EXECUTIVE SUMMARY

The results of engineering, economic, environmental, and real estate investigations performed for this Feasibility Study (FS) are being used to determine if improvements to the constructed federal project are warranted and if necessary, seek additional authorization where not already granted for navigation system improvements at Norfolk Harbor, Virginia (Figure 1). The Virginia Port Authority (VPA) requested the re-evaluation of the project which was authorized under Section 201 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662). This law authorized the construction of the Norfolk Harbor and Channels, Virginia, Project, as described in House Document 99-85, dated 18 July 1985, entitled "Norfolk Harbor and Channels, Virginia." The original authorization included channel deepening from 45 to 55 feet within most of the project area and 57 feet within the Atlantic Ocean Channel (AOC). Since being authorized all areas were deepened to a depth of 50 feet with the exception of the AOC which was deepened to 52 feet. This study is being conducted under Section 216 of the Flood Control Act of 1970 (Public Law 91-611), which authorizes the review of completed projects in the interest of navigation and related purposes to determine the feasibility of further port deepening.

Figure 1: Norfolk Harbor and Channels

DESCRIPTION OF REPORT

This Draft Integrated Feasibility Report and Environmental Assessment (IFR/EA) documents the FS process and presents the results of investigations and analyses conducted to evaluate modifications to the existing Federal navigation system to improve its ability to efficiently serve the current and future vessel fleet and process the forecasted cargo volumes. It presents: (1) a survey of existing and future conditions; (2) an evaluation of related problems and opportunities; (3) development of potential alternatives; (4) a comparison of costs, benefits, adverse impacts, and feasibility of those alternatives; and (5) identification of a National Economic Development (NED) Plan and Tentatively Selected Plan (TSP).

PURPOSE AND NEED

The cargo transportation industry continues its shift to increased use of standardized containers used for multimodal (marine, rail, and truck) freight transportation systems. Additionally, the marine vessel fleet is trending to larger, deeper-draft vessels, particularly for containerships. Norfolk Harbor also serves as the location of Naval Station Norfolk, which supports the operational readiness of the U.S. Atlantic fleet. The Federal channels serving Norfolk Harbor's major terminals are currently authorized to a depth of -55 feet mean lower low water (MLLW) but were constructed to only 50 feet and 1,000 feet wide and 52 feet in the AOC. The existing dimensions of those channels place constraints on deeper-draft containerships, which result in reduced efficiency and increased costs.

Specific problems warranting Federal consideration include navigation and safety considerations, engineering challenges, and concerns of those who live and work along or around the Federal navigation project. Navigation concerns include three main types of problems: limited channel depth causing navigation inefficiencies, channel width does not allow safe meeting of Department of Defense and commercial navigation vessels, and existing anchorages are insufficient to fully accommodate existing vessel fleet. Larger ships currently experience transportation delays due to insufficient Federal channel depths. To reach port terminals, these larger ships might have to light load, experience delays while waiting for favorable tide conditions, and/or wait while Department of Defense (DoD) or commercial vessels transit the main channel. These approaches require the vessel operator to forego potential transportation cost savings available from the economies of scale associated with larger ships. Restrictive channel widths also limit ship passage to one-way traffic in many reaches and larger container ships require expanded turning basins.

ALTERNATIVES AND RECOMMENDED PLAN

Utilizing the Corps' Planning Process as specified in ER 1105-2-100, plan formulation was conducted with a focus on achieving the Federal objective of water and related land resources project planning, which is to contribute to National Economic Development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Plan formulation also considers all effects, beneficial or adverse, to each of the four evaluation accounts identified in the Principles and Guidelines (1983), which are National Economic Development, Environmental Quality, Regional Economic Development, and Other Social Effects.

