

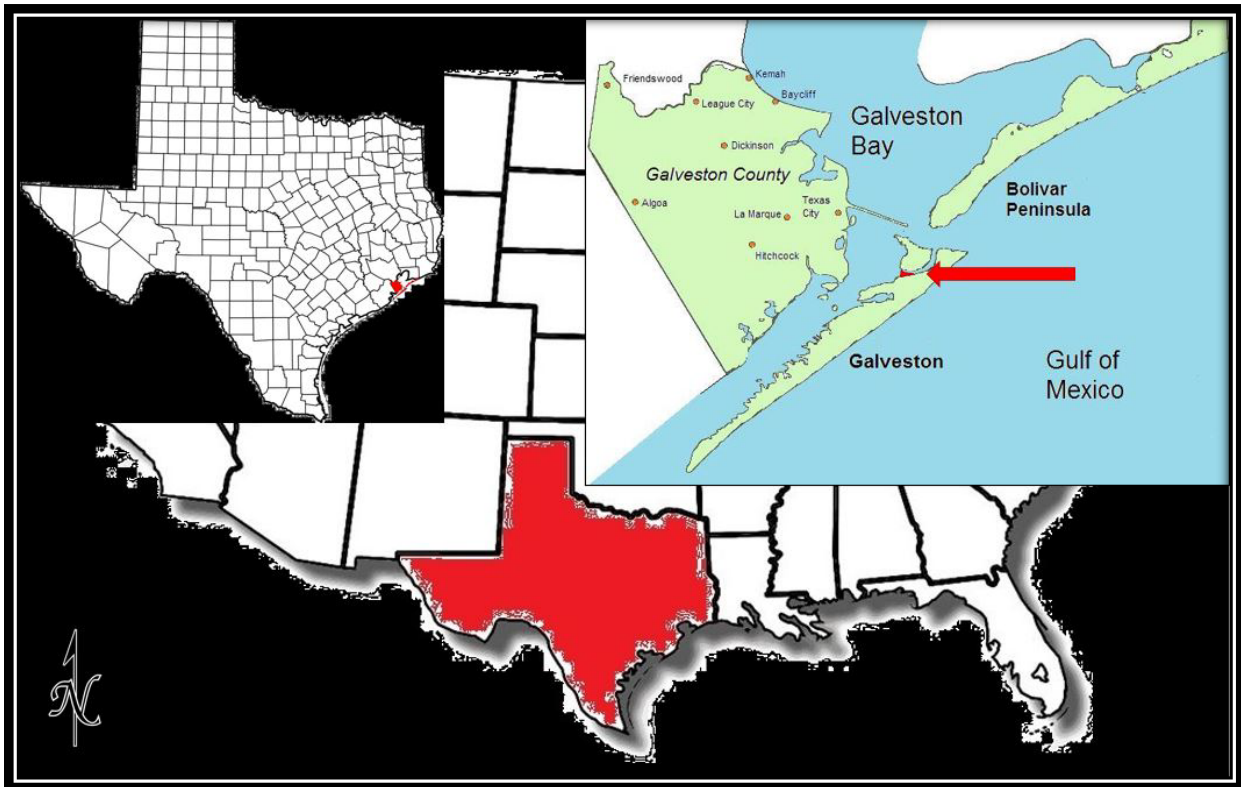
# VALIDATION REPORT

For

## HGNC Galveston Channel Extension

Galveston, Galveston County, Texas

December 2023



P2: 401250

DRAFT



**US Army Corps  
of Engineers®**  
Galveston District

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**DEPARTMENT OF THE ARMY**  
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## EXECUTIVE SUMMARY

### **Background**

The HGNC Galveston Channel Extension – Houston-Galveston Navigation Channels, Texas feasibility study completed February 2017, was part of an earlier study for improving the deep-draft navigation channels within the Galveston Bay area implemented pursuant to resolutions of the House Committee on Public Works in April 1950 and in October 1967. The Galveston Harbor and Channel were deepened to a depth of 41 feet pursuant to Section 201 of the 1965 Flood Control Act, as amended (42 U.S.C. 1962d-5), in accordance with the Report of the Chief of Engineers dated November 6, 1970, House Document 92-121, 92nd Congress, 1st Session (1971).

Subsequently, the deepening of the Houston-Galveston Navigation Channels Project was authorized by Section 101(a)(30) of the Water Resources Development Act of 1996, PL 104-303. This authorization included deepening both the Houston Navigation Channel and the Galveston Navigation Channel to a depth of 46 feet, substantially in accordance with the Report of the Chief of Engineers dated May 9, 1996, and the Houston-Galveston Navigation Channels, Texas, Limited Reevaluation Report and Final Supplemental Environmental Impact Statement dated November 1995.

The deepening of the Galveston Navigation Channel to 46 feet was completed in January 2011, not including the last 2,571 feet which remained at a 41 feet depth. This remaining 2,571 feet had been evaluated for deepening to 46 feet in the 1995 Limited Reevaluation Report but was determined not to be economically justified at that time since no portside facilities were in place. In the intervening years, conditions changed, and beginning in 2006 portside service facilities began operating and utilizing the 41-foot channel. In addition, there are now two end users, Gulf Sulphur Services and Texas International Terminals.

In order to continue with the study to evaluate deepening the last 2,571 feet of Galveston Harbor Channel, the Port of Galveston entered into a new Feasibility Cost Share Agreement the US Army Corps of Engineers on 29 February 2016, pursuant to Section 216 of the Flood Control Act of 1970 (33 U.S.C. 549a). The plan recommended by this feasibility report involved extending the 46-foot-deep Galveston Harbor Channel the remaining 2,571 feet to reach the end of the limits of the authorized and currently maintained 41-foot channel.

The results of the economic analysis showed that there was an economically rational justification to deepen the Galveston Harbor Channel to 46 feet through the reaches that are presently authorized to 41 feet. The average annual cost for the remaining 2,571 feet was \$585,000 for a 46-foot channel at the FY19 interest rate of 2.875 percent.

The 2016 Environmental Assessment determined that environmental impacts were expected to be negligible. A Supplemental EA is being prepared and is expected to confirm this finding because construction will occur within the existing project footprint which is regularly dredged for routine operations and maintenance, and an existing upland confined placement area will be used. However, a Supplemental EA is needed to account for new project footprint as well as newly listed endangered species.

Sediment sampling will be done within the new project footprint to determine suitability of dredged materials for identified placement areas.

The Galveston District converted the vertical datum for all navigation projects from Mean Low Tide (MLT) to Mean Lower Low Water (MLLW) in accordance with US Army Corps of Engineers Headquarters memorandum directing conversion (USACE 2014). For the HGNC Galveston Channel Extension (GHCE) Entrance Channel the conversion from MLT to MLLW is one foot deeper, for example where prior reports reference deepening to 45 feet MLT this report references 46 feet MLLW.

### **2023 Validation Report**

When there are deviations from the authorized project, the Project Delivery Team is required to analyze and mitigate those deviations. If the deviations are significantly different from the authorized project, the Project Delivery Team may need to prepare a post-authorization change report for additional authorization.

Since signing of the Chief's Report on 8 August 2017, the pilots who move vessels within the project area asked the non-federal sponsor, the Port of Galveston, to extend the project area by approximately 505 feet in order to more safely move vessels into and out of the Texas International Terminals Facility.

The addition of this channel extension to the authorized plan results in an increase in overall footprint of the project by approximately 6.5 acres (284,995 feet<sup>2</sup>) and an increase in project area of approximately 10.3 percent. Since the Chief's Report, a survey of the bottom of the proposed project area was conducted and the dredging quantities were reanalyzed and updated for the authorized footprint and additional channel area. The updated new work dredged volume for the authorized footprint was reduced to 501,000 CY. The new work volume for the additional scope footprint is 126,000 CY. The updated volumes result in net increase in new work dredging volume of approximately 22 percent.

Costs for the authorized project use the WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE, COST AGENCY TECHNICAL REVIEW CERTIFICATION STATEMENT, PN 401250, SWG Houston-Galveston Ship Channel Extension 45' Depth MLT or 46' Depth MLLW signed by Michael P. Jacobs, PE, CCE, Chief Cost Engineering MCX on 26 May 2022.

The Benefit to Cost Ratio for the authorized project was 2.7 at 2.875% and the modified project's Benefit to Cost Ratio is 2.1 at 2.5%.

Therefore, the Project Delivery Team and Galveston District determine that the deviations from the authorized project were significant enough to warrant a post-authorization change document, a validation report.

Since all decision documents recommending modification of existing project authorization other than raising the cost limit established by Section 902 or WRDA 1986, or projects that lack delegated authority, must follow the review and approval procedures outlined in ER 1165-2-502, Delegation of Review and Approval Authority for Post-Authorization Decision Documents, this validation report will be approved at the Major Subordinate Command level, at the Southwestern Division.

