US Army Corps of Engineers®
Alaska District

DRAFT Feasibility Report and Environmental Assessment

Homer Navigation Improvements
Homer, Alaska
Appendix N: Draft Dredged Material Management Plan

May 2026

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Acronyms and Abbreviations

%	Percent
BOUSS-2D	Boussinesq Wave Model (2-Dimensional)
BU	Beneficial Use
BUPA	Beneficial Use Placement Area
BUSS	Beneficial Use Spit Stockpile
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CY	Cubic Yards
DA	Discharge Area
DMMP	Dredged Material Management Plan
DMPA	Dredged Material Placement Area
DWDS	Deep Water Disposal Site
EM	Engineer Manual
FS	Federal Standard
IFR/EA	Integrated Feasibility Report and Environmental Assessment
MLLW	Mean Lower Low Water
O&M	Operations and Maintenance
PED	Preconstruction Engineering and Design
PPA	Project Partnership Agreement
sqft	square feet
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
WRDA	Water Resources Development Act

APPENDIX N – DRAFT DREDGED MATERIAL MANAGEMENT PLAN

N.1 Overview

United States Army Corps of Engineers (USACE) developed this Draft 5-year Regional Dredged Material Management Plan (DMMP) for the Homer Navigation Improvements Feasibility Study's Proposed Project (herein Project); wherein there is no current DMMP. As a DMMP is required for all existing Federal navigation projects, that are physically interrelated (i.e., share a common discharge area or channel) or are economically complementary, one DMMP may encompass that group of projects to identify specific measures necessary to manage the volume of material likely to be dredged. Thus, the Project and existing Homer Port and Harbor (herein Homer Harbor) annual maintenance dredging operations will be addressed in this Draft DMMP.

According to USACE policy, the dredged material associated with the construction or maintenance of a navigation project should be accomplished in a least costly manner consistent with sound engineering practice and meeting all Federal and environmental requirements (i.e., the Federal Standard). Hence, the DMMP should be associated with the least cost plan in order to determine the appropriate dredged material management strategy with consideration of dredged material characteristics, dredging methods, and potential dredged material discharge options from the Feasibility Study. However, USACE Districts shall pursue beneficial use (BU) alternatives requested by partners, particularly those where a non-federal sponsor or other agency have expressed a willingness to cost share the full costs above the Federal Standard (FS).

Section 125(a)(2)(C) of the Water Resources Development Act (WRDA) of 2020 amends Section 204(d) of WRDA 1992 (33 U.S.C. 2326(d)) to authorize the Secretary to use funds appropriated for construction or operation and maintenance of a project involving the disposal of dredged material when selecting a disposal method that is not the least cost option based on a determination that the incremental costs of the disposal method are reasonable in relation to the environmental benefits or the hurricane and storm or flood risk reduction benefits. A non-Federal interest must agree to fund 35 percent (%) of the incremental costs of a Section 204(d) placement that exceeds the Federal Standard base plan costs for dredging and disposal of the Federal navigation project.

