
Public Beach Protection in 4 Illinois Coastal Communities
Beneficial Use of Dredged Material Pilot Project Program
DRAFT Detailed Project Report



July 2020



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1.0 Introduction

This study explores the feasibility of implementing a pilot project for the beneficial use of dredged material generated from operations and maintenance dredging at a 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. The Chicago District currently maintains a positive working relationship with these stakeholders through participation in the Illinois Sand Management Working Group dating back to 2015. 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.

In July 2017, four nonfederal entities submitted a letter of intent to the Chicago District to beneficially use dredged material from Waukegan Harbor to protect and restore six public parks and beaches. Under this original proposal, the communities would have paid the difference in transportation costs (similar to an existing arrangement that the Chicago District has with IDNR for placing sand from Waukegan Harbor in the nearshore of Illinois Beach State Park). In February 2018, the Chicago District provided a positive response that it would consider the request and undertake an environmental analysis under the National Environmental Policy Act (NEPA) to determine whether such an action would cause any adverse impacts to human health and the environment. That NEPA process was completed in September 2019.

1.1 Study Purpose and Scope

The purpose of this pilot project is to beneficially use dredged material from Waukegan Harbor for ecosystem restoration in four Illinois coastal communities. It is anticipated that this action will provide flood risk management and/or coastal storm damage reduction benefits as well. This 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 the Water Resources Development Act (WRDA) of 2016.

1.2 Location

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

- Sunset Park and Beach in Lake Bluff
- Foss Park in North Chicago
- Glencoe Beach in Glencoe
- Dog Beach in Evanston

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- Greenwood Street Beach in Evanston
- Lee Street Beach in Evanston

Lake Bluff

The Lake Bluff Park District requests that sand be placed at Sunrise Park Beach (455 Sunrise Ave., Lake Bluff, IL). This beach is a regulated and gated facility that is free to utilize for Lake Bluff residents (non-residents can purchase a pass). Recreational amenities include play equipment, two shelters with fireplaces, charcoal grills, restroom facilities, complimentary games and complimentary beach chairs.



Figure 1: Approximate Sunrise Beach placement site in Lake Bluff, IL

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North Chicago

The Foss Park District in North Chicago requests that sand be placed at the Foss Beach (1901 Foss Park Ave., North Chicago, IL). The Foss Park beach facility is free and open to the general public. The 32-acre park includes 3 shelters, a band shell, a concession stand, baseball diamonds, a skate park, and playground equipment.



Figure 2: Approximate Foss Beach placement site in North Chicago, IL

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Glencoe

The Glencoe Park District requests that sand be placed at Glencoe Beach (55 Hazel Ave., Glencoe, IL). This Glencoe Park District beach is a regulated beach that requires residents and non-residents to purchase a pass. Recreational amenities include paddleboard, kayak, and sailboat rentals, Paul & Ada Safran Sprayground for children, shaded trellis & sun shelters for picnics and parties, sand chairs, cabanas and umbrella rentals, volleyball courts and complimentary volleyball rentals, beach cafe with lakefront dining options, and scheduled complimentary beach cart service.



Figure 3: Approximate Glencoe Beach placement site in Glencoe, IL

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Evanston

The City of Evanston requests that sand be placed at the Lee Street Beach (1111 Lake Shore Blvd., Evanston, IL), Greenwood Street Beach (1401 Sheridan Rd., Evanston, IL) and Dog Beach (1631 Sheridan Rd., Evanston, IL). The City of Evanston's beaches require residents and non-residents to purchase a pass. Low income families can apply for assistance with proof of burden. These beaches are typically used for swimming and sun bathing, with opportunities to purchase tube rides on Lake Michigan.

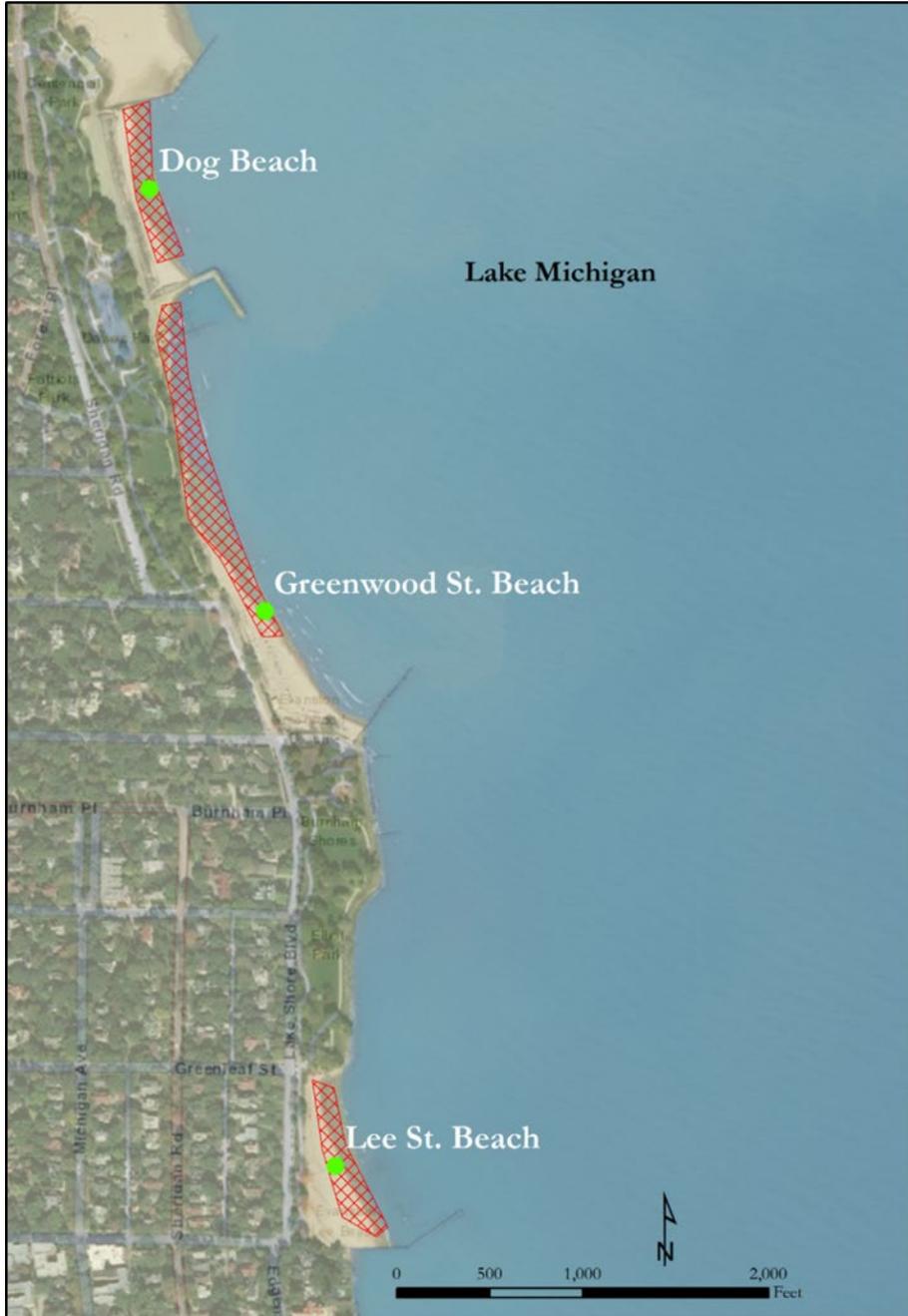


Figure 4: Approximate Dog Beach, Greenwood St Beach, and Lee St Beach placement sites in Evanston, IL

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In addition to the immediate benefits that this project would provide at these six placement sites, the pilot project would be a proof-of-concept to determine:

- The potential for significant impacts to natural and cultural resources to occur
- Whether similar placement sites could be utilized between the Wisconsin/Illinois state border and the northern city limits of Chicago, assuming they meet certain criteria identified in the NEPA process that was completed in September 2019: *Waukegan Harbor Maintenance Dredging and Placement Environmental Assessment (EA) and Finding of No Significant Impact (FONSI)*
- The anticipated costs for communities to implement this strategy in the future, particularly as they compare to the cost of trucking in quarried sand
- Whether the implementation process and the final product are satisfactory to local municipalities
- How long the material can be expected to stay in place before reapplication is required

Depending on these outcomes, the proposed pilot project has the potential to become a new tool for regional stakeholders who are hoping to expand sustainable and collaborative shoreline management options in the region.

1.3 Study Authority

Section 1122 of WRDA 2016 required the U.S Army Corps of Engineers to establish a pilot program to recommend ten projects for the beneficial use of dredged material. The Corps received 95 proposals during the February 8 to March 11, 2018 submission period, and announced in December 2018 that this proposal from four coastal Illinois communities is one of the ten selected proposed pilot projects for potential implementation (Figure 5). Section 1122 amends Section 204 of WRDA 1992 (33 U.S.C. 2326) dealing with the Continuing Authorities Program (CAP) for beneficial use of dredged material, specifically with regard to cost sharing of such projects.



Figure 5: 10 pilot projects were selected for inclusion in the pilot project program under Section 1122 of WRDA 2016.

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Section 204 of WRDA 1992 authorizes the Corps to carry out projects for structural and non-structural flood control, hurricane and storm damage reduction, and environmental protection and restoration in connection with dredging for construction, operation, or maintenance of authorized navigation projects. Under WRDA 2007, the feasibility study for a Section 204 project is 100% federally-financed. Construction of any proposed alternative is financed based on the incremental cost increase of the proposed project over the cost of the least costly plan that accomplishes the disposal of dredged material from a federal navigation project, consistent with sound engineering practices and environmental standards. This is referred to as the Base Plan. Cost increases above the Base Plan are shared at 65% federal and 35% non-federal for Section 204 projects.

Under Section 1122 of WRDA 2016, the feasibility study is 100% federally financed, as is the incremental cost of transportation and placement of dredged material above the Base Plan to implement an authorized project. Any additional measures beyond transportation and placement would be cost-shared at 65% federal and 35% non-federal.

