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**Chicago Area Waterway Systems (CAWS)**  
**Dredged Material Management Plan (DMMP)**  
**and**  
**Integrated Environmental Impact Statement (EIS)**



**April 2019**



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## **Executive Summary**

### **DRAFT**

# **Chicago Area Waterway Systems (CAWS) Dredged Material Management Plan (DMMP) and Integrated Environmental Impact Statement (EIS)**

This Draft Chicago Area Waterway System (CAWS) Dredged Material Management Plan (DMMP) and integrated Environmental Impact Statement documents the analyses completed to identify and evaluate alternatives for dredged material management for the CAWS. There are six navigation projects in the CAWS: Calumet Harbor and River; the Calumet-Saganashkee (Cal-Sag) Channel; Chicago Harbor; Chicago River; the South Branch of the Chicago River; and the Chicago Sanitary and Ship Canal. The alternatives were sized based upon the anticipated volume of dredged material generated in the operation and maintenance of federal navigation channels over a 20-year period of analysis. Based upon the analysis of sediment volume and quality, it was determined that additional disposal capacity was required to contain material from the Calumet River and Cal-Sag Channel. Dozens of alternatives were considered and screened out and six final alternatives were fully developed and analyzed in detail. Vertical Expansion of the existing Chicago Area CDF was identified as the Tentatively Selected Plan (TSP).

This DMMP was developed under the authorities of the existing navigation projects requiring maintenance dredging in the study area, and the study process is guided by several sections of U.S. Code (U.S.C.) and the Code of Federal Regulations (C.F.R.) pertaining to the management and placement of dredged material. This study was developed in partnership with two non-federal sponsors who agree to provide real estate and share in the cost of implementing the TSP: the City of Chicago and the Chicago Park District. This DMMP builds upon the analysis that was completed for the Draft Chicago Area Waterways, Dredged Material Management Plan and Integrated Environmental Assessment (Draft CAWS DMMP) released for public comment in June 2015.

Maintaining safe navigation throughout the CAWS is an important part of sustaining the economic viability of the region. Continued maintenance of these waterways allows barges and vessels to move commodities and other goods through the channels efficiently. When navigable depths are reduced, barges and vessels may need to light-load and increase the number of trips in order to move the same amount of cargo, thereby leading to higher transportation costs. Therefore, maintaining the federally-authorized depths of the channels creates transportation cost savings by supporting the efficient transportation of goods, allowing shippers to use maximum depths, and using fewer resources.

Navigation in the CAWS is maintained by periodic dredging of the channels to congressionally-authorized depths. Dredging is required because of sedimentation and the formation of shoals which affect navigation safety and efficiency in the CAWS. Since 1984, maintenance dredging associated with

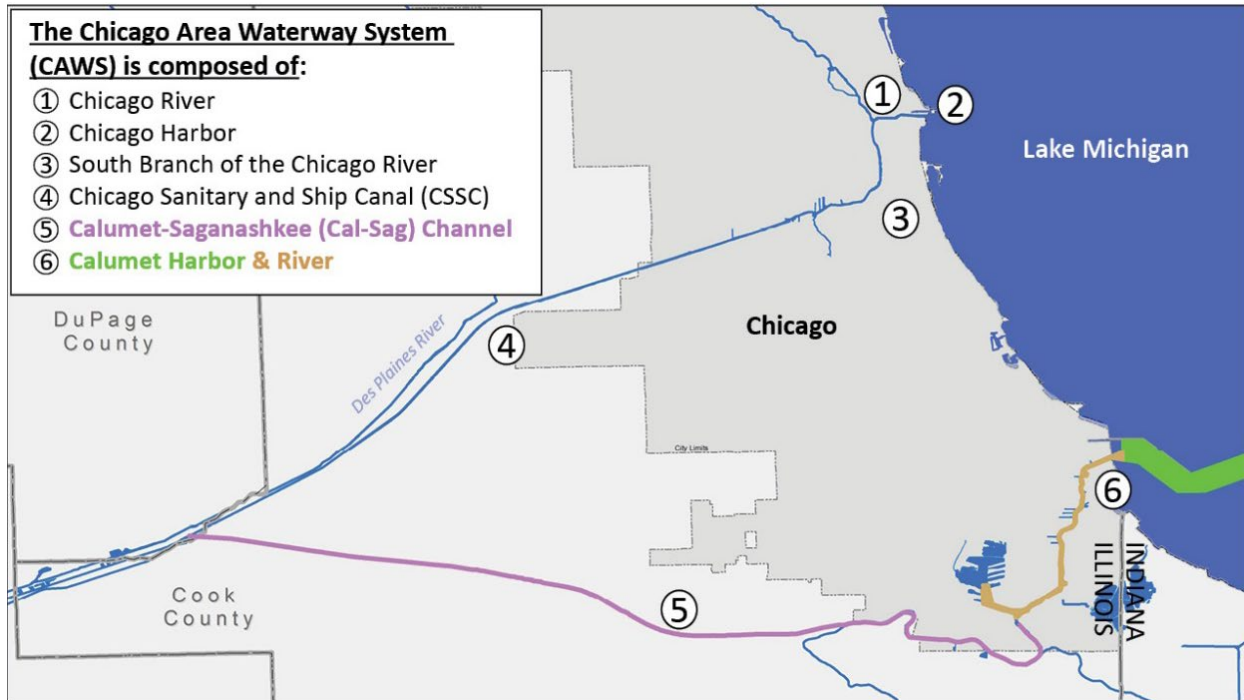
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these projects has been made possible by the operation of the Chicago Area confined disposal facility (CDF), where dredged material can be safely confined. The Chicago Area CDF was built out into Lake Michigan at the mouth of the Calumet River in 1984, with the Illinois International Port District (IIPD) Iroquois Landing site as its western boundary and the Illinois-Indiana state boundary as its eastern boundary. The site is currently accessed through the IIPD property, but is owned by the Chicago Park District. In the years since the CDF was constructed, it has been filled with dredged material and is now at the same grade as the lakeshore. This facility will reach full capacity in 2022 and will no longer be able to receive dredged material.

Only Calumet Harbor and River and the Cal-Sag Channel are anticipated to require dredging over the 20-year study period. An estimated 1,030,000 cubic yards (cy) of sediment is anticipated to be dredged from these two projects over this time, with the vast majority (97%) coming from Calumet Harbor and River. Anticipated minor dredging needs have been identified on the Cal-Sag Channel at some point during the study period, but no specific plans exist to dredge this waterway currently. Based upon this analysis of dredging needs, analyses in this Integrated DMMP are focused on the Calumet Harbor and River and the Cal-Sag Channel.



The CAWS is made up of six federal navigation projects. The three waterways depicted in color are those projects that have an anticipated maintenance dredging need over the next 20 years.

Federal law and U.S. Army Corps of Engineers (USACE) policy require that a Base Plan for managing dredged material be identified, addressing placement needs for at least 20 years. The Base Plan is the least-cost dredged material disposal alternative that is consistent with sound engineering practices and meets all federal environmental standards, including Section 404 of the Clean Water Act (CWA) of 1972. Due to elevated levels of contamination in material dredged from Calumet River and the Cal-Sag Channel, this material cannot be placed in open water or unconfined upland locations. Over the 20-year project life, Calumet River is projected to generate 500,000 cubic yards of dredged material and the Cal-

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Sag Channel to generate 30,000 cubic yards of dredged material. The Calumet Harbor is also projected to generate 500,000 cubic yards of dredged material but this material can be used beneficially in certain upland applications.

Federal navigation projects are evaluated based upon their contribution to the national economy. National Economic Development (NED) benefits represent the avoided increases in transportation costs due to continued channel maintenance. Typically, commercial navigation benefits are based upon the cost savings between water borne commerce and rail/truck transport for those commodities. On average, the deep draft tonnage transiting Calumet Harbor and River between 2019 and 2045 is estimated to be 5.7 million tons per year. Tonnage transiting the shallow draft Cal-Sag Channel during the same 20-year period is estimated to be 5.1 million tons per year, on average. Continued maintenance of Calumet Harbor and River and the Cal-Sag Channel is estimated to provide \$10,900,000 (FY 2019 price level) in average annual NED benefits, with \$7,081,000 attributed to Calumet Harbor and River and \$3,819,000 attributed to Cal-Sag Channel. These benefits are estimated using a 20-year project evaluation period, a base year of 2026, the FY19 Federal discount rate (FDR) of 2.875%, and FY19 price levels.

### Plan Formulation Strategy

A DMMP is a long term planning tool to manage at least 20 years of maintenance dredging. The basis for the analysis is a forecast of the quantity, quality, and location of material that is expected to be dredged over this period. For Calumet Harbor and River, these quantities were developed using Chicago District dredging records dating back to 1984. For the Cal-Sag Channel, an estimate of 30,000 cy of dredged material was based on historical maintenance required in this waterway by the U.S. Army Corps of Engineers Rock Island District.

The quality of the sediment determines the potential appropriate uses and handling requirements. The Federal Standard as defined in 33 C.F.R. § 335.7 requires the disposal alternative that represents the least-cost alternative that is consistent with sound engineering practices and meets the environmental standards established by the CWA Section 404(b)(1). Dredged material disposal alternatives typically include open-water placement, in-water or shoreline beneficial uses (such as near-shore beach nourishment or environmental restoration), and upland beneficial uses (such as fill for athletic fields, parks, and other recreational areas, landscaping, road construction, structural fill, cover for brownfields, landfill cover, etc.). For dredged material that is not suitable for any of these disposal alternatives, other management measures are available, including confined disposal.

A list of potential disposal alternatives (management measures) was assessed for handling the dredged material from the CAWS. These measures included options for altering dredging operations, beneficial use of uncontaminated dredged material, and safe handling of contaminated material. The Base Plan for the DMMP was developed by matching the forecasted dredging needs and sediment quality/composition with the best possible management measures. None of the dredged material is currently suitable for open water placement or in-water beneficial use. The quality and composition of sediment from Calumet Harbor will allow for its beneficial use in upland, unconfined applications. Sediment from the Calumet River and the Cal-Sag Channel requires continued confined disposal.

After consideration of a preliminary analysis of technical feasibility, cost, and environmental acceptability, a final array of management measures was identified. More detailed design and cost

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estimates were developed for the management measures in the final array of alternatives. The final array includes the following measures:

### **Open Water Placement**

The sediment anticipated to be dredged over the next 20 years is not been suitable for open water placement currently. However, dredged material from Calumet Harbor is close to being suitable, and its quality is expected to continue to improve over time. Since open water placement is expected to be the least-cost method of managing dredged material, it will be retained, pending possible future demonstration of suitable quality during the 20 year period of analysis.

### **Beneficial Use**

Beneficial use measures must be technically and economically feasible, have public support, and address legal and regulatory issues. Implementation will require an evaluation of various end uses to determine whether the sediment meets criteria established to protect human health and the environment. Beneficially using the sediment from the harbor is retained in this analysis because it meets the necessary quality and composition requirements.

### **Reducing Dredging Requirements**

The USACE Chicago District is already practicing reduced dredging requirements in the CAWS and will continue to only dredge material when it is necessary to maintain the federal navigation channels to their respective authorized depths. Therefore, this management measure is incorporated in all study alternatives.

### **Reducing Dimensions and Minimized Dredging**

Reduced dimensions are already maintained at both Calumet Harbor and River and the Cal-Sag Channel—only minimum safe channel widths are maintained at Calumet Harbor and River. The Cal-Sag Channel has been allowed to accumulate sediment, reducing the effective width of the channel.

### **Source Reduction**

Measures such as upland best management practices that address sediment sources can improve the financial and environmental sustainability of the navigation. The USACE Chicago District has been working with the Engineer Research and Development Center (ERDC) in Vicksburg, MS to investigate potential principal sources of sediment and associated contamination deposited in the Calumet River (Perkey, Chappell, and Seiter 2017). Based on the results of their preliminary investigation, it appears the sediment sources are primarily stormwater and combined overflow sewer outfalls, channel outlets (particularly the channel outlet known as Pullman Creek), non-point sources and overland flow.

### **Private Management (Landfill)**

This measure is potentially viable for small-scale applications. However, due to the increased cost of pursuing private management at the scale of this study and the lack of assured capacity, it was not retained for inclusion in the study alternatives.



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### Sediment Treatment

Use of sediment remediation technologies depends on whether the processes would provide a lower cost placement alternative. Preliminary cost estimates for these technologies were compared to estimated CDF costs and it was determined that these measures would be significantly more costly to implement. Based upon these findings, and combined with environmental concerns, a lack of demonstrated success at the required scale, and the remaining need to dispose byproducts of processes, these sediment treatment measures were not retained for inclusion in the study alternatives.

### Confined Disposal

Confined disposal has been successfully used to contain material dredged from numerous federal harbors and waterways. The Chicago Area CDF has been in safe operation for more than 30 years and it has provided a cost-effective means for managing contaminated dredged material from Calumet Harbor and River and Chicago Harbor. For sediment with contaminant concentrations that have the potential to adversely impact human health or the environment, confined disposal continues to be an appropriate and effective management strategy, so it was retained in all study alternatives.

#### Summarized screening of management measures

Management Measure	Retained? (Y/N)	Justification for Screening	Quality
Reducing Dredging Requirements	N	Currently practicing; Assumed to continue	All
Reducing Dimensions and Minimized Dredging	N	Currently practicing; Assumed to continue	
Source Reduction	Y	Pending, based on Perkey et al. study (2017)	
Open Water Placement	Y	-	Clean
Beneficial Use	Y	-	Suitable for Beneficial Use
Private Management (landfill)	N	Cost; Scale; No guarantee of capacity	Contaminated
Treatment/Remediation	N	Cost; Effectiveness; Environmental concerns	
Confined Disposal	Y	-	

As the table above shows, confined disposal is the only viable management measure for contaminated sediment based on a comparison of effectiveness, scale, environmental concerns, and costs of other potential management measures.

## Identification of the Base Plan:

The Base Plan is very similar to the Federal Standard, but includes more site specific considerations. The Federal Standard first identifies whether the material is suitable for open water placement, suitable for beneficial use, or not suitable for either. Then, a Base Plan is developed that would include information such as: where open water placement would occur; what beneficial uses are covered and where; what management measure(s) will be used for material that is not suitable for open water placement or beneficial use and where will it be implemented.

- **Identify the Need.** The Chicago District anticipates that regularly occurring maintenance dredging will be required in Calumet Harbor and River and that a possible minor dredging event in the Cal-Sag Channel may be required during the next 20 years. The current Chicago Area CDF is estimated to reach capacity after FY22.

Dredging at Calumet Harbor and River would occur regularly through FY45 (the 20 year period of analysis with year one being FY26); dredging in the Cal-Sag Channel would occur much more intermittently, as necessary, over this same period of time.

- **Identify the Quantities of Dredged Material.** Based on average dredging quantities since the opening of the existing Chicago Area CDF, approximately 50,000 cubic yards of material, on average, is anticipated to be dredged annually, split evenly between the Calumet Harbor and the Calumet River. It is estimated that if a dredging event is required to address shoaling in the Cal-Sag Channel, approximately 30,000 cubic yards of material would require dredging.
  - a. **Calumet Harbor:** 20 years x (50,000/2) cubic yards per year = **500,000 cubic yards**
  - b. **Calumet River:** 20 years x (50,000/2) cubic yards per year = **500,000 cubic yards**
  - c. **Cal-Sag Channel:** 1 years x 30,000 cubic yards = **30,000 cubic yards**
  - d. **TOTAL:** **1,030,000 cubic yards** dredged from the CAWS over 20 years
- **Identify the Sediment Quality.** Federal Standard Determination for the waterways
  - a. **Suitable for open-water placement:** N/A based on most recent testing
  - b. Suitable for certain unconfined upland beneficial uses: Calumet Harbor
  - c. **Not Suitable for beneficial use:** Calumet River; Cal-Sag Channel
- Suitable material will be beneficially used first as part of the federal project to reduce overall project costs in the Base Plan before being used for other purposes.
- **Identify Suitable Management Measures.** The waterways were matched with the appropriate least-cost, environmentally acceptable, and technically feasible management measures based on sediment quality and the Federal Standard Determination:
  - a. **Calumet Harbor:** Beneficial use in certain unconfined upland applications.
  - b. **Calumet River & Cal-Sag Channel:** Confined in a dredged material disposal facility (DMDF).



### Formulation of Alternatives:

**Design Development.** The same conceptual design of the Dredged Material Disposal Facility (DMDF) proposed in this DMMP is used throughout the analysis. This conceptual design was the subject of a Value Engineering (VE) study that took place in 2015 during a previous iteration of the Draft CAWS DMMP. This design incorporates beneficial use of dredged material to reduce costs that fulfills USACE's guidance on consideration of beneficial use of dredged material and increases cost-effectiveness.

**Conceptual Design.** The design incorporates Calumet Harbor material into the berm construction and for the final cap at the end of the project life. An impervious liner of compacted clay is included in the design to separate the facility from potential existing contamination if a contaminated site is selected, and to prevent seepage of effluent from contaminated dredged material. Drainage features are included to collect effluent before directing it either to a wastewater treatment plant (via an existing sewer line) or to treatment cells prior to discharge.