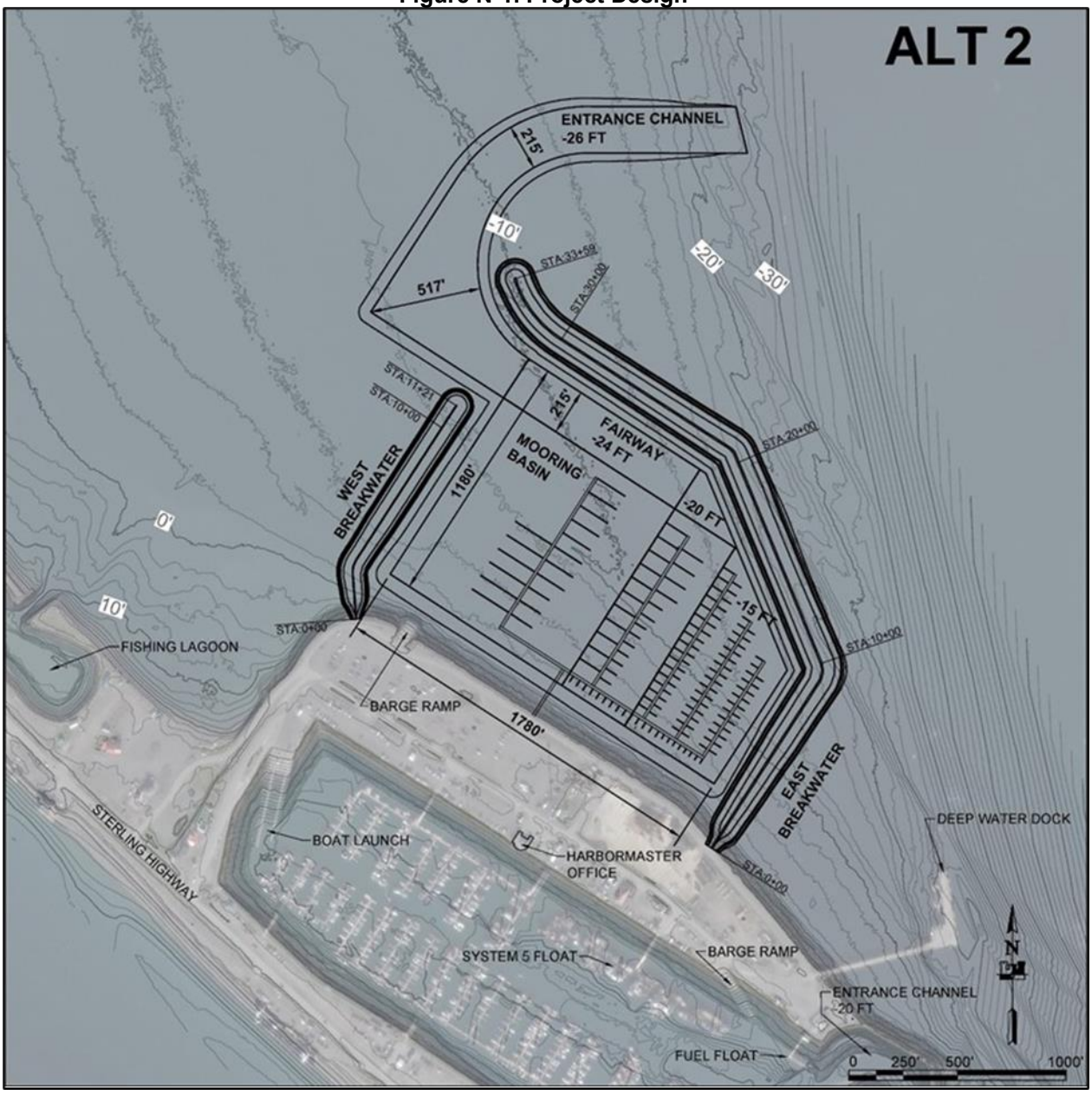
This Draft DMMP will be appended to the Draft Integrated Feasibility Report and Environmental Assessment (IFR/EA) and available for public and agency review and comment concurrently with the IFR/EA. The comments received during the Draft IFR/EA 30-day comment period and completion of geotechnical analyses will be considered, as appropriate, in the development of the Final DMMP.

The purpose of Project dredging operations is to construct a new harbor that will accommodate larger transient marine vessels and smaller waitlisted vessels that the current Homer Harbor does not have the capacity to accommodate. New work and

maintenance dredging are an integral component of the Project and are required to improve Homer Harbor for its existing and future users.

The Tentatively Selected Plan informed by USACE's *Homer Navigation Improvements Study*, is "Alternative 2: Transient & Waitlisted Vessels Harbor." This alternative will herein be termed "Project." The Project design (Figure N-1) is not final and at an estimated 30-35% design. As the design is refined in the next phase, the Preconstruction Engineering and Design (PED) Phase, this Draft DMMP will be updated.

Figure N-1. Project Design



N.2 Existing Conditions

The Homer Harbor was first constructed in 1961 and 1962, restored following the 1964 earthquake, and has been expanded several times since. Homer Harbor is located at the end of the Homer Spit, and maintenance dredging of the harbor entrance channel has been performed annually since 1972.

