

# Public Beach Protection in 4 Illinois Coastal Communities

## Beneficial Use of Dredged Material Pilot Project Program

### Section 1122 of the Water Resources Development Act of 2016

#### 1. Feasibility Study Introduction:

Under Section 1122 of the Water Resources Development Act (WRDA) of 2016, 10 pilot projects were selected from around the country to explore innovative applications of beneficial use of dredged material. This study explores the feasibility of implementing a pilot project for the beneficial use of clean dredged material generated from operations and maintenance dredging at Waukegan Harbor in Waukegan, IL.

The pilot project proposal builds upon existing partnerships between the U.S. Army Corps of Engineers (USACE) Chicago District, Illinois Department of Natural Resources (IDNR), coastal communities, and other stakeholders. Specifically, the Illinois Sand Management Working group is a network of elected officials and leaders from federal, state, and local organizations who collaborate on regionally-impactful and tangible approaches to public shoreline management.

The feasibility study is being conducted in joint effort by the USACE Chicago District, Lake Bluff Park District, Foss Park District, Glencoe Park District, and the City of Evanston.

#### 2. Study Purpose and Scope:

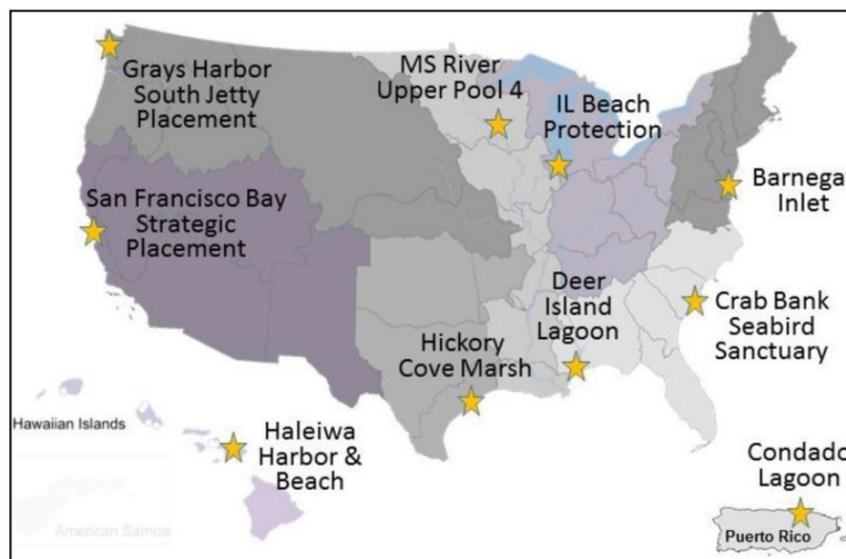
The purpose of this pilot project is to beneficially use clean dredged material from Waukegan Harbor for ecosystem restoration, shoreline protection, and recreation benefits in four Illinois coastal communities. The draft report documents the feasibility of the proposed activity and how it achieves the stated goals for the pilot program as outlined in the implementation guidance for Section 1122 of WRDA 2016.

[https://www.usace.army.mil/Missions/Civil-Works/Project-Planning/Legislative-Links/wrda2016/wrda2016\\_impguide/](https://www.usace.army.mil/Missions/Civil-Works/Project-Planning/Legislative-Links/wrda2016/wrda2016_impguide/)

#### 3. Study Location:

The proposed pilot application of dredged material from Waukegan Harbor would involve placing sand to provide shoreline protection and habitat creation at six sites:

- Sunset Park and Beach in Lake Bluff, IL
- Foss Park in North Chicago, IL
- Glencoe Beach in Glencoe, IL
- Dog Beach, Greenwood, and Lee Street Beaches in Evanston, IL



#### 4. Management Measures: Possible options for achieving the study goals.

##### NO ACTION:

No action assumes that no project would be implemented by the Federal Government to achieve the planning objectives.

##### OPEN WATER OR NEARSHORE PLACEMENT TO NOURISH VULNERABLE COASTAL AREAS:

Placing clean dredged material in the littoral zone would return it to the natural littoral drift system. Over time, wave action would be expected to disperse the material, moving it up onto beaches and other accretion areas. Placement in the open water or nearshore zone is accomplished using a split hull bottom dump scow.

##### HYDRAULIC DREDGING FOR ON-BEACH PLACEMENT OF DREDGED MATERIAL:

Currently, dredging at Waukegan Harbor is carried out mechanically, typically utilizing a clamshell dredge. Utilizing a hydraulic dredge instead would allow the material to be piped directly to an upland placement site, rather than transported by barge. This measure is most applicable when the placement site is located in close proximity to the dredging area.