1.4 Non-Federal Sponsorship

The non-federal partners for this pilot project proposal are:

- Glencoe Park District
- Foss Park District in North Chicago
- Lake Bluff Park District
- City of Evanston

These entities first submitted a letter of intent to the Chicago District seeking to beneficially use dredged material from Waukegan Harbor in July 2017 separate from, and predating, the issuance of guidance on implementing Section 1122 of WRDA 2016. Subsequently, they submitted a similar proposal for inclusion in the Section 1122 Pilot Project Program during the February 8 to March 11, 2018 submission period and were ultimately one of 10 projects selected by Headquarters, U.S. Army Corps of Engineers (HQUSACE) for further analysis and potential implementation.

This feasibility study is being carried out similarly to studies carried out under Section 204 of WRDA 1992 (Beneficial Use of Dredged Material) of the Continuing Authorities Program (CAP).

1.5 Relevant Prior Studies and Reports

- Environmental Assessment - Waukegan Harbor Maintenance Dredging and Placement (2019)
- Programmatic Environmental Assessment and Finding of No Significant Impact for Implementation of Section 1122 of the Water Resources Development Act of 2016 Selection of Recommended Projects
- Section 204 Beneficial Use of Dredged Material – Illinois Beach State Park Feasibility Report
- Memorandum of Understanding with Illinois Department of Natural Resources for Placement of Dredged Material from Waukegan Harbor at Illinois Beach State Park
- Letter of Intent from Four Illinois Coastal Communities to Receive Dredged Material from Waukegan for Public Beach Protection

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- Regular Operation and Maintenance of Waukegan Harbor

The District has made the following reports available on its website:

- 2008-2019 Approach Channel Contaminant Determination
- 2014 Approach Channel Contaminant Determination
- 2009 Approach Channel Annual Report
- 2010 Approach Channel Annual Report
- 2012 Approach Channel Annual Report
- 2013 Approach Channel Annual Report
- 2006 Outer Harbor Contaminant Determination
- 2012 Outer Harbor Contaminant Determination
- 2017 Outer Harbor Contaminant Determination
- U.S. Environmental Protection Agency (USEPA) Reports Related to the Waukegan Harbor Area of Concern (AOC). <https://www.epa.gov/great-lakes-aocs/restoring-waukegan-harbor-aoc-timeline>
- 1994 I & II Remedial Action Plan
- 1999 Stage III Remedial Action Plan
- 2008 Delisting Targets for the Waukegan Harbor Area of Concern: Final Report
- 2013 Summary Report: Benthos and Plankton within Waukegan Area of Concern
- 2013 Draft Summary Report: 2012 Fish Sampling in Waukegan Harbor Area of Concern
- Waukegan Harbor, Illinois Continuing Authorities Program Section 107 – Small Harbor Improvements – Federal Interest Determination (FID) Report (2015)
- Waukegan Harbor Maintenance Dredging and Placement Environmental Assessment, Waukegan Harbor, IL, USACE 2019
- Draft Initial Appraisal Report, Waukegan Harbor, IL, USACE 2013
- Integrated Feasibility Report and Environmental Assessment, Illinois Beach State Park Section 204, USACE 2014
- Draft Interim Dredged Material Management Plan, Waukegan Outer Harbor, USACE 2012
- Illinois Shoreline Erosion Interim I, Waukegan to the IL-WI State Line, USACE 2003
- Final Environmental Impact Statement, Waukegan Harbor, Maintenance Dredging and Disposal Areas, USACE 1975
- Illinois Shore of Lake Michigan, Beach Shore Erosion Study, USACE 1949

2.0 Affected Environment – Existing Conditions

An Environmental Assessment was prepared during a parallel effort by the Chicago District that originated through participation in the Illinois Sand Management Working Group and was based on a letter of intent from the sponsor communities in 2017 to receive dredged material from Waukegan Harbor at 100% non-federal expense. This Environmental Assessment was conducted under the Chicago District’s authority to operate and maintain the Waukegan Harbor federal navigation project. The Environmental Assessment found that no significant adverse impacts were anticipated as a result of placing dredged sand from Waukegan Harbor upland on the subject beaches; this was documented in a FONSI issued in September 2019.

The analysis of existing conditions in that document overlaps with the majority of the actions included in the Section 1122 pilot project proposal and is therefore included by reference in this document (see Appendix A for the complete referenced Environmental Assessment and FONSI).

3.0 Plan Formulation

3.1 Treatment Similar to a CAP 204 Feasibility Study

As noted in Section 1.4, the feasibility phase for the Section 1122 Pilot Project Program is being carried out similar to a CAP Section 204 Beneficial Use of Dredged Material study. This decision is based on the fact that Section 1122 of WRDA 2016 amends Section 204 and that any costs to implement the selected pilot projects beyond transportation and placement of dredged material would be cost shared in accordance with Section 204, as noted in the implementation guidance issued for Section 1122 of WRDA 2016. Additionally, utilizing the general CAP 204 process as a roadmap for the feasibility phase of the Section 1122 Pilot Project Program increases study and implementation efficiency. However, it is important to recognize that there will be divergences from the CAP Section 204 plan formulation and comparison processes inherent to the specific innovation-driven goals of the pilot project program compared to a typical USACE beneficial use of dredged material project. These differences will be called out, as necessary, throughout the remainder of this feasibility report.

3.2 Problems and Opportunities

Problems: Current storm damage costs thousands of dollars to repair and endangers important infrastructure, including: piers, break walls, beach access points, boat launches, water pipes, sewer pipes, and roads. Erosion and sediment overwash cause significant drop-offs at swimming beaches and endanger public access points.

- The construction of updrift structures perpendicular to the shore has resulted in increased downdrift shoreline erosion
- Urbanization along the Illinois shoreline has resulted in the destruction of the majority of natural Lake Michigan coastal habitat
- Currently, record high lake levels are increasing erosion and public concern/awareness

Opportunities: Using dredged material beneficially to protect public beaches and improve coastal habitats while supporting navigation in Waukegan Harbor.

- An opportunity exists to restore and protect critical habitat for a variety of critical species including the federally-listed Piping plover (*Charadrius melodus*) and/or Pitcher's thistle (*Cirsium pitcheri*)
- An opportunity exists to restore beaches that are being negatively impacted by high lake levels and interrupted sediment transport processes

3.3 Objectives, Constraints, and Considerations

3.3.1 Planning Objectives and Other Considerations

The federal objective of water and related land resources planning is to contribute to National Economic Development and/or National Ecosystem Restoration consistent with protecting the nation's environment. For this study, the following planning objectives have been identified:

- Allow for continued maintenance of the federal navigation channels at Waukegan Harbor while reducing the amount of dredged material to be disposed of in the open-lake site

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- Identify beneficial use opportunities that reduce damages to coastal resources in four coastal Illinois communities
- Identify beneficial use opportunities for dredged material to improve the quality and resilience of coastal habitat
- Protect, restore, and create aquatic ecosystem habitats

Other Considerations under Section 1122 of WRDA 2016:

The implementation guidance for the Section 1122 Pilot Project Program as a whole also considers other objectives that pilot projects should, to the extent practical, strive to accomplish. These considerations for the pilot project program include:

- Reducing storm damage
- Promoting public safety
- Stabilizing stream systems and enhance shorelines
- Promoting recreation
- Supporting risk management adaptation strategies
- Reducing the costs of dredging and dredged material placement

3.3.2 Planning Constraints

Formulated plans are limited by constraints, including resource, legal, and policy constraints. Resource constraints are associated with limits on knowledge, expertise, experience, ability, data, information, funding, and time. Legal and policy constraints are those defined by law, USACE policy, and USACE guidance. For this study, the following constraints have been identified:

- Any sediment used for the project must be of suitable grain size and quality for habitat restoration
- The placement of dredged material would require appropriate state and federal permits
- Any project would be limited by the quantity of dredged material available

3.3.3 Planning Considerations

While not rising to the same level of significance as project-specific constraints, there are a number of other key considerations that the Project Delivery Team (PDT) considered during plan formulation and analysis.

- Project area is within a sand-depleted littoral zone
- Project area is subject to large fluctuations in lake level, wave energy, and ice loadings
- Numerous laws, regulations, Executive Orders, and policies must be considered:
 - a. National Environmental Policy Act (NEPA)
 - b. Endangered Species Act (ESA)
 - c. Clean Water Act (CWA)

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- d. Coastal Zone Management Act (CZMA)
 - e. National Historic Preservation Act (NHPA)
 - f. Corps of Engineers Planning and Engineering guidance
- All plans will seek to avoid, minimize, or mitigate potential negative environmental impacts
 - Sand placed at any of the subject beaches is exposed to natural erosive processes and may be washed away rapidly as a result of further disturbance of the littoral transport system, major storms, etc.

3.4 Future without Project Conditions (FWOP)

If no additional action is taken to address erosion at the six public beaches included in the pilot project proposal, it is expected that the non-federal sponsors would continue to truck in quarried sand, as local funding allows, to protect these public amenities and the associated habitat they provide, particularly for migrating shorebirds traveling along the Mississippi Flyway. During periods of high lake levels, erosion would also continue to reduce the size and reliability of these beaches, putting the property, populations, and infrastructure behind them closer to eventual damage. In time, this would likely force the communities and USACE to consider structural alternatives to coastal management such as revetments and groins to reduce erosion. These measures would result in long term reduction of habitat and public recreation, and cause or exacerbate additional erosion downdrift.

3.5 Management Measures

In order to address beach erosion, several measures utilizing beneficial use of dredged material were considered.

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 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 in Vulnerable Coastal Areas

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.

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Hydraulic Offloading for On-Beach Placement of Dredged Material in Vulnerable Coastal Areas

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 for On-Beach Placement of Dredged Material in Vulnerable Coastal Areas

This measure involves loading 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 of At-Risk Coastal Areas 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.

Appropriate Native Plantings to Hold Dredged Material in Place and Improve Coastal Habitat

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).

3.6 Formulation and Comparison of Alternative Plans

In addition to a 'No Action' plan, three alternative plans were formulated to address the study goals by combining one or more of the measures described in Section 3.4.

3.6.1 Preliminary Alternative Plan Descriptions

Alternative 0 – No Action: The Corps is required to consider the option of “No Action” as one of the alternatives. No action assumes that no project would be implemented by the Federal Government to achieve the planning objectives. No Action, which is synonymous with “Without Project Condition,” forms the basis from which all other alternative plans are measured.