The current Operations and Maintenance (O&M) maintenance dredging of the Homer Harbor occurs in the fall annually, typically in September, to maintain the following Federally-authorized depths:

- Homer Harbor Entrance Channel to a required depth of -20 feet Mean Lower Low Water (MLLW); and,

- Homer Harbor Maneuvering Channel to variable required depths of -20, -15, and -10 feet MLLW.

The entrance channel is dredged annually, and the maneuvering channel is dredged less frequently, on an as needed basis. Between 2015 to 2025, the maneuvering channel was dredged once in 2022, and it is not anticipated to require dredging until 2029. The annual maintenance dredging includes excavation of limited overdepth material that may be removed to a maximum pay line of 1-foot beyond the required depth and side slopes to account for the natural angle of repose. From 2015 through 2025, the average annual amount of dredged material from the current Homer Harbor is 3,067 cubic yards (CY) but it is highly variable, ranging between approximately 1,665 to 4,503 CY annually.

The Homer Harbor maintenance dredging operations use a contracted, hydraulic cutterhead pipeline dredge that pumps the sediment and water through a portable pipeline to a dewatering site located on Lot 49 at the southeast end of the Homer Spit. Effluent from the dewatering operations is routed via pipeline through a campground and discharged on the beach of Kachemak Bay on the southern side of the Homer Spit. Dewatered dredged material is stockpiled on Lot 49 and either hauled to a beneficial use placement site between +10 to +20 feet MLLW across from the Nick Dudiak Fishing Lagoon for purposes of beach nourishment or utilized by the non-Federal sponsor based on framework established in City Ordinance 11-09 amending Homer City Code 19.12.050.

The excavated material from any beach or any portion of the Homer Spit, in general shall remain on the Homer Spit and utilized in the following order of priority:

1. Replacement of material removed from City of Homer beaches by storms and erosion;

2. Fill to improve City of Homer Harbor facilities on the Homer Spit;

3. Sale for use as fill on privately owned or leased property on the Homer Spit;

4. Emergency repairs for erosion; and,

5. Sale for use as fill material at locations off the Homer Spit.

The Homer Harbor maintenance dredging features are depicted in Figure N-2.

Figure N-2. Homer Harbor Maintenance Dredging Features

N.3 Dredging Template

The construction of a new harbor on the eastern side of the Homer Spit near the current Homer Harbor will generate approximately 1,311,800 million CY of new work and 850,500 million CY (based on an estimated maintenance dredging quantity of 17,000 CY annually) of maintenance dredging material over the 50-year life of the Project. The Project's dredged prism will include an entrance channel, fairway, and mooring basin and dredged accordingly:

- The entrance channel will be dredged to -26 feet mean lower low water (MLLW).

- The fairway and mooring basin will be dredged from -24 to -15 feet MLLW.

The total area of the dredged prism is 68-acres, with the mooring basin estimated at 37-acres.

N.4 Dredged Material

In addition to existing maintenance dredging operations of the Homer Harbor, the Project will require an initial new work dredging and increased maintenance dredging requirements.

N.4.1 New Work Dredging

The volume calculations are based on the Project harbor dimensions for a harbor basin, turning channel, and entrance channel. The volume calculations include both the overdepth and advanced maintenance requirements. Table N-1 provides the volumes of the new work dredged material.

Table N-1. New Work Volumes

Name	Start Station	End Station	Volume with Advanced Maintenance (CY)	Allowable Overdepth (CY)	Total Volume (CY)	Discharge Area (sqft)	Method[1]
General Navigation Features	Pending	Pending	465,591	31,749	497,340	1,400,000	Cutterhead
Local Service Facilities	Pending	Pending	754,166	60,295	814,461	1,400,000	Cutterhead

Note:
[1] Contracting does not specify the method which the contractor must utilize to complete dredging. Thus, this column represents the typical method used but alternate methods are possible.

N.5 Maintenance Dredging

As a preliminary operations and maintenance calculation, an annual maintenance dredging volume of approximately 17,000 cubic yards was assumed. This volume was estimated by scaling the historical dredging rate from the existing harbor to the larger area of the proposed entrance channel, as it is anticipated that the majority of shoaling will continue to occur in this area.