The DMDF will be constructed in two stages. Once the capacity provided by the initial ~11-foot berm is reached, a second berm will be constructed adding additional height and capacity. When the facility is full at the end of the projected 20-year project life, a 3-foot cover consisting of clean dredged material and topsoil would be placed on top of the contaminated material and seeded for final site closure. At this point, the facility would be an approximately 25-foot tall grassy hill that the USACE Chicago District would turn over to the non-federal sponsor for appropriate use in perpetuity.

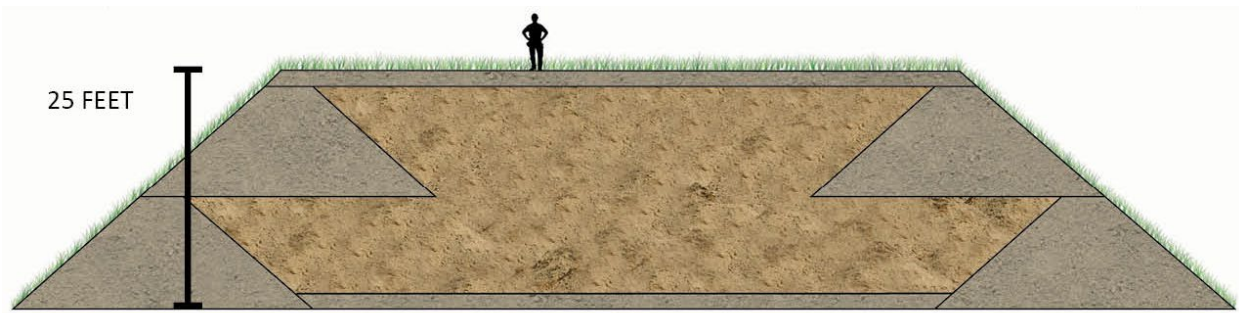


Conceptual DMDF Design Step 1 - Utilizes a perimeter berm of dredged material suitable for beneficial use to safely confine dredged material that is not suitable for open water placement or beneficial use.



Conceptual DMDF Design Step 2 - A second level of containment berms increases the facility's capacity.

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Conceptual DMDF Design Step 3 – Once full, the facility would be capped with beneficial use material and turned over to the on-federal sponsor for operation and maintenance.

Extensive efforts were made to identify potential sites for a DMDF that would meet multiple criteria such as technical requirements, federal policy, property availability, public and stakeholder interests, and non-federal sponsor and natural resource agency input.

A thorough list of potential sites (more than 60) for initial screening including many new sites proposed by the public and stakeholders during multiple outreach events for this study in 2018. Nine screening criteria were used to identify the least-cost, technically feasible, and environmentally acceptable option:

- **Size: At least 30 Acres.** A suitable site must be large enough to provide the required capacity for dredged material not suitable for beneficial use.
- **Natural Resources: Avoid High Quality habitat.** Per policy, only sites that would meet all federal environmental standards including those established by Section 404 of the Clean Water Act of 1972 were considered.
- **Current Site Use: Preference for Under-Utilized Land.** Due to the historical and changing industrial development patterns, the Calumet area is home to many vacant former industrial sites. Vacant or generally under-utilized sites were identified as potential DMDF locations. This strategy aims to avoid large disruptions to the local work force and, consequently, tended to select sites with less existing infrastructure.
- **Environmental Conditions: No Unresolved Contamination Issues.** Hazardous, toxic, and radioactive waste (HTRW) is a major concern in formerly industrial landscapes. Unresolved regulatory status or litigation over contaminated sites and/or requirements for the non-federal sponsor(s) to carry out remediation actions prior to implementation would have negative, and potentially major, impacts on the implementation schedule.
- **Cultural Resources: No Historic Landmarks.** Impacts to significant existing cultural resources, particularly those identified on the National Register of Historic Places (NRHP), existing parks, etc. should be avoided to the extent possible.
- **Operational feasibility: Practical to Build and Fill.** This criterion considers whether a site is flat and how it is laid out. Irregularly shaped or hilly sites would be more costly to operate, and sites with hard-to-move infrastructure would require additional site preparation prior to construction.

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- **Direct Waterway Access: Safer and More Efficient Handling of Material.** Sites that are directly adjacent to the waterway allow for more efficient and cost-effective offloading of dredged material from the barges. Sites removed from the water's edge would require hydraulic offloading or overland hauling, as opposed to mechanical offloading directly to the facility. More distant offloading would also create additional risk of spillage, and thus increased potential adverse impacts to human health and the environment.
- **Located on the Calumet River: Minimizes Transportation Costs.** Calumet Harbor and River are the source of virtually all of the anticipated dredged material (97%) being removed from the CAWS over the study period (~1,000,000 cy), with only a small amount of capacity (~30,000 cy) being set aside for material from the Cal-Sag Channel. Therefore, building a DMDF along the Cal-Sag Channel (which would require transiting the TJ O'Brien Lock and Dam for each barge of dredged sediment) represents an additional cost compared to sites located along the Calumet River where the bulk of the dredging will occur.
- **Upland Site: Beneficial Use Opportunity.** An upland site is easier to operate and maintain, creates opportunities for beneficial use, and reduces potential impacts to the natural environment when compared to in-water construction.

After applying these screening criteria to all of the identified preliminary sites, six alternatives remained. The remaining sites appeared to potentially satisfy all of the preliminary screening criteria. These sites were then evaluated against specific design-related considerations to eliminate sites that would have higher costs, more environmental impacts, and/or more challenging operating conditions:

- **Dock Wall:** The presence or absence of existing dock wall infrastructure that could support or be easily improved to support a crane pad for offloading dredged material from barges into the facility. This is the primary cost driver between sites to implement the conceptual facility design.
- **Berm Shape.** More regular and compact facility layouts would reduce the cost of berm construction and sediment management. All else being equal, long skinny or very irregular sites would not likely represent the least cost, environmentally acceptable, and technically feasible alternative.
- **Site Conditions:** A more detailed analysis of site specific conditions was undertaken to determine the presence of site characteristics that would increase the risk or magnitude of significant adverse impacts, or make operating the facility less feasible or efficient.

The final array of alternatives includes one 'No Action' Plan, four upland sites on the existing channel (Former KCBX Site, Former Wisconsin Steel Site, 116<sup>th</sup> and Burley, and the LTV Site), and vertical expansion of the existing Chicago Area CDF.



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In addition to a No Action Plan, the final array of alternatives identified 5 potential sites for the development of a new DMDF to support ongoing maintenance of the CAWS over the next 20 years, as identified in the Base Plan.

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## Environmental Impacts of Study Alternatives:

USACE is required under the National Environmental Policy Act (NEPA) to consider the potential environmental effects of any proposed plan. An Integrated Environmental Assessment (EA) was released for public review in June 2015. During this public review, considerable feedback related to potential impacts on the local community were received. Much of this feedback was reiterated during a series of stakeholder roundtable meetings and public workshops. As a result, USACE determined that it was appropriate to complete an EIS instead of an EA. An EIS generally represents a more in-depth analysis than an EA and calls for additional procedural steps to increase transparency (Notice of Intent [NOI] in the Federal Register and posting of the Draft NEPA document on the U.S. Environmental Protection Agency's eNEPA website), and includes a longer and includes a longer opportunity for public comment (45 days instead of 30 days).

NEPA and the Council on Environmental Quality (CEQ) implementing regulations require an early and open process for the public and agencies to provide input to the planning and environmental compliance analyses for major federal projects. This process has been termed "scoping" and was initiated for this iteration of the study by the widespread mailing of Public Scoping Information Packets, first in February 2018 and then again in January 2019 after the decision was made to complete an EIS rather than an EA for this study. A NOI to prepare an EIS was published in the Federal Register on 28 December 2018. As noted in the NOI: "The Calumet Harbor and River navigation project is third largest by tonnage among Great Lakes harbors, with shipments and receipts totaling 14M tons annually. Commercial navigation activities at the Calumet Harbor & River and Cal-Sag Channel are locally and regionally significant, supporting more than 3,700 jobs and \$600M in annual sales in the Chicagoland area. If a plan for managing the dredged material is not identified, sediment would accumulate in the federal channel, reducing the safe depth at which vessels can operate, forcing boats to carry less cargo. Shipping costs would increase, impacting businesses at the harbor. The project requires annual dredging of approximately 50,000 cubic yards (CY) to maintain deep draft navigation. Dredged material is currently placed in the Chicago Area Confined Disposal Facility (CDF). With over 1.3M CY placed since inception in 1984, the CDF will reach capacity in 2022. The plan will include disposal management of more highly contaminated dredged sediment and beneficial use planning for material that is deemed suitable for various identified uses. The study is identifying and analyzing potential locations along the Calumet Harbor and River to construct a new sediment management facility, as well as the feasibility of expanding the existing CDF to provide the required capacity for safely handling material that is too contaminated for beneficial use."

The EIS also considers environmental justice in accordance with Executive Order 12898 to determine whether minority or low-income populations will experience disproportionately high adverse human health or environmental effects as a result of the proposed federal action. Minority and low-income populations reside in the study area, but are not expected to experience significant adverse impacts to their natural and human environment as a result of the DMDF. A summary of the impacts analysis for the study alternatives is included below.

**Natural Resources:** There are no high quality natural resources at any of the sites included in the final array of alternatives and there are no anticipated significant adverse impacts to natural resources from construction of a DMDF at any of these sites. The primary difference between the sites in the final array of alternatives is the method of handling excess water as the dredged material dries. In the four upland sites, water drained from the facility would be directed to the sewer system where it would be treated

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at a Metropolitan Water Reclamation District (MWRD) of Great Chicago water treatment plant. For the Vertical Expansion alternative, water drained from the sediment would be directed through the filter cells before discharge to the Calumet River, consistent with the current permitted water handling at the existing CDF. Vertical Expansion would likely require additional permitting and coordination with the Illinois Environmental Protection Agency. However, permit requirements are anticipated to be similar to what is currently required for the existing Chicago Area CDF.

**Cultural Resources:** In their current state, none of the sites in the final array of alternatives have significant cultural resources. The four upland sites are all zoned for industrial use and are not open to the public. The site of the existing Chicago Area CDF was previously Lake Michigan bottom and has strict future use restrictions. This site's final use must be maintained in perpetuity as open space or parkland. Vertical Expansion of the existing facility would delay the transition of this property back to the Chicago Park District, and also delay its development into open space or parkland. The Federal Government will not be a party to decisions about the future use and the development of the site other than to ensure that certain restrictions are upheld to protect the eventual site cap.

**Socioeconomic Resources:** The four industrial sites along the Calumet River included in the final array of alternatives are all zoned for industrial use. While a DMDF facility would be consistent with the described uses in this zoning area, the eventual closed facility would have restrictions in place for future development to protect the site cap. Possible uses for a closed DMDF site in an industrial corridor may include parking, staging or storage, solar development, open space, and recreational lands; uses that would not require major excavation. These restrictions could potentially have negative impacts on industrial employment and revenue generation in the future. Vertical Expansion of the existing CDF would not have a permanent negative impact socioeconomic resources in the study area because the site's long-term use must be as open space or parkland.

### Economic Analysis

The planning team conducted an economic analysis of the Calumet Harbor and River and the Cal-Sag Channel to quantify the benefits of continued operation of the waterways at their authorized depths and the damages (increased shipping costs) caused by shoaling if maintenance were to cease. Economically justified alternatives are any of those for which the average annual benefits exceed the average annual cost of implementation and operations and maintenance (i.e., benefit to cost ratio is greater than 1). The least-cost, technically feasible, and economically justified alternative is tentatively selected as the Base Plan in the DMMP.

Depending on the location of the alternative plan (upland site versus vertical expansion), continued maintenance of Calumet Harbor and River and the Cal-Sag estimated to provide between \$10,900,000 and \$11,072,000 (FY 2019 price level) in average annual NED benefits. These benefits are estimated using a 20-year project evaluation period, a base year of 2026 when the new facility would open, and the FY19 Federal discount rate (FDR) of 2.875% and FY19 prices.



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First costs<sup>1</sup> of the final array of alternatives. Identification of the least-cost alternative is based upon project first costs, per USACE policy.

Cost Category	LTV	Wisconsin Steel	KCBX	116th & Burley	Vertical Expansion
Preconstruction Engineering and Design	\$5,015,000	\$6,036,000	\$4,554,000	\$5,024,000	\$4,944,000
Construction Mgmt.	\$2,508,000	\$3,017,000	\$2,279,000	\$2,513,000	\$2,470,000
Construction (4 Phases)	\$25,081,000	\$30,151,000	\$22,762,000	\$25,110,000	\$24,702,000
<b>Construction Total</b>	<b>\$32,604,000</b>	<b>\$39,204,000</b>	<b>\$29,595,000</b>	<b>\$32,647,000</b>	<b>\$32,116,000</b>
<b>Real Estate</b>	<b>\$4,448,000</b>	<b>\$3,800,000</b>	<b>\$5,430,000</b>	<b>\$4,250,000</b>	<b>\$-</b>
<b>Sediment Management</b>	<b>\$16,275,000</b>	<b>\$16,275,000</b>	<b>\$16,275,000</b>	<b>\$16,275,000</b>	<b>\$16,275,000</b>
<b>Dredging</b>	<b>\$38,811,000</b>	<b>\$38,811,000</b>	<b>\$38,811,000</b>	<b>\$38,811,000</b>	<b>\$42,579,000</b>
<b>Total First Cost</b>	<b>\$92,138,000</b>	<b>\$98,090,000</b>	<b>\$90,111,000</b>	<b>\$91,983,000</b>	<b>\$90,970,000</b>

1/ First costs expressed at the FY19 price level; this includes cost contingencies, but excludes escalation. The annuity factor is determined using the FY19 Federal Discount Rate (FDR) and a 20-year period of analysis; it is used to derive the average annual cost estimate.

Summary of average annual costs (AAC), average annual benefits (AAB), net benefits, and BCR for the final array of alternatives.

	LTV	Wisconsin Steel	KCBX	116th & Burley	Vertical Expansion
<b>Project Benefits</b>					
AAB	\$10,900,000	\$10,900,000	\$10,900,000	\$10,900,000	\$11,072,000
<b>Project Costs</b>					
AAC	\$5,124,000	\$5,557,000	\$4,980,000	\$5,144,000	\$5,074,000
<b>Benefits to Cost Ratio (BCR)</b>					
BCR	2.1	2.0	2.2	2.1	2.2

1/ The average annual tonnage represents that which is expected for years 2019-2045. Project benefits are the transportation costs savings attributed to continued channel maintenance. Estimates were developed using expected shoaling rates and traffic demand forecasts for Calumet Harbor & River deep draft movements and Cal-Sag Channel shallow draft movements. The existing Chicago Area CDF is expected to reach capacity in 2022. For all future with project (FWP) condition alternatives (aside from Vertical Expansion) a 3-year gap (2023-2025) would occur until the project is on-line in FY26. The benefit estimates for Vertical Expansion are higher since two additional years of dredging could be accommodated (FY23 and 24), with only single gap in dredging (FY25) prior to the project online year in FY26.

2/ Monetary values in this table expressed at FY19 price level, assuming a base year of 2026 (FY26), a 20-year period of analysis. First costs expressed at FY19 price level; this includes cost contingencies, but excludes escalation. Present values expressed at FY19 price level and discounted using the FY19 FDR of 2.875%.

3/ The annuity factor is determined by utilizing the FY19 FDR and a 20-year period of analysis; it is used to derive the average annual cost (AAC) and average annual benefit (AAB) estimates.

## Plan Selection

It is USACE policy that when all sites are environmentally compliant and technically feasible, then the selected alternative is the least costly option. In the current analysis, KCBX appears to be the least cost option. However, three of the other sites are within 2% of the cost of this alternative and have similar BCRs. Since, any of these alternatives could reasonably represent the least-cost option based on more detailed design and cost estimation in later phases of the study, it is appropriate to consider other factors in the risk informed decision-making process. A qualitative risk assessment was conducted for the upland sites (KCBX, LTV, and 116<sup>th</sup> & Burley) and the Vertical Expansion alternative, which involved identifying the risks of selecting each alternative, rating the likelihood and consequences of the risks, and determining the overall risk rating (low, medium, or high). A summary of these risks are presented

CAWS DMMP

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below. The Wisconsin Steel site is not considered here because the associated costs are more than 8% above the other sites.

### **Risks of selecting any of the 'upland sites' (KCBX, LTV, or 116<sup>th</sup> & Burley)**

**Real Estate Acquisition (High Risk)** - Selection of any of the upland sites would represent increased real estate risks compared to Vertical Expansion. None of these sites are owned by a public entity, and there is an associated schedule risk based on the ability to acquire real estate in a timeframe that does not delay the implementation schedule. Delays in real estate acquisition would affect implementation and channel maintenance dredging by increasing the gap in which the USACE Chicago District would not be able to maintain the waterways.

**Contamination Issues (High Risk)** –Each of the upland sites has a long industrial history and several potential contamination concerns that require additional investigation. Site investigations would be conducted during the design phase and cost-shared as part of the design. Any required remediation costs would be borne entirely by the non-federal sponsor(s) and would need to be completed prior to implementation of the federal project. In addition, remediation would delay project implementation and channel maintenance dredging, and would adversely affect navigation until maintenance dredging could resume.

**Social Considerations (Medium Risk)** – Public feedback indicates that the construction of a DMDF at any of the upland sites along the Calumet River in proximity to residential areas is strongly opposed. Development of a DMDF at these sites would severely restrict options for future development on the property.