Alternative 1 – Littoral Placement: This alternative proposes placing dredged material below the water line in an effort to restore and replenish the nearshore zone. By supplementing the littoral sediment deficit, this alternative may raise the local nearshore lake bed over time, protect and preserve the existing beach and foredune habitat from erosion, and possibly result in increased beach habitat. This habitat is of particular importance for the federally-listed Piping plover and Pitcher’s thistle, as well of a variety of migratory shorebirds. Since the material would be placed below the water line, all material would remain within the littoral system providing additional benefits to the downdrift shoreline.

Alternative 2 - On-Beach Placement:

Alternative 2a – On-Beach Placement with Hydraulic Dredging: This alternative proposes hydraulically dredging Waukegan Harbor and direct placement of dredged material mostly above the water line via pipeline in an effort to restore and replenish the beach zone. This alternative will immediately restore beach habitat as well as preserve and protect foredune habitat from erosion. This habitat is of

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particular importance for federally-listed Piping plover and Pitcher’s thistle, as well as a variety of migratory shorebirds. Since this alternative does not directly address the littoral sediment deficit, some of the beach fill is expected to reenter the littoral zone. However beach fill losses to the littoral drift over time will still provide benefits to the downdrift shoreline.

Alternative 2b – On-Beach Placement with Hydraulic Offloading: This alternative proposes placing dredged material mostly above the water line via hydraulic offloading in an effort to restore and replenish the beach zone. Dredging would continue to be done mechanically and then transported offshore of the placement site by barge. This alternative will immediately restore beach habitat as well as preserve and protect foredune habitat from erosion. This habitat is of particular importance for federally-listed Piping plover and Pitcher’s thistle, as well as a variety of migratory shorebirds. Since this alternative does not directly address the littoral sediment deficit, some of the beach fill is expected to reenter the littoral zone. However beach fill losses to the littoral drift over time will still provide benefits to the downdrift shoreline.

While implementation of Alternatives 2a and 2b would have different methods, costs, and impacts to implement, the end result in terms of appearance and ecosystem benefits would be approximately the same. Therefore, Alternatives 2a and 2b are considered subsets of the broader alternative of *on-beach placement*.

Table 1: Preliminary study alternatives for the beneficial use of dredged material from Waukegan Harbor

Alternative	Open water or nearshore placement	Hydraulic dredging for on-beach placement	Hydraulic offloading	Overland transport	Contouring/ Grading ^[3]	Native Plantings ^[3]
Alt 0	-	-	-	X ^[1]	-	-
Alt 1	X	-	-	-	-	-
Alt 2a	-	X	-	X ^[2]	X	X
Alt 2b	-	-	X	X ^[2]	X	X

^[1] Overland transport in the No Action Alternative (Alt 0) represents the non-federal partner’s ongoing practices. It does not represent a potentially cost-shared management measure

^[2] Overland transport may potentially be coupled with other on-beach placement measures to avoid sensitive habitat or inaccessible placement locations

^[3] See ‘Maximizing Sand Placement’ below for consideration of contouring/grading and native plantings in the formulation process

3.6.2 Preliminary Evaluation of Alternatives

Alternative 1 would provide the least immediate and targeted shoreline protection and habitat creation benefits as a result of relying on natural littoral processes to move the sand up onto the beaches and to downdrift locations. Alternatives 2a and 2b would provide nearly equivalent shoreline protection and ecosystem benefits. These alternatives would also start providing benefits more immediately due to the direct placement of dredged material onto the beaches. Cost and potential for adverse environmental impacts are used to compare alternatives that have equivalent habitat benefits in order to potentially recommend one over the other.

3.6.3 Maximizing Sand Placement

In addition to on-beach sand placement, Alternatives 2a and 2b would potentially be compatible with other measures for ecosystem restoration and/or protection such as strategic contouring and native

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plantings (see Table 1). 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 PDT 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 contouring and/or native plantings. This decision is based on the following considerations:

- Ecosystem Benefits and Modeling – The habitat model utilized for this study identifies the alternative plan that best supports habitat for the endangered piping plover. This model tends to select for alternatives that best provide reliable access to stable shoreline habitat when comparing alternative plans (see Chapter 4.0 for more detail on the habitat model utilized for this study). This consideration supports the strategy of maximizing the quantity of sand placed at each location, particularly if it is placed directly on-beach
- Funding Limits – Available federal funding to implement the Section 1122 project program will affect the size and scope of each project. This is similar to the Continuing Authorities Program authorities that have per-project and annual program spending limits. The PDT and the non-federal partners agree that the focus of this pilot project should be maximizing dredged material placement over additional potential measures as described in Section 3.5.
- Multiple Sponsors and Objectives – The four non-federal partners for this pilot project share a common goal: to place sand dredged from the Waukegan Harbor federal navigation channel on public beachfronts in their respective communities in order to reduce coastal erosion. Beyond this common goal, each of the communities have individual plans, needs, and operational considerations at each of the proposed placement sites. Rather than coordinating additional site-specific measures for implementation at locations outside of their respective jurisdictions/ownership, the PDT and the non-federal sponsors agree that additional measures/betterments at each location will be most efficiently implemented by the individual communities separate from the Section 1122 pilot project program. The time saved in planning and design as a result of this approach will facilitate earlier implementation of the pilot project, which is an important consideration given current record high lake levels and ongoing coastal erosion.
- Efficiency – in addition to the efficiency described above, the decision to maximize sand placement over additional measures will help streamline the cost-sharing requirements for the pilot project as well as the development of the Project Partnership Agreement (PPA).
- Desired Lessons-Learned from Pilot Implementation – As a pilot application, the intent of implementing the proposed project is to provide proof-of-concept for application of this beneficial use of dredged material in the future. As such, isolating the variable of material placement gives potential future partners the clearest image of what they can expect the process and end product to look like. Specifically for this pilot project, some of the intended goals are to
 - Lay the regulatory groundwork for on-beach placement in northeastern Illinois
 - Demonstrate what beneficial use of dredged sand looks like for local communities potentially interested in such an application
 - Demonstrate how the implementation process is carried out

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- Demonstrate what the cost would be for other non-federal entities to implement similar applications in the future (especially compared to the less sustainable practice of trucking in quarried sand from out of state)

4.0 Evaluation and Comparison of 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. Lastly, a qualitative risk-analysis was conducted and an alternative was identified for recommendation.

4.1 Ecological Modeling

Ecological models simulate anticipated ecological responses of the ecosystem or components of the ecosystem to fluxing environmental conditions and 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 and can be applied to compare the expected outcome of alternative courses of action versus the natural condition (no action).

For this analysis, the PDT identified a certified model based on migratory shorebird habitat. Shorebirds are a diverse group belonging to the suborder Charadrii including plovers, yellowlegs, godwits, and sandpipers. Nearly all are wetland-dependent species during most if not all stages of their annual life cycle (Potter, Gates, et al., 2007). In general, they are small birds ranging in size from 130-650 mm in body length and from 20-700 g in mass (Skagen, 1997). They generally have long legs positioned near the center of their bodies.

Forty-nine shorebird species commonly occur in North America (Harrington, 1999). Of those, 38 species occur in the area identified as Midcontinental North America (Skagen, et al., 1999) and the Upper Mississippi River and Great Lakes shorebird planning region (Potter, et al., 2007). Many shorebird species have experienced population declines likely due to habitat loss, and more specifically due to the loss of wetlands and other suitable stopover sites. The piping plover (*Charadrius melodus*) is federally-listed as endangered and known to occur near the project area. Illinois Beach State Park has even been designated critical habitat for the Piping Plover by the U.S. Fish and Wildlife service (50 CFR Part 17).

The western shoreline of Lake Michigan is part of a globally significant north-south migratory flyway. The 140-mile portion of the flyway from the urbanized area north of Milwaukee, Wisconsin to east of Portage, Indiana has limited locations where migratory birds can find food, shelter, and protection from hazards (both natural and man-made). Despite the limited number of stopover sites, this flyway is used by millions of migrant birds including: hawks, falcons, owls, waterfowl, gulls, terns and shorebirds, and an estimated 5,000,000 migrant songbirds (per Chicago Field Museum of Natural History). This flyway extends from the tip of South America to as far north as the Arctic Circle, a distance over 9,000 miles. Birds using this flyway can pass through as many as 14 US States, Canada, Mexico, Central and South America.

The economic impact associated with wildlife watching is significant and birding is a major component. According to the U.S. Fish and Wildlife Service in 2011, the number of wildlife watchers in the U.S. (over the age of 16) was nearly 72 million; this generated over \$142 billion in economic benefits. The state of Illinois had more than 3 million wildlife watchers generating over \$1.3 billion. The habitat projects in these four shoreline communities will add to the bird watching economic output in Illinois and all the states and countries that these birds migrate through.

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As such, the model identified for this feasibility study is the Shorebird Migration Model (Clark and Jordan 2017) to compare alternative plans’ habitat creation potential for migrating shorebirds, including the endangered piping plover. The modeling results were then used to perform a cost effectiveness/incremental cost analysis (CE/ICA) to identify the best buy plan and inform selection of the Recommended Plan.

4.1.1 Shorebird Migration Model

Concern about the decrease in shorebird numbers and habitat has led to many shorebird conservation efforts such as the U.S. Shorebird Conservation Plan, the International Shorebird Survey, and the Western Hemispheric Shorebird Reserve Network. Other efforts such as the North American Waterfowl Management Plan, and the Prairie Pothole Joint Venture recognize shorebirds as important members of wetland communities that deserve management consideration.

As a result of these efforts and others, projects aimed at improving shorebird habitat have become increasing popular. Managers and planners have worked to identify areas in need of protection or enhancement. There is a need for methodology to measure impacts induced by management activities. Furthermore, with limited budgets there will be a need to assess the potential investment return of individual projects in order to prioritize them, thereby providing the most benefit to the resource.

The Shorebird Migration Model can accurately assess habitat quality throughout the North American Midcontinent during the spring and fall migration periods and expands shorebird migration patterns to include the Upper Mississippi River and Great Lakes Joint Venture Region (Clark and Jordan 2017).