The calculation began with the historical average dredging volume of 3,350 cubic yards per year (from 2011-2025). This rate corresponds to the portion of the existing entrance channel that experiences shoaling, an area of approximately 150,300 square feet. This historical rate was then scaled to the larger 608,400-square-foot area of the proposed entrance channel, resulting in a preliminary estimate of 13,600 cubic yards per year. Finally, to account for the uncertainty inherent in this simplified analysis, a 25% contingency was added, yielding the final estimated annual maintenance volume of 17,000 cubic yards.

A refined maintenance estimate will be developed for the final DMMP. This analysis will utilize results from the BOUSS-2D (Boussinesq Wave Model [2-Dimensional])sediment transport model currently under development by HDR. It is important to acknowledge the inherent limitations of sediment transport models like BOUSS-2D. Such models rely on simplified equations to represent complex natural processes, and actual shoaling rates may deviate from model predictions. While numerical modeling is the best available tool for forecasting sedimentation, there can be a significant difference between the model's predictions and real-world results.

Proposed annual maintenance volumes for each reach of the harbor are provided in Table N-2. All open water discharge areas (DAs) for maintenance material theoretically have an unlimited capacity since they are unconfined and dispersive.

Table N-2. Project Maintenance Volumes

Name	Start Station	End Station	50 Year O&M Quantities (CY)	Discharge Area	Capacity (CY)	Method[1]	Frequency (Years)
Total	Pending	Pending	1,200,000	1,400,000	Pending	Cutterhead	50

Note:
[1] Contracting does not specify the method which the contractor must utilize to complete dredging. Thus, this column represents the typical method used but alternate methods are possible.

N.5.1 Without vs With Project O&M Quantities

The Homer Harbor Dredged will construct a harbor with a 68-acre dredge prism footprint (includes a 37-acre harbor basin). Thus, the total maintenance dredging quantities for the Homer Harbor will increase to include maintenance dredging quantities associated with the Project's new harbor dredge prism. Project impacts to maintenance dredging quantities of the existing Homer Harbor features will also need to be considered. The frequency and quantity of maintenance dredging of existing Homer Harbor Features is annually and up to approximately 7,000 CY. The O&M dredged material quantities per cycle comparison between Without Project O&M and With Project O&M quantities are presented in Table N-3. The average annual increase in O&M costs necessary to dredge the additional quantity of dredged material under the With Project conditions is approximately $3,513,000.

Table N-3. Without vs With Project Maintenance Volumes

Stationing	Estimated		
	Without Project O&M per Cycle (CY)	With Project O&M per Cycle (CY)	Frequency (Years)
Pending	7,000	24,000	Annually

N.6 Typical Dredging Equipment

The type of dredging equipment considered depends on the type of material, the depth of the Project dredge prism feature, and the depth of access to the DA(s), the amount of material, the distance to the DA, the wave-energy environment, and so forth. Based on

these considerations and current available data, three types of dredging equipment have potential to be utilized and are as follows:

- Hydraulic cutterhead and pipeline suction dredge;
- Mechanical clamshell dredge with dump scow;
- Mechanical long-armed excavator with dump scow; and/or,
- Hydraulic Hopper dredge.

A detailed description of the types of dredging equipment can be found in Engineer Manual (EM) 1110-2-5025, Dredging and Dredged Material Management (USACE 1983; EM 1110-2-5025). The appropriateness and suitability of this equipment will need to be reevaluated once geotechnical analyses are completed. The following sections present description of these three types of dredging equipment and their potential use for the Project and O&M dredging for the Homer Harbor.

N.6.1 Hydraulic Cutterhead and Pipeline Suction Dredge

A hydraulic cutterhead and pipeline suction dredge is used to dredge the existing Homer Harbor to transfer material to Lot 49, the designated dewatering site. The dewatered dredged material is managed as described in Section N.2. Hydraulic cutterhead and pipeline suction dredges are typically used to discharge material directly in upland-confined DAs or bay-confined DAs. Based on the Project design and potential DAs, a hydraulic cutterhead and pipeline suction dredge is likely a suitable option for Project new work and maintenance dredging operations wherein sediment is unconsolidated and composed predominately of gravel, sand, and/or silt and within the protected portions of the dredged prism (i.e., within the breakwater). It may also be suitable for dredging the more exposed entrance channel of the Project harbor; however, this would be determined by the contractor based on safety considerations.