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# 1 INTRODUCTION

The HGNC Galveston Channel Extension – Houston-Galveston Navigation Channels, Texas project is currently in the Pre-Construction Engineering and Design (PED) phase. This validation report is being prepared to analyze and document changes to the scope of the project based on changed conditions identified during PED using input provided by the Port of Galveston, the non-federal sponsor (NFS) and the pilots. In accordance with implementation guidance from the Assistant Secretary of the Army for Civil Works dated 25 April 2022, on project funded for construction under the Implementation of Infrastructure Investment and Jobs Act (Public Law 117-58), this Validation Report (VR) is being prepared to describe the changed conditions and rescoping of the authorized plan described in the 2017 Feasibility Study and Chief’s Report. The VR includes the district’s analysis and rationale for the modified plan, as well as legal analysis on whether the modified plan is within the Chief’s discretionary authority to implement and provides the deep draft navigation benefits of the authorized project.

## 1.1 Background

The GHCE Chief’s Report was signed on 8 August 2017, and the project was authorized by Congress in the Water Resources Development Act of 2018 (also known as America’s Water Infrastructure Act of 2018<sup>1</sup>).

The PED phase for the authorized project began in 2019. Since then, the Texas International Terminals Facility (TXIT) was expanded to add another dock to the west of their existing doc (Figure 5 yellow box).

A 2019 Ship Simulation study was performed by Locus LLC, the Galveston – Texas City Texas Pilots and G & H Towing (TXIT Suezmax Extension Simulation Report) and demonstrated that an additional 505 feet of channel length was necessary to allow the pilots to safely and efficiently maneuver the terminal end of the channel and enter and exit the TXIT docks. Based on changed conditions the non-federal sponsor requested that USACE conduct further engineering and economic analysis to include this additional channel extension in a rescoped plan.

The Project Partnership agreement was signed between the US Army Corps of Engineers (USACE) Galveston District and the Wharves Board of the City of Galveston as the non-Federal Sponsor on 13 July 2022.

## 1.2 Description of Authorized Project

### AUTHORIZED PROJECT

Authorized channel improvements consist of deepening a segment of the existing 41 feet deep by 1,085 feet wide channel to 46 feet mean lower low water (MLLW), for a

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<sup>1</sup> <https://www.congress.gov/115/bills/s3021/BILLS-115s3021enr.pdf>

distance of 2,571 feet (Figure 2) and area of approximately 64 acres (2,789,535 ft<sup>2</sup>). The deepening originates near Port of Galveston Pier-38 at Station 20+000 and continues westward towards Pelican Island Bridge and end at Station 22+571.

Advanced maintenance and allowable over-depth have been updated to the current requirement of 4 feet and 1 foot, respectively, such that the maximum channel depth following periodic maintenance will not exceed 51 feet MLLW.

New work materials from channel construction consist primarily of stiff to hard high-plasticity clays. This material will be placed in the upland confined Pelican Island PA, located north of the Galveston Harbor Channel on the northernmost end of Pelican Island. The PA is approximately 1,100 acres in size and is currently divided into a three-cell system.

The current estimated dredged material capacity in the Pelican Island PA is 70.9 million cubic yards (MCY) based on an ultimate dike height of +50 feet and required freeboard of 3 feet, as discussed in the 1995 LRR. The total new work volume anticipated for placement in the PA from construction of the channel extension, 726,900 CY includes 513,800 CY from construction of the extension, 95,700 CY from third-party facilities, plus 102,400 CY of non-pay dredging for the extension and 15,000 CY of non-pay dredging for the third-party facilities. Non-pay dredging would be defined as dredging outside the paid allowable over-depth that may occur due to such factors as unanticipated variations in substrate, incidental removal of submerged obstructions, or unusual wind and wave conditions.

The maintenance dredging cycle of the channel is defined as the average number of years between the O&M dredging operations for a historical period. Each channel or reach may or may not have its own dredging frequency. An analysis of 24 years of dredging history identified six maintenance dredging cycles with an estimated shoaling rate of 1,425,500 cubic yards per year for the complete 22,571-foot-long channel. The newly constructed 46-foot-deep channel shoaling rate will be assumed to remain the same as the existing channel; therefore, a linear interpolation of the channel dredging data produces a shoaling rate of approximately 162,000 cubic yards per year for the proposed extension. The maintenance dredging frequency will remain the same (four years) as the existing 46-foot channel.

About 7.8 MCY of maintenance material (12 maintenance cycles) is forecast for the project (Station 20+000 to Station 22+571) over the 50-year period of analysis, the same as is required for the existing 41-foot channel. All maintenance material would be placed in the existing upland confined Pelican Island PA, consistent with current practices. However, the PA must have capacity for storage of maintenance dredging volumes from the entire GHC (Station 0+000 to Station 22+571) which totals about 68.4 MCY over the 50-year period of analysis. Including the projected new work volume (726,900 cubic yards), the total forecast dredging volume for the 50-year period of analysis is about 69.2 MCY, leaving about 1.7 MCY of available capacity. Updates to the channel shoaling analysis are ongoing. Any changes to future maintenance volumes will be provided when the ongoing H&H update to the shoaling and scour analysis is completed.

No increment of maintenance volumes over and above the historic dredging volumes is anticipated as a result of deepening the channel to 46 feet; therefore, Pelican Island PA has more than sufficient remaining capacity to accommodate the new work volume generated by this project. Based on analysis of the Pelican Island PA capacity, there is no requirement for additional placement areas to contain the new work or maintenance dredge materials over the 50-year period of analysis.

A hydraulic pipeline dredge would be used to minimize turbidity during initial dredging. Initial dredging would temporarily increase water column turbidity during dredging activities for any of the proposed channel deepening alternatives; however, these are considered minor and are comparable in type and magnitude to those experienced during routine maintenance dredging that occurs for the existing channel template. Typical cut depth of maintenance material would be identical to the new work. For O&M dredging, standard operating procedures employ a pipeline dredge. The extension would continue to allow the same advanced maintenance and allowable over-depth after it is deepened.

Past NEPA documentation and coordination for the adjacent 46-foot channel identified impacts to bay bottom (benthic habitat) as minor and temporary and required no mitigation. Deepening the extension involves deepening only 2,571 linear feet of channel to match the bottom depth of the recently constructed 46-foot channel. Environmental impacts were analyzed for deepening the GHC and no significant or adverse impacts were identified. Policy compliance and agency coordination is documented in the Final 2016 EA.

## **LOCATION**

The project area includes the eastern end of Galveston Island and Pelican Island. The Galveston Harbor Channel is a very active shipping lane providing deep-draft vessel access to the Port of Galveston, an important Texas deep-water port. This channel, inclusive of the portion that will be deepened, is lined with various wharves, docks and commercial and industrial facilities associated with NFS operations and other port users. Texas City, an important Gulf port city and producer of refined petroleum products, is located approximately seven miles from the project area (see cover sheet and Figure 1).

