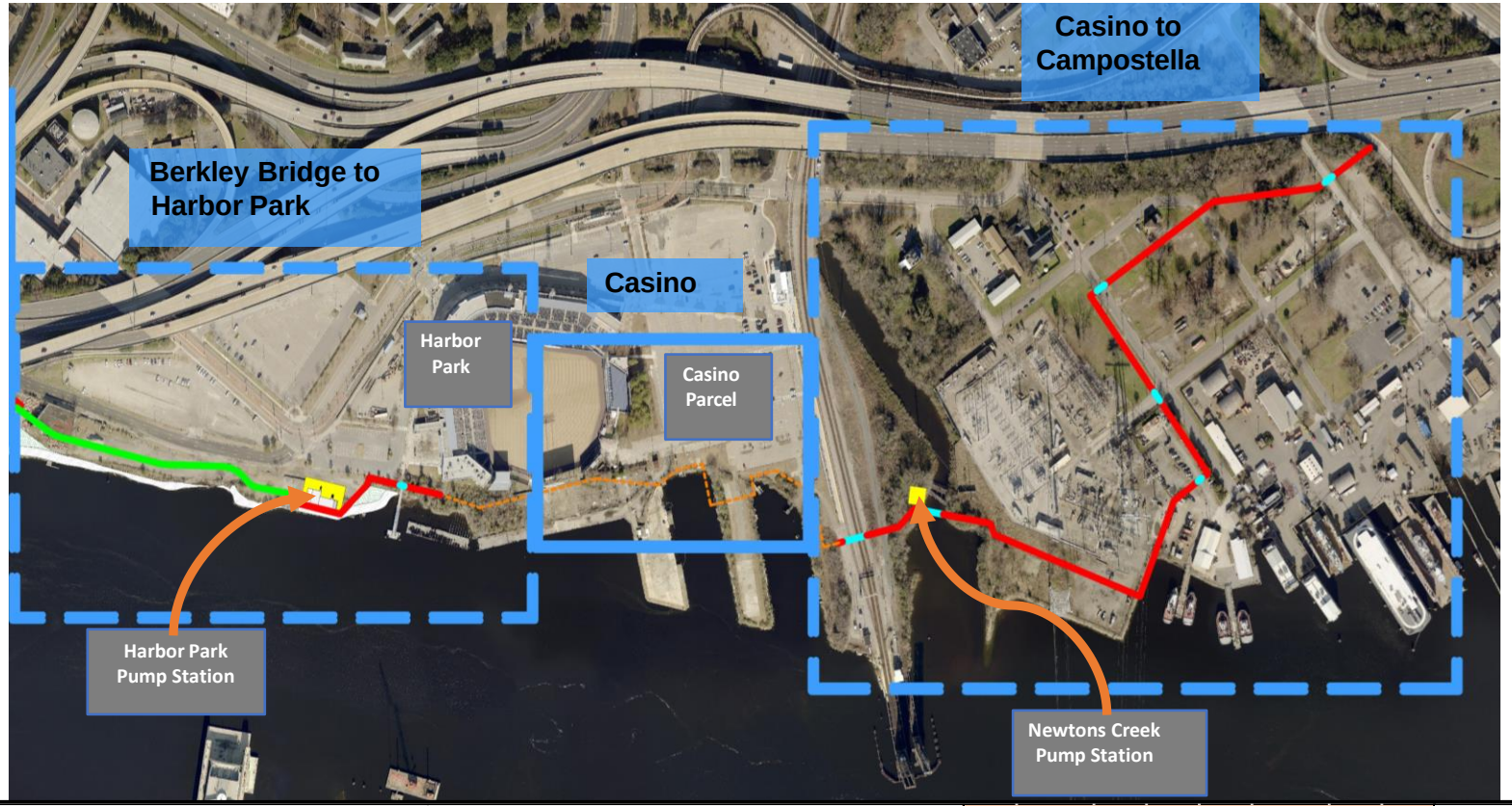


PHASE 1 PLAN


Phase 1B
Phase 1A
Town Point Park
Waterside
Waterside
Otter Berth Pump Station
St. Paul's Pump Station
Berkley Bridge
Berkley Bridge to Harbor Park
Harbor Park
Harbor Park Pump Station
Casino
Casino Parcel
Casino to Campostella
Newtons Creek Pump Station
NORFOLK CSRM PHASE 1
FLOOD PROTECTION SYSTEM ALIGNMENT
LEVEE
FLOOD WALL
CLOSURE
PUMP STATION
LIVING SHORELINE