Alternative plans combining multiple structural and nonstructural measures to improve the safety and efficiency of the navigation system were considered to determine whether the

Federal government should participate in implementing navigation improvements. The expected returns to the national economy (NED benefits) are calculated. NED benefits are generated by addressing inefficiencies in the existing transportation system to lower transportation costs. Net benefits are calculated by subtracting the total cost to construct and maintain the improvements over a 50-year study period from the total transportation cost savings that would be generated by the proposed improvements over that period. The NED Plan is the alternative that reasonably maximizes net NED benefits while remaining consistent with the Federal objective of protecting the nation's environment. Where two cost-effective plans produce similar net benefits, the less costly plan is identified as the NED plan, even though the level of outputs may be less. The NED Plan is normally recommended for implementation. However, if the non-Federal sponsor prefers a more costly plan and is willing to pay the additional costs, a Locally Preferred Plan (LPP) can be recommended if the outputs are similar in kind, and equal to or greater than the outputs of the NED Plan.

In this study, multiple alternatives were developed that generated significant annual net benefits. After careful consideration, the USACE identified the alternative that reasonably maximizes annual net benefits as the NED Plan. The TSP is the NED plan. The plan recommends:

- Deepening of Atlantic Ocean Channel (AOC) to 59 feet
- Deepening of Thimble Shoal Channel to 56 feet
- Deepening of Norfolk Harbor Channel to 55 feet
- Deepening of Norfolk Harbor Entrance Channel to 55 feet
- Deepening of Newport News Channel to 55 feet
- Widening of Thimble Shoal Channel West to 1200 feet
- Widening of Thimble Shoal Channel East to 1200 feet

Dredged material placement/disposal could occur at the Dam Neck Ocean Disposal Site, the Norfolk Ocean Disposal Site, and the Craney Island Dredged Material Management Area for this project. Portions of the dredged material may be suitable for beneficial use. Beneficial use projects are encouraged and would be coordinated separately from this project based on schedule and sponsor availability.

COSTS AND BENEFITS

The USACE employed the traditional providers of traffic and fleet projections to study the Norfolk Harbor project. Based on existing and projected future vessel traffic, vessel fleet mix, trade route allocations, and liner services currently associated within Norfolk Harbor, two design vessels were selected. The vessel mix was allocated over time to provide benefit calculations using the HarborSym economic analysis model. The characteristics of the design vessels were used to develop channel dimension and alignment needs. Further refinement of the dimensions and alignment is expected through application of ship simulations prior to developing final designs. The dimensions of the two design vessels are described as follows:

- MSC Daniela:
    a. 1,201 foot length
    b. 168 foot beam
    c. 51.2 foot draft

- Large Capesize Bulker:
    a. 985 foot length
    b. 164 foot beam
    c. 59.7 - 60.4-foot draft

The projected traffic allocated between the time-modified mix of containerships and bulkers has provided average annual net benefits of $90.8 million for the TSP (the NED Plan). The TSP maximized annual net benefits and maintained a robust BCR of 4.9. The estimated project costs are $321.9 million and economic investment costs are $336.9 million. The entire project is economically justified. Table 1 provides a summary of the Federal and non-federal costs and Table 2 provides the annualized benefits and costs for the TSP. The benefits are attributable to transportation cost savings through the use of existing ships with a deeper draft, the use of larger vessels, and delay reductions.

Table 1: Federal and Non-Federal Costs

	Total Cost	Federal	Non-Federal
Mob and Demobilization	$18,554,000	$9,277,000	$9,277,000
Dredging Cost (Including Mob / Demob)	$224,687,000	$112,343,000	$112,343,000
Environmental Mitigation	$0	$0	$0
Monitoring	$0	$0	$0
Construction Management	$2,393,000	$1,197,000	$1,197,000
PED	$13,379,000	$6,690,000	$6,690,000
Contingency (12.45%)	$29,757,000	$14,879,000	$14,879,000
Total Construction of GNF	$288,770,000	$144,385,000	$144,385,000
Lands & Damages	$14,772,000	$7,386,000	$7,386,000
Total Project First Costs	$303,542,000	$151,771,000	$151,771,000
Non-Federal Berthing Area Dredging Costs	$18,439,000	$9,219,000	$9,219,000
Relocating Aids to Navigation	$0	$0	$0
10% GNF Non-Federal		($14,105,000)	$14,105,000
Total Cost	$321,981,000	$146,886,000	$175,096,000