N.6.2 Mechanical Clamshell Dredge

Clamshell dredges along with dump scows are generally used when the DA is too far away to hydraulically pump dredged material and where the material cut section consists of soft clay or compacted clay, glacial till, sand, gravel, and larger rock. Clamshell dredges are not suitable for dredging loose, fine-grained (i.e., sand and silt) due to potential for spillage. In mechanical clamshell dredge operations, dredged material is placed in a dump scow and towed to the designated DA. The dredged material may be bottom-dumped from the scow, off-loaded with a crane, or pumped via hydraulic loader from the scow.

N.6.3 Mechanical Long-armed Excavator

A long-armed excavator can be placed on top of a barge platform and utilized to dredge material. The use of this equipment is consistent with the use of a clamshell dredge. The long-armed excavator would place dredged material into a dump scow for transfer to the designated DA. Typically this equipment is used when the DA is too far to hydraulically pump dredged material and where the material cut section consists of soft clay or compacted sediment. It is not appropriate to use a long-armed excavator for dredging unconsolidated, fine-grained (i.e., sand and silt) due to potential spillage. Means of discharging material from the scow include bottom-dumping from the scow, off-loaded with a crane, or pumped via hydraulic loader from the scow.

N.7 Hydraulic Hopper Dredge

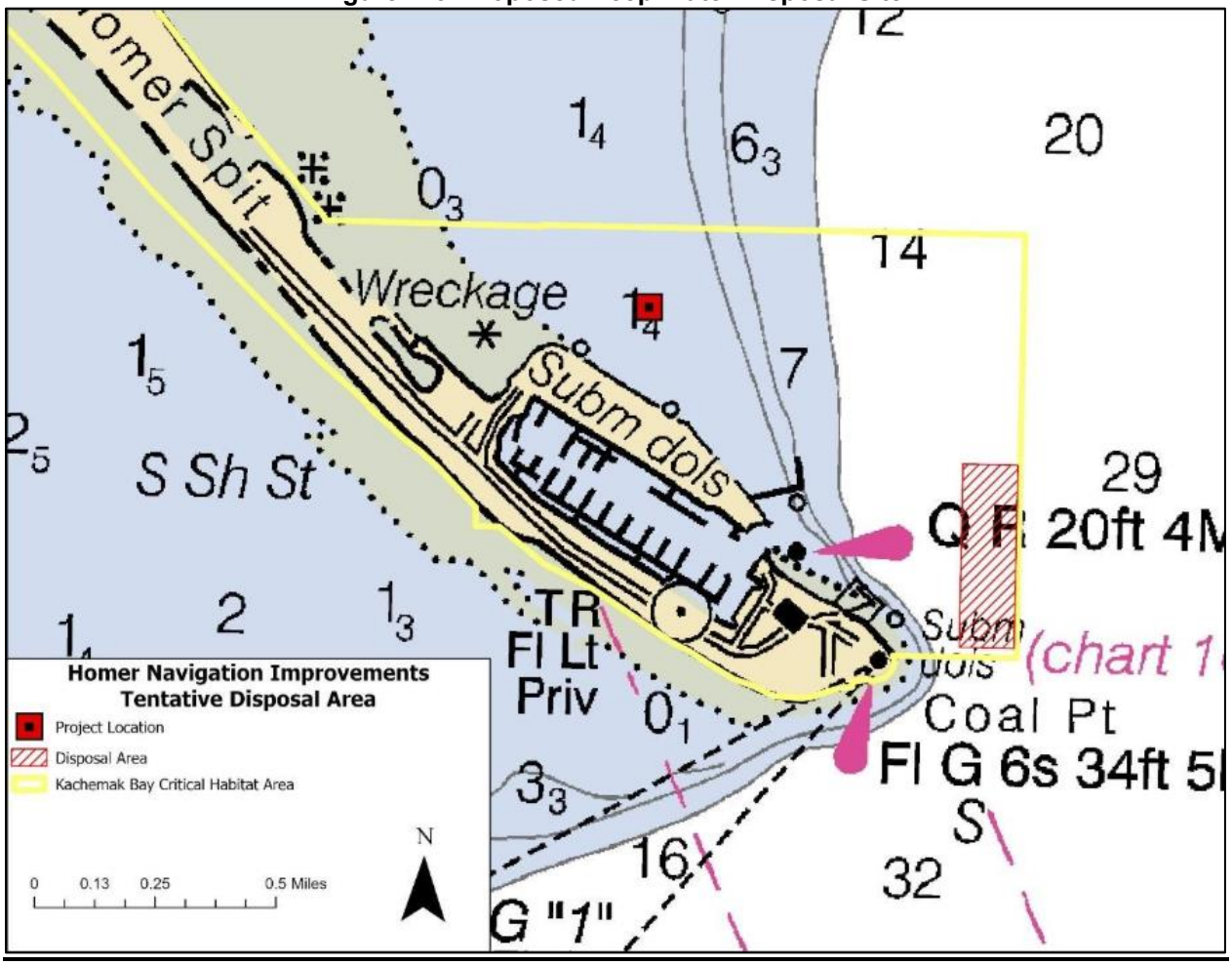
Hopper dredges are used when unrestricted movement within the dredge prism is possible and the DA is too far away to economically pump the material. Based on the proposed site layout and potential DA locations, a hopper dredge would be suitable for dredging loose silt, sand, and gravel. Means of discharging material from the scow include bottom-dumping or pumped via pipeline. This type of dredge is also known to operate in rougher waters.