### **Risks of selecting the Vertical Expansion Alternative**

**Real Estate Acquisition (Medium Risk)** – The existing CDF property is owned by a public entity, the Chicago Park District (CPD), likely making acquisition of real estate rights less difficult than the upland sites.

**Contamination Issues (Medium Risk)** – The risk of contamination issues associated with the Vertical Expansion alternative is the lowest of all study alternatives. This is due to the fact that vertical expansion occupies the same footprint as the existing Chicago Area CDF. Prior to construction of the existing facility, the site was occupied by the near-shore waters of Lake Michigan. The current facility was completed in 1984, it has operated safely ever since.

**Social Considerations (Low Risk)** – Vertical Expansion may be the most favorable site for the local community to support. First, this alternative would not require the construction of an entirely new disposal facility in the 10<sup>th</sup> Ward. Secondly, due to its isolation, the existing CDF has operated successfully here for over 30 years without conflict with the surrounding communities. The selection of the Vertical Expansion alternative would delay converting the existing CDF into parkland by approximately 25 years. Despite the delay, this parcel will eventually become parkland in perpetuity following cessation of the DMDF operation.

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Summary of key risks between the KCBX site and the Vertical Expansion alternative.

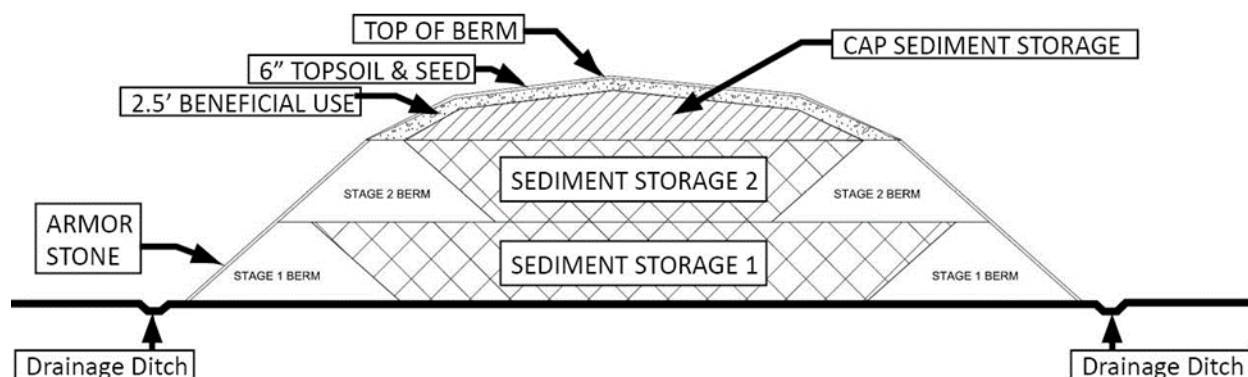
Source of Risk	Potential Risk Associated with any of the Upland Sites	Potential Risk Associated with the Vertical Expansion Alternative
Real Estate	HIGH	MEDIUM
HTRW	HIGH	MEDIUM
Social Considerations	MEDIUM	LOW

### Tentatively Selected Plan

Based on a comparison of the risks associated with pursuing any of the apparent least-cost alternatives, the TSP is the Vertical Expansion of the Existing CDF. This project alternative represents a lower level of anticipated risk for each of the key risk categories discussed above.

The Vertical Expansion alternative provides greater net benefits while producing a similar BCR of 2.2. The estimated first cost (2019 price level) of the TSP is \$90,970,000. This project life-cycle costs include construction, facility operation and maintenance, and closure costs for the proposed DMDF, and maintenance dredging costs over the life of the project. The total average annual cost of the TSP is estimated to be \$5,074,000 (FY 2019 price level). The average annual benefits of the TSP are \$11,072,000. The construction of the new facility itself is estimated at \$32,116,000 and would be cost-shared with an estimated federal investment of \$20,875,400. This would equate to an estimated non-federal cost of \$11,240,600.

The TSP includes construction of a 530,000 cy capacity DMDF on top of the existing Chicago Area CDF. Construction of a DMDF at this site would include berms constructed from clean dredged material from Calumet Harbor. The existing settling pond would be used to collect effluent which would be directed to existing filter cells prior to being discharged to the Calumet River. This process is similar to how the existing facility has been operated since it opened in the 1980s.



CAWS DMMP

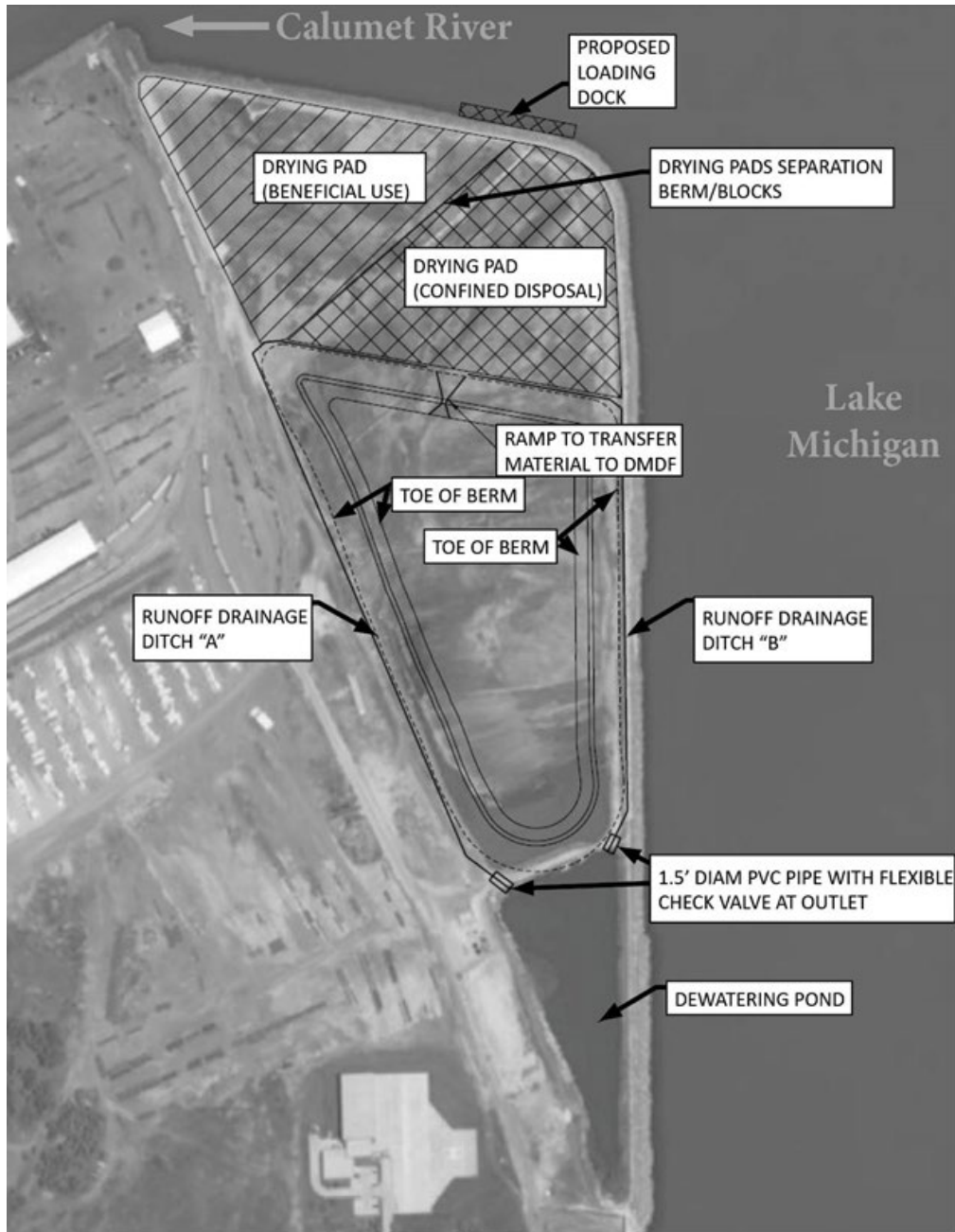
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Preliminary elevation of a capped and closed DMDF under the Vertical Expansion Alternative. The berms are composed of beneficial use material and lined with clay.

Construction costs are allocated between the federal navigation projects by the amount of confined capacity reserved for each project. Of the anticipated 1,030,000 cubic yards of dredged material to be removed from the CAWS over the next 20 years, 500,000 (49%) of Calumet River Material and 30,000 (3%) of Cal-Sag Channel material will be placed in the DMDF. The remaining 500,000 cubic yards will be Calumet Harbor material that is used beneficially during DMDF construction and closure, as well as in other approved upland beneficial uses through an agreement with the non-federal sponsors. Costs for construction of a DMDF allocated to Calumet Harbor and River will be shared by the project non-federal sponsor(s). Costs allocated to the Cal-Sag Channel will be funded by the Federal Government.

## Draft Dredged Material Management Plan and Environmental Impact Statement



Preliminary plan view of the proposed DMDF under the Vertical Expansion Alternative.

## **Unresolved Issues and Areas of Controversy**

The primary social and environmental factors that influenced the DMMP are the presence of varying levels of contaminants in the dredged material in the study area and the potential impacts of these contaminated sediments on human health and the environment. This is addressed through the identification of sediment-quality-based management measures (open water placement, beneficial use, and confined disposal) outlined in the TSP.

Local residents and community advocacy groups generally oppose any alternative that results in construction of a new DMDF in the study area. This opposition appears to be based primarily on environmental justice concerns and distrust of government entities based on the local legacy of industrial development in Southeast Chicago. These stakeholders have repeatedly stated a desire to see a TSP that includes treatment of contaminated sediment. However, this technology is unproven at the scale of this study and would not represent the least-cost, environmentally acceptable, and technically feasible alternative. It is imperative that the DMMP adequately documents that vulnerable populations do not bear the brunt of any significant adverse impacts associated with implementation of the TSP. This is accomplished through documentation of vulnerable populations present in the study area, potential adverse impacts to the human and natural environment, and why these communities would not be disproportionately burdened by the proposed action. A transparent public involvement process that involves the potentially affected community is important in fulfilling this responsibility. Implementation of the DMMP would result in the confinement of these contaminants, which would otherwise remain in the environment in the future without project condition. Strict controls would need to be implemented to avoid any potential adverse impacts resulting from implementation of the TSP and to safely confine contaminated dredged material.

Park advocate groups appear to oppose utilization of the existing Chicago Area CDF property. They would prefer for this facility to be closed, turned over to CPD, and developed into parkland.

The development of an agreement between USACE and the non-federal sponsors to beneficially excess the material dredged from Calumet Harbor that is not required for berm construction is ongoing. This agreement is vital to the success of the study and proposed project, as the TSP site is otherwise inadequately sized to facilitate storage of large quantities of beneficial use material. This is considered a low risk, as demand for low-cost clean fill material is likely to persist throughout the period of analysis.



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- E. Civil Design
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- G. Real Estate Plan
- H. Climate Change
- I. Previous Iterations of the Site Selection Process
- J. Section 404(b)(1) Evaluation
- K. Environmental Justice Guiding Documents

## Acronyms and Abbreviations:

CAWS	Chicago Area Waterway System
CCD	Chicago City Datum
CDF	Confined Disposal Facility
C.F.R.	Code of Federal Regulations
CPD	Chicago Park District
CSO	Combined Sewer Overflow
CSSC	Chicago Sanitary and Ship Canal
CWA	Clean Water Act
CY	Cubic Yards
DMDF	Dredged Material Disposal Facility
DMMP	Dredged Material Management Plan
EO	Executive Order
ER	Engineering Regulation
ERDC	Engineering Research and Development Center
FWOP	Future without Project Conditions
GIS	Geographic Information Systems
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HTRW	Hazardous, Toxic, or Radioactive Waste
IDNR	Iowa Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
IGLD 1985	International Great Lakes Datum 1985
IIPD	Illinois International Port District
ILDNR	Illinois Department of Natural Resources
IWW	Illinois Waterway
LERR	Lands, Easements, Rights-of-Way, and Relocations
LPP	Locally Preferred Plan
LWA	Lightweight Aggregate
LWD	Low Water Datum
MWRD	Metropolitan Water Reclamation District of Greater Chicago
NED	National Economic Development
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
O&M	Operations and Maintenance
OMRR&R	Operations, Maintenance, Repair, Replacement and Rehabilitation
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PL	Public Law
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Conditions
RHA	River and Harbor Act
RM	River Mile
SIP	State Implementation Plan for Air Quality Standards

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SVOC	Semi-Volatile Organic Compound
TACO	Tiered Approach to Corrective Action Objectives
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USWRC	U.S. Water Resources Council
VOC	Volatile Organic Compound
WES	Waterways Experiment Station
WRDA	Water Resources Development Act
WRP	Water Reclamation Plant
WRRDA	Water Resources Reform and Development Act
WCSC	Waterborne Commerce Statistical Center

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# **Chicago Area Waterway Systems (CAWS) Dredged Material Management Plan (DMMP) and Integrated Environmental Impact Statement (EIS)**

## **1.0 INTRODUCTION**

### **1.1 General**

This document serves as a draft feasibility report and integrated Environmental Impact Statement (EIS) for the Chicago Area Waterway System (CAWS) Dredged Material Management Plan (DMMP). This Draft DMMP/EIS presents an assessment of the environmental impacts associated with continued maintenance of the federally-authorized navigation channels within the study area, including disposal requirements for dredged material, and describes the process for identifying the Tentatively Selected Plan (TSP), and concludes with recommendations for project implementation.

### **1.2 Dredged Material Management Planning Authorities and Procedures**

Dredged material management planning is conducted under the authorities of the navigation projects requiring maintenance dredging. The authorization history of the CAWS federal navigation projects is presented in Section 0. The study process is guided by several sections of U.S. Code (U.S.C.) and the Code of Federal Regulations (C.F.R.) pertaining to the management and placement of dredged material:

Management of Dredged Material is provided for in:

- Section 2326 of Title 33 of the U.S. Code (33 U.S.C. § 2326, Regional Sediment Management)
- 33 U.S.C. § 2326a (Dredged Material Disposal Facility Partnerships);
- 33 U.S.C. § 2326b (Sediment Management); and
- 33 U.S.C. § 2326c (Dredged Material Marketing and Recycling).

The Clean Water Act (CWA) regulates placement of Dredged Material by USACE in the following parts of Title 33 of the Code of Federal Regulations (C.F.R.):

- 33 C.F.R. Part 335 (Operation and Maintenance of Army Corps of Engineers Civil Works Projects Involving the Discharge of Dredged or Fill Material into Waters of the U.S. or Ocean Waters);
- 33 C.F.R. Part 336 (Factors to be considered in the Evaluation of Army Corps of Engineers Dredging Projects Involving the Discharge of Dredged Material into Waters of the U.S. and Ocean Waters);

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- 33 C.F.R. Part 337 (Practice and Procedure); and
- 33 C.F.R. Part 338 (Other Corps Activities Involving the Discharge of Dredged Material or Fill Into Waters of the U.S.)

Policy, guidance, and procedures for development of dredged material management plans are provided in Section E-15 of the *Planning Guidance Notebook* [Engineering Regulation (ER) 1105-2-100]. *Cost Sharing for Dredged Material Disposal Facilities and Dredged Material Disposal Facility Partnerships* (Policy Guidance Letter [PGL] No. 47, 3 April 1998) provides additional guidance on cost sharing dredged material management for deep-draft harbors. Section 2005 of the Water Resources Development Act (WRDA) of 2007 amended dredged material management cost sharing requirements. Implementation Guidance for this Section was issued on August 11, 2008.

The Federal Standard for dredged material management is determined based on the environmental quality of the sediment. The Federal Standard, as defined by 33 C.F.R. § 335.7, is the dredged material disposal alternative which represents the least-costly alternative consistent with sound engineering practices and meeting the environmental standards established by Section 404(b)(1) [CWA] evaluation process or ocean dumping criteria. Once the Federal Standard has been determined, site specific factors will lead to the identification of a Base Plan from which to develop potential dredged material management alternatives.

As required by USACE ER 1105-2-100, a Base Plan must be identified that represents the least-cost, environmentally acceptable, and technically feasible dredged material management alternative. An August 26, 2013 memorandum from the USACE Great Lakes and Ohio River Division on the subject of “Great Lakes Dredged Material Management Conceptual Determination of the Federal Standard and Base Plan for Regional Consistency” distinguishes the Base Plan from the Federal Standard as including additional consideration of site specific information. This information, such as cost, engineering considerations, and environmental acceptability, may adjust plan features such as the ultimate placement location but would not change the conceptual approach.

### 1.3 National Environmental Policy Act Documentation

USACE is required under the National Environmental Policy Act (NEPA) to consider the potential environmental effects of any proposed plan. USACE is required under the National Environmental Policy Act to consider the potential environmental effects of any proposed plan. An Integrated Environmental Assessment (EA) was released for public review in June 2015. During this public review, considerable feedback and concerns related to the project's potential impact on the local community were received. Many of these concerns were reiterated during a series of stakeholder roundtable meetings and public workshops held in 2018. In light of these concerns, USACE determined that it was appropriate to complete an EIS instead of an EA. An EIS generally represents a more in-depth analysis than an EA, calls for additional procedural steps to increase transparency (a formal Notice of Intent [NOI] to prepare in EIS published in the Federal Register and posting of the Draft NEPA document on the U.S. Environmental Protection Agency's [USEPA] eNEPA website), and includes a lengthier public review period (45 days instead of 30 days). Once the Final DMMP and EIS are complete, the final report and Record of Decision (ROD) will be signed which signals the end of the feasibility phase process.