Table 2: Costs and Benefits

Equivalent Annual Benefits and Costs FY2017 Price Levels 50-Year Period of Analysis / 2.75 % Discount Rate	
Project Costs	$321,981,000
Interest During Construction	$14,970,000
Total Economic Investment	**$336,952,000**
AAEQ Costs	
Economic Investment	$12,481,000
Increased O&M Costs	$5,932,000
Total AAEQ Costs	**$18,413,000**
AAEQ Benefits	
Transportation Cost Savings	$90,808,000
Total AAEQ benefits	**$90,808,000**
Net AAEQ Benefits	**$72,395,000**
Benefit-Cost Ratio (at 2.75%)	**4.93**

ENVIRONMENTAL IMPACTS AND MITIGATION

The possible consequences of the Tentatively Selected Plan were considered in terms of probable environmental impact, social well-being, and economic factors. Endangered Species Act, Section 7 consultation is ongoing with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Marine Mammal Protection Act and Essential Fish Habitat consultation as required per the Magnuson-Stevens Fishery and Conservation Management Act with the NMFS is ongoing. Impacts to these species and any designated Critical habitat are not anticipated to be "significant," as defined by the significance thresholds in National Environmental Policy Act guidelines (40 CFR Parts 1500-1508). There is no anticipated required compensatory mitigation anticipated with implementation of the Preferred Alternative. All mitigation, in terms of avoidance and minimization measures, has been incorporated into the development of the proposed project. Best Management Practices have been incorporated in order to protect the environment and minimize impacts during construction, and operation and maintenance cycles. Best Management Practices and standard USACE protocols will be implemented for the protection of listed turtle and whale species, Atlantic Sturgeon, as well as other species protected by the Marine Mammal Protection Act to reduce any potential negative impacts of the project.

There are no significant economic, recreation, aesthetic, or social well-being impacts, either adverse or unavoidable, as a result of the proposed action. This project is expected to have a positive impact on the economy of Hampton Roads and the Commonwealth of Virginia. In addition, a Programmatic Agreement was coordinated and signed by USACE, Virginia Port Authority and the Virginia State Historic Preservation Office in June 2017 to address any potential cultural resource impacts anticipated during project implementation.

There are no significant impacts anticipated to benthic resources, wetlands, and water quality. All impacts are anticipated to be temporary and negligible to minor in nature. Total Suspended Solids and turbidity in the water column resulting from dredging and material placement/disposal will quickly return to ambient conditions after construction is complete.

The NODS and DNODS are authorized ocean disposal areas designated by the Environmental Protection Agency for Atlantic Ocean Channel and the Thimble Shoal Channel dredged materials. U.S. Army Corps of Engineers has permitting authority under Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) for the use of these sites. In the past material from these location have met MPRSA Section 103 Limiting Permissible Concentration (LPC) criteria.

Dredged material which meets sediment and elutriate testing requirements for placement at the CIDMMA may be placed in the Craney Island Re-handling Basin (CIRB) or directly in one of the containment cells at CIDMMA.

Dredged material placement actions at CIDDMA will comply with Clean Water Act and CIDMMA acceptance criteria. Commanders Policy WRD-01 is an NAO internal guidance document which also governs the operation of CIDMMA. Prior to commencement of construction, dredged material will undergo evaluation procedures. During construction effluent discharged from the CIDMMA will be managed in accordance with Commander's Policy WRD-01 to maximize the retention of suspended solids minimizing migration of contaminants through the effluent pathway beyond the boundaries of the disposal site.