This is a habitat suitability index (HSI) model, where variables related to food, security, and predictability are used to project and compare how suitable the habitat is for migrating shorebirds under each alternative plan, including the no action plan.

4.1.2 Ecological Model Scoring and Summary of Results

Table 2: Summary of HSI values generated for each study alternative by the Shorebird Migration Model.

	Alt 0 - No Action	Alt 1 – Littoral Placement	Alt 2a – On-Beach Placement with Hydraulic Dredging	Alt 2b- On-Beach Placement with Hydraulic Offloading
Summer/Fall Season				
Food	0.03	0.05	0.33	0.33
Security	0.15	0.15	0.15	0.15
Predictability	0.13	0.13	0.13	0.13
HSI¹	0.15	0.16	0.30	0.30
Spring Season				
Food	0.03	0.03	0.33	0.33
Security	0.15	0.15	0.15	0.15
Predictability	0.13	0.13	0.13	0.13
HSI¹	0.15	0.15	0.30	0.30
COMBINED HSI¹	0.31	0.32	0.60	0.60

1 – HSI assumed in Year 1 after placement; HSI is expected to decrease in future years as a result of natural erosion

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While littoral placement would likely result in certain habitat and shoreline protection benefits, the habitat benefits associated with Alternative 1 as it relates to migratory shorebird habitat would be predominantly indirect benefits. While additional shoreline protection may increase reliability of coastal shoreline habitat by reducing erosion rates, particularly during the summer and fall season, it is unlikely to create additional targeted stopover habitat for migratory shorebird species. Littoral Placement is anticipated to require reapplication every 1-2 years. 2 years was used as an assumption in order to calculate Average Annual Habitat Units (AAHU) over a 50 year period using USACE’s IWR Plan tool.

As hypothesized in Section 3.6.2, Alternatives 2a and 2b appear to provide equivalent shoreline protection and ecosystem benefits. Baird and URS completed an analysis as part of the nearby Rosewood Park Beach CAP 506 study in Highland Park, which included a review of historic shorelines. There, they note that a comparison of the 1998 to 2012 shorelines would translate to a 31 to 47 foot difference in shoreline. Depth of closure appears to occur around 576 IGLD85. The backshore profiles seemed to converge around 584 IGLD85, suggesting that the lake would have less of an influence beyond this point. Assuming a simple trapezoidal shape of material was uniformly lost this would be equivalent to a loss of 248-376 sf or 18-27 sf/yr. Per 100 feet of shoreline, this would translate to 67-100 CY per year.

Applying this rough estimate to the 5,700 linear feet of combined placement are in the pilot project proposal, this would equate to 3,819-5,700 CY of placed dredged material being lost per year. At this rate, it is anticipated that the beaches would return to approximately their Future without Project Conditions after 11-16 years. 11 years was used to calculate AAHUs over a 50 year period using USACE’s IWR Plan tool.

Table 3: Summary of National Ecosystem Restoration (NER) benefits for study alternatives over a 50 year period of analysis.

	Acres	Avg. HSI¹	AAHU²	NAAHU³
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

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4.2 Costs

Table 4: Cost analysis

Alternative	Construction Cost	LERRD ¹	PED ²	CM ³	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)

4.3 Cost Effectiveness/Incremental Cost Analysis

Cost effectiveness and incremental cost analysis (CE/ICA) are two distinct analyses that must be conducted to evaluate the effects of alternative plans according to USACE policy. First, it must be shown through cost effectiveness analysis that a restoration plan's output cannot be produced more cost effectively by another alternative. Cost effective means that, for a given level of non-monetary output, no other plan costs less and no other plan yields more output at a lower cost.

Incremental cost analysis means that the subset of cost effective plans are examined sequentially to ascertain which plans are most efficient in the production of environmental benefits. Those most efficient plans are called "best buys" because they provide the greatest increase in output for the least increases in cost. They have the lowest incremental costs per unit of output

4.3.1 Cost Effectiveness

Alternatives that generate positive net average annual habitat units (NAAHU) are considered to be cost effective unless another plan provides equal or greater benefit at a lower cost. The No Action Plan is always considered cost effective.

- Alt 0, Alt 1, and Alt 2b result in positive NAAHU and are therefore cost effective
- Alt 2a is not considered cost effective because it produces equivalent benefits compared to Alt 2b but at a much higher cost.

Cost estimates were developed assuming placement of the total amount removed from Waukegan Harbor in a given dredging cycle; the historical average quantity of 60,000 cubic yards was used. Since these alternatives are comprised of a flat mobilization/demobilization cost and a per-cubic-yard placement cost, maximizing placement of available material would be the most cost effective approach.

4.3.2 Incremental Cost Analysis

An incremental cost analysis was performed on the Best Buy Plans identified from the cost effectiveness analysis, including the No Action plan. The objective of the incremental cost analysis is to assist in determining whether the additional output provided by each successive plan is worth the additional

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cost. Three cost effective alternatives were identified. Two of these are “best buy” plans – Alt 0 (No Action) and Alt 2b. See Figure 6 and Table 5.

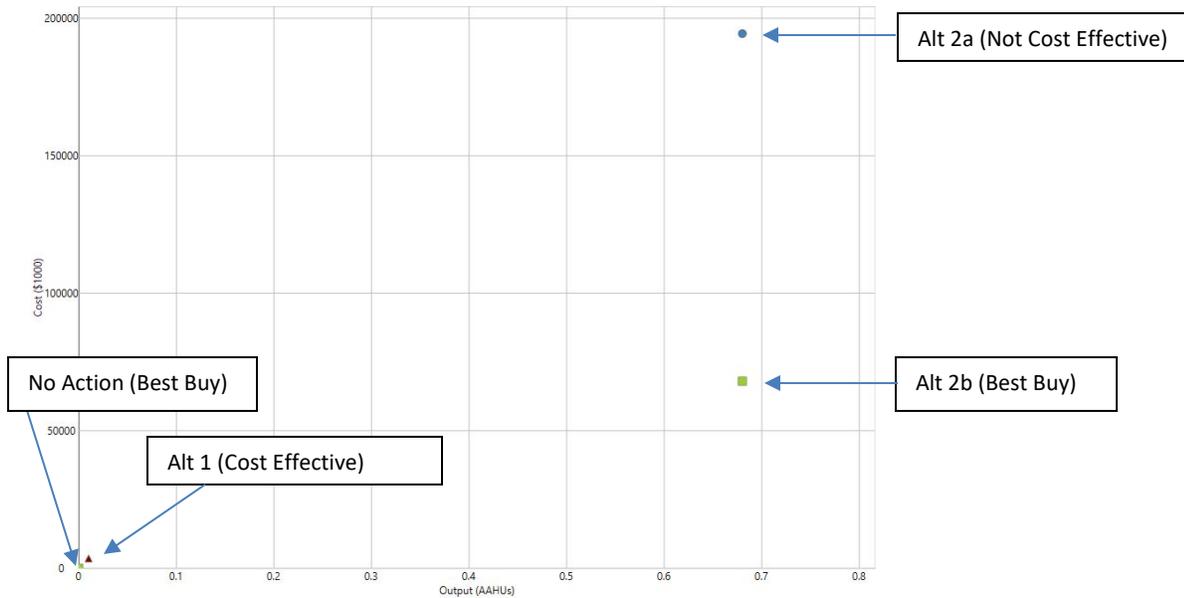


Figure 6: Cost Effectiveness/Incremental Cost Analysis

Table 5: Cost Effectiveness/Incremental Cost Analysis

#	Alternative	AAC ¹	AAHUs	NAAHU ²	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.

4.4 Risk and Uncertainty

During this feasibility level analysis, a number of assumptions were made due to uncertainty that exists related to future conditions, both with- and without-project. The risks associated with this uncertainty are that the selected plan may not be as implementable, effective, or robust as described. The risks are qualitatively described using the probability of negative consequences occurring and the expected magnitude of those consequences. The probability and consequence ratings define the level of risk as outlined in the table below. The risks associated with proposed alternatives are considered low.

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Table 6: Risk Matrix

Risk Rating Computation Guide			
Likelihood Estimate	Consequence Estimate		
	High	Medium	Low
High	<i>Very High</i>	<i>High</i>	<i>Medium</i>
Medium	<i>High</i>	<i>Medium</i>	<i>Low</i>
Low	<i>Medium</i>	<i>Low</i>	<i>Very Low</i>

Unknown future lake levels account for the greatest component of risk and uncertainty. Shoreline erosion, which is the main cause of habitat impairment in the proposed placement areas, is heavily dependent on lake levels, which are currently high. Regardless of lake level fluctuations, the with-project scenarios are expected to increase environmental quality compared to the without-project condition. For more discussion on lake levels and possible climate change scenarios, see the Coastal Engineering Appendix.

Implementation of the action alternatives is dependent on a sufficient quantity of sand accumulated in the Waukegan Harbor federal navigation channel to provide meaningful habitat benefits and shoreline protection. If maintenance dredging is not deemed necessary in a given year, implementation of the action alternatives would not be possible. If only a minor dredging event is required, there may not be sufficient material available to implement placement at all of the sites that communities may wish to nourish in a given year. During periods of low lake levels, more dredging is typically required. This increases that material available but decreases shoreward erosion. The opposite is true during periods of high lake levels. While the Chicago District anticipates sufficient material will be dredged from Waukegan Harbor in 2021 to implement this potential pilot project, there is no guarantee that this will be the case in future years, especially during the current period of elevated lake levels. Federal maintenance dredging is dependent upon need and funding on a year-to-year basis.

From an ecosystem perspective, there is a risk that habitat benefits will be short lived. While beach nourishment in this disturbed system is inherently impermanent, storms and increased lake levels could increase the rate of erosion, effectively undoing the habitat benefits gained by implementation of the pilot project. Better understanding this risk and the steps that communities can take to manage it would be valuable lessons-learned to come out of the pilot project.

Conversely, depending on the success of the improved habitat, local communities may experience new challenges as a result of implementing the pilot project, especially as it relates to co-managing these sites for recreation and improved habitat simultaneously.

Table 7: Summary of Major Risk Areas that Could Impact Federal Interest prior to implementation.