NEPA and the Council on Environmental Quality (CEQ) implementing regulations require an early and open process for the public and agencies to provide input to the planning and environmental



## Draft Dredged Material Management Plan and Environmental Impact Statement

compliance analyses for major federal projects. This process has been termed “scoping” and was initiated for this iteration of the study by the widespread mailing of Public Scoping Information Packets, first in February 2018 and then again in January 2019 after the decision was made to complete an EIS rather than an EA for this study. A NOI to prepare an EIS was published in the Federal Register on 28 December 2018. The scoping and subsequent coordination, as well as the NOI in the Federal Register are documented the Coordination and Public Involvement Appendix (Appendix A).

### 1.3.1 Guiding Regulations

This Draft DMMP was prepared in compliance with NEPA (42 U.S.C. Section 4321, et seq.) in conformance with the CEQ Regulations for Implementing NEPA (40 C.F.R. Part 1500, et seq.) and the USACE Engineer Regulation (ER) 200-2-2, Implementing NEPA (33 C.F.R. Part 230), as well as USACE policies including, the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (March 1983) and ER 1105-2-100, Planning Guidance Notebook (22 April 2000), as amended.

### 1.4 Stage of the Planning Process

This Draft DMMP was prepared for technical, policy, agency, and public review.

Table 1: Study timeline to date. [\*] denotes estimated future dates.

<b>Preliminary Assessment</b>	<b>08 January 2010</b>
<b>Feasibility Cost Sharing Agreement Signed</b>	<b>N/A</b>
<b>Alternatives Formulation Briefing</b>	<b>28 February 2014</b>
<b>Tentatively Selected Plan Milestone</b>	<b>28 February 2019</b>
<b>Release of Draft Report for Public and Agency Review</b>	<b>03 May 2019</b>
<b>Agency Decision Milestone*</b>	<b>10 July 2019</b>
<b>Final Feasibility Report Approved*</b>	<b>18 April 2020</b>

The Project Delivery Team (PDT) engaged the non-federal sponsors (NFS), several federal and state agencies, and the public in an effort to define the problems, opportunities, objectives and constraints in the study area and to understand the likely future without project conditions (FWOP). The following meetings were conducted following the release of the prior Draft Feasibility Report for public review in 2015:

- NEPA Public Meeting (2015 Draft Report/EA).....22 June 2015
- Stakeholder Roundtable Meeting #1..... 20 February 2018
- In-Progress Review with Vertical Team..... 26 February 2018
- Stakeholder Roundtable Meeting #2..... 09 March 2018
- Public Workshop #1..... 28 April 2018
- Public Workshop #2..... 30 April 2018
- In-Progress Review with Vertical Team..... 06 June 2018

## Draft Dredged Material Management Plan and Environmental Impact Statement

- Stakeholder Roundtable Meeting #3..... 28 June 2018

### 1.5 Purpose and Need

The CAWS DMMP identifies and evaluates alternatives to manage the volume of dredged material expected to be generated by the operation and maintenance (O&M) of these federal navigation channels over a 20-year period of analysis, the first year being fiscal year (FY) 2026.

Continued channel maintenance at authorized depths allows vessels to move commodities at a specific transportation cost. The need for dredging arises from sedimentation and the formation of shoals within the channel. Reduced channel dimensions result in the need for light-loading, which would increase the number of vessel trips to move the same amount of tonnage, and thus, increased transportation costs. The benefits associated with continued maintenance of the channels are the avoided increases in vessel transportation costs. Maintaining authorized channel depths is an important part of maintaining the economic viability of the federal navigation projects.

There is currently limited available capacity for managing material dredged from the CAWS. Annual dredging events at Calumet Harbor and River have filled the existing Chicago Area Confined Disposal Facility (CDF) to capacity, with fill management measures currently being used to extend the life of the facility. Potential minor dredging needs have also been identified for the Cal-Sag Channel at an undetermined time in the future as well, but currently no specific plans exist to dredge. There is currently no placement strategy for Cal-Sag Channel sediment, potentially risking important through-traffic that connects the Great Lakes to the Inland Waterway System (IWS).

The study is identifying and analyzing potential locations along the Calumet Harbor and River to construct a new sediment management facility, as well as the feasibility of expanding the existing CDF to provide the required capacity for safely handling material that is too contaminated for beneficial use.

### 1.6 Non-federal Sponsors and Stakeholders

The non-federal sponsors are the City of Chicago (City) and the Chicago Park District (CPD). Previously, this study was sponsored by the Illinois International Port District (IIPD) but it was ultimately unable to meet the requirements to participate as a non-federal sponsor. The City, working through the Chicago Department of Transportation (CDOT) became the primary non-federal sponsor in 2017.

Key local stakeholders and the public were also involved in this study, through the NEPA process (including public review and public meetings for a previous Draft DMMP in 2015), stakeholder roundtable meetings, and public workshops. More information about study stakeholders and public involvement can be found in Chapter 7.0 and the Coordination and Public Involvement Appendix (Appendix A).

### 1.7 Regional Dredged Material Management Strategies

In accordance with the Planning Guidance Notebook, Appendix E, (p. E-70) Section E-15, *a. Policy, (2) Requirements, (c) Management Plans [E-15 a(2)(c)]*, this DMMP was developed within the context and parameters of regional dredged material management strategies. These strategies were developed to create a framework for management of sediment within a broader regional context.

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The *Great Lakes System Dredged Material Management Long-Term Strategic Plan* was developed by the Great Lakes Navigation Team of the USACE Great Lakes and Ohio River Division and published in April 2012. Within the Great Lakes region, USACE has developed a long-term management strategy for dredged material. The Great Lakes Navigation System (GLNS) is a system of interdependent locks, ports, harbors, navigation channels, dredged material disposal facilities, and navigation structures. Within the United States portion of the Great Lakes, there are 60 commercial [deep-draft] and 80 shallow-draft harbors. Of those, 51 of the deep-draft harbors and 67 of the shallow-draft harbors are federal navigation projects. Dredged material management practices used in the Great Lakes include open-water placement (25% of all harbors), near-shore placement or beach nourishment (45%), restricted or unrestricted upland placement (16%), and confined disposal (28%). The quality and quantity of material dredged from these harbors varies but, in general, the industrial and agricultural history of the region has had a significant impact on sediment quality. Half of all dredged material from Great Lakes harbors each year is considered contaminated and placed in confined disposal facilities (CDFs), and comes from the 28% percent of harbors noted above.

The *Illinois Waterway Long-Term Management Strategy for Dredged Material Placement* was developed by the USACE Rock Island District and published in June 1995. The strategy was developed in partnership with the Illinois On-Site Inspection Team, an interagency group consisting of state and federal natural resource agencies. A collaborative process was used to provide input and guidance for the selection of dredged material placement sites. The strategy is intended to address placement of uncontaminated sediments dredged from the Illinois Waterway (IWW). Although the Cal-Sag Channel and CSSC were excluded from the long-term management strategy when it was developed, the principles used to evaluate and select alternatives were used to inform the development of this DMMP.

### 1.8 Study Area

The study area for the CAWS DMMP can be summarized as the lands and waterways adjacent to the Calumet Harbor and River (Figure XX). The identification of this study area has been informed by previous analyses, as described in Section XX, and the plan formulation and site screening process described in Chapter 3.0.



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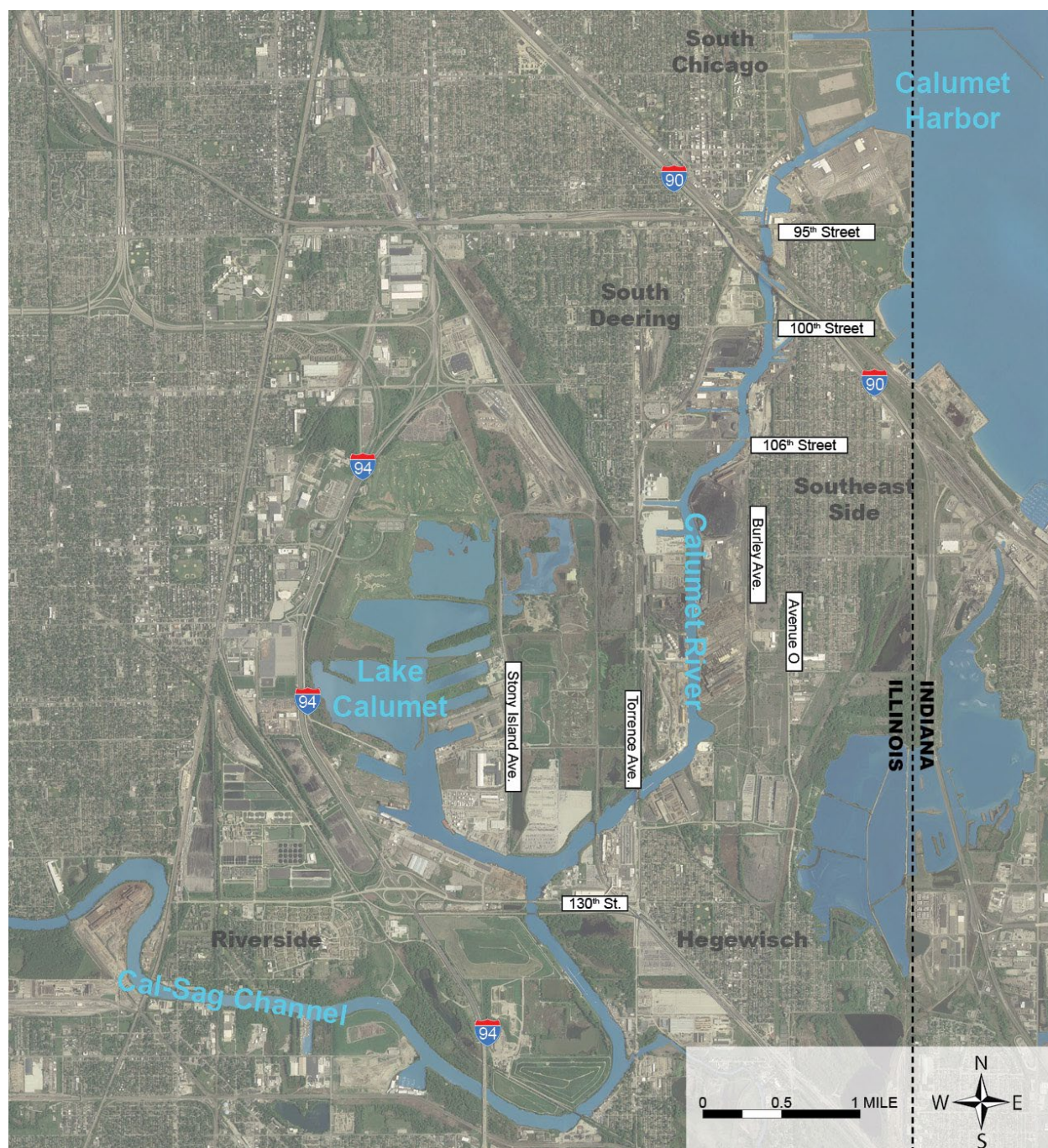


Figure 1: Study Area

## 1.9 Regional Context

The Chicago area is located on the southwestern shore of Lake Michigan at the natural boundary of two of the country's major watersheds, the Great Lakes and the Mississippi River Basin. These once hydrologically separate drainage areas were connected through human intervention, first with the construction of the Illinois and Michigan (I&M) Canal, which opened in 1848. Due to the pollution in the Chicago River, there were concerns that the water posed a public health risk. As a consequence, the Chicago Sanitary and Ship Canal (CSSC) was constructed along the same path as the I&M Canal and used to move goods and divert the flow of the Chicago River away from Lake Michigan, which was and still remains the primary source of drinking water for the City of Chicago. As a result of these actions, the Chicago area represents an important and unique connection for waterborne commerce between the Great Lakes, the Inland Waterway System (Mississippi River), and the Gulf of Mexico (Figure 2).

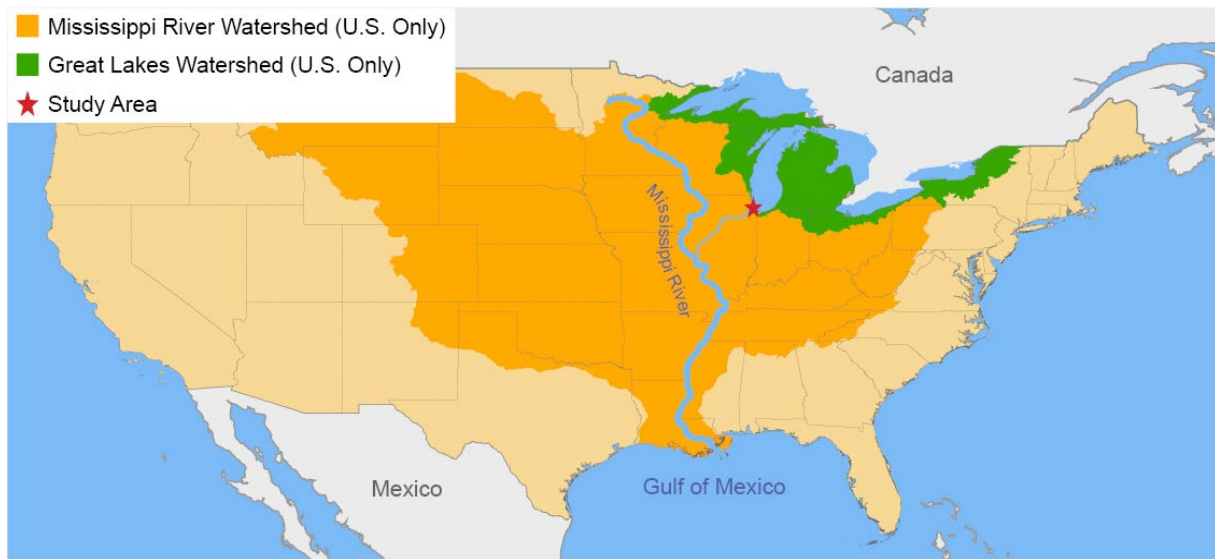


Figure 2: The Chicago area is located at the boundary of the Mississippi River and Great Lakes watersheds. It is also a unique connection for waterborne commerce in the Gulf of Mexico, the Inland Waterway System, and the Great Lakes markets.

## 1.10 Navigation Projects in the Chicago Area Waterway System

The CAWS is made up of six federal navigation projects in the Chicago area and shown in Figure 3. The navigation channels connect the deep-draft Great Lakes navigation system to the shallow-draft IWW and the Inland Waterway System. Specific congressional authorization is not required for disposal activities needed for operation and maintenance of authorized federal navigation projects (Policy Guidance Letter [PGL] No. 47). Descriptions of the federal projects and their authorization histories are included below.



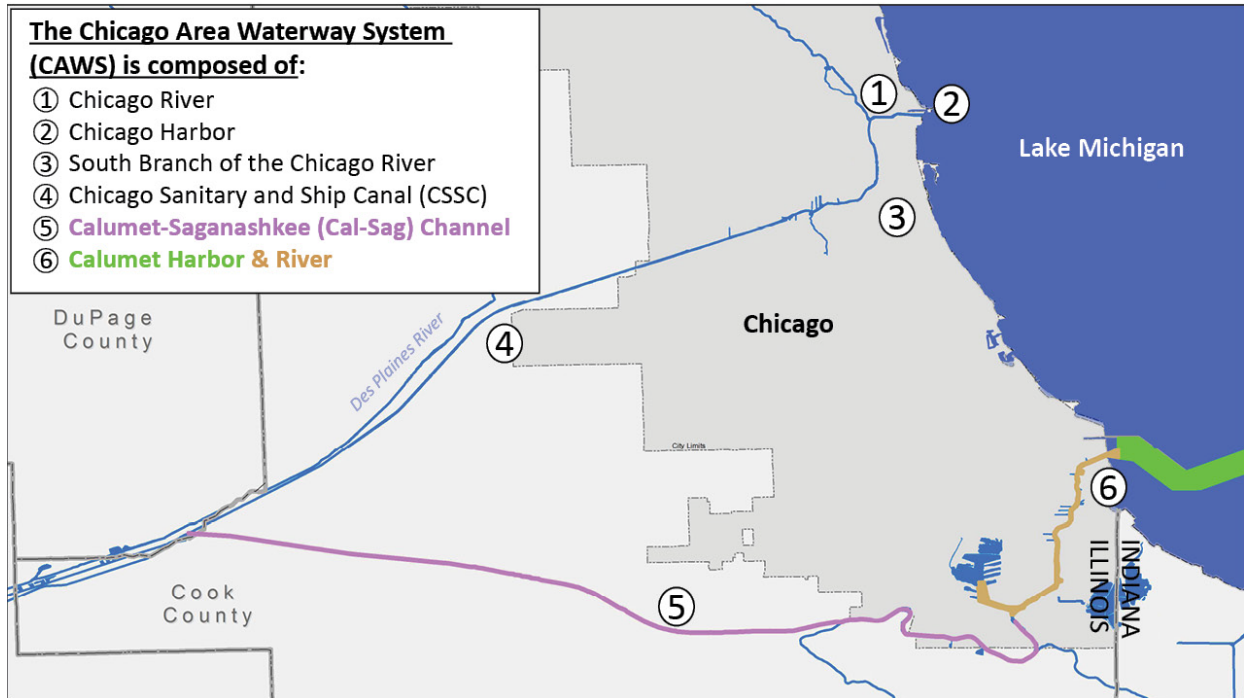


Figure 3: Federal navigation channels of the CAWS.