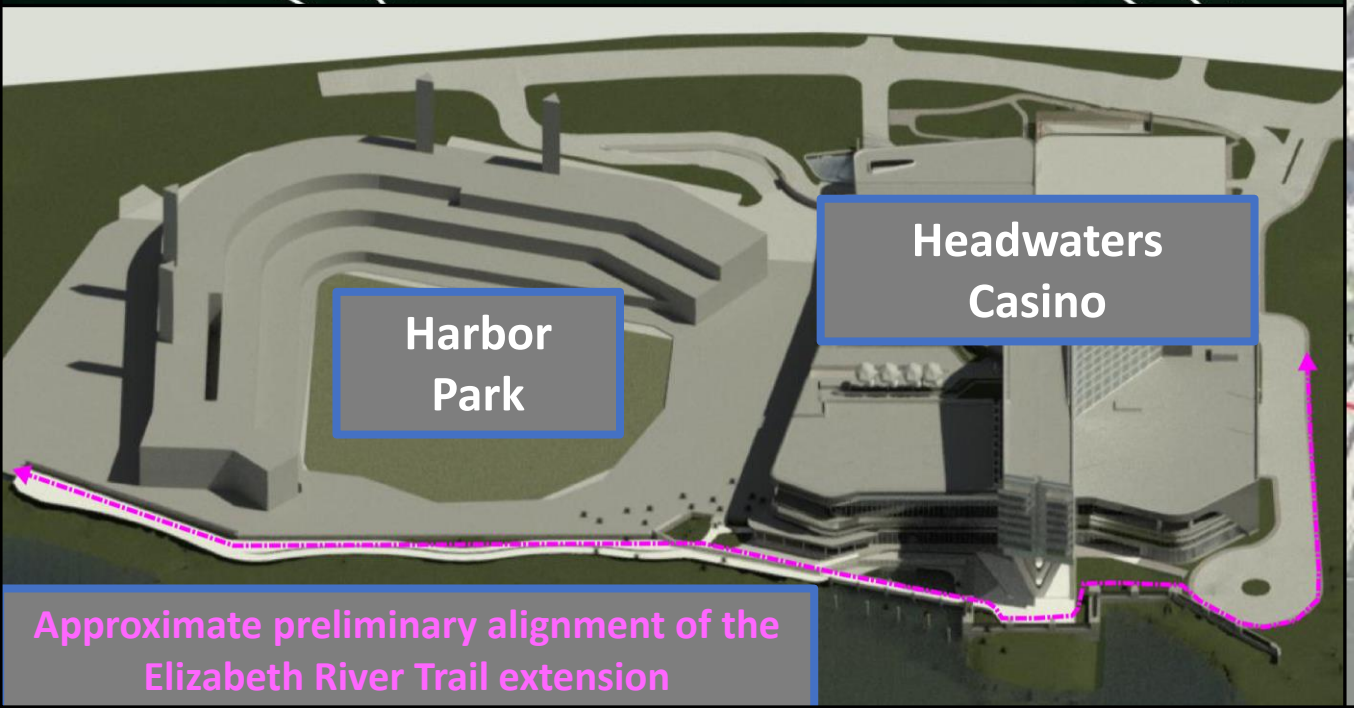

Census Tract Social Vulnerability Index
2.2
3.6
2.3
4.5
-0.4
2.8
3.4
HARBOR PARK TO AMTRAK - NOT IN SCOPE
4.5 Census Tract 42
3.6 Census Tract 41
3.4 Census Tract 48
2.8 Census Tract 47
2.3 Census Tract 43
2.2 Census Tract 35.01
1.5 Very High Social Vulnerability
1.0 High Social Vulnerability
0 Low Social Vulnerability
-0.4 Census Tract 49
-1.0 Low Social Vulnerability
-1.5 Very Low Social Vulnerability
CDC Social Vulnerability Index

