

## Report to Congress for Future Water Resources Development (WRRDA 7001) Submission Package

Proposal Name: City of Norfolk Coastal Storm Risk Management Project -- Construction Authorization

Submission Date: 08/28/2019

Proposal ID Number: 702c2084-be61-4500-b03c-2906aa961226

Purpose of Proposal: Norfolk was identified as one of the nine areas of high risk by the North Atlantic Coast Comprehensive Study (NACCS). This high risk is a result of the both a combination of rising sea levels and land subsidence. Norfolk experiences one of the highest rates of relative sea level rise on the east coast and increasing frequency of storm. Six out of the eleven highest water levels experienced by the City since 1933 have occurred in the last decade. The Army Corps has completed the Final Integrated City of Norfolk Coastal Storm Risk Management Study and Environmental Impact Statement and it was signed by the Army Corps of Engineer's Chief of Engineers on February 5, 2019. The City of Norfolk is submitting this WRRDA 7001 authorization request to obtain an authorization for the construction of a project to reduce risk to residents, industries, and businesses which are critical to the nation's economy and security. Norfolk is the second largest city in the Commonwealth of Virginia and the commercial, cultural, and educational urban core supporting the highest job density in the 1.7M population Hampton Roads region. Norfolk is a global nexus for security and trade. The city is home to the Naval Station Norfolk, the largest naval complex in the world supporting the operational readiness of the U.S. Atlantic fleet, the third largest port on the East Coast, and NATO's Allied Command. Located at the gateway to the Chesapeake Bay, Norfolk naval assets provide security to the entire East Coast, including Washington DC, Europe, Africa and the Middle East. The NED plan estimates the total project first cost of constructing all elements of the citywide coastal flood reduction project at \$1,368,897,000. The calculated benefit-cost ratio for these projects (BCR) is 3.2. The federal construction cost share (65%) is estimated at \$1,228,843,850, and non-federal cost share (35%) is projected to be \$661,685,150.

*1. Administrative Details*

**Proposal Name: City of Norfolk Coastal Storm Risk Management Project - Construction Authorization**

**by Agency: The City of Norfolk, Virginia**

**Locations: VA**

**POC Name:**

**POC Phone:**

**POC Email:**

**Date Submitted: 08/28/2019**

**Confirmation Number: 702c2084-be61-4500-b03c-2906aa961226**

*Supporting Documents*

<b>File Name</b>	<b>Date Uploaded</b>
City of Norfolk Ltr of Support 20190826.pdf	08/28/2019
NFK-WRDA-7001-Project-Overview-Map.pdf	08/28/2019
Signed Chief's Report - Norfolk Coastal.pdf	08/28/2019

**2. Provide the name of the primary sponsor and all non-Federal interests that have contributed or are expected to contribute toward the non-Federal share of the proposed feasibility study or modification.**

Sponsor	Letter of Support
<p>The City of Norfolk, Virginia has been the non-Federal sponsor through the Final Integrated CSRM Study and will continue to be the non-Federal sponsor for this project through PED and construction.(Primary)</p>	<p>The City of Norfolk is willing and able to participate as the non-federal partner with the U.S. Army Corps of Engineers (USACE) through the Preconstruction Engineering Design (PED) and construction phase of the Recommended Plan identified in the Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study_Environmental Impact Statement to reduce the risk of damage from coastal storms to the people, property and assets within the City of Norfolk, Virginia. The City has aggressively pursued multiple partners to target and reduce its future flood risk, and is excited to target the coastal storm risks with USACE.</p>

**3. State if this proposal is for new feasibility study authority, a modification to an existing feasibility study authority, a modification to an existing USACE project authority, or a modification to an existing USACE Environmental Infrastructure Program authority. If it is a proposal for a modification to an existing study, project or program authority, provide the authorized water resources development feasibility study or project name.**

[x] Modification to a USACE Feasibility Study Authority : The Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study and Environmental Impact Statement

***4. Clearly articulate the specific project purpose(s) of the proposed study or modification. Demonstrate that the proposal is related to USACE mission and authorities and specifically address why additional or new authorization is needed.***