#### 1.10.1 Calumet Harbor and River (Deep Draft Waterway)

The Calumet Harbor and River is comprised of an Approach Channel, an Outer Harbor Channel, an Entrance Channel and a River Channel. Two miles of breakwater protect the Outer Harbor Channel. The Approach and Outer Harbor Channels are mainly in Indiana and span approximately 4.4 miles. The Entrance Channel and River Channel are in Illinois and extend approximately 6.7 miles up the Calumet River to Lake Calumet. There are three turning basins along the River Channel; numbered 1, 3 and 5. Authorized depths are 29 feet below Lake Michigan Low Water Datum (LWD) in the Approach Channel, 28 feet below LWD in the Harbor and 27 feet below LWD in the River. This project is maintained by the USACE Chicago District.

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Table 2: Calumet Harbor and River authorization history.

River & Harbor Act (Law)	Work Authorized	Documents
1899 (30 Stat. 1121), 1902 (32 Stat. 331)	Outer harbor protected by breakwaters (Calumet Harbor), deepening of entrance channel and 2 miles of river (Calumet River).	Annual Report, 1896 pp. 2584 et.seq. and H. Doc. 277, H. 54 <sup>th</sup> Congress, 1 <sup>st</sup> Session
1905 (33 Stat. 1117)	Five turning basins (Calumet River)	H. Doc. 172, 58 <sup>th</sup> Congress, 2 <sup>nd</sup> Session
1910 (36 Stat. 630)	Provided shape and dimensions of turning basins (Calumet River)	H. Doc. 349, 60 <sup>th</sup> Congress, 1 <sup>st</sup> Session
1922 (43 Stat. 1009)	Consolidation of Calumet Harbor and Calumet River	--
1935 (Pub. L. No. 74-409)	Detached breakwater, deepening and widening of outer harbor; deepening, widening and straightening of river channel; authorization of turning basin depth equivalent to adjacent channel.	H. Doc 494, 72 <sup>nd</sup> Congress, 2 <sup>nd</sup> Session
1935 (Pub. L. No. 74-409)	Extension of channel to south end of Lake Calumet; deepening and widening of entrance channel.	H. Doc. 180, 73 <sup>rd</sup> Congress, 2 <sup>nd</sup> Session
1945 (Pub. L. No. 79-14)	Authorization of 3,200 ft wide and 28 ft deep approach channel to harbor through shoals outside breakwater; closing of existing gap between breakwaters	H. Doc. 233, 76 <sup>th</sup> Congress, 1 <sup>st</sup> Session
1960 (Pub. L. No. 86-645)	Authorization of 29-ft depth in approach channel, 28-ft depth in outer harbor, and 27-ft in river entrance channel (up to Elgin, Joliet and Eastern Railway (EJ&E) Bridge).	H. Doc. 149, 86 <sup>th</sup> Congress, 1 <sup>st</sup> Session
1962 (Pub. L. No. 87-874)	Deepening, widening, and straightening river channel, from EJ&E Bridge up to and including turning basin 5, to a depth of 27 ft in earth and 28 ft in rock; deepening turning basins 1, 3 and 5 to 27 ft; enlarge turning basins 3 and 5; a 3,000-ft long, 1,000-ft wide and 27-ft deep channel in Lake Calumet; de-authorization of turning basins 2 and 4.	H. Doc 581, 87 <sup>th</sup> Congress, 2 <sup>nd</sup> Session
1965 (Pub. L. No. 89-298)	Protection for EJ&E Bridge over the Calumet River, to permit dredging to full width of the south draw to depth of 27 ft, and temporary protection for the center pier and south abutment of the New York, Chicago and St. Louis Railroad Bridge to permit dredging of full width of south bridge draw to depth of 27 ft prior to its replacement	H. Report 973, 89 <sup>th</sup> Congress, 1 <sup>st</sup> Session



### **1.10.2 Calumet-Saganashkee (Cal-Sag) Channel (Shallow Draft Waterway)**

The Cal-Sag Channel, part of the IWW, includes both the Cal-Sag Channel and a portion of the Little Calumet River. The Cal-Sag Channel extends from its junction with the CSSC in Lemont at River Mile (RM) 303.5 to the Little Calumet River at RM 319.5, and along the Little Calumet River to RM 327 where the project connects to the Calumet River at 130th Street in Chicago. Maintenance is authorized to a useable depth of 9 feet below the normal pool elevation, 2 feet below Chicago City Datum (CCD). This project is maintained by the USACE Rock Island District.

According to the Final Environmental Impact Statement for the Cal-Sag Channel (USACE 1975), the channel was completed in 1922 by the Metropolitan Sanitary District of Greater Chicago, which is currently known as the Metropolitan Water Reclamation District of Greater Chicago (MWRD), and the channel was originally built as a sanitation and drainage canal. The Cal-Sag channel was initially 60 feet wide and 9 feet deep and extended eastward 16 miles from its connection with the CSSC to the Little Calumet River, just east of Blue Island. Due to increasing navigation needs, the Cal-Sag Navigation Project was authorized by Congress in the Rivers and Harbors Act of 1945 (USACE 1975). Work on the channel was initiated in 1955, and the channel was widened from 60 to 225 feet, 31 highway and railroad bridges were replaced or altered, and six roadway bridges were removed without replacement in order to remove navigational restrictions (USACE 1975). The Blue Island Lock was removed, and a new lock; the T.J. O'Brien Lock and Dam, was completed in 1960.

Table 3: Cal-Sag Channel authorization history.

<b>River &amp; Harbor Act (Law)</b>	<b>Work Authorized</b>	<b>Documents</b>
1930 (Ch. 847, 46 Stat. 918)	Federal improvement of the IWW, establishing channel depth of 9 ft from Utica, IL to the Chicago and Calumet Rivers.	S. Doc. 126, 71 <sup>st</sup> Congress, 2 <sup>nd</sup> Session
1945 (Pub. L. No. 79-14)	Construction of three passing places along the channel and 300-ft channel width in Little Calumet River	H. Doc. 180, 73 <sup>rd</sup> Congress, 2 <sup>nd</sup> Session
1946 (Pub. L. No. 79-525)	Widening of the channel to 225 ft, removal of the Blue Island lock to be replaced with a lock at the head of the channel at 130 <sup>th</sup> Street, alteration or elimination of railroad bridges to provide suitable clearances	H. Doc. 677, 79 <sup>th</sup> Congress, 2 <sup>nd</sup> Session
1957	Required as an item of local cooperation removal of bridges at non-federal expense	H. Doc. 45, 85 <sup>th</sup> Congress, 1 <sup>st</sup> Session

### **1.10.3 Chicago Sanitary and Ship Canal (CSSC) (Shallow Draft Waterway)**

The CSSC begins at RM 290 in Lockport, and extends to RM 321.7 at the junction with the South Branch of the Chicago River at Ashland Avenue in Chicago. The project is part of the IWW which continues along the South Branch until the junction with the Chicago River at Lake Street. Although the canal was constructed at a depth of 26 feet, maintenance is authorized to a useable depth of 9 feet below the normal pool elevation (-2 feet CCD). This project is maintained by the USACE Rock Island District.

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Table 4: CSSC authorization history.

River & Harbor Act (Law)	Work Authorized	Documents
1930 (Ch. 847, 46 Stat 1038)	Federal improvement of the IWW, establishing channel depth of 9 ft from Utica, IL to the Chicago and Calumet Rivers.	S. Doc. 126, 71 <sup>st</sup> Congress, 2 <sup>nd</sup> Session
1946, (Pub. L. No. 79-525)	Replacement of emergency dam, enlargement of canal from Dam to Sag Junction	H. Doc 677, 79 <sup>th</sup> Congress, 2 <sup>nd</sup> Session

### 1.10.4 Chicago Harbor (Deep Draft Waterway)

Chicago Harbor is located at the outlet of the Chicago River and is comprised of an Approach Channel from the lake to the terminal facilities at Navy Pier and to the Chicago River Lock and inner basin. The channel is approximately 2.2 miles long with a depth of 29 feet below LWD in the Lake Michigan harbor approach, 28 feet below LWD in the outer harbor up to the Lock Approach Channel. Authorized depth in the Lock Approach Channel is 21 feet below the normal pool elevation (-0.6 feet LWD). This project is maintained by the USACE Chicago District.

Table 5: Chicago Harbor authorization history.

River & Harbor Act (Law)	Work Authorized	Documents
1870 (16 Stat. 44)	Inner breakwaters and inner basin	Exec. Doc. 114, 41 <sup>st</sup> Congress,
1880 (21 Stat. 180)	Exterior breakwater	Annual Report, 1879, pp. 1562-1567
1899 (30 Stat. 1121)	Present project depth in the basin and entrance to Chicago River	Annual Report, 1897, pp. 2790-2791
1912 (Ch. 253, 37 Stat. 201)	Shore-arm and southerly extension of the exterior breakwater	H. Doc. 710, 62 <sup>nd</sup> Congress, 2 <sup>nd</sup> Session
1919 (Ch. 95, 40 Stat. 1275)	Modification of the area to be dredged in the inner basin	H. Doc 1303, 64 <sup>th</sup> Congress, 1 <sup>st</sup> Session
1931	Shore-arm extension of the exterior breakwater transferred to Lincoln Park Commissioners	Public 797, 71 <sup>st</sup> Congress
1945 (Pub. L. No. 79-14)	Resumption of jurisdiction over the shore-arm extension breakwater and over certain navigable waters in Lake Michigan which lie in the northwestern part of the outer harbor	Public 14, 79 <sup>th</sup> Congress

### 1.10.5 Chicago River (Deep Draft Waterway)

The Chicago River consists of a main and a north branch. The channel runs from the mouth of the river at Rush Street to the junction of the North and South Branches at Lake Street, the North Branch from the junction to North Avenue, a turning basin south of North Avenue, the North Branch Canal which connects to the North Branch north of Chicago Avenue and at the turning basin, and the North Branch from North Avenue to Addison Street. The authorized channel depth is 21 feet below the normal pool elevation (-0.6 feet LWD) until the channel reaches the North Branch Turning Basin. Upstream of the turning basin, the authorized depth is 9 feet below the normal pool elevation, although this portion was never constructed. This project is maintained by the USACE Chicago District.

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Table 6: Chicago River authorization history.

River & Harbor Act (Law)	Work Authorized	Documents
1896, (29 Stat. 202)	Project depth of 16 ft	--
1899, (30 Stat. 1121)	Project depth of 21 ft in lieu of that fixed by act of 1896	Specified in act
1902, (32 Stat. 331)	Turning Basins	--
1907, (34 Stat. 1073)	Interpreted by Chief of Engineers, 11 April 1908, as adopting the new work of the then existing project for 21-ft depth	H.Doc 95, 56 <sup>th</sup> Congress, 1 <sup>st</sup> Session (Annual Report, 1900, p. 3863 and Annual Report
1919 (Ch. 95, 40 Stat. 1275)	Eliminated all work, except maintenance of the main river, North Branch, North Branch Canal, and turning basin	H.Doc 1294, 64 <sup>th</sup> Congress, 1 <sup>st</sup> Session
1946, (Pub. L. No. 525)	Dredging channel 9 ft deep to within 30 ft of existing bulkheads and river banks from North Ave. to Belmont Ave., thence 9 ft deep and 50 ft wide to Addison St.	H. Doc. 767, 78 <sup>th</sup> Cong., 2 <sup>nd</sup> Session

### 1.10.6 South Branch of the Chicago River (Shallow Draft Waterway)

The South Branch extends from Lake Street, where the North and South branches of the river split, to Ashland Avenue, where the channel connects with the CSSC. The South Branch, constructed at a depth of 21 feet, is part of the IWW and maintenance is currently authorized to a useable depth of 9 feet below the normal pool elevation (-2 feet CCD). This project is maintained by the USACE Rock Island District.

Table 7: South Branch of the Chicago River authorization history.

River & Harbor Act (Law)	Work Authorized	Documents
1896, (29 Stat. 202)	Project depth of 16 ft	--
1899, (30 Stat. 1121)	Project depth of 21 ft in lieu of that fixed by act of 1896	Specified in act
1907, (34 Stat. 1073)	Interpreted by Chief of Engineers, 11 April 1908, as adopting the new work of the then existing project for 21-ft depth	H.Doc 95, 56 <sup>th</sup> Congress, 1 <sup>st</sup> Session (Annual Report, 1900, p. 3863 and Annual
1919, (Ch. 95, 40 Stat. 1275)	Eliminated all work maintenance work on the South Branch as part of the Chicago River project	H.Doc 1294, 64 <sup>th</sup> Congress, 1 <sup>st</sup> Session
1930 (Ch. 847, 46 Stat. 1038)	Federal improvement of the IWW, establishing channel depth of 9 ft from Utica, IL to the Chicago and Calumet Rivers.	S. Doc. 126, 71 <sup>st</sup> Congress, 2 <sup>nd</sup> Session

## **1.11 Facilities and Activities in the Chicago Area Waterway System**

### **1.11.1 Vessel Fleet**

The CAWS is used by both barges and deep-draft vessels for the transportation of commodities. Barges move commodities to, from, and through all of the channels. Deep-draft vessels move commodities between Calumet Harbor and River and other deep-draft harbors on the Great Lakes. Although the authorized depths at Chicago Harbor and Chicago River are sufficient to allow passage of deep-draft vessels, these channels are currently only used by barges and other shallow-draft commercial vessels. Barges account for the majority of commercial inland navigation traffic on the Cal-Sag Channel and CSSC.

Barge traffic patterns are limited by the channel configuration both within the channel and in connecting channels. A typical barge is 35 feet wide and 195 feet long. Barges using the CAWS typically fleet two barges wide and three to four barges long in order to safely navigate the turns and bends and allow for passing in the channel. The maximum allowed draft for the barges is nine feet and the barges will typically draft to this maximum depth.

Calumet Harbor and River is used by both barges and deep-draft vessels. Barges move commodities to and from the harbor via Lake Michigan and the IWW Project. These shallow-draft barges also move commodities through the harbor between docks along the IWW and nearby Lake Michigan Harbors such as Indiana Harbor and Burns Waterway Harbor. Deep-draft vessels carry shipments between Calumet Harbor and River and other deep-draft harbors. The vessel fleet has included this range of barges and deep-draft vessels historically.

Since 1960, when the existing channel depth at Calumet Harbor and River was authorized, the size of the largest ships in the deep-draft harbor's vessel fleet has increased and is now 1,000 feet long and 105 feet wide. Calumet harbor and River cannot handle the largest vessels on the lake fleet given the channel width, dimensions and winding nature. Throughout the history of the harbor, deep-draft vessels have used up to the maximum available draft in the channel and continue to do so at 27ft. In 1937, shortly after the authorization of the existing Outer Harbor dimensions, the largest vessels using the harbor were 638 feet long and 65 feet wide. Prior to the opening of the St. Lawrence Seaway in 1959, the largest vessels using the harbor were 737 feet long and 75 feet wide. This is fairly similar to Seaway max vessels which are 740 feet long by 78 feet wide and much of the foreign fleet is made up of. Calumet Harbor and River can accommodate up to Seaway max vessels.

### **1.11.2 Related USACE Activities along the Chicago Area Waterway System**

The USACE Chicago and Rock Island Districts conduct various operations along the CAWS including O&M of lock facilities and general navigation features.

Chicago Harbor includes nearly 4 miles of breakwater protecting the harbor and the Chicago Harbor Lock and Controlling Works. The Chicago Harbor Lock, located at the mouth of the Chicago River (Site A in Figure 4) was designed and built by MWRD to control flow from Lake Michigan into the Chicago River. Construction was completed in 1938 and MWRD continued to operate and maintain the lock until 1984 when this responsibility was transferred to USACE. A major rehabilitation of the lock was completed by USACE in 2011. The Chicago River Controlling Works (CRCW) is operated by MWRD. Rehabilitation of several features of CRCW was completed in 2000, including a new turning basin wall, four south sluice gates, and three pumps. USACE will initiate backflow through the lock gates upon request by MWRD.

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Calumet Harbor includes a 2-mile breakwater maintained by USACE. A USACE storage building and stone dock are located at the mouth of the Calumet River. The dock, shown as site B in Figure 4, is used for storage of breakwater stone needed for on-going maintenance of harbor structures by the USACE Chicago District. The boat shed is used for storage and support for the district's fleet of work boats as well as storage of construction equipment and routine maintenance supplies for the District's marine structures.

The USACE Rock Island District operates and maintains the T.J. O'Brien Lock and Controlling Works, located in the Little Calumet River near its confluence with the Calumet River (Site D in Figure 4). T.J. O'Brien Lock controls river traffic between the Cal-Sag Channel and the Calumet River. The controlling works regulate the flow of water between Lake Michigan and the IWW, and are operated by USACE as directed by MWRD.