Risk Area	Likelihood	Consequence	Risk Level
Lake levels subside	Low	Low	Low
Insufficient dredged material for pilot project in Waukegan Harbor	Low	Medium	Low
Not enough material available for placement at all 6 beaches	Low	Low	Low
Material is washed away soon after placement	Medium	Low	Low
Presence of T&E species causes impacts on recreational operations and management	Medium	Low	Low

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4.5 Recommended Plan

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. Alternative 2a is not, however, a cost effective plan. Alternative 2b is the only action alternative that is cost effective and “best buy” plan. Therefore Alternative 2b is the plan that is 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, including protection and creation of aquatic ecosystem habitats, reducing storm damage, promoting public safety, stabilizing and enhancing shorelines, promoting recreation, and supporting risk management adaptation strategies. The Recommended Plan will provide valuable resting and stop over habitat for migratory shorebirds, including the piping plover (*Charadrius melodus*), which is federally-listed as endangered. The Recommended Plan is the NER 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).

4.5.1 Recommended Plan Description

The recommended plan includes placing dredged material from Waukegan Harbor at the six proposed placement sites (public beaches). The placement would involve direct on-beach placement of the material rather than placement in the nearshore zone for the purposes of ecosystem restoration and shoreline protection.

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 CY of dredged material is available following FY 2021 maintenance dredging of Waukegan Harbor, a summary of the 4 applications is as follows:

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 (Figure 7). Approximately 800 linear feet in total.

Foss Park District – 15,000 CY spread out in a single long continuous unit (Figure 8). 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 (Figure 9). Approximately 1400 linear feet in total.

Evanston – 15,000 CY spread out over three beaches in close proximity (Figure 10 through Figure 12). Approximately 2000 linear feet in total.

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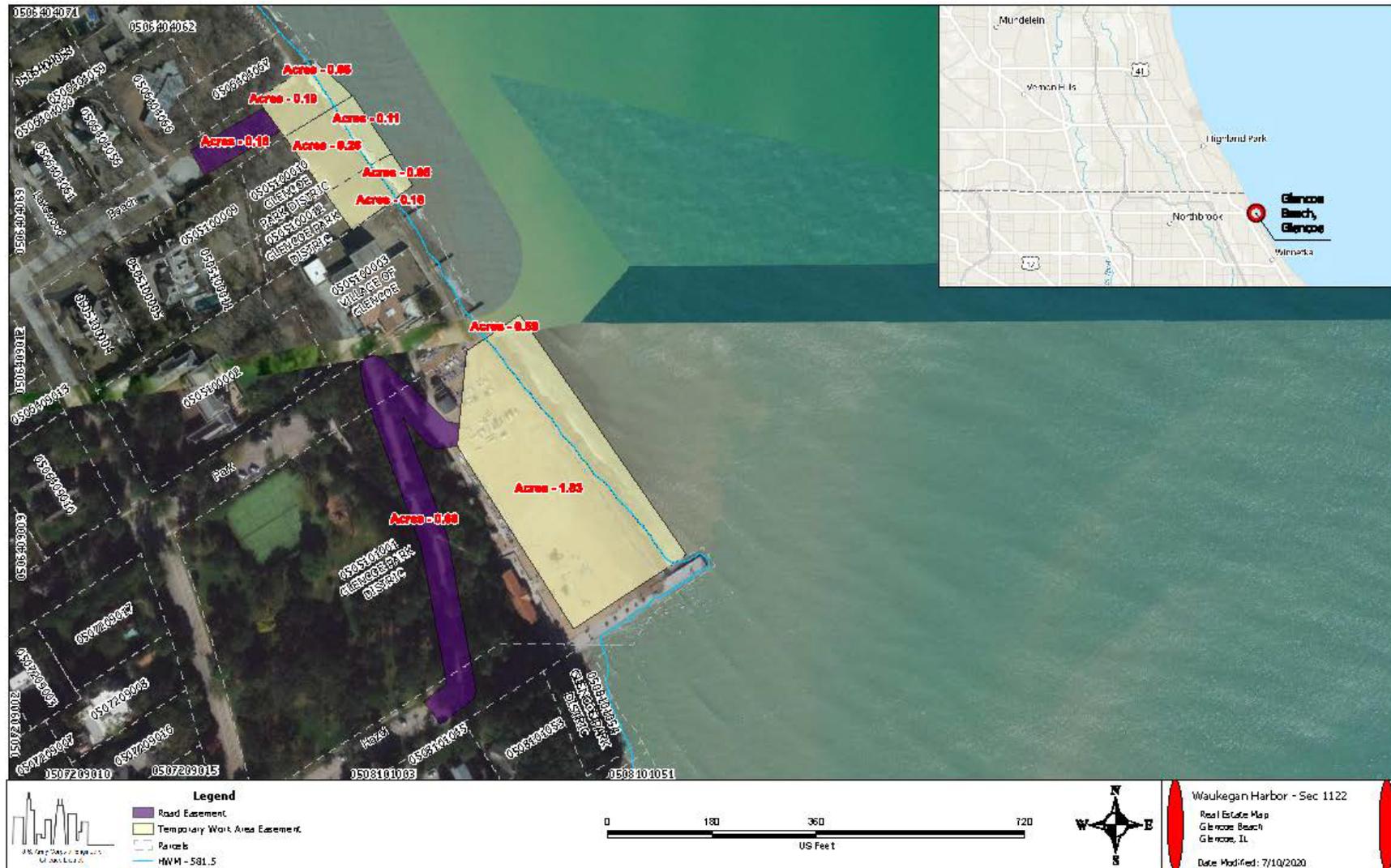


Figure 7: Placement areas at Glencoe Beach in Glencoe, IL.

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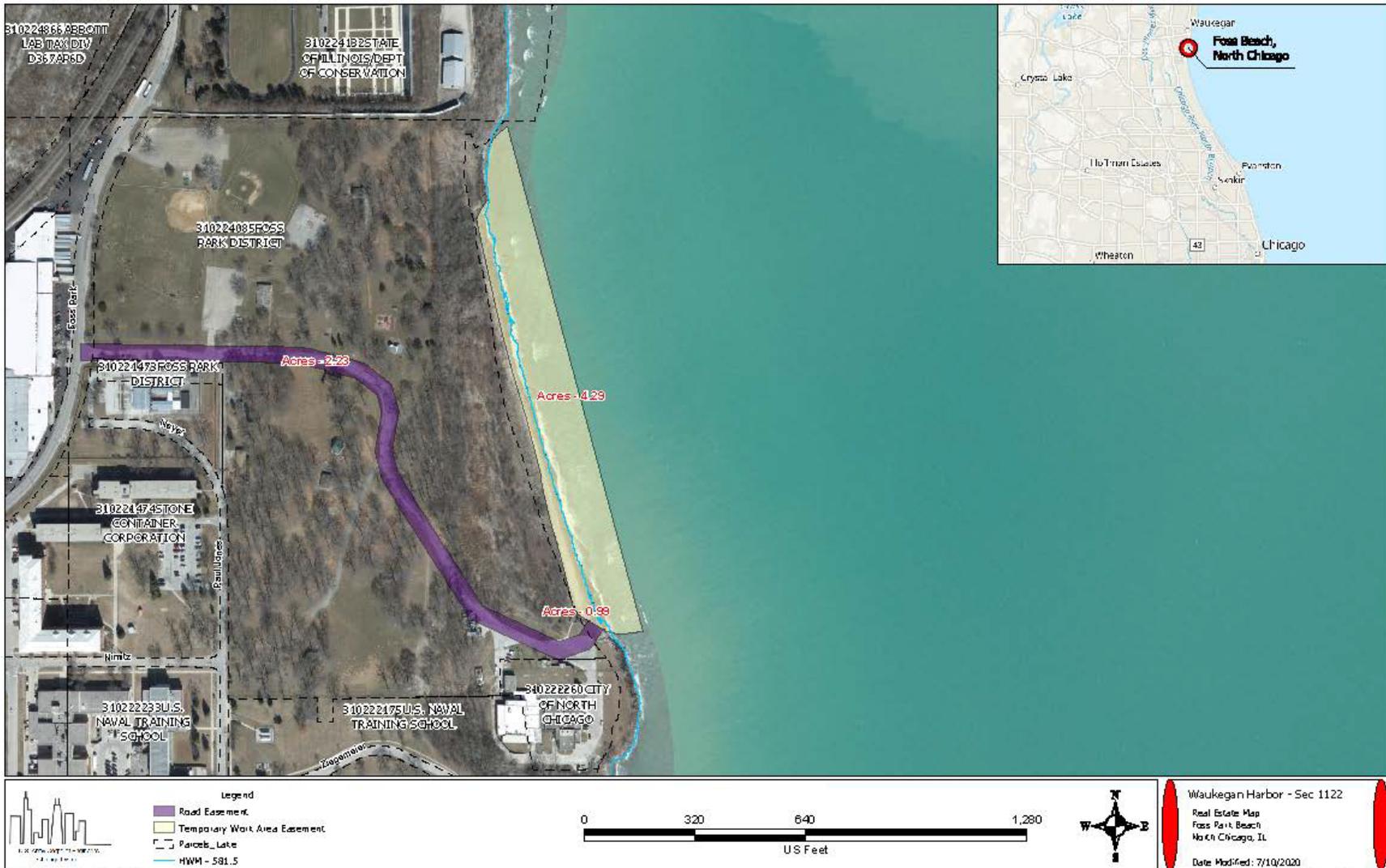


Figure 8: Placement areas at Foss Park Beach in North Chicago, IL.