N.8 Discharge Plan Formulation

The discharge plan for Project dredged material will be subject to change based on, on-going analyses, ship simulations, modeling, and design development during the Project's Feasibility Phase and PED Phase. Furthermore, the release of the IFR/EA for the public and agency comment period will concurrently act as the comment period for this Draft DMMP.

This Draft Dredged Material Management Plan (DMMP) proposes in-water disposal of dredged material at a designated Deep Water Disposal Site (DWDS; Figure N-3). The site was selected as it is the nearest suitable area outside the Kachemak Bay Critical Habitat Area and is sufficiently deep to prevent material from re-entering the harbor. The proposed DWDS is a 28-acre rectangle (approximately 600 by 2,000 feet). While formal modeling has not been conducted, a preliminary calculation shows that an even distribution of material would raise the seabed by approximately 28 feet.

Figure N-3. Proposed Deep Water Disposal Site



Increasing the size of the disposal site would distribute substrate alterations over a larger area, but reduce the magnitude of the elevation changes. The water over the disposal site is at least 160 feet deep, near the maximum depth of photosynthesis and well beyond the depth of concern for navigational impacts.

USACE also considered a beneficial use site for new work dredged material, termed "Beneficial Use Placement Area" (BUPA), during the USACE *Homer Navigation Improvements Study*. The BUPA is on the west side of the Homer Spit and the concept was dredged material would be placed in-water for the purposes of:

- Creating an in-water berm with the gravel or larger sediment in the dredged material to reduce wave energy eroding the Homer Spit's western shoreline;
- Nourishing the eroding beach on the west side of the Homer spit with the sand content of the of the dredged material; and,
- Dispersing the finer-grained sediment (e.g., silt) back into the system from which it originated.

This site was eliminated from further consideration due to the difficulty it would be for a dump scow to reach the site due to inadequately deep water and due to the results of geotechnical investigations that identified the material as predominately composed of fines. USACE is currently coordinating with its Engineer Research and Development Center Dredging Operations Technical Support Team to identify beneficial use alternatives for dredged material discharged. The results from that coordination will be used to refine this DMMP.

Existing Homer Harbor maintenance dredging is expected to continue forward with its current dredged material management strategy wherein dredged material is dewatered and used beneficially by the City of Homer or placed under USACE's annual maintenance dredging contract on the westside beach of the Homer Spit for purposes of beach nourishment. This method will be termed Beneficial Use Spit Stockpile (BUSS). As material from the new harbor is anticipated to be similar to the material currently dredged in the existing harbor, this DMMP assumes it will be managed similarly. It is important to note that the final management of maintenance dredged material from the new harbor will be determined under the USACE Operations and Maintenance (O&M) Program and informed by the actual shoaling and sediment experienced post-construction.

Thus, the two DAs for this Draft DMMP are the DWDS and BUSS Table N-4.