Lockport Lock and Dam is also maintained by the USACE Rock Island District. O&M of the structure was transferred to USACE in the early 1980s. The lock is located at the southern end of the CSSC (Site F in Figure 4) in Lockport, Illinois. The lock was designed and partially constructed by the State of Illinois. USACE completed the final stages of construction in 1933 and the lock was opened concurrent with four downstream locks and dams at Brandon Road, Dresden Island, Marseilles, and Starved Rock. The Lockport Powerhouse and Controlling works, owned and operated by MWRD, consists of a powerhouse, and associated controlling works.

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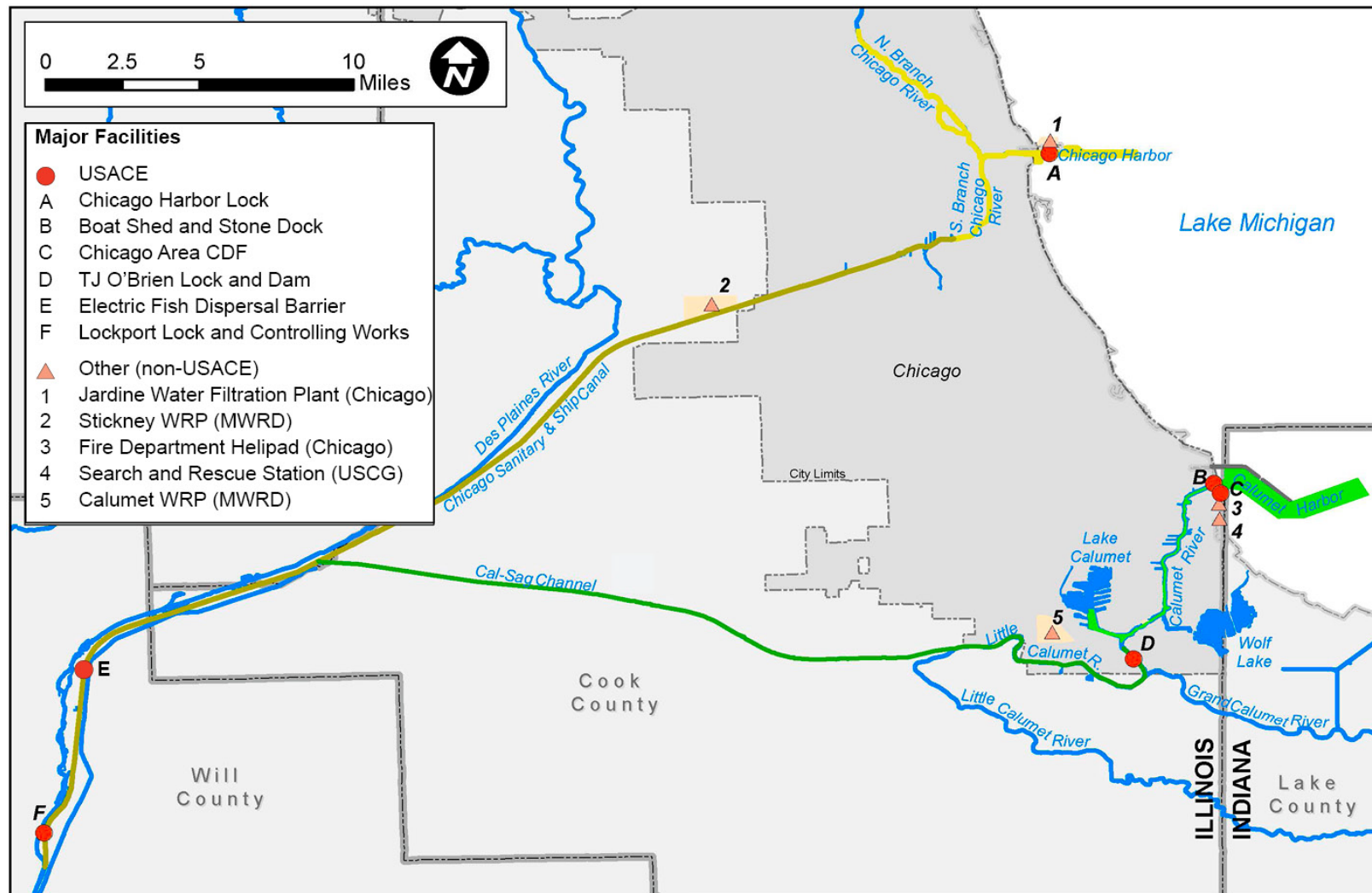


Figure 4: Major facilities along the CAWS.

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### **1.11.3 Non-USACE Facilities along the Chicago Area Waterway System**

There are many users of the federal channels and numerous private and commercial docks along the CAW, including other federal and non-federal agencies.

Federal facilities include a U.S. Coast Guard (USCG) Search and Rescue Station in Calumet Harbor south of the mouth of the Calumet River (Site 5 in Figure 4) as well as a seasonal sub-unit located at the Chicago Lock and Controlling Works. The National Oceanic and Atmospheric Administration maintains the southern Lake Michigan water level gauge, located on the USACE storage building property.

The Illinois International Port District (IIPD) owns several facilities along and near the Calumet Harbor and River federal channel. Several of the properties are leased to commercial users of the harbor, including Iroquois Landing at the mouth of Calumet River and docks at Lake Calumet. In addition to these commercial and industrial properties, the IIPD also operates and maintains the Harborside International Golf Center on the north shore of Lake Calumet.

MWRD also has facilities in the area. The Stickney Water Reclamation Plant (WRP) (Site 3 in Figure 4) at West Pershing Road and South Austin Boulevard treats wastewater from approximately 260 square miles and discharges to the CSSC. The Calumet WRP (Site 6 in Figure 4), at East 130<sup>th</sup> Street and Cottage Grove Avenue, treats wastewater from an area of approximately 300 square miles and discharges to the Little Calumet River. The Lemont WRP (Site 7 in Figure 4), near Lemont Road and Main Street in Lemont is the smallest treatment plant in the MWRD system. There are numerous combined sewer overflows (CSOs) that discharge to the CAWS as well as five major pumping stations: North Branch, Racine Avenue, 95<sup>th</sup> Street, 122<sup>nd</sup> Street, and 125<sup>th</sup> Street. The CSOs and pumping stations discharge only during extreme rain events when the system's storage and treatment capacity is exceeded. Other MWRD facilities in the area include five Sidestream Elevated Pool Aeration Stations along the Calumet River, Little Calumet River, and Cal-Sag Channel. These stations add oxygen to the water, improving water quality.

In addition to these activities, MWRD manages flows in the CAWS, as regulated by U.S. Supreme Court Decrees and Title 33 C.F.R., § 207.420 and 207.425. The C.F.R. provides for the maintenance of navigable depths to support commercial navigation and to prevent unintentional reversal into Lake Michigan. The U.S. Supreme Court Decrees govern the quantity of water from Lake Michigan that is diverted from the Great Lakes Basin to the Mississippi River Basin by the State of Illinois. Within Illinois, this quantity is subject to regulation by the Illinois Department of Natural Resources (IDNR), Division of Water Resources (DWR). In addition to the coordination of T.J. O'Brien Controlling Works operations with USACE, MWRD operates the controlling works at Lockport (Site 8 in Figure 4) and at Chicago Harbor (Site 2 in Figure 4).

City of Chicago facilities in the area include a water purification plant treating water drawn from Lake Michigan as well as docks along the channel. The Jardine Water Purification Plant is located within the exterior breakwater of Chicago Harbor and North of Navy Pier; it treats nearly one billion gallons of water per day (Site 1 in Figure 4). The City of Chicago Fire Department maintains a helipad adjacent to the Chicago Area CDF (Site 4 in Figure 4). City docks along the waterway system include a Chicago Department of Transportation dock on the CSSC at RM 319.7, a dock for Chicago Police Department Marine Unit at the mouth of the Chicago River, and a city recycling program dock along the North Branch of the Chicago River.

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There are also numerous commercial and private docks along the CAWS as shown in Table 8. There are 41 at Calumet Harbor and River with an additional 11 in Lake Calumet. Chicago River includes 20 docks, several of which are for commercial recreation vessels. The CSSC has the most docks, with 58 along the channel. In contrast, there are only 5 private docks along the Cal-Sag Channel.

Table 8: Distribution of private docks along the CAWS.

Federal Project	Number of Privately-Owned Docks
Calumet Harbor and River (includes Lake Calumet)	52
Cal-Sag Channel	5
CSSC and South Branch	58
Chicago River	20

### 1.12 Local Planning Efforts

Local planning efforts have been undertaken with the goal of revitalizing the Calumet region both economically and environmentally. This DMMP gives consideration to these local planning efforts. However, their acknowledgement within this DMMP is in no way an endorsement of any recommendations or findings from the efforts relative to the regulatory authority of USACE under Section 10 of the Rivers and Harbors Act or Section 404 of the CWA.

#### 1.12.1 Millennium Reserve: Calumet Core

The Millennium Reserve was launched by the State of Illinois in 2011 as part of President Obama's Great Outdoors Initiative to align federal programs with locally-developed conservation and recreation goals. The Calumet Core of the Millennium Reserve intends to catalyze innovative partnerships and action in the Calumet Region in a way that honors its cultural and industrial past, restores and enhances the natural ecosystems, supports healthy and prosperous communities and residents, and stimulates vigorous and sustainable economic growth. The entire study area lies within the 220 square-mile Calumet Core. As part of the program, the State of Illinois has invested nearly \$7 million in recreation and ecosystem restoration projects.

#### 1.12.2 Calumet Area Land Use Plan and Calumet Open Space Reserve

In 2001, a Calumet Area Land Use Plan was developed by the City of Chicago Department of Planning and Development in conjunction with the City of Chicago Department of the Environment, the Openlands Project, the Southeast Chicago Development Commission, and the Calumet Area Industrial Commission. In conjunction with this effort, a Tax Increment Financing (TIF) district to encourage private investment and an Open Space Reserve Plan to protect and enhance ecological features were developed.

Recognizing the Calumet Area's unique position with respect to commodity transport and industry as well as the preservation and restoration of natural areas, the Calumet Area Land Use Plan designates areas for both kinds of development. The City has made commitments to enhance the infrastructure of the area by adding additional heavy truck routes. Existing and potential wetland and habitat resources in the area are the foundation of ecological planning efforts. Approximately 4,800 acres in the area are planned to become part of the Calumet Open Space Reserve. The Reserve will be a matrix of open lands providing opportunities for recreation and ecological preservation.

### **1.12.3 Illinois International Port District Strategic and Capital Needs Study**

In June 2012, the Illinois International Port District (IIPD) published *A Strategic and Capital Needs Study*. The study evaluated IIPD's current financial situation, its near-term opportunities to invest in the local and regional freight transportation network, and long-term prospects for growth and development. The report recommended reinvestment in the Port District through operational and capital improvements as well as restructuring the IIPD's current property leasing program.

In a supplement to the study released in August 2012, the IIPD considered dredged material management needs. The supplement recognizes that a plan for future dredged material management is needed and this plan should be developed in partnership with stakeholders. The supplement recommends that the plan for managing material be developed in the context of the Strategic and Capital Needs Study. As recommended by the study, the IIPD has participated as a partner in the development of this DMMP.

### **1.12.4 Last Four Miles Plan**

Friends of the Parks, a Section 501(c)(3) [of Title 26 of the U.S.C.] designated park advocacy organization dedicated to preserving, protecting, and improving Chicago's parks and forest preserves, has undertaken an initiative to extend the vision of the Chicago Lakefront first proposed by Daniel Burnham in 1909. Burnham's plan proposed that the entire lakefront in Chicago be converted to publicly accessible lands and parks. While most of Chicago's lakefront has been developed in this way, Friends of the Parks proposes that the remaining 4 miles be converted to parkland as part of a Last Four Miles Plan. The southernmost portion of this plan includes land adjacent to the mouth of the Calumet River and includes the Chicago Area CDF. In 2014, the site of the CDF was listed by Friends of the Parks as one of ten priority endangered parks and open spaces in the Chicago area.

### **1.12.5 "Mud to Parks" Dredged Material Beneficial Use Project**

As part of the Illinois River Project of the Illinois Sustainable Technology Center, demonstration projects for the beneficial use of dredged material from Lower Lake Peoria have been conducted in the Calumet area. Illinois River sediment, dredged over 160 miles away, was transported to sites in the Calumet area in need of topsoil. The source of sedimentation at Lower Lake Peoria is primarily topsoil from agricultural lands within the Kankakee and Illinois River watersheds. State and local regulating agencies determined that the sediment quality was such that the material could be placed as-is, where it was allowed to dry and act as topsoil in its new location. The material has been delivered to the Calumet Area and placed at the former U.S. Steel South Works site beginning in 2004.

### **1.12.6 Chicago Southland Green TIME Zone**

The Chicago Southland Green TIME (Transit, Intermodal, Manufacturing, Environment) Zone strategy was developed by the South Suburban Mayors and Managers Association, the Center for Neighborhood Technology, the Delta Institute, and the Metropolitan Planning Council in 2010. The plan proposes economic development focused on transit oriented development, cargo oriented development supported by intermodal infrastructure, and green manufacturing, rooted in a commitment to preserve and improve the environment. Integral to the proposed development are the intermodal connections of which the CAWS is an integral part.

### 1.12.7 South Suburban Calumet Area Open Space Initiative

The South Suburban Mayors and Managers Association partnered with the Openlands Project in 2004 to develop an open space preservation and restoration plan for the Calumet Area's south suburban region that would enhance existing natural and cultural resources. Recommendations of the plan include the preservation and restoration of remaining natural areas and historic sites and the development of regional trails, including river corridors, for recreational use.

### 1.12.8 Cal-Sag Trail

The Cal-Sag Trail is currently being developed by various agencies and organizations as a 26-mile trail from Lemont to Burnham along the Cal-Sag Channel and Calumet River. This multi-year effort is intended to promote access to the waterway and provide regional recreation opportunities. The planned trail will pass through 14 communities and provide the public access to both natural and cultural resources.

### 1.12.9 Calumet National Heritage Area

In 1996, Congress passed legislation authorizing a study of the Calumet Region, including Calumet Harbor and River, by the National Park Service to determine whether an Ecological Park was warranted for the area. The goal of the Ecological Park would be to preserve open lands while simultaneously working to economically revitalize the area. A report summarizing the study's findings was published in 1998. The study recommended establishment of a National Heritage Area rather than an Ecological Park. To date, the area has not been assigned the National Heritage Area designation.

### 1.12.10 Our Great Rivers

In 2016, this vision and action plan was published by the Metropolitan Planning Council (MPC) in close partnership with the City of Chicago Office of the Mayor, Friends of the Chicago River, and Chicago Metropolitan Agency for Planning. The goal of this effort is to make Chicago's rivers (Chicago, Des Plaines, and Calumet) *inviting, productive, and living* by 2040 through a series of intermediate accomplishments that will contribute to these themes. In an effort to change the industrial image of Chicago's riverfront, efforts aimed at improving water quality, habitat, park space, and aesthetics will "unify activities and communities along the rivers, inspire new projects and ideas, motivate stewardship, guide new initiatives and prioritize investment."

## 1.13 Existing Projects near the Study Area

There are several USACE projects in close proximity to the study area, primarily focused on ecosystem restoration.

### 1.13.1 Indian Ridge Marsh Ecosystem Restoration

Located on the southeast side of Chicago, the Indian Ridge Marsh project site covers about 145 acres between Lake Calumet to the west and the Calumet River to the east. The site is bounded by 116th Street on the north, Torrence Avenue on the east, the Calumet River on the south, and the Norfolk and Western railroad on the west. The site was used for the disposal of slag from steel making operations and dredged materials from the Calumet Harbor and River during the 1970s. Since then, lower quality wetlands have been reestablished throughout the site. The poor hydrology of the disturbed area has isolated the wetlands and ponds, allowing the wetlands to become overgrown with the non-native

species and reducing the diversity of native aquatic life. Under the USACE Continuing Authority Program (CAP) Section 1135, the USACE Chicago District has partnered with the City of Chicago to preserve and restore the site. Construction was initiated in April 2011 and was completed in November 2014. The project received the 2014 Conservation and Native Landscaping Award from Chicago Wilderness. The award is for outstanding efforts to address environmental problems and restore lost function and native biodiversity in the Chicago Region. The project was closed out in September 2015.

### **1.13.2 Wolf Lake Ecosystem Restoration**

Wolf Lake is located on the northwest edge of Hammond, Indiana and the far southeast edge of Chicago, Illinois. The Illinois-Indiana state line nearly bisects the lake system. The Indiana portion of the lake covers more than 450 acres and has a maximum depth of 18 feet. The lake is separated into pools by dikes constructed during sand and gravel dredging for the Chicago Skyway toll road that crosses the lake. Ecosystem degradation in Wolf Lake included proliferation of exotic plant species, low diversity of plant and fish species, poor aquatic habitat, negative impacts from contaminants, and shoreline erosion. Under CAP Section 206, the USACE Chicago District partnered with the City of Hammond to implement an ecosystem restoration plan, completed in 2007, with total project costs of approximately \$7,300,000. The project features included creation of approximately 25 acres of new aquatic and wetland habitat, restoration of approximately 5,000 linear feet of shoreline, creation of deep holes to locally diversify the lake bottom, control of aquatic and shoreline exotic and undesirable plant species using herbicidal and biological controls, channel clearing, and creation of openings in dikes and causeways to promote a more natural hydroperiod of the lake and fringe marsh.