Norfolk was identified as one of the nine areas of high risk by the North Atlantic Coast Comprehensive Study (NACCS). This high risk is a result of the both a combination of rising sea levels and land subsidence. Norfolk experiences one of the highest rates of relative sea level rise on the east coast and increasing frequency of storm. Six out of the eleven highest water levels experienced by the City since 1933 have occurred in the last decade. The Army Corps has completed the Final Integrated City of Norfolk Coastal Storm Risk Management Study and Environmental Impact Statement and it was signed by the Army Corps of Engineer's Chief of Engineers on February 5, 2019. The City of Norfolk is submitting this WRRDA 7001 authorization request to obtain an authorization for the construction of a project to reduce risk to residents, industries, and businesses which are critical to the nation's economy and security. Norfolk is the second largest city in the Commonwealth of Virginia and the commercial, cultural, and educational urban core supporting the highest job density in the 1.7M population Hampton Roads region. Norfolk is a global nexus for security and trade. The city is home to the Naval Station Norfolk, the largest naval complex in the world supporting the operational readiness of the U.S. Atlantic fleet, the third largest port on the East Coast, and NATO's Allied Command. Located at the gateway to the Chesapeake Bay, Norfolk naval assets provide security to the entire East Coast, including Washington DC, Europe, Africa and the Middle East. The NED plan estimates the total project first cost of constructing all elements of the citywide coastal flood reduction project at \$1,368,897,000. The calculated benefit-cost ratio for these projects (BCR) is 3.2. The federal construction cost share (65%) is estimated at \$1,228,843,850, and non-federal cost share (35%) is projected to be \$661,685,150.

5. To the extent practicable, provide an estimate of the total cost, and the Federal and non-Federal share of those costs, of the proposed study and, separately, an estimate of the cost of construction or modification.

	Federal	Non-Federal	Total
<b>Study</b>	\$54,125,500	\$29,144,500	\$83,270,000
<b>Construction</b>	\$889,783,000	\$479,114,000	\$1,368,897,000

**Explanation (if necessary)**

The study cost above represents the following Recommended Plan’s total Preconstruction Engineering Design (PED) cost as estimated in the Norfolk Final Integrated CSRM Feasibility Study report. The combination of structural and nonstructural measures follows the NACCS model in the citywide plan by dividing the city into four areas that allow for separable elements to be constructed. The benefit-cost ratios of the major structural project measures in each of the four areas is outline below in rank order of BCR. This is the City of Norfolk’s preferred sequencing of the project implementation. Ghent-Downtown-Harbor Park Barrier System: BCR 3.66: Estimated Total Cost \$412,386,600 Measure description: includes a surge barrier, pump stations, tide gates, earthen berm and flood walls. In addition to structures captured in BCR, this measure improves access to the region’s central commercial and business district including the region’s only Tier 1 trauma hospital, the region’s children’s hospital, the region’s only medical school, critical transportation corridors used for evacuation, city hall, city institutional network, and historic districts. Pretty Lake Upper Surge Barrier: BCR 3.32: Estimated Total Cost \$86,905,470 Measure description: Surge barrier, floodwall, pump station in addition to structures captured in BCR. In addition to the structures captured in the BCR, this measure improves access to the Little Creek Amphibious Base and improves emergency evacuation routes for the northern section of Norfolk. Lafayette Outer Surge Barrier: BCR 2.98: Estimated Total Cost \$510,439,200 Measure description: includes a surge barrier, floodwall, earthen berm, pump station in addition to structures captured in the BCR this measure improves access to Naval Station Norfolk. Remaining measures: See attached MAP

***6. To the extent practicable, describe the anticipated monetary and nonmonetary benefits of the proposal including benefits to the protection of human life and property; improvement to transportation; the national economy; the environment; or the national security interests of the United States.***

Citywide alternative provides annual net benefits of \$120,226M. Additional benefits include: Citizens. Risk reduction of the impact of coastal storms on 247,087 residents and an additional 100K daily commuters into Norfolk (80K of whom are active military personnel). Vulnerable population. Norfolk has the region's highest concentration of poverty. More than 53% of residents are low-moderate income, 19.2% live in poverty, and the city is rated the 13th most fiscally stressed locality in Virginia. National Security. Norfolk hosts major Navy, Army, Marine Corps, and Coast Guard facilities, including Naval Station Norfolk, the largest military base in the world, with a plant replacement value of over \$4.2B. Nearly a quarter of the nation's active-duty military personnel are stationed in the region, and 31% of US naval shipbuilding and repair capacity is in the region. Many base personnel commute to Norfolk from different cities, and access is critical. At an average elevation of 8-1' above mean sea level, many of these assets already experience storm-related flooding. Studies show the 1.5-foot sea-level rise projected between 2032-62, combined with a mild 3-foot storm surge, would impede roadway access to military facilities. Economic Assets. Port of Virginia and related employment produce nearly 10% of Virginia's workforce (over 374K jobs, \$17.5B in wages). Nearly 7% of Virginia's Gross State Product is related to port activity(\$30.5B). Almost 73% of the goods passing through the port serve areas outside the region, including areas as far as the upper mid-west. The third largest commercial port on the east coast, Port of Virginia, saw approximately 81M tons of cargo, valued at \$5.3B, moved through its facilities in 2013. The port has experienced a 29% increase in imports and 34% in exports since 2008, the strongest overall growth of all east coast ports of call. Job Center: In all, 191,212 jobs are located in Norfolk, and employees from across the region commute here.