##### HYDRAULIC OFFLOADING FOR ON-BEACH PLACEMENT OF DREDGED MATERIAL:

This measure assumes continued mechanical dredging onto a barge. However, the material would then be slurried and offloaded hydraulically via a pipeline. Hydraulic offloading allows for upland placement where the placement site is not located in close proximity to the dredging area.

##### OVERLAND TRANSPORT OF DREDGED MATERIAL:

This measure involves loading clean dredged material into trucks/railcars and transporting it overland to the placement site. This measure may be beneficial where the placement site is not located near the shoreline, the shoreline is inaccessible, or there is sensitive shoreline habitat/infrastructure/etc. that needs to be avoided.

##### CONTOURING OF DREDGED MATERIAL TO REDUCE VULNERABILITY AND IMPROVE HABITAT:

Once placed, grading or contouring of the beneficial use material can be utilized to protect specific vulnerable habitat/structures/infrastructure, improve habitat, and create a shoreline profile that is more resilient to future erosion.

##### NATIVE PLANTINGS TO HOLD DREDGED MATERIAL IN PLACE:

Native plantings serve dual purposes; they create or improve coastal habitat and their root structures help hold the beneficial use material in place (reducing future erosion).

#### 5. Study Alternatives: Management measures are combined to form potential alternatives

Alternative	Open water or nearshore placement	Hydraulic dredging for on-beach placement	Hydraulic offloading	Overland transport	Contouring/Grading	Native Plantings
Alt 0	-	-	-	X <sup>[1]</sup>	-	-
Alt 1	X	-	-	-	-	-
Alt 2a	-	X	-	X <sup>[2]</sup>	X	X
Alt 2b	-	-	X	X <sup>[2]</sup>	X	X

[1] Overland transport in the No Action Alternative (Alt 0) represents the non-federal partner's ongoing practices.

[2] Overland transport may be used with other measures to avoid sensitive habitat or inaccessible placement areas

## 6. Evaluation & Comparison of Study Alternatives:

Following formulation of alternative plans for implementing the proposed pilot project, a process of evaluation and comparison was carried out based on the ecological merits and cost effectiveness of the plans.

### ECOLOGICAL MODELING:

Ecological models can be used to assess effects of anthropogenic interventions such as restoration. Models are used to predict the future state of an ecological system over time.

The western shoreline of Lake Michigan is part of a globally significant north-south flyway. The 140-mile urbanized portion of the flyway from north of Milwaukee, WI to east of Portage, IN has limited locations for migratory birds to find food, shelter, and protection from hazards. Despite the limited number of stop over sites, this flyway is used by millions of migrant birds including an estimated 5,000,000 songbirds alone (per Chicago Field Museum of Natural History). The pilot project will provide valuable resting and stop over habitat for migratory shorebirds, including the piping plover (*C. melodus*), which is federally-listed as endangered.

**TABLE - Habitat Suitability Index (HSI) and ecosystem benefits for study alternatives.** These numbers show the relative habitat quality under each alternative (HSI) and the calculation of ecological benefits (AAHU and NAAHU) that are used to compare the alternatives. Alt 2a and Alt2b provide the highest level of ecosystem benefits.

	Acres	Avg. HSI <sup>1</sup>	AAHU <sup>2</sup>	NAAHU <sup>3</sup>
No Action	19.43	0.31	6.02	-
Alt 1 - Littoral Placement	19.43	0.31	6.03	0.01
Alt 2a - On-Beach Placement with Hydraulic Dredging	19.43	0.35	6.71	0.68
Alt 2b - On-Beach Placement with Hydraulic Offloading	19.43	0.35	6.71	0.68

1 – HSI averaged over a 50 year period

2 – Average Annual Habitat Units

3 – Net Average Annual Habitat Units

### COST ANALYSIS:

The ecosystem modeling results were used to perform a cost effectiveness/incremental cost analysis (CE/ICA) to identify the “best buy” plan(s) and inform selection of a Recommended Plan.