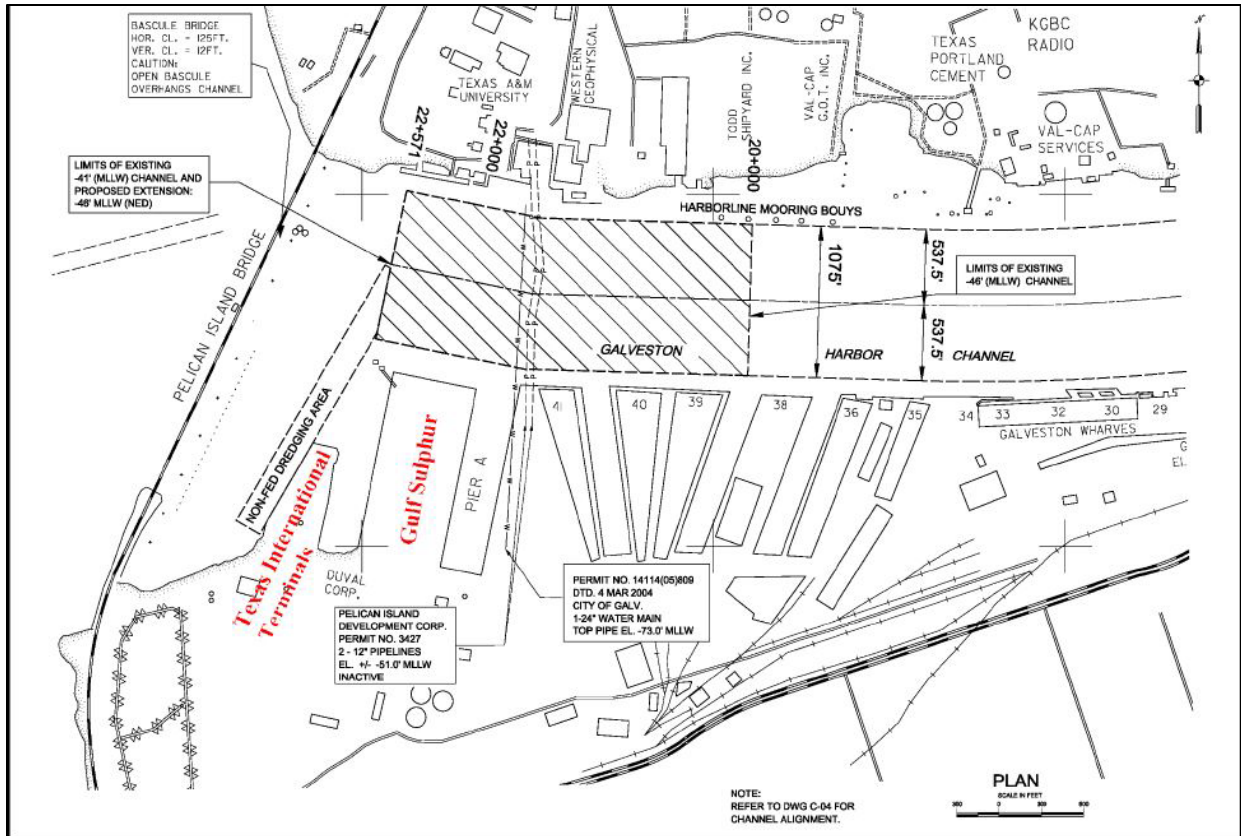


Figure 1 – Location of Authorized Project within Galveston Harbor Channel

### 1.3 Authorization

The existing Galveston Harbor Channel project was authorized by Section 101(a)(30) of WRDA 1996, PL 104-303.

The Galveston Harbor Channel Extension (GHCE) study was authorized under Section 216 of the Flood Control Act (FCA) of 1970, PL 91-611, which authorizes the Secretary of the Army to review existing USACE constructed projects due to changes in physical and economic conditions and report to Congress recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest. The 2017 feasibility report presented an evaluation of extending the 46 feet deep Galveston Harbor Channel the remaining 2,571 feet (Station 20+000 to Station 22+571) to reach the west end of the limits of the authorized and currently maintained 41-foot channel.

On 29 February 2016, a new Feasibility Cost Share Agreement was signed between USACE and the NFS to resume investigations on deepening the remaining 2,571 feet of the GHCE from 41 feet to 46 feet under the 2017 feasibility study.

The VR seeks to approve minor design changes to the project authorized in the Water Resources Development Act (WRDA) 2018 as described in the Chief’s Report dated August 8, 2017, Galveston Harbor Channel Extension Project, Houston-Galveston Navigation Channels, Texas (Table 1).

**Table 1 – Relevant Authorities**

| Authority  | Project and Work Authorized   |
|--|---|
| <p>PL 91-611; Title II – River and Harbor and Flood Control Act of 1970, Section 216, 31 December 1970</p>   | <p>The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of project the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest.</p>  |
| <p>PL 99-662; Title IX – General Provisions, Section 902, Water Resources Development Act of 1986, 17 November 1886</p>  | <p>In order to insure against cost overruns, each total cost set forth in this Act, or an amendment made by this Act, for a project shall be the maximum cost of the project, except that such maximum amount—(1) may be increased by the Secretary for modification which do not materially alter the scope or functions of the project as authorized, but not by more than 20percent of the total cost stated for the project in this Act or in an amendment made by this Act; and (2) shall be automatically increase for—(A) changes in construction costs applied to unconstructed features...from the date of enactment of this Act...as indicated by engineering and other appropriate cost indexes; and (B) additional studies, modifications, and actions (including mitigation and other environmental actions) authorized by this Act or required by changes in Federal law.</p>           |
| <p>PL 115-270; Title I – Water Resources Development, Subtitle D – Water Resources Infrastructure, Section 1401. Project Authorizations<br/><br/>(May be cited as America’s Water Infrastructure Act of 2018 [AWIA])</p> | <p>The following projects for water resources development and conservation and other purposes, as identified in the reports titled “Report to Congress on Future Water Resources Development” submitted to Congress on March 17, 2017, and February 5, 2018, respectively, pursuant to section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d) or otherwise reviewed by Congress are authorized to be carried out by the Secretary substantially in accordance with the plans, and subject to the conditions, described in the respective reports or decision documents designated in this section: (1) NAVIGATION.—3. TX - Galveston Harbor Channel Extension Project, Houston-Galveston Navigation Channels. Chief’s Report signed 8 August 2017.</p> <p style="text-align: right;">Federal: \$10,444,000<br/>Non-Federal: \$3,481,000<br/>Total: \$13,925,000</p> |

### 1.4 Funding Since Chief's Report

The Chief's report was signed on 8 August 2017 and authorized by WRDA 2018. PED money was provided to the District in Fiscal Year 2017 as a placeholder. Further PED monies followed between fiscal years 2018 to the present (Table 2).

Table 2 - GHCE Funding Since Chief's Report

| Fiscal Year  | Investigations - PED    |             | CONSTRUCTION            |             | Total Funding       |             |
|--|-------------------------|-------------|-------------------------|-------------|---------------------|-------------|
|  | Cost Share Record # 265 |             | Cost Share Record # 291 |             |                     |             |
|  | Federal                 | Non-Federal | Federal                 | Non-Federal | Federal             | Non-Federal |
| FY17   | \$1                     |             |                         |             | \$1                 | \$-         |
| FY18   | \$410,000               |             |                         |             | \$410,000           | \$-         |
| FY19   | \$813,000               |             |                         |             | \$813,000           | \$-         |
| FY20   |                         | \$407,000   |                         |             | \$-                 | \$407,000   |
| FY21   |                         |             |                         |             | \$-                 | \$-         |
| FY22   |                         |             | \$10,781,000            |             | \$10,781,000        | \$-         |
| FY23   |                         |             |                         | \$100,000   | \$-                 | \$100,000   |
| FY24   |                         |             |                         | \$300,000   | \$-                 | \$300,000   |
| TOTAL  | \$1,223,001             | \$407,000   | \$10,781,000            | \$400,000   | \$12,004,001        | \$807,000   |
|  | <b>\$1,630,001</b>      |             | <b>\$11,181,000</b>     |             | <b>\$12,811,001</b> |             |
| Source of data Work Allowance History Report & FINRPT updated 2023-10-30 |                         |             |                         |             |                     |             |



## 1.5 Changes in Project Location

There are no changes in location of the project, or project elements. There are no changes in additional lands or changes in real estate to be acquired.

## 1.6 Changes in Project Purpose

There are no changes in project purposes; the purpose of the project remains Deep Draft Navigation. The planning objectives from the feasibility are and remain:

- Increase deep-draft navigation efficiency for Galveston Harbor Channel over the 50-year period of analysis.
- Develop an alternative that is environmentally sustainable for the 50-year period of analysis.
- Reduce navigation transportation costs to and from Galveston Harbor Channel to the extent possible over the 50-year period of analysis.

## 1.7 Changes in Scope of the Authorized Project

### AREA

The addition of the channel extension (Figure 2, yellow polygon) to the authorized plan results in an increase in overall footprint of the project by approximately 6.5 acres (284,995 feet<sup>2</sup>). The red polygon shows the extents of the authorized plan. This results in an increase in project area of approximately 10 percent (Table 3).



Figure 2 - Aerial Drawing of Authorized Project (red) Showing Increase in Footprint for Addition of Channel Extension (yellow)

**Table 3 - Dredging Areas Authorized Plan and Modified Plan**

| Reach  | Area (feet <sup>2</sup> ) | Change from Authorized Plan   |
|--|---------------------------|-------------------------------|
| Authorized GHCE PLAN = -46 feet MLLW                   |                           |                               |
| GHCE Authorized  | 2,764,191                 |                               |
| 2023 CHANGE TO THE AUTHORIZED PLAN = -46' DEPTH MLLW   |                           |                               |
| GHCE Authorized  | 2,764,191                 | Increased footprint<br>+10.3% |
| Additional Scope<br>(Channel Extension + End of Slope) | +284,995                  |                               |
| TOTAL  | 3,049,186                 |                               |

**QUANTITIES**

The new work dredging quantity of 513,800 cubic yards (CY) referenced in the 2017 Chief's Report was based upon pre-survey estimates. Since the Chief's Report, a survey of the bottom of the proposed project area was conducted and the dredging quantities were reanalyzed and updated for the authorized footprint and additional channel area (Table 3). The updated new work dredged volume for the authorized footprint was reduced to 501,000 CY. The new work volume for the additional scope footprint is 108,000 CY plus 18,000 CY for 126,000 CY. The updated volumes result in net increase in new work dredging volume of approximately 22 percent (Table 4).