*7. Does local support exist? If 'Yes', describe the local support for the proposal.*

Yes

### **Local Support Description**

The City of Norfolk supports the construction of the project identified by the Final Integrated City of Norfolk Coastal Storm Risk Management Study and Environmental Impact Statement. A public scoping meeting and several follow up public meetings were held throughout the study process. Cooperating agencies were invited to participate in the development of this Environmental Impact Statement (EIS); and consulting parties were invited to participate in the development of a Programmatic Agreement to address historic resources. Inter-agency coordination of the EIS occurred throughout the study process.

*8. Does the primary sponsor named in (2.) above have the financial ability to provide for the required cost share?*

Yes

# Primary Sponsor Letter of Support

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**City of Norfolk Ltr of Support 20190826.pdf**

August 26, 2019

COL Patrick V. Kinsman  
District Commander  
US Army Corps of Engineers, Norfolk District  
803 Front Street  
Norfolk, VA 23510

Dear Colonel Kinsman:

The City of Norfolk is willing and able to participate as the non-federal partner with the U.S. Army Corps of Engineers (USACE) in the construction phase of the Recommended Plan identified in the *Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study/Environmental Impact Statement* to reduce the risk of damage from coastal storms to the people, property and assets within the City of Norfolk, Virginia. The City has aggressively pursued multiple partners to target and reduce its future flood risk, and is excited to target the coastal storm risks with USACE.

The City of Norfolk is the non-federal sponsor on the CSRSM study, authorized by Resolution of the Senate Committee on Environment and Public Works dated July 25, 2012. Our city staff has worked closely with the Norfolk District on this study and are anxious to move the project forward as quickly as possible to the construction phase.

Sincerely,



Douglas L. Smith  
City Manager

# Map Document

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NFK\_WRDA\_7001\_Project\_Overview\_Map.pdf