PHASE 1A PLAN – SEPERABLE ELEMENTS



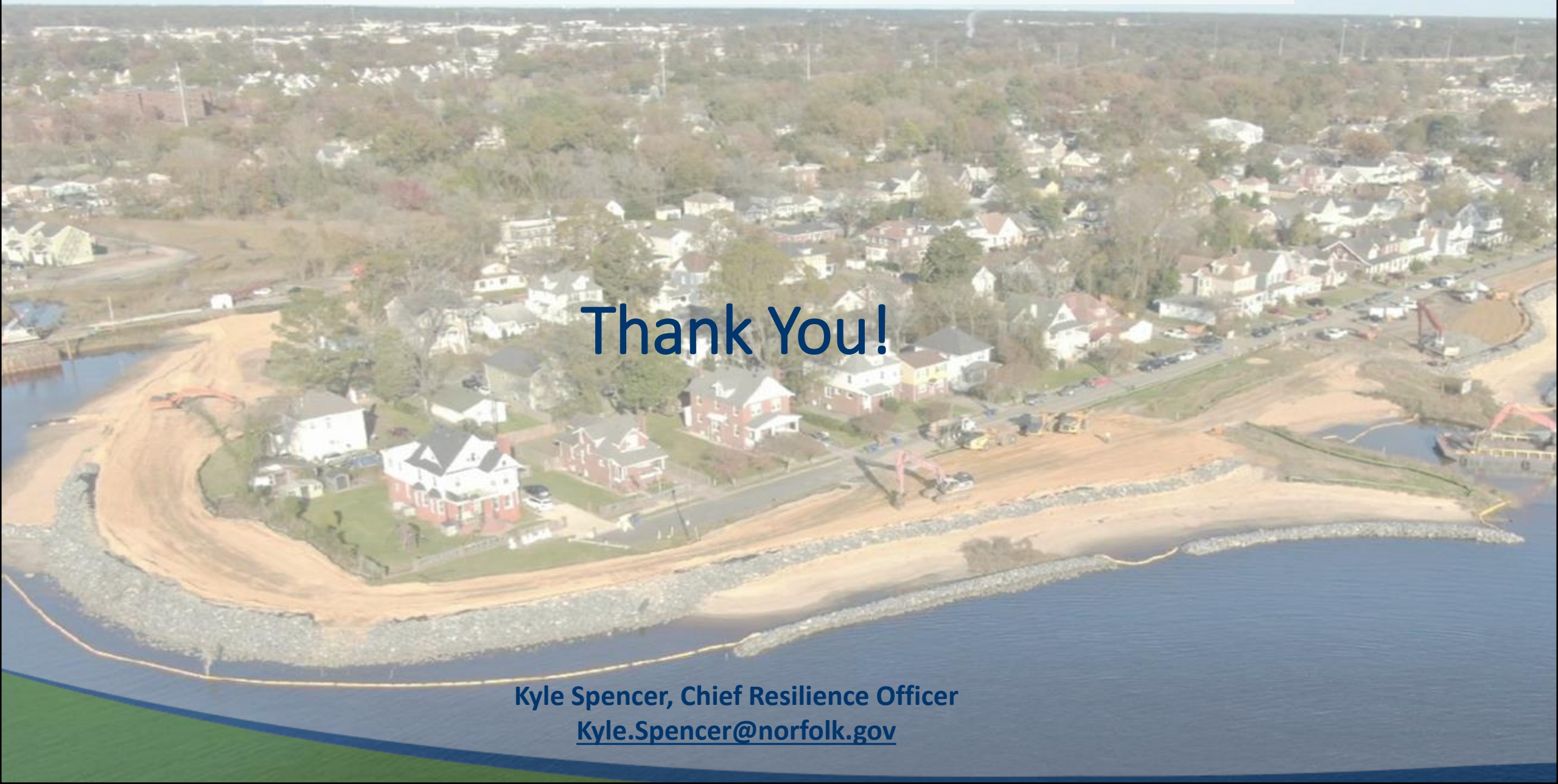
		Projects	Design Phase								Total
				FY22				FY23			Construction
Sub-Phase	Location	Design Description	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	FY24-FY26
1a	Berkley Bridge Levee	Levee, T-Wall, Closures, Living Shoreline						$3,700,000			$37,800,000
1a	Berkley Bridge Pump Station	Pump Station						$1,350,000			$17,888,000
1a	Harbor Park and NS Railroad Gate	Closure, T-Wall						$600,000			$5,860,000
1a	Newton's Creek Closure	Tide Gate, T-Wall						$500,000			$34,055,000
1a	Newton's Creek Pump Station	Pump Station						$1,350,000			$57,893,000
1a	Newton's Creek to Campostella	T-Wall, Closures						$6,900,000			$68,910,000
											$222,406,000


CONCEPT ONLY


Harbor Park
Headwaters Casino
Approximate preliminary alignment of the Elizabeth River Trail extension


St Paul's Blue Greenway
I-264
Harbor Park

NORFOLK RESILIENT CITY



Thank You!

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