### **1.13.3 Grand Calumet River Environmental Dredging**

The Grand Calumet River spans approximately 15.5 river miles. The river is not currently used for commercial navigation. It was historically the site of industrial waste discharges and the waterway and sediment remain contaminated. The USACE Chicago District partnered with the Indiana Department of Environmental Management (IDEM) and the IDNR to conduct a Feasibility Study under Section 312 of WRDA 90, as amended. The study examined ways to address contaminated sediment and restore habitat in and along the Grand Calumet River and non-federal portions of the Indiana Harbor Canal. High levels of pollutants in the sediment have significantly impacted the ecosystem and habitat in the area. A feasibility report and EIS were prepared to document the evaluation process and potential effects on the human health and the environment as well as recommend alternatives for management of the contaminated sediment. Under the authority of the Great Lakes Legacy Act, IDEM and IDNR have partnered with USEPA to implement the proposed plan in portions of the river.

### **1.13.4 Electric Dispersal Barrier**

The Electric Dispersal Barrier, located near Romeoville, Illinois on the CSSC, was designed and constructed by USACE to reduce the risk of inter-basin transfer of fish between the Mississippi River and Great Lakes drainage basins. The barrier project includes several electric barriers. Barrier I was authorized as a demonstration project under Section 1202(1)(3) of the Aquatic Nuisance Prevention and Control Act [Pub. L. No. 101-636] and was placed in operation in April 2002. Barrier II was authorized by Section 1135 of WRDA 1986, as amended by Section 345 of the District of Columbia Appropriations Act of 2005 (Pub. L. No. 108-335). Barrier II includes two barriers, Barrier IIA and Barrier IIB, in operation since April 2009 and April 2011, respectively. In 2013, construction began on a new electric barrier, authorized by Congress as an upgrade to Barrier I. The barriers use steel electrodes secured to the

bottom of the CSSC. The electrodes are connected to a raceway, consisting of electrical connections to a control building. Equipment in the control building generates a direct current pulse through the electrodes, creating an electric field in the water that discourages fish from crossing. Laboratory and tagged-fish study results show that the electric barriers are an effective fish deterrent.

#### **1.13.5 Great Lakes and Mississippi River Interbasin Study**

As authorized in Section 3061 of WRDA 2007, USACE, in collaboration with federal, state and local agencies as well as nongovernmental entities, conducted the Great Lakes and Mississippi River Interbasin Study (GLMRIS). The GLMRIS Report was a study of the options and technologies (controls) that could be applied to prevent or reduce the risk of aquatic nuisance species (ANS) two-way transfer between the Great Lakes and Mississippi River basins through aquatic pathways. Five aquatic pathways within the CAWS that would permit ANS transfer were identified in the GLMRIS Report, including Calumet Harbor and River. In January 2014, the GLMRIS Report was released and the report identified eight alternative plans to prevent the transfer of ANS via aquatic pathways between the Great Lakes and Mississippi River basins. The eight alternatives included the No New Federal Action – Sustained Activities Alternative as well as a nonstructural alternative, which included controls such as education and monitoring; two technology alternatives to be implemented in a range of locations within the CAWS, and included nonstructural and structural ANS controls such as electric barriers and ANS treatment plants; two hydrologic separation alternatives, which included nonstructural measures and physical barriers to separate the Great Lakes and Mississippi River Basins; and two hybrid alternatives representing a combination of the nonstructural, technology and physical barrier alternatives.

The GLMRIS Report (USACE 2014), as discussed above, identified several alternatives to address the interbasin transfer of ANS; however, full implementation of several of the alternatives would require a substantial investment of time and of money. Given the potential urgency of the ANS threat and in response to a growing consensus, the Secretary of the Army determined that a formal evaluation of potential control options and technologies to be applied near the Brandon Road Lock and Dam was an appropriate next step.

The GLMRIS-Brandon Road Report (GLMRIS-BR) is a feasibility study that builds on the foundation of the GLMRIS Report (USACE 2014). Six alternatives were formulated and evaluated, including; a No New Federal Action (No Action) alternative; nonstructural alternative, which includes nonstructural measures such as education and monitoring; three separate technology alternatives, which include an electric barrier, acoustic fish deterrent, and/or a combination of the two, along with other structural and nonstructural control measures; and a lock closure alternative, which involves the permanent closure of BR Lock and Dam as well as nonstructural control measures. Each alternative is described in detail in the GLMRIS-BR Report (USACE 2018). The GLMRIS-BR Report included a Recommended Plan for implementation which was the Technology Alternative – Acoustic Fish Deterrent with Electric Barrier.

The Recommended Plan includes the following measures: nonstructural measures, acoustic fish deterrent, air bubble curtain, engineered channel, electric barrier, flushing lock and boat launches. The Recommended Plan was identified as the alternative plan that reduces the risk of Mississippi River Basin ANS establishment in the Great Lakes Basin to the maximum extent possible while minimizing impacts on waterway uses and users. The Final GLMRIS-BR Report was submitted to HQ USACE in April 2019.



## 1.14 Problems and Opportunities

### Problems

- Calumet Harbor and River and the Cal-Sag Channel continue to accumulate sediment, requiring dredging to maintain safe and efficient navigation.
- Unrestricted placement of the sediment from the Calumet River and the Cal-Sag Channel is not possible due to levels of contaminants in the sediment.
- There is insufficient placement capacity for sediment dredged from the federal channels:
- The existing placement site for material from Calumet Harbor and River, the Chicago Area CDF, is at capacity, and fill management measures can only provide limited capacity.
- There is currently no designated placement site for Cal-Sag Channel material. Placement of dredged material at the previously designated placement site for material from the Cal-Sag Channel, Lucas Berg CDF, was prohibited by WRRDA 2014, Section 6004.

### Opportunities

The problems identified above led to the following opportunities:

- Provide dredged material placement capacity to maintain authorized depths in Calumet Harbor & River and the Cal-Sag Channel for a minimum of 20 years.
- Regional planning for dredged material management would minimize costs and impacts to navigation.
- Sediment sampling indicates that the quality of sediment at Calumet Harbor has gradually improved, and the dredged material in the outer portion of the Federal channel, east of the Illinois and Indiana State boundary line, appears to be suitable for certain beneficial upland uses.
- Identify and address sources of sediment to reduce future overall dredging needs.
- Develop a regional dredged material management strategy and gain efficiencies by considering the CAWS holistically rather than project-by-project as has been done in the past.

## 1.15 Objectives and Constraints

### Objectives

- *Sustainability and Long-Term Planning:* Plans should consider the long-term sustainability of the project and opportunities for providing additional dredged material management capacity beyond the current planning period of analysis either as part of the current Base Plan or through expansion or modification of the Base Plan in the future.
- *Operational Efficiency:* Plans should consider and be compatible with current dredging and site maintenance practices.
- *Beneficial Use Compatibility:* Plans should seek to use material dredged from Calumet Harbor beneficially as part of the plan, maximizing the efficient use of resources and potentially extending the life of the Base Plan.



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- *Formerly Used Sites:* The study area is highly urbanized and industrialized. Where possible, plans should make use of existing infrastructure on sites that have been previously developed, minimizing impacts to scarce and valuable natural resources.
- *Site End Use:* Plans should consider the impacts of sediment management activities on future site uses.

### Planning Constraints and Considerations

- *Sediment Properties:* Existing sediment composition and contamination in some areas limit opportunities for dredged material handling, transportation, placement, and beneficial use.
- *Formerly Used Industrial Sites:* Due to the long industrial history of the study area, potential placement sites near the waterways are likely to have recognized environmental conditions (RECs). ER 1165-2-132 and ASTM E1527 provide guidance on the evaluation and use of sites that may contain Hazardous, Radioactive, or Toxic Waste (HTRW) materials. Plans should seek to avoid and minimize impacts from RECs.
- *Real Estate:* The CAWS is located within an urban, industrialized area where there is generally a limited amount of available land and property values are often high in comparison to rural areas.
- *Impacts to Neighboring Resources:* Plans should consider the impacts of proposed facilities, both during use and once they are closed, on surrounding resources and properties.
- *Jurisdictional Boundaries:* Calumet Harbor crosses the border between Illinois and Indiana; and the state line limits the eastward expansion of the existing confined disposal facility. Although there are portions of the Calumet Harbor and River federal navigation project that are located in Illinois and Indiana, industrial and commercial activity serviced by the project is conducted entirely within Illinois.

### 1.16 Report Organization

The content for this Draft DMMP/EIS was established based on USACE guidelines, professional judgment, and USACE standard NEPA practices. Chapters noted below by an asterisk (\*) are compliant with and required by CEQ Regulations for Implementing NEPA. Detailed technical and background information are provided in the appendices.

*Executive Summary\*:* Summarizes the Draft DMMP/EIS. It stresses the major conclusions, areas of controversy (including issues raised by agencies and the public), and the issues to be resolved (including the choice among alternatives).

*List of Acronyms\*:* A list of acronyms is included with the Table of Contents

*Chapter 1\* - Introduction:* Describes lead agencies, guiding regulations, study authority, statement of purpose and need, proposed study area and scope, study participants and coordination. Identifies problems and opportunities, project objectives and planning constraints, prior reports, and report organization.

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*Chapter 2\* - Affected Environment:* Describes the existing, potentially affected environment in the study area.

*Chapter 3\* - Plan Formulation:* Identifies a range of potential management measures that address specific problems identified in Chapter 1; develops screening evaluation; the basis (strategies) and considerations driving the development of alternative plans; associated screening; and establishment of focused alternative plans that adequately address the objectives established. Chapter 3 also describes the evaluation process leading to the final array of alternatives.

*Chapter 4\* - Environmental Consequences:* Discloses the potential environmental impacts of implementing each of the alternatives in the final array. This chapter also identifies applicable environmental commitments to avoid or minimize impacts. Mitigation needs are addressed in this chapter, as applicable.

*Chapter 5\* - Comparison of the Final Array of Alternatives:* Quantitatively compares the costs and benefits of the final array of alternatives.

*Chapter 6\* - Tentatively Selected Plan:* Describes the recommended alternative plan. This includes costs, project-specific considerations, design and construction considerations, and a project implementation strategy.

*Chapter 7\* - Public Involvement, Review and Coordination:* Summarizes the coordination with agencies and the public that has taken place during the study.

*Chapter 8\* - Compliance with Applicable Laws, Policies, and Plans:* Description of applicable laws, policies, and plans, as well as a list describing the study's compliance status for each.

*Chapter 9\* - Recommendation:* Documents the TSP and next steps leading to the final feasibility report.

*Chapter 10\* - References:* Lists the references cited throughout the report.

*Chapter 11\* - List of Preparers:* Provides a listing of preparers of this report.

*Chapter 12\* - Index*

*Appendices:* Separate documents that provide additional technical detail for analyses referenced throughout the main report.

## **2.0 AFFECTED ENVIRONMENT**

### **2.1 General Setting**

The planning process involves inventorying study area resources including the economic, social, demographic, physical, and biological resources. In addition, a forecast of future without project conditions was conducted that provides the basis from which alternative plans are formulated and impacts assessed. However, more precise local analysis is also required for the disposal site alternatives developed in the DMMP, which will be focused on the Calumet Harbor and River. Site-specific local analyses are included in the impacts analysis for the final array of alternatives in Chapter 4.0

### **2.2 Earth Resources**

The following sections describe pertinent earth resources within the study area.

#### **2.2.1 Geology and Topography**

The underlying regional bedrock is Silurian-age dolomite of the Niagaran Series. This rock resulted from marine deposition when all of northeastern Illinois and much of the neighboring Great Lakes region was the floor of a tropical sea from about 440 to 410 million years ago. This formation is the foundation for Great Lakes alvars and reefs.

#### **2.2.2 Maintenance Dredging and Disposal**

Calumet Harbor and River are the only waterways in the CAWS that regularly require maintenance dredging. At Calumet Harbor and River, an average of 50,000 cy of sediment is dredged annually, based on the history of dredging between 1984 and 2018. This dredging volume is expected to continue in order to maintain authorized depths. As shown in

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Table 9, roughly half of the total volume of dredged material came from the river and half from the harbor.

Based on dredging records between 1984 and 2018, approximately 44,000 cy of material were dredged from Calumet Harbor and River annually. Roughly the same amount of material was dredged from each waterway. However, due to a lack of capacity in the existing CDF, the USACE Chicago District has not been able to maintain full channel widths for many years. Therefore a conservative projection of 50,000 cy of annual dredging, alternating between Calumet Harbor and River, is considered over the 20-year study period. Although the annual average of material dredged from the Calumet Harbor and River is assumed to be approximately 50,000 cy, maintenance dredging events do not occur every year, as shown in the Table 6.5. These totals are for Calumet Harbor and River and do not include the 62,000 cy dredged from Chicago Harbor in 1986.

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Table 9: Historical Dredging Volumes for Calumet Harbor and River (1984-2018)

Year	Volume Dredged (cy)	
	Calumet Harbor	Calumet River
1984	0	99,000
1985	0	108,000
1989	0	83,000
1994	0	68,000
2000	0	205,000
2001	291,000	0
2003	0	135,000
2007	131,000	0
2009	167,000	0
2011	0	56,000
2012	20,000	7,000
2013	30,000	0
2014	35,000	35,000
2017	20,000*	60,000
2018	11,500*	
<b>Yearly Average</b>	<b>19,000</b>	<b>25,000</b>
<b>Channel Total</b>	<b>674,000</b>	<b>856,000</b>
<b>Percent of Total</b>	<b>44%</b>	<b>56%</b>

[\*] – blasted bedrock from Calumet Harbor; not included in yearly average or total.

While the Cal-Sag Channel has not been dredged since the 1970s, the waterway continues to slowly accumulate sediment. This has reduced the average channel width from 225 feet to 160 feet, but the vessel fleet is currently able to accommodate this width. Rather than dredge this backlog, the channel will be maintained at this minimum acceptable width if maintenance dredging is required over the 20-year study period.

Although Chicago Harbor and Chicago River have not been dredged for nearly 30 years, periodic soundings measure the available draft and existing channel dimensions. As with Calumet Harbor and River, data from the soundings is used to classify the channel's depth. The available draft in Chicago Harbor and Chicago River is typically around 20 feet. Although in some areas the depth is around 16 feet, this is still significantly more than the 9 feet required for the barge traffic that uses the channel.

### 2.2.3 Sediment Quality

Analysis of sediment quality within the study area was conducted as part of the GLMRIS Report Appendix B. Additional information on this topic can be found in Section B.1.2.3 of the Appendix B and is incorporated here by reference.

The quality of the sediment from the Calumet Harbor and River and the Cal-Sag Channel were used to select alternative measures and determine the Federal Standard associated with each channel. See Section 3.4.1 for a summary of Federal Standard requirements and Federal Standard determinations for the projects. The chemical constituents of the remaining waterways in the CAWS that do not require maintenance dredging are unknown.

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A Tier 1 Sediment Evaluation for material dredged from Calumet Harbor and River was completed in November 2010. Based on the sediment quality, the evaluation divided the federal channel into three segments, shown in Figure 5.

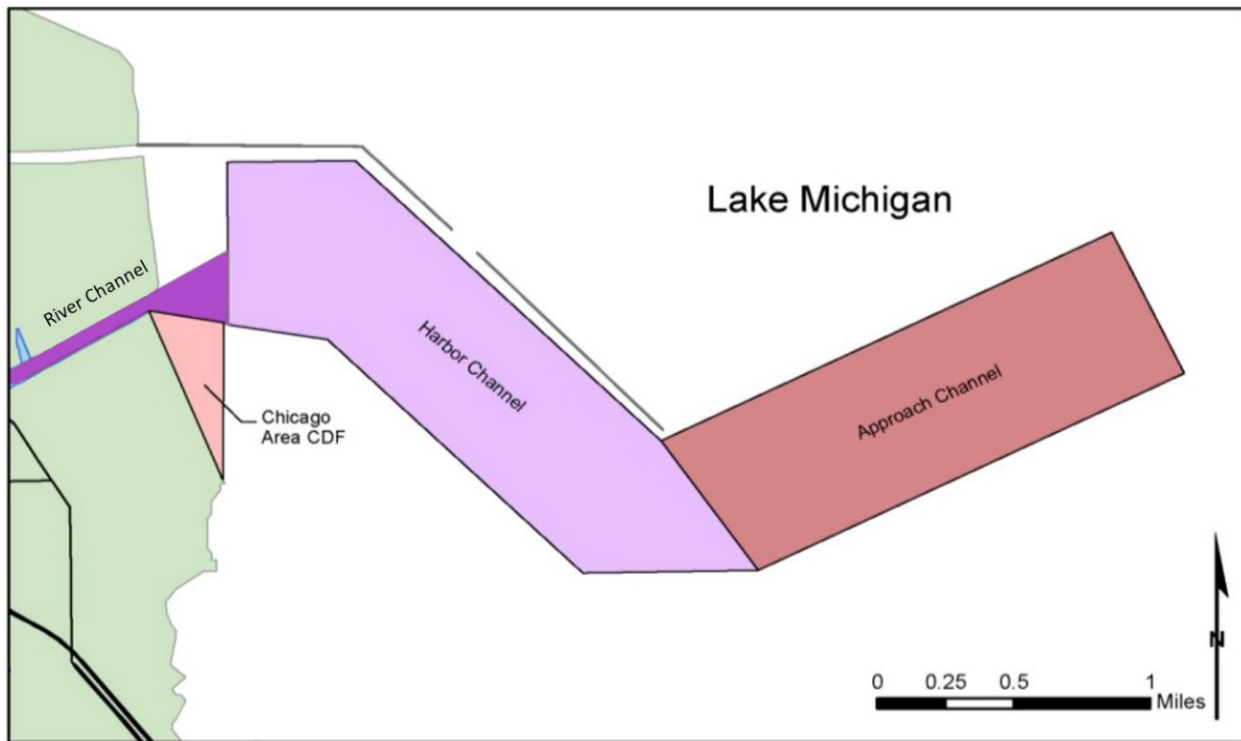


Figure 5: Calumet Harbor and River environmental channel segments.