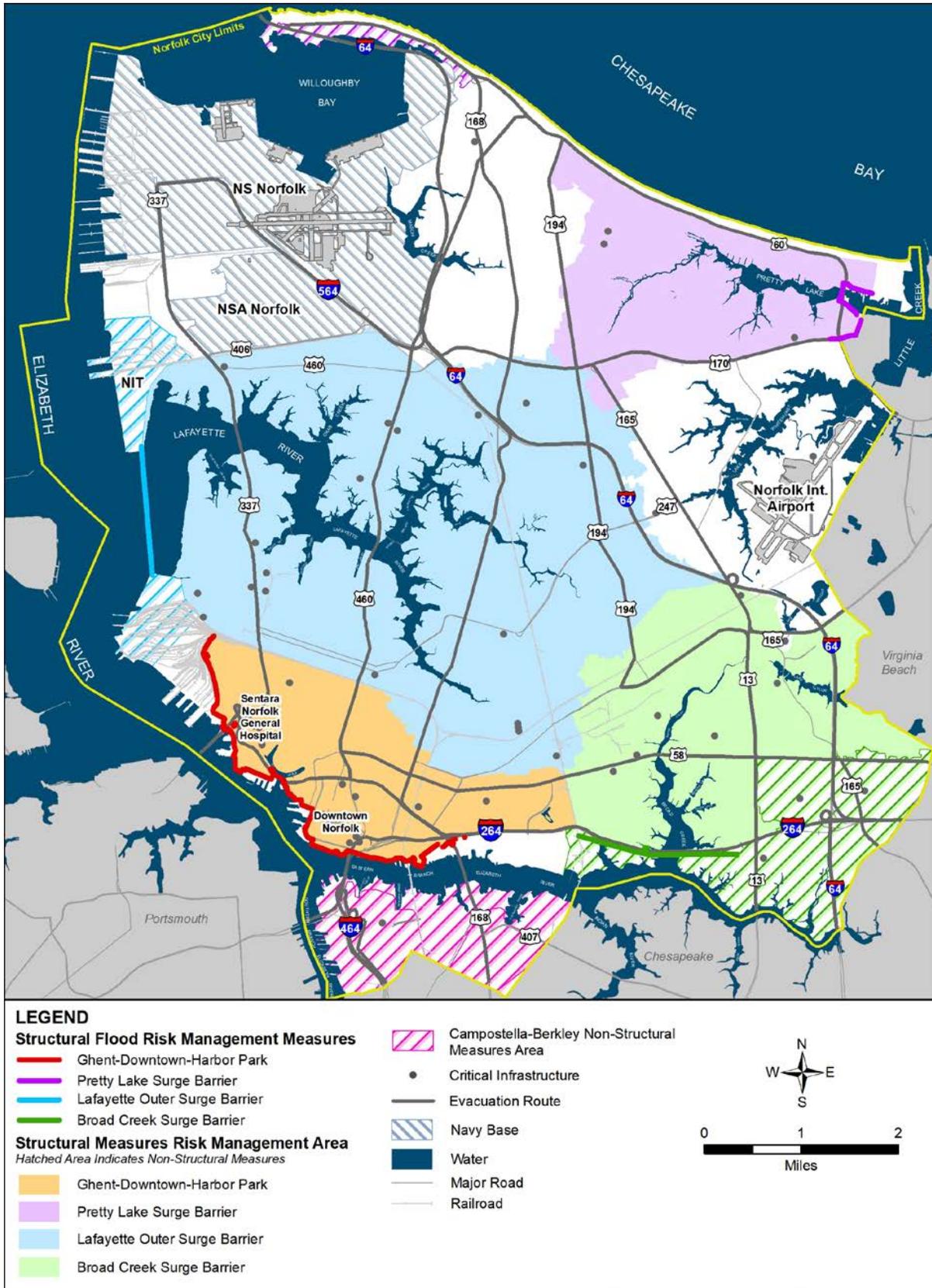


Figure 1. Map Supporting the Description of the Recommended Plan

# Additional Proposal Information

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**Signed Chief's Report - Norfolk Coastal.pdf**



DEPARTMENT OF THE ARMY  
CHIEF OF ENGINEERS  
2600 ARMY PENTAGON  
WASHINGTON, DC 20310-2600

DAEN

FEB 05 2019

SUBJECT: Norfolk Coastal Storm Risk Management Study, Virginia

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on coastal storm risk management (CSRМ) recommendations for the city of Norfolk, Virginia. It is accompanied by the report of the district and division engineers. The city of Norfolk was previously evaluated for coastal storm flood risk within the January 2015 North Atlantic Coast Comprehensive Study (NACCS), and was identified as a high-risk area of the North Atlantic Coast that warranted additional analysis by the Corps. This study is an interim response to a resolution of the Senate Committee on Environment and Public Works dated 25 July 2012. The resolution requested that the Secretary of the Army review the report of the Chief of Engineers on beach erosion and hurricane protection for Norfolk, VA, dated 17 April 1984, and other pertinent reports, to include existing coastal storm risk management studies and engineering reports to determine whether any modifications of the recommendations contained therein are advisable in the interest of flood damage reduction in the vicinity of Norfolk, VA. Preconstruction engineering and design activities for the Norfolk CSRМ project are authorized under the authority granted in "America's Water Infrastructure Act of 2018." Section 1203(a)(29) of the Water Resources Development Act of 2018, Public Law 115-270, identifies the Norfolk CSRМ project for expedited transition to preconstruction engineering and design once a justified project is identified in a completed report.

2. The reporting officers recommend authorizing a plan that will significantly reduce the coastal storm risk and associated damage to structures in the city of Norfolk. The Recommended Plan is the National Economic Development (NED) Plan which includes the following principal features:

*Pretty Lake Storm Surge Barrier:* This structural feature would be a 114 linear foot storm surge barrier with a pump and power station. The feature would tie into 5,642 linear feet of floodwall.

*Lafayette River Storm Surge Barrier:* This structural feature would be a 6,634 linear foot storm surge barrier with a power station. The feature would tie into 1,535 linear feet of constructed earthen levee. Three tide gates would be constructed and operated.

*The Hague / Downtown Storm Surge Barrier:* This structural feature would be a 600 linear foot storm surge barrier with a pump and power station. The surge barrier would tie into 27,236 linear feet of constructed floodwall and 2,582 linear feet of earthen levee. Three pump stations would also be constructed and operated for interior drainage.