**Table 4 - Dredging Quantities Authorized Plan and Modified Plan**

| Reach   | Station Numbers                   | Federal Channel Est. New Work (CY) | Change from Authorized Plan |
|---|-----------------------------------|------------------------------------|-----------------------------|
| 2017 AUTHORIZED PLAN = 45' DEPTH MLT                |                                   |                                    |                             |
| Original GHCE                                       | STA. 20+000 to 22+571.34          | 513,800                            |                             |
| 2023 CHANGE TO THE AUTHORIZED PLAN = 46' DEPTH MLLW |                                   |                                    |                             |
| Original GHCE                                       | STA. 20+000 to 22+571.34          | 501,000                            | +22%                        |
| Added Channel Extension                             | STA. 22+571.34 to STA. 22+926.27  | +108,000                           |                             |
| End of Slope  | STA. 22+926.247 to STA. 23+076.27 | +18,000                            |                             |
| TOTAL   |                                   | 627,000                            |                             |

### 1.8 Changes in Local Cooperation Requirement

There have been no changes in the local cooperation requirements since the 2017 Chief's Report was signed.

## 2 ENGINEERING CHANGES

The Galveston District converted the vertical datum for all navigation projects from Mean Low Tide (MLT) to Mean Lower Low Water (MLLW) in accordance with US Army Corps of Engineers Headquarters memorandum directing conversion (USACE 2014). For the HGNC Galveston Channel Extension (GHCE) Entrance Channel the conversion from MLT to MLLW is one foot deeper, for example where prior reports reference deepening to 45 feet MLT this report referenced 46 feet MLLW.

The authorized project was to deepen the Galveston Harbor Channel from Station 20+000 to 22+571 from 41' to 46' MLWW. The design template for bottom width, side slopes and centerline were not changed from existing 46-foot MLLW GHC at Station 20+000. The authorized plan was the NED plan which included using the Pelican Island upland confined PA for containment of the new work material and future 50-year period of dredged maintenance material.

The modified plan includes an additional channel extension from Station 22+571 to 23+076.27. This additional 505 feet of channel expansion is necessary to facilitate safe and efficient egress and ingress of traffic from the TXIT (Figure 5, area in yellow box).

In addition, the authorized plan called for 3 foot of advanced maintenance and 2 feet of allowable over-depth; however, based on Geotechnical analysis and in accordance with the memo titled “District policy on setting dredging templates for studies, new work construction projects, and channel maintenance” dated April 2019, it was determined that the authorized plan was configured to have hard stiff clays. The modified plan then called for 4 feet advanced maintenance and 1-foot of allowable over-depth.

## **2.1 Changes in Hydrology and Hydraulics**

Additional hydrology and hydraulics studies or modeling were not performed for the design of the rescoped plan. Hydrology and hydraulics did confirm the envelope of safety around the dock structures at Texas A&M at Galveston and the Pelican Island bridge based on the surveyed scour in those areas.

Updates to the channel shoaling analysis are ongoing. The update will utilize the Corps Shoaling Analysis Tool (CSAT) that was previously unavailable. Any changes to future maintenance volumes will be provided when the ongoing H&H update to the shoaling and scour analysis is completed.

Hydrology and hydraulics did confirm the envelope of safety around the dock structures at Texas A&M at Galveston and the Pelican Island bridge based on the surveyed scour in those areas.

Updates to the bridge pile scour analysis are ongoing using the Coastal Engineering Manual's Equation VI-5-265 (Engineer Manual (EM) 1110-2-1100; Colorado State University Equation). Preliminary results from the updated analysis are comparable to the original. Final values will be provided up on completion of the analysis.

## **2.2 Changes in Geotechnical Engineering**

Geotechnical evaluations were completed on the additional channel extension of the modified plan. Slope stability for the side slopes and the end slope of the additional channel were calculated and evaluated with existing soil borings and data. The new work and maintenance material was also evaluated for placement on Pelican Island. It was confirmed that the additional channel area would keep the same side slopes of 1V:3H that are existing in Galveston Harbor Channel design.

## **2.3 Changes in Environmental Engineering**

The Modified Plan will not lead to changes in environmental compliance compared to the Authorized Plan. The Feasibility Study described certain environmental design and investigations to be conducted in the PED phase if the project was authorized, thus, these will be based upon the Modified Plan. As an example, Clean Air Act (CAA) compliance is a task that was deferred to PED so that accurate emissions estimates

could be made using up-to-date estimates of equipment and durations. The Modified Plan does not introduce new project elements and is solely an increase in areal extent and dredge volume of approximately 30% that is readily incorporated into the environmental compliance work that is currently underway.

## **2.4 Changes in Civil Design**

The authorized plan called for a channel centerline alignment extends westward from Station 20+000 to the end of the existing 41-foot channel at Station 22+571. The channel would have side slopes of 1V:3H and a bottom width of 1,075 feet (Figure 3).

Civil design evaluated the authorized dimension of the authorized GHCE project and the TXIT Suezmax Extension Simulation Report (LOCUS, LLC 2019). Based on the information, design changes would provide for the centerline alignment to continue westward from Station 22+571 to the end of the additional channel extension at Station 23+076.27. The design bottom width of the channel area varies along the centerline from 744.45 feet at Station 22+571 to 384.50 feet at Station 22+926.27 as shown in cross sections (Figure 4).

The final design was based on information shared in the TXIT Simulation Report to facilitate the vessel movements at the end of channel. The analysis on the simulation report, showed the extended area for navigating design vessels into and out of port docks (Figure 5) was needed in the Stations closest to the existing GHCE.

The design was also limited by cost associated with this addition which caused the revision from the wider end of channel suggested in the report of 920.33 feet to the design width of 384.50 feet. Design changes based on the simulation report also included a 150-foot factor of safety envelope offset around the fishing pier at Texas A&M at Galveston to prevent scouring issues at the bridge footings that could reduce the integrity of the structure. The final 150-foot end slope design would also facilitate ease of dredging in the area and reduce the amount of material sloughing back into the channel footprint.