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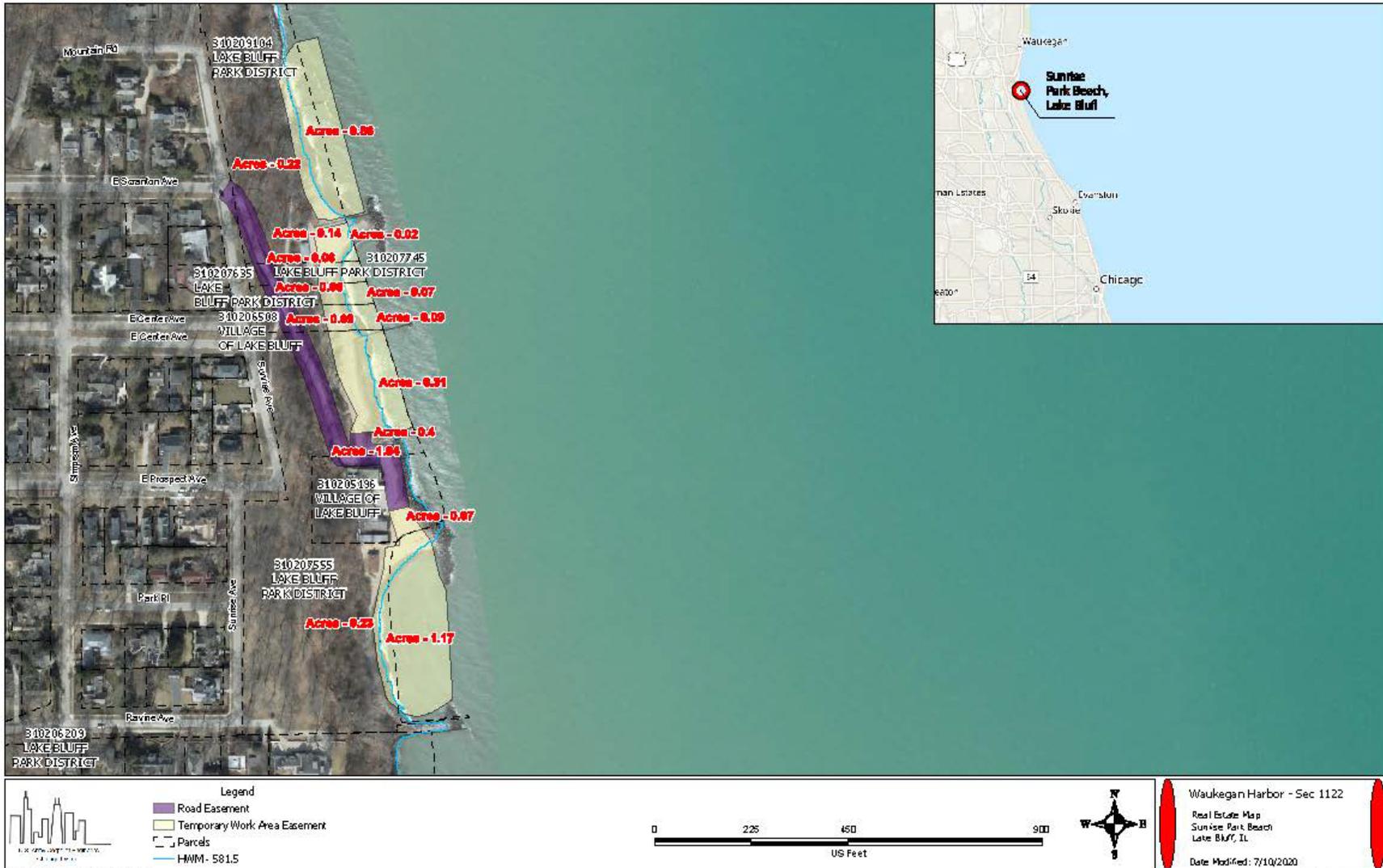


Figure 9: Placement areas at Sunset Park Beach in Lake Bluff, IL.

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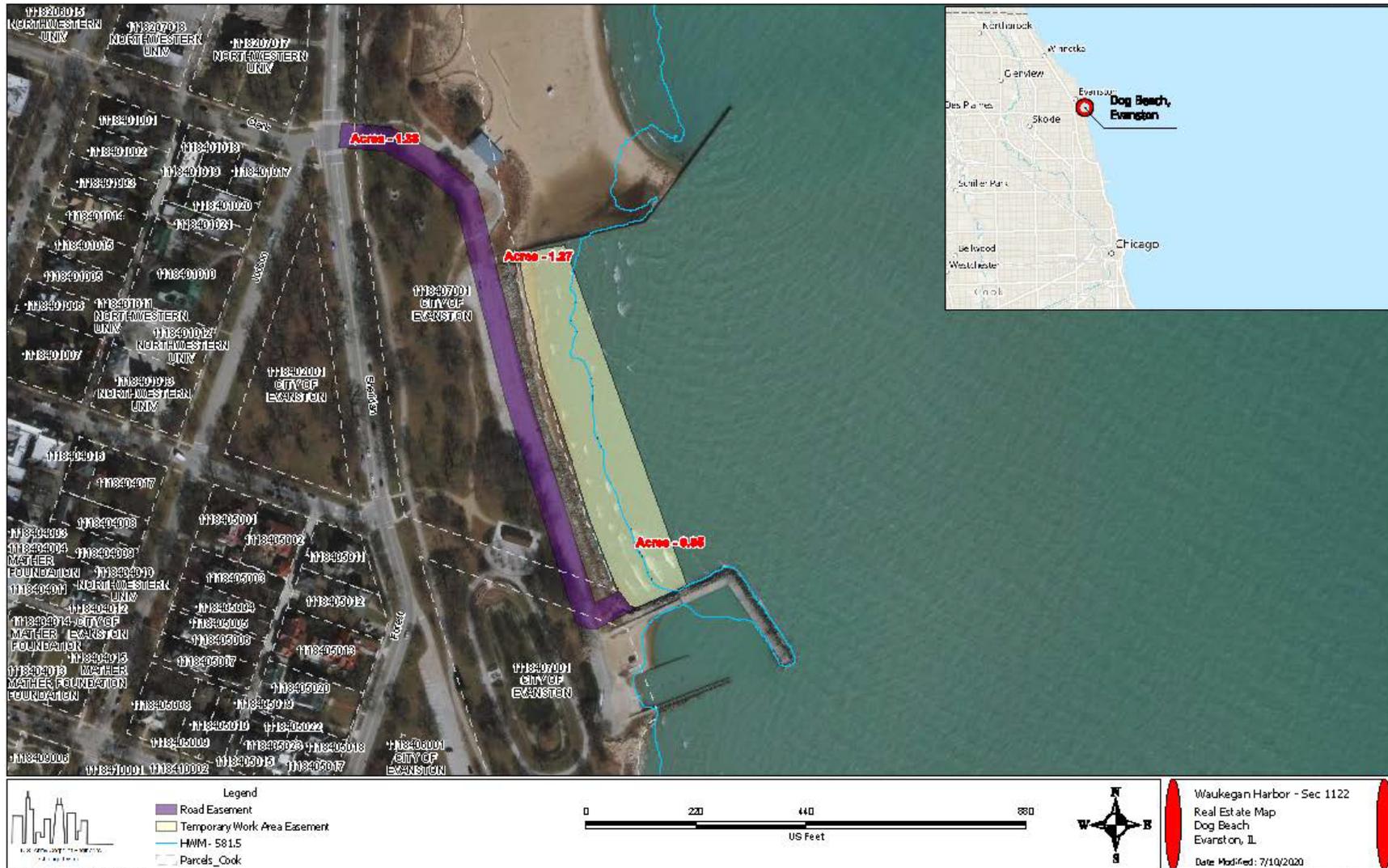


Figure 10: Placement areas at Dog Beach in Evanston, IL.

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Figure 11: Placement areas at Lee Street Beach in Evanston, IL.

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Figure 12: Placement areas at Greenwood Beach in Evanston, IL.

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4.5.2 Innovation under the Pilot Project Program

The Implementation Guidance for Section 1122 of WRDA 2016 states that special attention will be given to identifying projects that would serve purposes outside the scope of, or underrepresented in, the Section 204 Continuing Authorities Program (CAP) or that would demonstrate the feasibility and benefits of innovative uses of dredged material. The Recommended Plan described here achieves this directive.

On-beach placement of dredged material in itself is not an innovative use of dredged material. In addition to potential cost savings (depending on the dredging and placement locations), this common practice has been proven successful for providing shoreline protection, coastal storm damage reduction, ecosystem restoration, and recreation benefits. However, the Recommended Plan is innovative in that it serves as a proof-of-concept application for other communities to consider in the future and builds upon a concerted effort by local, state, and federal partners to develop a more holistic sand management toolbox for the Great Lakes, specifically the western shoreline of Lake Michigan, where beach nourishment is not as common as on the ocean coasts.

The Recommended Plan for this pilot project accomplishes a number of valuable objectives. First, it supports ongoing efforts by the Illinois Sand Management Working Group and the USACE Chicago District to assess the potential impacts to natural and cultural resources for a number of dredged material management techniques that are currently not employed at Waukegan Harbor. See the 2019 Waukegan Harbor Dredging EA and FONSI for more detail on this point. The analysis and findings from that effort lay the regulatory groundwork for potentially repeating the Recommended Plan in other locations in coastal Illinois (north of Chicago) in the future.

The Recommended Plan will result in the development of cost estimates above the Base Plan that other interested communities can use for planning future sand placements from Waukegan Harbor at their local beaches. This will help communities implement beach nourishment using material from Waukegan Harbor without having to enter into a CAP Section 204 Beneficial Use of Dredged Material Study with the USACE. While communities would not benefit from the cost sharing associated with CAP Section 204 in this scenario, it would allow them to implement more quickly, address a wider range of potential goals, and provide cost savings compared to trucking in a comparable volume of quarried sand from out of state. As such, the Recommended Plan demonstrates another “tool in the toolbox” as local, state, and federal partners continue to develop effective and efficient regional strategies for more sustainable coastal sand management in Illinois.

In addition to aiding future beneficial use of dredged material applications with the environmental and cost analyses described above, the Recommended Plan will also serve as a proof-of-concept on a more practical level. Implementation in these four different settings will allow the pilot communities to see what the final product looks like before they commit to investing in this sand management strategy in the future. Through post-implementation monitoring and continued participation in regional partnerships like the Illinois Sand Management Working Group, the lessons learned through this pilot project will be shared with other coastal communities that may be considering similar investments in on-beach placement in the future. In time, the blueprint created by the Illinois Sand Management Working Group and this pilot project may result in other Great Lakes Regions undergoing similar collaborative efforts to facilitate local, state, and federal cooperation in more sustainable shoreline management.

5.0 Environmental Effects of the Recommended Plan

The analysis of environmental effects of the Recommended Plan is presented in detail in the 2019 Waukegan Harbor EA & FONSI and is therefore included by reference in this document (see Appendix A for the complete referenced EA and FONSI). However, a high level summary of the findings and the cumulative impacts analysis from that effort are included in this chapter for increased accessibility for the reader's benefit.