**TABLE - Preliminary cost estimates for study alternatives**

Alternative	Construction Cost	LERRD <sup>1</sup>	PED <sup>2</sup>	CM <sup>3</sup>	Total First Cost
No Action	\$0	\$0	\$0	\$0	\$0
Littoral Placement (60k CY)	\$82,500	\$0	\$8,250	\$4,125	\$95,000
On-Beach Placement with Hydraulic Dredging (60k CY)	\$4,156,000	\$156,000	\$588,774	\$277,070	\$5,178,000
On-Beach Placement with Hydraulic Offloading (60k CY)	\$1,362,000	\$156,000	\$220,000	\$74,000	\$1,812,000

1 – Lands, Easements, Rights of Way, Relocations, and Disposal

2 – Preconstruction Engineering and Design

3 – Construction Management (includes assumed monitoring of \$2,000 in each of the first 5 years following implementation)

**TABLE - Cost Effectiveness / Incremental Cost Analysis for study alternatives**

#	Alternative	AAC <sup>1</sup>	AAHUs	NAAHU <sup>2</sup>	Cost Effectiveness
0	No Action	\$0	6.02	-	Cost Effective, Best Buy
1	Littoral Placement (60k CY)	\$3,567	6.03	0.01	Cost Effective
2a	On-Beach Placement with Hydraulic Dredging (60k CY)	\$194,431	6.71	0.68	Not Cost Effective
2b	On-Beach Placement with Hydraulic Offloading (60k CY)	\$68,041	6.71	0.68	Cost Effective, Best Buy

1 – Average Annual Cost; generated in USACE’s IWR Plan tool.

## 7. Results:

- Alternatives 2a and 2b best meet the goals and objectives of the Section 1122 Pilot Project Program, as well as those of the non-federal partners
- Alternatives 2a and 2b provide the greatest habitat benefits of the study alternatives
- Alternative 2a is not, however, a cost effective plan.
- Alternative 2b is the only action alternative that is cost effective and “best buy” plan

## 8. Selecting a Recommended Plan:

On-beach placement via hydraulic offloading is anticipated to be recommended for implementation. Implementation of the Recommended Plan will meet multiple objectives of the Section 1122 of WRDA 2016 Beneficial Use of Dredged Material Pilot Project Program:

- Protection and creation of aquatic ecosystem habitats
- Reducing storm damage
- Promoting public safety
- Stabilizing and enhancing shorelines
- Promoting recreation
- Supporting risk management adaptation strategies

The Recommended Plan is the National Ecosystem Restoration Plan and is expected to provide 6.71 Average Annual Habitat Units over a 50 year period of analysis. The project is estimated to have a total first cost of \$1,812,000 (2020 Price Levels).

Available material will be split evenly among the four communities participating in the pilot study. This approach was vetted with the non-federal partners and will have the added benefit of demonstrating the effectiveness and/or challenges of implementing the pilot project in four distinct applications using the same volume of material. Assuming 60,000 cubic yards (CY) of dredged material is available following maintenance dredging of Waukegan Harbor in 2021:

**Glencoe Park District** – 15,000 CY spread out in one location but broken into two distinct units separated by a ‘no placement’ area in between them. Approximately 800 linear feet in total.

**Foss Park District** – 15,000 CY spread out in a single long continuous unit. Approximately 1,500 linear feet in total.

**Lake Bluff District** – 15,000 CY spread out in one location that is broken into three distinct units bounded by manmade shoreline features. Approximately 1400 linear feet in total.

**City of Evanston** – 15,000 CY spread out over three beaches in close proximity. Approximately 2000 linear feet in total.

The measures of contouring/grading the material and native plantings were dropped from all study alternatives. Under this pilot project program, any measures above and beyond transportation and placement of dredged material would be cost shared at 65% federal and 35% non-federal. The Project Delivery Team and the non-federal sponsors, however, have reached consensus that the preferred approach would be to use available federal funds to maximize sand placement first before considering any additional measures. This decision is based on:

- *Ecosystem Benefits* - creating open sandy coastal areas scores the highest habitat values for migratory shorebirds
- *Funding* - with limited available funding, maximize project features that USACE is integral to implementing
- *Differing Partner Objectives* - material placement is a shared goal; plans management of placement sites differ
- *Efficiency* - streamlines cost sharing (anticipated 100% Federal) and development of Partnership Agreement (PPA)
- *Desired Lessons Learned from Pilot Project* - will communities see this as a viable tool for protecting their beaches in the future? Prioritize demonstrating implementation process and developing cost estimates.

## 9. Environmental Considerations:

The Chicago District completed an Environmental Assessment and Finding of No Significant Impact in 2019 that analyzed the affected environment of the placement locations and the environmental impacts of all of the measures that are being included in the current Feasibility Report. These documents are available online, along with a fact sheet and frequently asked questions regarding the sediment quality, history, and testing:

<https://www.lrc.usace.army.mil/Missions/Civil-Works-Projects/Waukegan-Harbor-Dredging/>