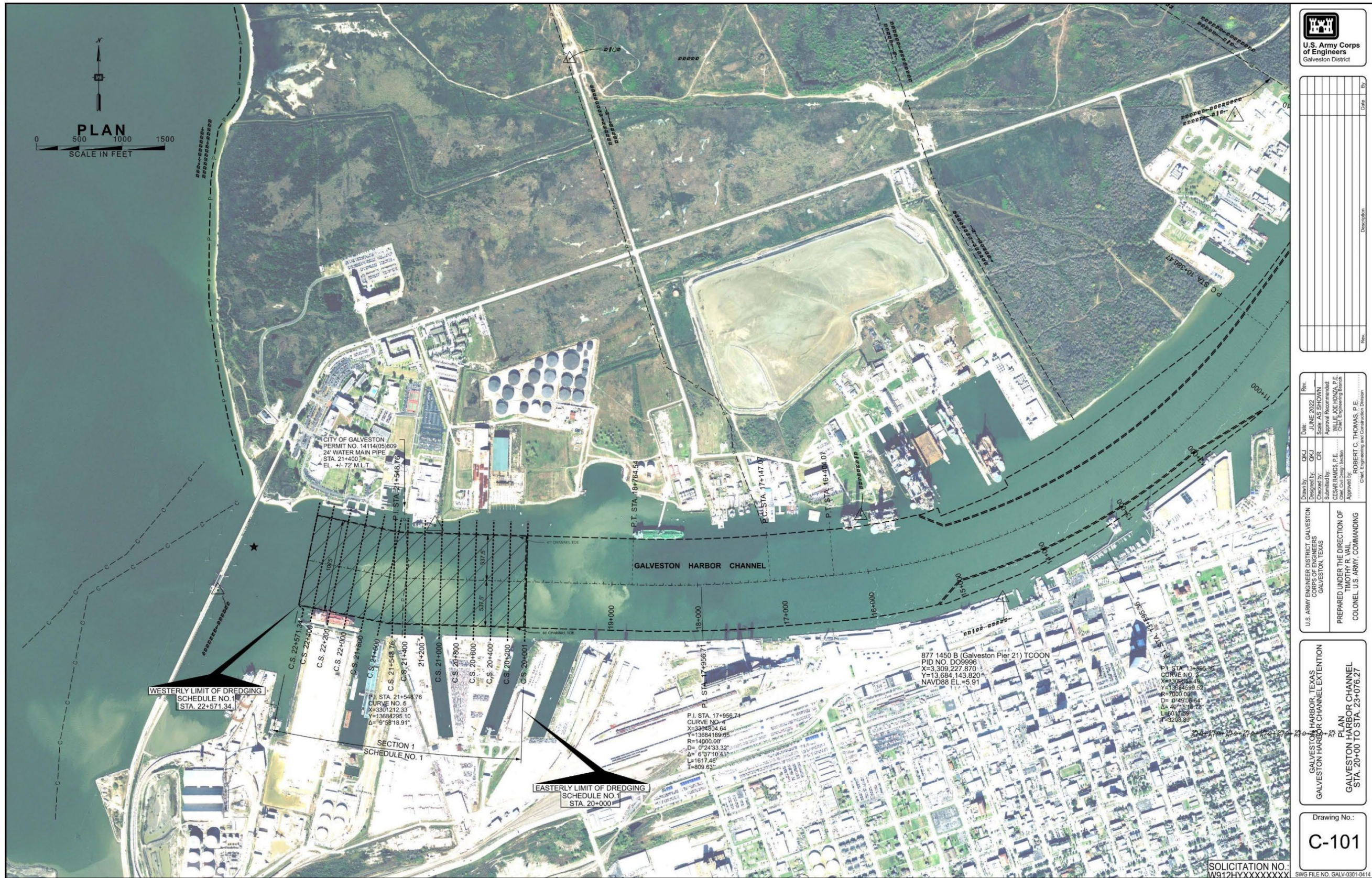


Figure 3 - GHCE Authorized Plan



| Rev. | Date | Description |
|------|------|-------------|
|      |      |             |
|      |      |             |
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U.S. ARMY ENGINEER DISTRICT GALVESTON  
 GALVESTON, TEXAS  
 PREPARED UNDER THE DIRECTION OF  
 COLONEL, U.S. ARMY, COMMANDING

Down by: OKJ  
 Checked by: CR  
 Submitted by: CESAR RAMOS, P.E.  
 Approved by: ROBERT C. THOMAS, P.E.  
 Chief, Engineering and Construction Division

Date: JUNE 2022  
 Scale: AS SHOWN  
 Approval Recommended by: WILLE JOE MONZA, P.E.  
 Chief, Engineering Bureau

GALVESTON HARBOR, TEXAS  
 GALVESTON HARBOR CHANNEL EXTENSION  
 PLAN  
 GALVESTON HARBOR CHANNEL  
 STA. 20+00 TO STA. 23+076.27

Drawing No.:  
**C-101**

SOLICITATION NO.:  
 W912HYXXXXXX  
 SWG FILE NO. GALV-0301-0414









Figure 5 - 2022 Aerial Photography showing Docks Built Since 2017 Authorized Plan



## 2.5 Changes in OMRR&R

The changes between the recommended plan and modified plan are the increase of maintenance material over the 50-year period of analysis with the inclusion of the additional channel area (Table 5). Updates to the channel shoaling analysis are ongoing. The update will utilize the Corps Shoaling Analysis Tool (CSAT) that was previously unavailable. The CSAT calculates channel shoaling volumes using historical channel surveys and uses the shoaling rates to predict future dredging volumes. CSAT results may differ from the original analysis and may result in changes to the predicted volumes of future maintenance material. Any changes to these volumes will be provided when the ongoing H&H update to the shoaling and scour analysis is completed.

Table 5 - 50-year OMRR&R Costs

| Authorized Plan 50-Year O&M | Modified Plan 50-Year O&M | Change  | % Change |
|-----------------------------|---------------------------|---------|----------|
| \$158,000                   | \$161,000                 | \$3,300 | 2.1%     |

October 2022 Price Levels, Costs in \$1,000s

## 2.6 Engineering Risk and Uncertainty

The additional risk and uncertainty between the authorized plan and modified plan are the lack of environmental testing and geotechnical investigations of the soil in the additional channel area. Both factors present low risk for the modified plan design.

# 3 COSTS AND ECONOMIC EVALUATION

## 3.1 Changes in Cost Apportionment

**2017 Final Feasibility Report, Section 5.3 Total Project First Costs:** Costs were certified by Walla Walla MCX 14 February 2017. Price Level is 1 October 2016 or FY17 (see Appendix A). The Total Project Cost (FY17 price levels) estimates the constant dollar cost of the GHCE Project at \$15,333,000. The fully funded (total project cost) project estimate, including contingencies and escalation, is \$16,305,000. The study expenditures are not included in that figure.

New authorization is not required for the GHCE. The project first cost (less associated costs) from the Chief's Report was \$13,395,000 (FY17 price level) for the approximately half mile long project. The Authorized Project First Cost from WRDA 2018 was \$13,925,000 (FY19 price level) and is the cost estimate against which future Section 902 calculations will be made. The Modified Project's first cost in FY24 price level is \$17,077,000 (excluding associated costs).

Except for updates for inflation, there have been no changes in cost apportionment since the Project Partnership Agreement was entered into on 13 July 2022 (Table 6).

**Table 6 - Changes in Cost Apportionment**

| <b>Changes in Cost Apportionment</b>                       |                                   |                    |              |  |                    |              |  |                    |              |
|--|-----------------------------------|--------------------|--------------|--|--------------------|--------------|--|--------------------|--------------|
| <b>Project Feature</b>                                     | <b>Chief's Report</b>             |                    |              | <b>Authorized Project First Cost (AWIA 2018)</b> |                    |              | <b>Modified Project First Cost (2024 PACR)</b> |                    |              |
|  | <i>(October 2016 Price Level)</i> |                    |              | <i>(October 2016 Price Level)</i>                |                    |              | <i>(October 2023 Price Level)</i>              |                    |              |
|  | <b>Federal</b>                    | <b>Non-Federal</b> | <b>Total</b> | <b>Federal</b>                                   | <b>Non-Federal</b> | <b>Total</b> | <b>Federal</b>                                 | <b>Non-Federal</b> | <b>Total</b> |
| <b>Construction GNF</b>                                    | \$10,046                          | \$3,349            | \$13,395     | \$10,444   | \$3,481            | \$13,925     | \$11,504                                       | \$3,835            | \$15,339     |
| <b>Channel Extension (Requires Authorization) GNF</b>      |                                   |                    | \$0          |  |                    | \$0          | \$1,304  | \$435              | \$1,738      |
|  |                                   |                    |              |  |                    |              |  |                    |              |
| <b>Total Cost Shared GNF</b>                               | \$10,046                          | \$3,349            | \$13,395     | \$10,444   | \$3,481            | \$13,925     | \$12,808                                       | \$4,269            | \$17,077     |
|  | \$0                               | \$0                | \$0          |  |                    | \$0          |  |                    | \$0          |
| <b>Total Cost Shared (Other)</b>                           | \$0                               | \$0                | \$0          | \$0  | \$0                | \$0          | \$0  | \$0                | \$0          |
| <b>Total Cost Shared Project</b>                           | \$10,046                          | \$3,349            | \$13,395     | \$10,444   | \$3,481            | \$13,925     | \$12,808                                       | \$4,269            | \$17,077     |
| <b>Non-Federal Berthing Areas</b>                          |                                   | \$1,938            | \$1,938      |  |                    |              |  | \$3,250            | \$3,250      |
| <b>Total Costs</b>   | \$10,046                          | \$5,287            | \$15,333     |  |                    |              | \$12,808                                       | \$7,519            | \$20,327     |
| Costs in \$1,000s  |                                   |                    |              |  |                    |              |  |                    |              |
| <b>Total General Navigation Features Costs and Credits</b> |                                   |                    |              |  |                    |              |  |                    |              |
| <b>Cost Shared GNF</b>                                     | \$13,395                          |                    |              | \$13,925   |                    |              | \$17,077                                       |                    |              |
| <b>10 percent of GNF</b>                                   | \$1,340                           |                    |              | \$1,393  |                    |              | \$1,708  |                    |              |
| <b>Creditable LERRS Costs</b>                              | \$0                               |                    |              | \$0  |                    |              | \$0  |                    |              |
| <b>Creditable Difference</b>                               | \$1,340                           |                    |              | \$1,393  |                    |              | \$1,708  |                    |              |
| Costs in \$1,000s  |                                   |                    |              |  |                    |              |  |                    |              |



### 3.2 Changes in Cost Allocation

Costs for 2017 Final Feasibility Report use the WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE, COST AGENCY TECHNICAL REVIEW CERTIFICATION STATEMENT, P2 401250, SWG Houston-Galveston Ship Channel Extension 45' Depth MLLW signed by Kim C. Callan, PE, CCE, Chief Cost Engineering MCX on 14 February 2017.

FY 17 Project First Cost: \$15,333,000 (Table 7)

Costs for the authorized project use the WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE, COST AGENCY TECHNICAL REVIEW CERTIFICATION STATEMENT, P2 401250, SWG Houston-Galveston Ship Channel Extension 45' Depth MLLW signed by Michael P. Jacobs, PE, CCE, Chief Cost Engineering MCX on 26 May 2022.

FY 22 Project First Cost: \$14,523,000

Costs for the modified project use the WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE, COST AGENCY TECHNICAL REVIEW CONDITIONAL CERTIFICATION STATEMENT, P2 401250, SWG Houston-Galveston Ship Channel Extension 45' Depth MLLW signed by Michael P. Jacobs, PE, CCE, Chief Cost Engineering MCX on 31 May 2022.