A summary of the study's compliance with appropriate environmental statutes is included in Chapter 8.0.

5.1 Summary of Anticipated Effects of the Recommended Plan

Table 8: Summary of Potential Effects of the Recommended Plan.

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Air quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic resources/wetlands	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Invasive species	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fish and wildlife habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Threatened/Endangered species/critical habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Historic properties	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other cultural resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Floodplains	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hazardous, toxic & radioactive waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydrology	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Land use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Navigation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise levels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Socio-economics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental justice	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tribal trust resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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5.2 Cumulative Effects

Placement of sand at the proposed project areas is considered a beneficial action and is considered to be a localized benefit compared to the entire southern Lake Michigan littoral drift system. Generally, the impact of removing sand from one location within the littoral system and subsequently placing it back into the system at another location is negligible and the effects are short term when considering the quantities included in the proposed pilot project and the dynamic movement of littoral sands in the system. The physical and ecological/biological impacts associated with littoral drift processes on Illinois' north shore were stated over 100 years ago with the development and build-out of the southern Lake Michigan shoreline. The proposed sand placement will temporarily abate minor shoreline erosion and potentially result in a cumulative economic and social effect by reducing local costs for sand placement and allowing the funding to be utilized for other municipal/public resources. Implementation of any of the alternatives would not result in a significant cumulative environmental effect since the greater littoral drift system and naturally occurring wave action far outweigh any of the minor and short term effects resulting from implementation of the proposed pilot project.

Clean Air Act

The local air quality in Cook County and Lake County is considered 'non-attainment' under the Clean Air Act for ozone and lead. The project is within the non-attainment zone. Due to the small scale and short duration of this project, the main sources of emissions would be vehicle emissions and dust associated with the construction activities. The project does not include any stationary sources of air emissions and, therefore, a General Conformity Analysis was not completed. The temporary mobile source emissions from this proposed pilot project are *de minimis* in terms of the National Ambient Air Quality Standards and the State Implementation Plan. The project is not expected to be a significant source of Green House Gas emissions. All construction vehicles will comply with federal vehicle emission standards. USACE and its Contractors comply with all federal vehicle emissions requirements. USACE follows EM 385-1-1 for worker health and safety, and requires all construction activities to be completed in compliance with federal health and safety requirements.

5.3 Mitigation of Adverse Effects

No adverse impacts are anticipated as a result of implementing the proposed pilot project. As such, no mitigation is required for this project. Best management practices will be utilized by USACE and its contractor(s) to protect the environment during implementation.

6.0 Implementation Requirements

6.1 Project Partnership Agreement (PPA)

Upon approval of a final feasibility report for this Section 1122 Pilot Project, a Project Partnership Agreement (PPA) would be created. A PPA is a legally binding agreement between the Federal Government (in this case, the USACE) and a non-federal sponsor(s) for construction of a water resources project, in this case the proposed Public Beach Protection in Four Illinois Communities. The PPA would describe the project and the responsibilities of the USACE and the four non-federal partner communities in the cost sharing and execution of project work.

6.2 Federal Responsibilities

In order to implement the selected alternative under the Section 1122 Pilot Project Program, USACE would provide the federal share of project cost which includes 100% of the costs to transport and place the beneficial use material, as well as 65% of any additional project features above and beyond the initial transportation and placement. The total non-federal share would include 35% of any additional project features above and beyond the initial transportation and placement. The non-federal partners would also be responsible for annual operation and maintenance expenses.

The Recommended Plan is limited to transportation and placement of dredged material from Waukegan Harbor. As such, the federal share of project cost is currently estimated to be \$1,812,000, with a non-federal cost of \$0. The feasibility phase costs were borne 100% by the Federal Government and are not included in this estimated implementation cost. The USACE would also provide the following:

- Review and certification of Real Estate provisions.
- Development of Plans and Specifications for project implementation.
- Contracting for project construction.
- Supervision and Administration of project construction.

6.3 Non-Federal Responsibilities

The non-federal sponsors, as stated in a letter dated 19 July 2017 and reiterated in their formal pilot project proposal submitted on 12 March 2018, have expressed support for the project with the financial capability to execute a project partnership agreement, and have agreed to accept the role of non-federal sponsor in the event of approval of a final feasibility report. The non-federal sponsors have statutory authority under the Federal Water Resources Development Law of 1969 (G.S. 143- 215.38 et. seq.) to make binding commitments to carry out the non-federal responsibilities related to USACE projects, including making cash contributions to projects.

Prior to initiation of the design phase, the Federal Government and the non-federal sponsors will execute a Project Partnership Agreement (PPA). The non-federal sponsors shall, prior to implementation, agree to perform the following items of local cooperation:

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- Provide 35 percent of the separable project costs (those above and beyond transportation and placement of dredged material) allocated to environmental restoration as further specified below:
 - Provide the non-federal share of all complete planning and design work upon execution of the PPA
 - Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or ensure the performance of all relocations determined by the government to be necessary for the construction and O&M of the project
 - Provide or pay to the government the cost of providing all features required for the construction of the project
 - Provide, during construction, any additional costs as necessary to make its total contribution equal to 35 percent of the separable project costs allocated to environmental restoration above and beyond the cost of transportation and placement of dredged material.
- For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project or the functional portion of the project at no cost to the government in accordance with applicable federal and state laws and any specific directions prescribed by the government
- Give the government a right to enter, at reasonable times and in a reasonable manner, upon land that the local sponsor owns or controls for access to the project for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project
- Assume responsibility for operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project or completed functional portions of the project, including mitigation features, without cost to the government in a manner compatible with the project's authorized purpose and in accordance with applicable federal and state laws and specific directions prescribed by the government in the OMRR&R manual and any subsequent amendments thereto
- Comply with Section 221 of Public Law (P.L.) 91-611, Flood Control Act of 1970, as amended, and Section 103 of the WRDA of 1986, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resource project or separable element thereof until the nonfederal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element
- Hold and save the United States free from damages due to construction of or subsequent maintenance of the project except those damages due to the fault or negligence of the United States or its contractors
- Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs
- Perform or cause to be performed such investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances

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regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S. Code 9601 through 9675, that may exist in, on, or under lands, easements, or rights-of-way necessary for the construction, and O&M of the project, except that the nonfederal sponsor shall not perform investigations of lands, easements, or rights-of-way that the government determines to be subject to navigation servitude without prior written direction by the government

- Assume complete financial responsibility for all necessary cleanup and response costs for CERCLA regulated material located in, on, or under lands, easements, or rights-of-way that the government determines necessary for the construction and O&M of the project
- To the maximum extent practicable, conduct OMRR&R of the project in a manner that will not cause liability to arise under CERCLA
- Prevent future encroachment or modifications that might interfere with proper functioning of the project
- Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, P.L. 91-646, as amended in Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987, P.L. 100-17, and the uniform regulation contained in Part 24 of Title 49, Code of Federal Regulations (CFR), in acquiring lands, easements, and rights-of-way for construction and subsequent O&M of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said acts
- Comply with all applicable federal and state laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964, P.L. 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 CFR, Part 300, as well as Army Regulation 600-7 entitled “Non-Discrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army”
- Provide 35 percent of that portion of the total cultural resource preservation, mitigation, and data recovery costs attributable to environmental restoration that are in excess of 1 percent of the total amount authorized to be appropriated for environmental restoration
- Do not use federal funds to meet the nonfederal sponsor’s share of total project costs unless the Federal agency providing the funds verifies in writing that the funds are authorized to be used for the Project

6.4 Lands, easements, Rights-of-Way, Relocations, and Disposals

The Real Estate Plan for the proposed pilot project is included as Appendix F, which was subjected to review through District Quality Control and Agency Technical Review. The non-federal partners own all upland placement areas in fee. Placement below the ordinary high water mark is assumed to fall under the USACE’s Navigation Servitude and is being conducted in close coordination with the IDNR Coastal Management Program. Since the Recommended Plan as currently described is expected to be implemented at 100% federal cost, the non-federal partners would not be able to seek LERRD crediting for the value of the real estate required to implement the Recommended Plan.

6.5 Operation, Maintenance, Repair, Replacement, and Rehabilitation

Once the project has been constructed and turned over, operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) shall be the primary responsibility of the local sponsor.

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In accordance with the Selected Plan, implementation of the pilot project is anticipated to coincide with regular maintenance dredging of Waukegan Harbor in 2021, pending need and funding. Periodic additional sand placement will be the sole responsibility of the non-federal partners. However, it is hoped that implementation of the pilot project will provide a proof-of-concept operation that these and other northern Illinois communities may choose to replicate in the future to reduce the cost and traffic-related impacts of continuing to truck in beach sand.

7.0 Public Involvement

The 2019 EA and FONSI was completed in an open and transparent process that included opportunity for public input. A draft of the EA was released on 28 June 2019. Subsequently, on 18 July 2019 the review period was extended to last until 20 August 2019. At this point, the PDT reviewed and addressed all comments received, as appropriate. Responses to relevant comments received during this time were incorporated directly into the final EA and/or included in a frequently-asked-questions document. Documentation of coordination related to this effort is included in the appendices to the 2019 EA and is publically available on the Chicago District's webpage for Waukegan Harbor dredging.

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

Separately, members of the PDT participated in a public forum on coastal erosion that was hosted by State Representative Robyn Gabel (IL-18) on 10 July 2019, gave a presentation on the proposed pilot project, and entertained questions from the public in attendance. Additionally, the PDT has strived to develop and make publically available materials that address common questions about the pilot project. The webpage above contains a Fact Sheet and frequently asked questions (FAQs) to address the common comments that USACE received during development of the 2019 EA and during the feasibility study process for a beneficial use of dredged material pilot project under Section 1122 of WRDA 2016.

USACE is also releasing a draft of the feasibility study for an additional round of public review prior to finalization of the feasibility report. During this time, the PDT will work with the non-federal partners to implement an appropriate public involvement strategy that is responsive to the needs and/or concerns of each partner community.