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SUBJECT: Norfolk Coastal Storm Risk Management Study, Virginia

*Broad Creek Storm Surge Barrier:* This feature would be a 1,291 linear foot storm surge barrier with four operational tide gates and a power station. The surge barrier would tie into approximately 8,787 linear feet of flood wall. One pump station would also be constructed and operated for interior drainage

*Nonstructural features:* Nonstructural features would be constructed in neighborhoods outside of a structural system alignment to include the following:

- Basement fills – 176 properties
- Basement fills plus elevation – 89 properties
- Basement fills plus dry floodproofing – 1 property
- Elevation – 624 properties
- Dry floodproofing – 54 properties
- Acquisition – 76 properties

*Natural and nature-based features (NNBF):* These CSRMs features would include approximately 0.3 acres of oyster reef and approximately 8.9 acres of living shoreline to increase resiliency.

The Recommended Plan requires the non-federal sponsor to prepare a Floodplain Management Plan, as required for all Corps flood risk management projects by Section 402 of WRDA1986, as amended. The Recommended Plan would have some adverse impacts to the environment and mitigation is required. Approximately 2.5 acres of wetlands, 2 acres of mudflats, and 20 acres of open water will be impacted. All impacts will be mitigated by the construction of living shoreline oyster reef and wetland in the study area. The Recommended Plan would implement the environmental compensatory mitigation plan and associated monitoring and adaptive management plan.

3. The city of Norfolk, Virginia is the non-federal cost sharing sponsor for all features of the project. Project costs are based on October 2018 price levels. The estimated project first cost of construction is \$1,361,810,000 which includes the cost of constructing structural, nonstructural, and NNBF measures along with the value of lands, easements, rights-of-way, relocations, and disposal areas (LERRDs). Total LERRD is estimated to be \$125,990,000. Cost sharing is applied in accordance with the provision of Section 103(c)(5) of WRDA 1986, as amended (33 U.S.C. 2213(c)(5)), as follows:

a. The cost share of construction is split 65% federal and 35% non-federal. The estimated federal and non-federal shares of the project first cost are \$885,180,000 and \$476,630,000 respectively. The non-federal sponsor will receive credit for the costs of LERRD toward the non-federal share.

b. The additional annual cost of operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) for the Recommended Plan is estimated to be \$1,780,000. The non-federal sponsor will be responsible for 100 percent of the cost of project OMRR&R.

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SUBJECT: Norfolk Coastal Storm Risk Management Study, Virginia

4. Based on a 2.875 – percent discount rate and a 50-year period of analysis, the equivalent average annual benefits and costs are estimated at \$177,700,000 and \$55,650,000 respectively. The project is estimated to provide annual net benefits of \$122,050,000 and a benefit-to-cost ratio (BCR) of 3.2. All project costs are allocated to the authorized purpose of coastal storm risk management.

5. The city of Norfolk, the U.S. Navy, and other key institutions have institutionalized a collaborative adaptive systems strategy that will incorporate the Recommended Plan and benefit Department of Defense facilities, the community, and other employers in the region. The city is a global security hub, home to the largest naval base in the world, Naval Station Norfolk (NSN), and the only North Atlantic Treaty Organization command on U.S. soil. Many of the 65,000 active duty and civilian base personnel employed at NSN commute to work from off the base making the housing and road infrastructure in Norfolk critical to mission readiness for the U.S. Navy. The Recommended Plan will directly contribute to national security by reducing the risk of flooding to this residential and transportation infrastructure. The study also incorporates a strategic approach that will reduce impacts on economic impacts in the city. 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.

6. The goals and objectives included in the Campaign Plan of the Corps have been fully integrated into the Norfolk CSRM study process. The Recommended Plan was developed in coordination and consultation with various federal, state and local agencies using a systematic and regional approach to formulating solutions and evaluating the benefits and impacts that would result. Coordination with the public occurred throughout the study process via public meetings and comment periods.

7. Risk and uncertainty were addressed during the study by completing a cost risk analysis and including sensitivity analyses as appropriate to evaluate potential impacts of assumptions in the economics, hydraulic modeling, and sea level change. The project is not intended to, nor will it, reduce all risk to loss of life during major storm events. Residual risks to the city of Norfolk have been communicated and these risks can be reduced by residents and visitors following local evacuation plans that are already in place. The future impact of sea level change is likely the largest risk factor and source of uncertainty for the project. As the study area is extremely sensitive to sea level rise due to the low-lying topography of Norfolk, a sensitivity analysis on sea level change was completed using the three Corps sea level change curves. The Recommended Plan is formulated to the intermediate sea level change curve, which projects approximately 1.4 feet of sea level rise during the 50 year analysis period of 2026 – 2075. A sea level change more closely aligning with the high rate would require significant adaptation and

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SUBJECT: Norfolk Coastal Storm Risk Management Study, Virginia

investment to maintain the same level of risk management. As such, adaptable measures such as T-walls have been designed into the Recommended Plan due to their ability to be modified for increased height in the future.