FY 22 Project First Cost: \$18,021,000

Costs for the authorized project were updated to FY24.

FY 24 Project First Cost: \$18,623,000

Costs for the modified project were updated to FY24. FY24 Project First Cost: \$20,327,000 Table 7 presents a comparison of the project first costs between Feasibility Study NED FY17, Authorized Project FY22 (excluding associated costs), and Modified Project FY24 (including associated costs).

- Labor rates in CEDEPs were adjusted (decreased) to the local level, using historical data from RMS.
- Fuel price was decreased from \$5.34 (May 2022) to \$4.50 (Oct 2023).
- Mobilization and demobilization cost was increased, considering the historical costs that the district has incurred on similar projects. Estimate assumes a full demobilization rather than a partial (50%) demobilization.
- Dredging quantities were increased due to the addition of the modified channel extension, based on the surveys conducted in September 2023.
- New discharge pipeline route was provided by the technical team and decreases length of the shore pipeline and increases length of the submerged pipeline.
- Associated costs for dredging third-party facilities (TXIT berth and Gulf Sulphur berth) were added to the total project cost.

Table 7 – Project First Cost Account Allocation Changes without Real Estate

| Cost Account  | Description   | Feasibility Project First Cost <sup>1</sup> | Feasibility Project Recertified First Cost (Includes \$756 spent cost) <sup>2, 5</sup> | Recommended Plan First Cost (Includes \$756 spent cost) <sup>3, 5</sup> | Cost Difference between Recertified Cost and Recommended Plan | % Difference between the Recertified Cost and Recommended Plan | Current Estimate for Authorized Plan First Cost (Includes \$2,050 spent cost) <sup>4, 5</sup> | Current Estimate for Modified Plan First Cost (Includes \$2,050 spent cost) <sup>4, 5</sup> | Cost Difference between Current Estimates for Authorized Plan and Modified Plan | % Difference between Current Estimates for Authorized Plan and Modified Plan |
|---------------|---|---|--|---|---|--|---|---|---|--|
|               |   | Oct-16                                      | Oct-21   | Oct-21  | Oct-21  | Oct-21   | Oct-23  | Oct-23  | Oct-23  | Oct-23   |
| 12            | Navigation, Ports & Harbors Federal Cost Channel            | \$11,490                                    | \$12,728   | \$16,225  |   |  | \$12,211  | \$12,211  |   |  |
| 12            | Navigation, Ports & Harbors Federal Cost Additional Channel | \$0   | \$0  | \$0   |   |  | \$0   | \$1,554   |   |  |
| 12            | Navigation, Ports & Harbors Non-Federal Cost                | \$1,938                                     | \$0  | \$0   |   |  | \$3,250   | \$3,250   |   |  |
| 12            | Navigation, Ports & Harbors Subtotal                        | \$13,428                                    | \$12,728   | \$16,225  | \$3,497   | 22%  | \$15,461  | \$17,016  | \$1,555   | 9%   |
| 30            | Planning, Engineering & Design                              | \$1,504                                     | \$1,404  | \$1,404   | \$0   | 0%   | \$2,415   | \$2,489   | \$74  | 3%   |
| 31            | Construction Management                                     | \$401                                       | \$392  | \$393   | \$1   | 0%   | \$747   | \$822   | \$75  | 9%   |
| <b>TOTALS</b> |   | \$15,333                                    | \$14,523   | \$18,021  | \$3,498   | 19%  | \$18,623  | \$20,327  | \$1,704   | 8%   |

<sup>1</sup>TPCS Certified February 14, 2017

<sup>2</sup>TPCS Certification May 26, 2022

<sup>3</sup>TPCS Conditional Certification May 31, 2022

<sup>4</sup>TPCS for the current estimate (PACR)

<sup>5</sup>Available funds were sufficient to capture the activities in the 30 Account

Between Feasibility Study NED (FY17), and Authorized Plan (FY22), and Modified Plan (FY24) (\$1,000s)

NOTE: There were no changes in the number or kinds of Aids to Navigation from Authorized Plan.

### 3.3 Economic Model Descriptions

The spreadsheet model uses vessel operating costs (VOCs) and loading practices to calculate a savings per ton at each channel deepening alternative. The savings per ton at each respective channel depth is applied to the benefiting tonnage forecast for each out-year in the period of analysis to calculate a present value of benefits. Then, the spreadsheet annualizes the benefits and costs, including interest during construction (IDC), to calculate net benefits and a benefit to cost ratio (BCR).

### 3.4 Changes in Project First Costs

|                           | Approved Plan                |                              |                           | Modified Plan                |                           |
|---------------------------|------------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|                           | 2017 Chief's Report (2.875%) | FY24 Economic Update (2.75%) | FY24 Economic Update (7%) | FY24 Economic Update (2.75%) | FY24 Economic Update (7%) |
| <b>Project First Cost</b> | \$13,395                     | \$15,373                     | \$15,373                  | \$17,077                     | \$17,077                  |
| <b>Increase</b>           |                              | 0%                           | 0%                        | 11.0%                        | 11.0%                     |

(Excludes Associated Costs)  
October 2023 Price Levels, Costs in \$1,000s

### 3.5 Changes in Key Benefit Assumptions

The following were the key economic assumptions made in the 2017 Feasibility Study that correlated directly to project benefit calculations:

- Cargo throughput on Panamax and Post-Panamax size vessels would increase over time at the two benefiting docks.
- The design vessel is an 80,000-deadweight ton (DWT) bulk vessel.

These assumptions have not changed since the 2017 Feasibility Study and have since been confirmed as accurate.

### 3.6 Changes in Project Benefits

Average Annual Equivalent (AAEQ) Benefits from the 2017 Feasibility Report were calculated using the FY17 Federal Discount Rate of 2.875%. AAEQ Benefits were estimated at approximately \$1,597,000, at FY17 price levels. For this update, annual benefits were updated to FY24 price levels (October 2023) and adjusted for changes in Deep Draft Vessel Operating Costs.

The 2017 report relied on FY 2013 deep-draft vessel operating costs as published in EGM 15-04 to analyze transportation costs and benefits. The most recent deep-draft

vessel operating cost estimates released in June 2020 (EGM 20-04) exhibited a decline in costs that has been confirmed in the international freight markets. The update to the most recent vessel operating costs resulted in a reduction in transportation cost savings (i.e., savings per ton) for vessels in this study. Once the changes in operating cost, design draft, and immersion factor associated with the benefiting vessels were factored into the savings per ton calculation, savings per ton decreased from \$6.47 in the feasibility study to \$4.33 in the update. This savings per ton was applied to the new baseline tonnage, and the resulting present value and average annual (AAEQ) benefits displayed (Table 8) .

**Table 8 - Economic Benefits Summary by Discount Rate**

|                               | <b>2017 Report<br/>(2.875%)</b> | <b>FY24 Economic<br/>Update (2.75%)</b> | <b>FY24 Economic<br/>Update (7%)</b> |
|-------------------------------|---------------------------------|---|--------------------------------------|
| <b>Total NPV<br/>Benefits</b> | \$42,091                        | \$52,602                                | \$25,270                             |
| <b>AAEQ Benefits</b>          | \$1,597                         | \$1,948                                 | \$1,831                              |

October 2023 Price Levels, Costs in \$1,000s

### **3.7 Benefit to Cost Ratio**

The Benefit to Cost Ratios for the authorized project and the modified project are shown below at the required Federal discount rates (Table 9).

**Table 9 - Benefit-to-Cost Ratios for the Authorized and Modified Plans**

|                   | Authorized Plan              |                              |                           | Modified Plan                |                           |
|-------------------|------------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|                   | 2017 Chief's Report (2.875%) | FY24 Economic Update (2.75%) | FY24 Economic Update (7%) | FY24 Economic Update (2.75%) | FY24 Economic Update (7%) |
| AAEQ Costs        | \$585                        | \$693                        | \$1,365                   | \$917                        | \$1,658                   |
| AAEQ Benefits     | \$1,597                      | \$1,948                      | \$1,831                   | \$1,948                      | \$1,831                   |
| Net AAEQ Benefits | \$1,012                      | \$1,255                      | \$466                     | \$1,031                      | \$173                     |
| BCR Calculation   | 2.7                          | 2.8                          | 1.3                       | 2.1                          | 1.1                       |
| RBRCR Calculation | -                            | 3.1                          | 1.4                       | 2.3                          | 1.2                       |

October 2023 Price Levels (\$1,000s)

#### 4 REAL ESTATE CONSIDERATIONS

Appendix C (Real Estate Plan) was prepared in support of this Validation Report to identify and describe the lands, easements, rights-of-way, relocations, and dredged material disposal areas (LERRD) as required for the project. There are no anticipated real estate actions to accomplish the dredging or placement for the GHCE deepening or additional channel extension deepening. If real estate requirements change, the NFS is responsible for acquiring and furnishing all LERRD required for the project. The real estate requirements for the project must support the construction, as well as the continued operation and maintenance of the project. The project's NFS has the authority and capability to furnish LERRDs (see Exhibit A of Appendix C - Assessment of NFS's Acquisition Capabilities).