7.1 Public Views and Comments

There appears to be broad public support for public beach restoration for its recreation, shoreline protection, and habitat benefits.

7.1.1 Areas of Known or Expected Controversy

To date, public concern that persists is primarily related to HTRW and Waukegan Harbor's history as a Superfund site.

Waukegan Harbor has a history of industrial pollution that resulted in it being listed as a Superfund site in 1981 by USEPA and independently named as one of 43 Areas of Concern on the Great Lakes by the International Joint Commission, USEPA and IEPA. The Outboard Marine Corporation (OMC) site was on the western shore of Lake Michigan and was formerly used from 1948 – 2000 as a boat motor manufacturing plant. The site's various parcels historically included a wood-treating plant (railroad ties), a coal gasification plant and a coke oven gas plant facility. During OMC operations, the site was a source of contamination entering the harbor, specifically PCBs and trichloroethene (TCE). Cleanup activities, primarily dredging the PCB-contaminated sediment and removal of contaminated upland soils, began in the early 1990s at the approximately 100-acre site. The cleanup had progressed to the point that in 2014 the dredging equipment was removed from the site and the upland confinement facility was capped. A full timeline of activities is listed on the US EPA website and as of 2019 the sources of contamination have been addressed and remediated. The state of Illinois continues to monitor PCB levels in fish tissue annually (USEPA 2019). During the Superfund remediation process, the outer harbor, approach channel, and advance maintenance area were tested for PCBs and were determined not to be present. The test

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results showed that the PCB contamination within the inner harbor had not moved out of the inner harbor (USACE 2017). Although the USEPA has removed the PCB contaminated sediment, the Chicago District has no plans to dredge the inner harbor at this time.

USACE sampling of the Waukegan Harbor sediments it proposes to dredge indicates no detectable levels of PCBs. The reason for this is largely that the source of the dredged material is sand being transported along the Lake Michigan shoreline rather than coming from the inner harbor. However, USACE is aware that a portion of the surrounding population remains concerned over the possibility of contamination being entrained in dredged material from its operation and maintenance of the federal navigation channel in the outer harbor, approach channel, and advanced maintenance area.

Additionally historic asbestos contamination near the site is another cause of lingering concern among a portion of the surrounding population. The Johns-Manville site is a 150-acre asbestos disposal area in Waukegan, Illinois. About 3 million cubic yards of product and wastewater sludge were disposed of at the site. Johns-Manville ceased operations at the site in the summer of 1998. EPA's cleanup of this site consisted of consolidating waste into the Industrial Canal, Pumping Lagoon, and Black Ditch areas and placing clean soil with vegetation over the waste disposal areas; placing sand and gravel on all site roadways; institutional controls; and periodic sampling of air, soil cover and groundwater to ensure the cleanup continues to protect people and the environment. (USEPA 2019).

The Illinois Department of Public Health (IDPH) in 2000 published a Public Health assessment of Illinois Beach State Park (IBSP) and concluded there were no public health hazards present (IL Department of Health 2000). IBSP is north of the Waukegan Harbor and the sand that erodes from there migrates southward along the coastline before shoaling within the approach channel of the Waukegan Harbor. At the request of the Illinois Attorney General, the Center for Excellence in Environmental Health at the University of Illinois at Chicago (UIC) School of Public Health evaluated the levels of asbestos at IBSP in 2005. They determined that the sand did contain statistically elevated levels of asbestos as compared to the background beach levels. However the levels of asbestos were below the risk level established by the USEPA. The U.S. Department of Health and Human Services' Agency for Toxic Substances and Disease Registry (ATSDR) in 2007 also conducted a study of the area to test for asbestos. The level of asbestos released into the air due to various activities was evaluated in the ATSDR study. The study showed no significantly elevated levels of asbestos that would pose a human health risk being present due to these activities. It was also hypothesized that the asbestos that was detected likely does not come from debris washing up on shore (ATSDR 2007).

The Chicago District also conducted testing in areas around Waukegan Harbor. The Advanced Maintenance Area and Approach Channel were tested between 1997 and 2012 for asbestos and it was determined that there were no detectable levels of asbestos in the dredged material at that time (USACE 2013). The 2005 UIC study also included an analysis of asbestos at Waukegan Approach Channel and asbestos was not found to present a human health risk. Testing of the Outer Harbor by the Chicago District in 2006 reached similar conclusions.

Although the Chicago District is aware that there is some concern from members of the public related to the potential for contamination in dredged material from Waukegan Harbor, sampling conducted by USACE, as well as other independent parties, has repeatedly found no contaminants of concern (including PCBs). Multiple independent studies have concluded that there is about a one-in-a-million risk in asbestos exposure. These results support the conclusion that sand dredged from Waukegan

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Harbor is not a risk to human health. The Chicago District will continue to sample in accordance with its permits and the Great Lakes Testing Manual and make sampling results available to the public.

7.2 Stakeholder and Agency Coordination

Federal, State, and local stakeholders were coordinated with during the development of the 2019 Environmental Assessment for Waukegan Harbor Maintenance Dredging and Placement. Documentation of this coordination is included in the appendices to the 2019 EA and are publically available on the Chicago District's webpage for Waukegan Harbor dredging.

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

8.0 Compliance with Applicable Laws and Regulations

The proposed placement of sand at the 6 project sites will be implemented in compliance with appropriate statutes, executive orders, memoranda and USACE regulations including the Natural Historic Preservation Act of 1966; the Endangered Species Act of 1973; the Fish and Wildlife Coordination Act; Executive Order (EO) 12898 (environmental justice); EO 11990 (protection of wetlands); EO 11988 (floodplain management); and the Rivers and Harbors Act of 1899.

The proposed pilot project is in compliance with the Clean Air Act; the Clean Water Act, and the National Environmental Policy Act of 1969. There are no adverse environmental effects identified which cannot be avoided should the proposal be implemented [40 C.F.R. 1502.16; NEPA Section 102(2)(C)(ii)]. The proposed work does not have local and short-term effects to uses of the environment or Lake Michigan’s coastal zone [40 C.F.R. 1502.16; NEPA Section 102(2)(C)(iv)]. There have been no irreversible and irretrievable commitments of resources identified resulting from the proposed action should it be implemented [40 C.F.R. 1502.16; NEPA Section 102(2)(C)(v)].

Table 9: Status of compliance with applicable statutes

Reference	Environmental Statutes/Regulations	Project Compliance ^a
Federal		
42 U.S.C. 7401	Clean Air Act of 1970, as amended	C
33 U.S.C. 1251, et seq.	Clean Water Act of 1977, as amended	C
42 U.S.C. 9601	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980	N/A
16 U.S.C. 1531, et seq.	Federal Endangered Species Act of 1973, as amended	C
EO 11990	Protection of Wetlands	N/A
EO 11988	Floodplain Management	N/A
EO 12898	Federal Actions to Address Environmental Justice in Minority and Low-Income Populations	C
EO 13045	Protection of Children from Environmental Health Risks and Safety Risks	C
EO 13112	Invasive Species	C
16 U.S.C. 661	Fish and Wildlife Coordination Act, as amended	C
16 U.S.C. 1801, et seq.	Magnuson-Stevens Fish Conservation and Management Act	N/A
16 U.S.C. 1271, et seq.	Wild and Scenic Rivers Act of 1968	N/A
7 U.S.C. 4201, et seq.	Farmland Protection Act of 1981	N/A
16 U.S.C. 668, et seq.	Bald Eagle and Golden Eagle Protection Act	C
16 U.S.C. 703, et seq.	Migratory Bird Treaty Act of 1918, as amended	C
54 U.S.C. 300101, et seq.	National Historic Preservation Act, as amended	C
42 U.S.C. 4901, et seq.	Noise Control Act	C
42 U.S.C. 6901, et seq.	Resource Conservation and Recovery Act of 1976, as amended	C
16 U.S.C. ch. 33 § 1451, et seq.	Coastal Zone Management Act of 1972	P

^[a] N/A = not applicable, C = Compliance, P = Pending, and NC = Non-Compliant

9.0 Recommendation

The District recommends Division concurrence with the Recommended Plan for on-beach placement of dredged material from Waukegan Harbor via hydraulic offloading at Glencoe Beach in Glencoe, IL; Foss Park in North Chicago, IL; Sunset Park Beach in Lake Bluff, IL; and Dog, Lee Street, and Greenwood Beaches in Evanston, IL. The Recommended Plan is the National Ecosystem Restoration (NER) Plan.

Implementation of the Recommended Plan will meet multiple objectives of the Section 1122 of WRDA 2016 Beneficial Use of Dredged Material Pilot Project Program, including protection and creation of aquatic ecosystem habitats, reducing storm damage, promoting public safety, stabilizing and enhancing shorelines, promoting recreation, and supporting risk management adaptation strategies. The Recommended Plan will provide valuable resting and stop over habitat for migratory shorebirds, including the piping plover (*Charadrius melodus*), which is federally-listed as endangered. The Recommended Plan is the NER 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). The Recommended Plan falls within the authority of Section 1122 of WRDA 2016. The non-federal sponsors, Glencoe Park District, Foss Park District, Lake Bluff Park District, and the City of Evanston, support the implementation of the Recommended Plan and have demonstrated intent and capability to execute a PPA to design, build, operate, and maintain the project.

Aaron W. Reisinger
Colonel, U.S. Army
District Commander

10.0 References

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11.0 Acronyms and Abbreviations

AOC	Area of Concern
ATSDR	Agency for Toxic Substances and Disease Registry
CAP	Continuing Authorities Program
CE/ICA	Cost Effectiveness / Incremental Cost Analysis
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
FID	Federal Interest Determination
FONSI	Finding of No Significant Impact
FWOP	Future without Project
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HSI	Habitat Suitability Index
IBSP	Illinois Beach State Park
IDNR	Illinois Department of Natural Resources
NEPA	National Environmental Policy Act
NER Plan	National Ecosystem Restoration Plan
NHPA	National Historic Preservation Act
O&M	Operations and maintenance
OMRR&R	Operation, maintenance, repair, replacement, and rehabilitation
PDT	Project Delivery Team
PPA	Project Partnership Agreement
TCE	Trichloroethene
U.S.C.	U.S. Code
UIC	University of Illinois at Chicago
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
WRDA	Water Resources Development Act