Table N-4. Discharge Areas for Least Cost Plan of Project

Discharge Area ID	Discharge Area Description	New Work Dredging Quantity (CY)	Maintenance Dredging Quantity (CY)
DWDS	Deep Water Disposal Site	1,311,800	0
BUSS	Beneficial Use Spit Stockpile	0	24,000 (Annually) / 1,200,000 (Project Life)

N.9 Description of Discharge Areas

DAs described herein will be focused on the least cost plan DAs, DWDS and BUSS. Additional information on DAs considered by USACE for the Homer Harbor Annual Maintenance Dredging Project but not described herein can be reviewed in the following USACE documents:

- 2017 Dredged Material Management Guidance, Homer Small Boat Harbor and U.S. Coast Guard Cutter Hickory Berth, Homer, Alaska (USACE 2017); and,

- 2019 Environmental Assessment and Finding of No Significant Impact, Harbor Maintenance, Homer Small Boat Harbor, Homer, Alaska (USACE 2019).

Figure N-3 and Figure N-2 depict the approximate location of DWDS and BUSS, respectively. These DAs are associated with the current least cost plan covered in the Draft DMMP. DA capacities will be revised in PED once additional surveys and

geotechnical borings are completed. DA footprints have been assessed for protected resources and other potential anomalies.

N.9.1 Deep Water Disposal Site

This DA is a 28-acre rectangle (approximately 600 by 2,000 feet) located within the deepest portion of the area along the Homer Spit that was excluded from the Kachemak Bay Critical Habitat Area and lies southeast of the Homer Harbor. The depths are approximately 160 feet deep. Based on the assumption of a dump scow being used for dredge material disposal, the material is to descend as a single, relatively cohesive mass once released and descend to the seafloor in a concentrated area. Therefore, it is expected that this DA is a non-dispersive site, and that disposal at this DA is unlikely to increase the maintenance dredging of the existing Homer Harbor or Project harbor. This preliminary conclusion will be confirmed by the HDR sediment transport modeling currently underway. This DA will be used for the in-water disposal of approximately 1,311,800 CY of new work dredged material.

N.9.2 Beneficial Use Stockpile Site

This DA includes dewatering and stockpile sites on the Homer Spit. Dewatered dredged material then is used for beneficial purposes in the uplands or in a transitional area along the beach on the west side of the Homer Spit. The upland placement for beneficial use is variable and depends on a new or existing need on the Homer Spit. The City of Homer is responsible for the management of dredged material for upland beneficial use purposes. Dredged material not used for beneficial use purposes in the uplands is either retained at the dewatering or stockpile sites or placed on the beach on the west side of the Homer Spit within a transitional area called the Dredged Material Placement Area (DMPA) for the annual maintenance dredging of Homer Harbor project. The DMPA is an approximately 1.3-acre site consisting of a 600-foot-wide section of beach located northwest of the Homer Harbor and the Project. It encompasses the area of beach between the +10 to +20 feet MLLW elevations. The dredged material placed on the beach within the transitional zone naturally disperses back into Kachemak Bay, where the material originated. This DA will be used for the beneficial use and placement of approximately 850,000 CY of Project maintenance dredged material and approximately 350,500 CY of existing Homer Harbor maintenance dredged material over a 50-year period. This would equate to approximately 1,200,000 CY of maintenance dredged material over a 50-year period.

N.10 Hazardous Substances

The Non-Federal Sponsor shall be responsible for the costs of cleanup and response of any hazardous substances regulated under CERCLA that are located in, on, or under the project area, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination as stated in the Project

Partnership Agreement (PPA). Such costs shall be paid solely by the Non-Federal Sponsor without reimbursement or credit by the Government.

N.11 Reference

United States Army Corps of Engineers (USACE). 1983. Engineer Manual 1110-2-5025. Dredging and Dredged Material Disposal. Washington, D.C.

United States Army Corps of Engineers (USACE). 2017. Dredged Material Management Guidance, Homer Small Boat Harbor and U.S. Coast Guard Cutter Hickory Berth, Homer, Alaska. March 2017.

United States Army Corps of Engineers (USACE). 2019. Environmental Assessment and Finding of No Significant Impact, Harbor Maintenance, Homer Small Boat Harbor, Homer, Alaska. September 2019.