The new work dredging to take place from the beginning of the extension (Station 20+000) to the end of the additional channel extension (Station 23+076) will be conducted under navigational servitude. The new work dredged material and all maintenance material will be placed in the fee-owned and USACE-managed confined Pelican Island PA. This placement area is currently in use for the existing project. The dredged material will be transported via an open water pipeline route along the eastern edge of Pelican Island, as well as three additional established pipeline routes running from the southern edge of Pelican Island. Perpetual easements for the upland pipeline routes were conveyed to USACE from Mitchell Development Corps in 1974.

There are currently no wells or pipelines in the vicinity of the project location or within the project footprint. The 12-inch waterline and 12-inch sewer line described as obstructions in the feasibility report were removed on 19 December 2016. Therefore, there are no facility/utility/pipeline relocations or removals for the authorized plan or the modified plan.

The assumption is that there are no access and/or staging requirements beyond the limits of the project footprint. Access to the Pelican Island PA will be accomplished through the existing perpetual easements. There are also no mitigation requirements, borrow material, recreation features, zoning ordinances, or timber/mineral/energy activity concerns. Sediment sampling and analysis will be completed for the modified plan during Pre-Construction, Engineering and Design (PED) (Table 10). Appendix D contains more information regarding HTRW and other environmental contaminants.

**Table 10 - Real Estate Baseline Cost Estimates for Authorized & Modified Plans**

| FEDERAL COSTS     |   | AUTHORIZED PLAN | MODIFIED PLAN   |                 |               |
|-------------------|---|-----------------|-----------------|-----------------|---------------|
| Account           | Description   | Cost            | Cost            | Difference      | Difference    |
| 30                | Acquisitions (Review RE Planning Documents & Mapping) | \$5,000         | \$7,000         | +\$2,000        | +40%          |
| 30                | Project Related Administration                        | \$4,000         | \$5,500         | +\$1,500        | +37.5%        |
|                   | Total Admin and Payments                              | \$9,000         | \$12,500        | +\$3,500        | +38.9%        |
|                   | + Contingencies (25%)                                 | \$2,250         | \$3,125         | +\$875          | +38.9%        |
|                   | <b>Non-Federal Total</b>                              | <b>\$11,250</b> | <b>\$15,625</b> | <b>+\$4,375</b> | <b>+38.9%</b> |
| NON-FEDERAL COSTS |   | AUTHORIZED PLAN | MODIFIED PLAN   |                 |               |
| Account           | Description   | Cost            | Cost            |                 |               |
| 01                | Project Related Administration                        | \$0             | \$0             | \$0             | 0%            |
|                   | Total Admin and Payments                              | \$0             | \$0             | \$0             | 0%            |
|                   | + Contingencies (25%)                                 | \$0             | \$0             | \$0             | 0%            |
|                   | Federal Total   | \$0             | \$0             | \$0             | 0%            |
|                   | <b>GRAND TOTAL</b>                                    | <b>\$11,250</b> | <b>\$15,625</b> | <b>+\$4,375</b> | <b>+38.9%</b> |

October 2022 Price Levels

Additional information regarding the real estate considerations can be found in Appendix C.

## 5 ENVIRONMENTAL CONSIDERATIONS IN AUTHORIZED CHANGES

A Supplemental EA (Appendix D) was prepared to confirm the findings below because construction will occur within the existing project footprint which is regularly dredged for routine operations and maintenance, and an existing upland confined placement area will be used (Table 11).

The 2016 EA was prepared to satisfy the requirements of and compliant with all applicable environmental laws and regulations. Compliance with the following environmental laws and regulations is not necessary because of lack of the regulated resource in the project area or no effect to the regulated resource: National Historic Preservation Act (NHPA), Coastal Barrier Resources Act (CBRA), Executive Order (EO) 11990 – Protection of Wetlands, Farmland Protection Policy Act (referred to as CEQ Memorandum Dated August 11, 1980 – Prime or Unique Farmlands in the 2016 EA), and Memorandum of Agreement Between the Federal Aviation Administration - Aircraft Wildlife Strikes.

Implementation of the proposed Modified Plan likely will not change the conclusions and compliance status described in the 2016 EA for the following laws: Magnuson-Stevens Fishery Conservation Management Act (MSFCMA), Coastal Zone Management Act (CZMA), Clean Water Act (CWA) Section 401 and 404, EO 11988 Floodplain Management, Migratory Bird Treaty Act (MBTA), and EO 13112 – Invasive Species. Letters were sent to NMFS, the Texas General Land Office (GLO), and the Texas Commission on Environmental Quality (TCEQ) to notify them that the project design as described in the original compliance document has been modified but that the design changes do not trigger re-initiation of consultation under MSFCMA, CZMA, and CWA Section 401, respectively (Appendix D). For the supplemental EA, each of the resource agencies were coordinated with prior to sending the letters regarding the design changes and to confirm re-initiation of consultation will not be triggered.

Three new laws require additional review and coordination with the appropriate regulatory agency, as applicable, because the existing condition changed, the regulations were revised since 2016, or the PMRP will have impacts different than those described in the 2016 EA. The previously mentioned laws include newly listed species to the Endangered Species Act, changes in air quality analysis for the clean air act, and a new Executive Order used to help identify potential Environmental Justice issues. These laws are discussed in further detail in Appendix D.

**Table 11 - Changes to the Affected Environment Since the 2016 EA**

| Resource  | Changes to the Affected Environment Since the 2016 EA | Potential Impacts to Resource Areas from the Proposed Modified RP  | Additional Analysis Required? | Why?  |
|---|---|--|-------------------------------|---|
| Sea Level Change/<br>Local (Relative) Sea Level Change (RSLC) | No change   | Modifications would not change water levels and RSLC is not expected to have significant impacts on dredging frequency, shoaling or ship handling. No additional impacts beyond those previously analyzed are anticipated. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| Tides and Salinity  | No change   | Modifications would not change water levels and salinity variation that may occur due to deepening is likely to be relatively small. No additional impacts beyond those previously analyzed are anticipated.               | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| Vegetation  | No change   | All ground-disturbing modifications are proposed in the water. No additional impacts beyond those previously analyzed are anticipated.   | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |



| Resource                        | Changes to the Affected Environment Since the 2016 EA | Potential Impacts to Resource Areas from the Proposed Modified RP   | Additional Analysis Required? | Why?  |
|---------------------------------|---|---|-------------------------------|---|
| <b>Aquatic Nuisance Species</b> | No change   | Modifications would not result in an increase in the number of vessels that could introduce invasive aquatic species. No additional impacts beyond those previously analyzed are anticipated. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| <b>Wetland Resources</b>        | No change   | The one marsh site remains outside the project footprint resulting in no impacts beyond those previously analyzed.  | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| <b>Marine Aquatic Resources</b> | No change   | Impacts are further disclosed in Appendix D, Section 3.3.   | Yes                           | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |

| Resource                          | Changes to the Affected Environment Since the 2016 EA   | Potential Impacts to Resource Areas from the Proposed Modified RP  | Additional Analysis Required? | Why?  |
|-----------------------------------|---|--|-------------------------------|---|
| Wildlife                          | No change   | Modifications would cause temporary, minor disturbances to wildlife in the project area; however, the construction duration for all phase of work would be reduced by approximately 1 month over the No Action and as analyzed in the 2016 EA, resulting in impacts similar to those previously analyzed, but over a shorter period of time. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| Essential Fish Habitat            | No Change   | Modifications would cause temporary disturbance. However, will have little lasting impact.   | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| Threatened and Endangered Species | Species have been listed and species presence/absence has changed in the project area since 2016. | Impacts are further disclosed in Appendix D, Section 3.4.  | Yes                           | Additional species (Black Rail) has been listed since the 2016 EA was published.  |

| Resource           | Changes to the Affected Environment Since the 2016 EA                       | Potential Impacts to Resource Areas from the Proposed Modified RP  | Additional Analysis Required? | Why?  |
|--------------------|---|--|-------------------------------|---|
| Cultural Resources | Resource not present  | Resource not present -- Existing surveys cover the additional 11 acres and indicate no cultural resources listed on, eligible for listing, or currently unevaluated for listing on the National Register of Historic Places. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| Air Quality        | National Ambient Air Quality Standards (NAAQS) have been lowered for ozone. | Impacts are further disclosed in Appendix D, Section 3.5.  | Yes                           | Different Air Quality regulations have been enacted requiring measurements.   |