8. Washington level review indicates that the plan recommended by the reporting officers is technically sound, environmentally and socially acceptable, cost effective, and economically justified. The plan complies with all essential elements of the U.S. Water Resources Council's *Economic and Environmental Principles and Guidelines for Water and Land Related Resources Implementation Studies* and complies with other administrative and legislative policies and guidelines. The views of interested parties, including federal, state, and local agencies, were considered.

9. I concur in the findings, conclusions, and recommendation of the reporting officers. Accordingly, I recommend that CSRSM improvements for Norfolk, Virginia, be authorized in accordance with the reporting officers' Recommended Plan at an estimated cost of \$1,361,810,000 with such modifications as in the discretion of the Chief of Engineers may be advisable. My recommendation is subject to cost sharing, financing, and other applicable requirements of federal and state laws and policies, including Section 103 of WRDA 1986, as amended (33 U.S.C. 2213). The non-federal sponsor would provide the non-federal cost share and all lands, easements, and rights of way, including those necessary for the borrowing of material and the disposal of dredged or excavated material, and would perform or assure the performance of all relocations, including utility relocations. This recommendation is subject to the non-federal sponsor agreeing to comply with all applicable federal laws and policies include that the non-federal sponsor must agree with the following requirements prior to project implementation.

a. Provide 35 percent of project costs assigned to coastal and storm damage reduction, as further defined below:

(1) Provide, during design, 35 percent of design costs allocated to coastal and storm damage reduction in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

(2) Provide all lands, easements, rights-of-way, including suitable borrow areas, and perform or assure performance of all relocations, including utility relocations, as determined by the Federal Government to be necessary for the initial construction, periodic nourishment or operation and maintenance of the project, all in compliance with applicable provisions of the Uniform Relocation and Assistance and Real Property Acquisition Policies Act of 1970, as amended (42 U.S.C. 4601-4655) and the regulations contained in 49 C.F.R. Part 24;

(3) Provide, during construction, any additional amounts necessary to make its total contribution equal to 35percent of project costs assigned to coastal and storm damage reduction;

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SUBJECT: Norfolk Coastal Storm Risk Management Study, Virginia

b. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;

c. Inform affected interests, at least yearly, of the extent of protection afforded by the project; participate in and comply with applicable federal floodplain management and flood insurance programs; comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12); and publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the flood risk management features;

d. Operate, maintain, repair, replace, and rehabilitate the completed project, or function portion of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable federal and state laws and regulations and any specific directions prescribed by the Federal Government;

e. For so long as the project remains authorized, ensure continued conditions of public ownership and use of the project features;

f. Hold and save the United States free from all damages arising from the initial construction, operation, maintenance, repair, replacement, and rehabilitation of the project, except for damages due to the fault or negligence of the United States or its contractors;

g. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation and maintenance of the project;

h. Assume, as between the Federal Government and the non-federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way required for the initial construction, periodic nourishment, or operation and maintenance of the project;

i. Agree, as between the Federal Government and the non-federal sponsor, that the non-federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and, 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;

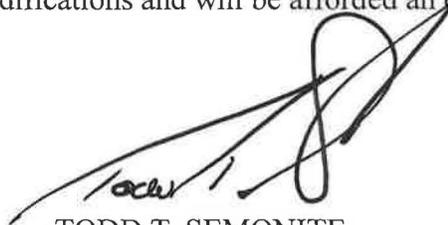
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SUBJECT: Norfolk Coastal Storm Risk Management Study, Virginia

j. Seek legislation in the Virginia General Assembly to authorize the use of submerged lands owned by the Commonwealth for the project.

10. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program or the perspective of higher review levels within the Executive Branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to Congress, the city of Norfolk (the non-federal sponsor), interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

*Fully Reviewed  
THIS PROJECT -  
CRITICAL TO PROTECT  
THE LIVES, PROPERTY AND  
LIVELIHOOD OF NORFOLK!*



TODD T. SEMONITE  
Lieutenant General, USA  
Chief of Engineers