| Resource | Changes to the Affected Environment Since the 2016 EA | Potential Impacts to Resource Areas from the Proposed Modified RP  | Additional Analysis Required? | Why?   |
|----------|---|--|-------------------------------|--|
| Noise    | No change   | <p>Noise impacts from dredging are expected to be reduced by approximately 19.5 days as compared to the No Action. Additionally, no dike raising is required so noise impacts associated with that work would not occur. General impacts would be similar to those previously analyzed, but over a shorter period of time.</p> | No                            | <p>No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column</p> |

| Resource      | Changes to the Affected Environment Since the 2016 EA  | Potential Impacts to Resource Areas from the Proposed Modified RP   | Additional Analysis Required? | Why?   |
|---------------|--|---|-------------------------------|--|
| Water Quality | <p>No change – 2021 water quality samples and elutriate sampling indicate water quality is generally good and all detected contaminant levels in all ambient water samples were below applicable EPA Water Quality Criteria and Texas Surface Water Quality Standards. Additionally, no significant spills have been reported since 2016</p> | <p>Dredged material from the additional channel extension would be placed into the existing PA and not require any modifications to the discharge location or decanting process. The duration of decanting and discharge of effluent would be increased by a couple of weeks over the No Action due to the increased sediment placed into the PA from addition of the channel extension. However, the increase would not result in any exceedance of water quality standards and is therefore expected to have negligible impacts beyond those previously analyzed.</p> | No                            | <p>No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column</p> |

| Resource                                | Changes to the Affected Environment Since the 2016 EA | Potential Impacts to Resource Areas from the Proposed Modified RP  | Additional Analysis Required? | Why?  |
|---|---|--|-------------------------------|---|
| Sediment Quality                        | No change   | Modifications would be dredging into virgin material; however, based on sampling there is no indication that sediment quality would be different than under the No Action                | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| Hazardous, Toxic, and Radioactive Waste | No change   | The 2016 EA HTRW assessment included a buffer of 0.25 miles around the RP which included the add channel length. No additional impacts beyond those previously analyzed are anticipated. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |

| Resource                   | Changes to the Affected Environment Since the 2016 EA  | Potential Impacts to Resource Areas from the Proposed Modified RP  | Additional Analysis Required? | Why?   |
|----------------------------|--|--|-------------------------------|--|
| Socioeconomics             | Additional docks and wharves have been constructed or redeveloped along the channel shoreline; however, the socioeconomics of the project area have not changed. | Modifications allow deep-draft vessels to access berthing areas on the far western end of the channel but is not expected to induce dockside infrastructure or cargo handling facility changes because the commodities will remain the same. No additional impacts beyond those previously analyzed are anticipated. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column. Additionally, new structures developed along the channel will have no impact. |
| Environmental Justice (EJ) | Updates to EJ mapping and environmental exposure have been completed since 2016.   | Impacts are further disclosed in Appendix D, Section 3.6.  | Yes                           |  |
| Prime and Unique Farmlands | Resource not present   | Resource not present   | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column  |

| Resource               | Changes to the Affected Environment Since the 2016 EA | Potential Impacts to Resource Areas from the Proposed Modified RP  | Additional Analysis Required? | Why?  |
|------------------------|---|--|-------------------------------|---|
| Recreational Resources | No change.  | Modifications would have no impact on tourism. Temporary impacts to small recreational fishing vessels would be reduced by approximately 19.5 days over the No Action, resulting in impacts similar to those previously analyzed, but over a shorter period of time. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |
| Roadways and Traffic   | No change.  | Modifications are not expected to increase the number of construction workers needed or the number of vehicles beyond what was previously analyzed resulting in negligible to no additional impacts.   | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |



| Resource                  | Changes to the Affected Environment Since the 2016 EA | Potential Impacts to Resource Areas from the Proposed Modified RP   | Additional Analysis Required? | Why?  |
|---------------------------|---|---|-------------------------------|---|
| Aircraft Wildlife Strikes | No change   | Elimination of the dike raising would reduce the potential for a higher structure to impede flight paths. No additional impacts beyond those previously analyzed are anticipated. | No                            | No change from 2016 EA per reasons listed in the Potential Impacts to Resource Areas from the Proposed Modified RP Column |

## **6 PUBLIC INVOLVEMENT, REVIEW AND CONSULTATION**

### **6.1 Public Involvement Process and Coordination**

A Notice of Availability (NOA) for the 2016 EA, Galveston Harbor Channel Extension, Post-Authorization Change Report was released on 10 May 2013. This public notice was made available to solicit public views and concerns regarding the tentatively recommended channel improvements. Documents were made available for review and comment for a period of 30 days from 10 May to 10 June 2013. The modifications of the GHCE Recommended Plan are limited in scope, non-controversial, and affect a previously deepened and regularly maintained channel and therefore, the district has determined that scoping was not necessary. The draft SEA will be released for a 30-day public comment period. It is anticipated that similar comments to the 2016 EA will be received.

### **6.2 Cultural Resources Consultation and Resource Agency Coordination**

All agencies involved during coordination of the 2016 EA concurred and agreed with the project. A Resource agency meeting was held in April 2022 where agencies were informed on the change of design. The only concern was of potential Oysters in the area. However, a survey was conducted and found no Oysters present in the area, there was no longer a concern. At that time, agencies agreed the project had limited scope and likely did not require reopening consultation, but documentation should be provided of this rationale. Letters will be sent to agencies to inform of final report availability and need for re-initiation of consultation.

### **6.3 Areas of Unresolved Controversy**

As of now there are no areas of controversy. However, air quality emissions produced during construction have the potential to start controversy even though they are legally compliant with the State Implementation Plan and the Clean Air Act. Recent projects in the Galveston Bay area have had pushback due to emission rates produced for other dredging projects.

## 7 RECOMMENDATION

I recommend the HGNC Galveston Channel Extension, Galveston, Galveston County, Texas project as authorized under Section 1401 of the Water Resources Development Act of 2018, be reaffirmed at current cost levels as outlined in this report. Based on information generated for this Validation Report, the construction of modified project to include the additional channel extension will not exceed the WRDA 86 Section 902 limit for the authorized project.

The Section 902 calculation began with an authorized cost of \$13,925,000 at the October 2018 (FY19) price level. The authorized cost at FY24 price levels is \$20,038,000, or \$20,547,000 when escalated through construction. After adding 20 percent, the maximum cost limited by Section 902 is \$23,332,000.

The total average annual costs for the modified project are \$917,000 at 2.75% interest rate. The Fully Funded Project Cost of the HGNC Galveston Channel Extension, Galveston, Galveston County, Texas Project, including associated costs, is \$20,848,000 (October 2023 price level).

The Project First Cost for all project elements would be cost shared 75 / 25 between Federal (USACE) and the non-federal sponsor, the Port of Galveston.

Galveston District is asking for approval by HQUSACE that the proposed changes fall within the Chief of Engineer's discretionary authority.

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Rhett A. Blackmon, P.E.  
Colonel, US Army  
Commanding

Date

## **8 REFERENCES**

DIRECTOR OF CIVIL WORKS POLICY MEMORANDUM CWPM 12-001, SUBJECT:  
METHODOLOGY FOR UPDATING BENEFIT-TO-COST RATIOS (BCRs) FOR BUDGET  
DEVELOPMENT

ENGINEER REGULATION 1105-2-100, PLANNING GUIDANCE NOTEBOOK (PGN) APPENDIX  
G: PLANNING REPORTS & PROGRAMS

ENGINEER REGULATION 1165-2-502, DELEGATION OF REVIEW AND APPROVAL AUTHORITY  
FOR POST-AUTHORIZATION DECISION DOCUMENTS, 31 APRIL 2014

ENGINEER PAMPHLET 1105-2-61, FEASIBILITY AND POST-AUTHORIZATION STUDY  
PROCEDURES AND REPORT PROCESSING REQUIREMENTS, 1 JULY 2023

LOCUS LLC, GEORGE B. BURKELY, TEXAS INTERNATIONAL TERMINALS SUEZMAX  
EXPANSION, SIMULATION BASED ASSESSMENT FOR TEXAS INTERNATIONAL  
TERMINALS, GALVESTON TEXAS, 10 APRIL 2019

PLANNING BULLETIN 2018, FEASIBILITY STUDIES MILESTONE

PLANNING BULLETIN 2018-01, FEASIBILITY STUDIES MILESTONE SUPPLEMENTAL  
GUIDANCE

WATER RESOURCES DEVELOPMENT ACT OF 1986, SECTION 902, AS AMENDED

WATER RESOURCES DEVELOPMENT ACT OF 2018, SECTION 1401 PROJECT  
AUTHORIZATIONS, (1) NAVIGATION-, 3. TX, GALVESTON HARBOR CHANNEL  
EXTENSION PROJECT, HOUSTON-GALVESTON NAVIGATION CHANNELS