When the Chicago Area CDF was constructed, a list of contaminants of concern for the Calumet Harbor and River was developed based on guidance established by the USEPA in 1977 in Guidelines for the *Pollutional Classification of Great Lakes Harbor Sediments*. The list of contaminants of concern identified for Calumet Harbor and River sediment includes arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, zinc, ammonia nitrogen, oil and grease, phosphorus, cyanide, and polychlorinated biphenyls (PCBs). Although the list does not include semi-volatile organic compounds (SVOCs), analytical testing for these compounds was performed for a sediment sampling event in 2000 in Calumet Harbor.

There are many potential sources for PCBs, and no single specific source has been identified for the PCBs in the Calumet River sediment. Although the industrial manufacture of PCBs was banned in the U.S. in 1977, the more-chlorinated PCBs are resistant to degradation and can remain in the environment for long periods of time, and PCBs can migrate via various contaminant transport mechanisms through the air, water, and/or sediment over long distances (National Research Council 2001). As a result, PCBs are ubiquitous and are present throughout the Chicago area and the Great Lakes.

None of the past sediment samples have exceeded the 50 milligrams per kilogram (mg/kg) PCB regulatory threshold under the Toxic Substances Control Act. Historically, concentrations of PCBs in the water samples collected from the Calumet River have been below the detection limit, but the concentrations of PCBs measured in sediment samples from the Calumet River have been

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heterogeneous and varied from non-detectable to a maximum of 39 mg/kg in 1989, as shown in the Tier 1 Sediment Evaluation prepared November 2010.

For the Tier 1 Sediment Evaluation, analytical sample results for the harbor and river areas were acquired from two different sources. The first source was the analytical results of grab samples collected from the barge during past dredging operations. After dredged material is placed into the barge, sediment samples are collected on a weekly basis prior to the placement of the material into the CDF. The second information source was two separate sediment sampling events, where grab or core samples were collected directly from specified locations within the river or harbor. The first sampling event was the Calumet River in 1999, and a second sampling event was conducted in Calumet Harbor in 2011. More detailed technical information on these events is available upon request and included in the Environmental Engineering Appendix (Appendix C).

**Approach Channel:** The Approach Channel has not required dredging in the past and, therefore, sediment quality data are not available for this portion of the channel. Data from an open-lake reference site near the channel suggests that the material may meet federal guidelines for open-lake placement. If a need for future dredging in this portion of the channel is identified, sampling and analysis of the sediment will be conducted.

**Calumet River:** Calumet River sediment has historically contained elevated concentrations when compared with background reference samples. A review of the grab sample results from the Calumet River reveals that the concentrations of parameters, such as arsenic, chromium, copper, lead, manganese, zinc, and oil and grease, are high in comparison to metropolitan background concentrations. The most recent data are provided in the Environmental Engineering Appendix (Appendix C) and in a report by Perkey, Chappell, and Seiter, (2017).

**Calumet Harbor:** The sediment within the Calumet Harbor area contains lower contaminant concentrations than the material in the Calumet River. Sediment samples were collected from Calumet Harbor in 2011 in order to evaluate whether the Calumet Harbor dredged material might be suitable for unconfined upland beneficial use.

A human health risk-based screening was conducted based on the analytical results of Calumet Harbor sediment samples collected in 2011 to determine whether the analytical by results from the sampling event were less than either the Illinois Environmental Protection Agency (IEPA) Tiered Approach to Corrective Action (TACO) or USEPA regional residential soil screening levels (see Appendix C). Some of the individual sediment or aqueous phase synthetic precipitation leaching procedure (USEPA - Test Method 1312) concentrations exceeded these risk-based concentrations. However, some of the constituents were naturally occurring and/or found at low ambient levels throughout most soils (such as polycyclic aromatic hydrocarbons (PAHs) in Illinois urban areas). As a consequence, these constituents were not considered to be a health threat when compared to background soil and/or streambed sediment concentrations of these constituents across Illinois. The human health risk-based screening did not identify any constituents of concern that would preclude unconfined upland beneficial use for the proposed settings, such as recreational parkland (athletic fields), brownfields, roadbeds, and/or structural fill or landfill cover.

The same 2011 data were used to conduct a preliminary evaluation of the suitability of the material for open-water placement. A Tier II mixing zone analysis was conducted to evaluate both mechanical and



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hydraulic placement. The sediment contains anthropogenic compounds, including both organics and metals, and a Tier III evaluation would be required to confirm the suitability of the sediment for open-water placement. For the mixing zone analysis, it was presumed that the open-water placement would be within the State of Indiana and ammonia was estimated to be the parameter requiring the most dilution to meet the Indiana Lake Michigan water quality standard. For mechanical dredging and open-water disposal using a split-hull barge, the maximum ammonia standards are met with a mixing zone measuring approximately 165 feet by 425 feet. The 24-hour ammonia standard is met within a mixing zone approximately measuring 2,300 feet long and 700 feet wide. For hydraulic dredging, modeling showed that the discharge of dredged sediments from a pipeline would meet the maximum ammonia standard approximately 1,000 feet away from the outfall. The 24-hour average ammonia standard would be met approximately 8,400 feet from the outfall. Based on the levels of ammonia in the results from elutriate testing and the results from biological testing, open-water placement is not recommended at this time. However, the concentrations are not high enough to rule out open-water placement as a potentially acceptable alternative in the future. Future evaluation, including sediment and elutriate chemical analysis and biological testing, should be conducted to re-evaluate open water placement and fully investigate this placement alternative.

Cal-Sag Channel - In February 2010, a Cal-Sag Channel Sediment Data Analysis Report was completed to compile and analyze all sediment data collected in the Cal-Sag Channel, including data from MWRD, USEPA, and USACE between 1992 and 2009 (Appendix C). The report identified trends in contamination over time, locations where contamination is elevated, and a comparison of all sediment data obtained to date.

A statistical analysis of all data was conducted to determine whether there were spatial or temporal trends. In 2010, samples were collected at outfalls to the channel and locations upstream of each outfall. There was greater variation throughout the Cal-Sag Channel than between the outfall and upstream locations. Concentrations of metals and SVOCs generally increased with time, although it is important to note that the sampling depths for the 2009 samples were targeted to a specific sediment dredge depth, and other samples were obtained from different depths. Most of the historical samples were obtained with sample depths that were generally isolated to the top six inches of sediment, but some of the historical set also included sampling intervals over sediment depths that were greater than the targeted sampling depths from this study.

Sediment samples collected in 2009 were analyzed for various metals, SVOCs, pesticides, VOCs, and general chemistry and compared to IEPA TACO soil screening levels, non-TACO standards, and Probable Effect Concentration (PEC)/Threshold Effect Concentration (TEC) levels. While the concentrations of all tested parameters exceeded the various criteria, the most prominent were SVOCs, ammonia, PCBs, and metals. These parameters are therefore expected to be the focus of future investigations. As with Calumet Harbor and River, none of the sediment samples exceeded the 50 mg/kg PCB regulatory threshold under the Toxic Substances Control Act (TSCA).

Most of the parameters of concern in the 2009 sediment samples were primarily bound to the sediment. Dissolved concentrations of most contaminants of concern were often not in exceedance of regulatory standards. However, the Total Suspended Solids (TSS) remained high (on the order of 10,000 mg/l to 100,000 mg/l or higher) throughout all elutriate tests. Fine particulates that do not readily settle control the concentrations of most of the parameters of concern in sediment samples taken from the channel. The elevated TSS and associated contaminants identified by elutriate tests could have a

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significant impact on the design of dredging, treatment, and placement of dredged sediment from the Cal-Sag Channel.

Total and dissolved ammonia concentrations were also elevated in the elutriate tests with the 2009 sediment samples. In the elutriate samples, total ammonia concentrations were as high as 112 mg/L and dissolved ammonia concentrations were approximately 80% of the total ammonia concentrations. These concentrations are much greater than surface water quality standards and most of the ammonia is in the dissolved phase.

### 2.2.4 Sediment Physical Properties

Sediment in the existing Chicago Area CDF was dredged from the Calumet Harbor and River federal channel and is considered representative of sediment in the channel. Two separate geotechnical investigations of sediment in the existing CDF were completed under contract to USACE (CDM 2006 and AECOM 2009). The investigations classified the materials and tested Atterberg Limits, Moisture Content, Permeability, Proctor Tests, Gradation Analyses, Specific Gravity, Consolidated-Undrained Triaxial Shear Strength, and Unconsolidated-Undrained Triaxial Shear Strength.

The investigation by CDM included 12 soil borings to depths between 16 and 31.5 feet below grade and three grab samples in the area covered by water. The report described the material in the CDF as consisting of 15 to 20 feet of silt and clay overlying native fine- to medium- grained sands. The overlying silts contain some clays and sands. Numerous samples exhibited staining, hydrocarbon odors, and sheens.

The investigation by AECOM sampled at three different locations in the CDF with a Bobcat excavator at depths between 0 and 5 feet. The soil conditions encountered at each location consisted of gray silty clay with varying amounts of sand. The results of the analyses are presented in Table 10. Bearing capacity tests showed that the material is weak when wet, only able to hold loads of 0.25 tons per square foot, but can hold much greater loads, over 7.0 tons per square foot, when dry. Additionally, the permeability of the material is very low, with values ranging from  $K = 6.14 \times 10^{-8}$  to  $4.08 \times 10^{-7}$ .

Table 10: Physical properties of sediment in Chicago Area CDF.

Parameter	Sample Location		
	(Site 1)	(Site 2)	(Site 3)
Sample Depth	5 ft	4 ft	5 ft
Soil Condition	wet	wet	dry
Classification	CL	CL	CL
Liquid Limit	42	48	36
Plastic Limit	25	24	19
Plasticity Index	17	24	17
Moisture Content (%)	42.6	37.0	17.9
Permeability	4.82E-07	7.50E-08	6.14E-08
Specific Gravity	2.686	2.712	2.705
Optimum Water Content (%)	19.3	19.0	18.0
Maximum Dry Density (pcf)	99.0	101.3	108.7
Bearing Capacity (TSF)	0.25	0.25	+7.0

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In addition to the tests cited above, additional tests were conducted in 2013 on material dredged from Calumet Harbor as part of an investigation to support evaluation of beneficial use opportunities. Three samples were classified according to the Unified Soil Classification System (USCS) and tested for Atterberg Limits, water content, Standard Proctor, grain size, and organic content by AECOM's laboratory in Vernon Hills. The results of the analysis are shown in Table 11.

Table 11: Physical properties of sediment dredged from Calumet Harbor.

Parameter	Sample		
	(S-1)	(S-2)	(S-3)
Classification	CL	CL	CL
Liquid Limit	43	32	29
Plastic Limit	23	21	20
Plasticity Index	20	11	9
Moisture Content (%)	66.79	50.98	55.73
Optimum Moisture Content (%)	18.1	15.6	15.7
Maximum Dry Density (pcf)	100.2	103.3	104.6
Percent passing #200 sieve (%)	77.9	83.6	80.5
Percent organic content (%)	1.84	1.03	1.05

All three samples produced similar results, as shown in Table 11. Initially, the dredged material is very saturated and cannot be worked with until it is dried and is closer to the optimum water content. Once it is dried however, it should be acceptable for use in construction. With the high amount of fine particles (percent passing #200 sieve) and lean clay classification, the material likely has permeability on the order of  $10^{-6}$  to  $10^{-8}$  cm/sec which would control seepage.

Additionally, the material has a low organic content, less than 2%, so there is little risk of organic degradation to cause settlement. The Atterberg limits indicate that the material is plastic and will allow for easier construction than if the material was silty. The samples all have a maximum dry density greater than 100 pcf, which would be acceptable for construction applications such as roadway embankments, berms, and site cover.

### Cal-Sag Channel

Sediment within the Cal-Sag Channel can be predominantly characterized as silts and clays with some fine sand. An investigation of the geotechnical characteristics of the sediment was conducted in 2009 under contract to USACE by the Futurenet Group. The general characteristics as determined by the investigation are shown in

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Table 12. Fine sediment material is more prevalent on the sides of the channel than in the center of the channel due to prop wash from boats.

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Table 12: Summary of Cal-Sag Channel sediment properties from 2008 and 2009 testing.

Parameter	Range	Average	Weighted Average
Organics <sup>1</sup>	1.2 – 9%	5.7%	--
Total Organic Carbon <sup>1</sup>	0.04-8.6%	3.9%	--
Specific Gravity	2.5-3.0	2.7	--
Percent Solids	49.9-69.2%	58.2%	59.3%
USCS Classification	CH-SP	High plasticity silt or clay with fine trace sand (CH or MH)	N/A

<sup>1</sup> Percent organics and TOC should be similar for the same sample, but statistical difference likely comes from a different set of samples or the methods.

% = Percent; NA = not applicable; Data is from 2008 and 2009.

The sediment physical properties of the remaining waterways in the CAWS that do not require maintenance dredging have not been characterized for this analysis.

### 2.3 Hydrology & Hydraulics

Analysis of hydrology and hydraulics within the study area was conducted as part of the GLMRIS Report Appendix B. Additional information on this topic can be found in Section B.1.2.5.1 and B.2.2 of Appendix B and is incorporated here by reference.

Chicago is located on the southwestern shore of Lake Michigan at the natural boundary of two of the country's major watersheds, the Great Lakes and the Mississippi River Basin. These once hydrologically separate drainage areas were connected through human intervention, first with the Illinois and Michigan (I&M) Canal, which opened in 1848. Due to the pollution in the Chicago River, there were concerns that the water posed a public health risk. As a consequence, the Chicago Sanitary and Ship Canal (CSSC) was constructed along the same path as the I&M Canal and used to move goods and divert the flow of the Chicago River away from Lake Michigan, which was and still remains the primary source of drinking water for the City of Chicago. As a result of these actions and widespread urbanization, the hydrology of the Chicago area is highly modified from its natural condition. Chicago's coastline is also heavily modified with hardened revetments and coastal structures such as jetties, groins, and breakwaters.

For Calumet Harbor, the coastal wave climates and subsequent littoral drift was studied and characterized in the past by Chrzastowski & Trask (1995). In summary, waves generated by large storms are attenuated and/or blocked by the outer breakwaters of Calumet Harbor. This provides a relatively calm aquatic area within the harbor. The resulting littoral drift from continuous wave action moves in an easterly direction within this zone. The littoral sands are not sequestered by Calumet Harbor structures, but they are attenuated.

This is provided by evidence that the navigation channel continually fills with mostly fine-grained lacustrine materials. This is the main type of material dredged/removed to keep the navigation channel clear for use by commercial ships.

### 2.4 Water Resources & Water Quality

Section 303(d) of the CWA requires states, territories, and authorized tribes to report to the USEPA on the quality of surface waters (e.g. lakes, streams, Lake Michigan, wetlands). "Impaired" waters are

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defined as those not meeting water quality standards, and “threatened” waters are those not expected to meet water quality standards by the next listing cycle. The IEPA prepares a 303(d) report every other year and has delineated impairments to designated uses in the CAWS.

For the 303(d) report, the Illinois EPA uses data collected from the Lake Michigan Monitoring Program nearshore component (IEPA 2018). This nearshore assessment includes 196 square miles of Lake Michigan open-waters, which represents about 13% of the approximately 1,526 square miles of Lake Michigan waters in the State of Illinois. The entire 196 square miles were rated as fully supporting for the following uses: aquatic life, primary contact (e.g., swimming, water skiing), aesthetic quality, and public and food processing water supply (IEPA 2018). However, fish consumption use in the Illinois portion of Lake Michigan was assessed as not supporting due to contamination from PCBs and mercury. Sources for these contaminants were listed as atmospheric deposition and unknown sources. The assessment of 64 miles of Lake Michigan shoreline in Illinois determined that the water quality was not supporting for primary contact and fish consumption due to contamination from *E.coli* bacteria, PCBs, and mercury (IEPA 2018). In the 2018 draft 303(d) report, Calumet Harbor within the Illinois border was assessed as fully supporting of aquatic life, primary contact, and aesthetic quality, but it was not assessed for fish consumption.

The Illinois EPA 303(d) report lists the Calumet River as fully supporting for aquatic life, but it is not supporting for primary contact or fish consumption due to mercury, PCBs, and fecal coliform (IEPA 2018). The sources for this contamination were listed as atmospheric deposition, combined sewer overflows, urban runoff/storm sewers, and unknown sources. In regards to the Cal-Sag Channel, the Illinois EPA 303(d) report (2018) lists the eastern, 10.35-mile segment as not supporting of indigenous aquatic life or fish consumption, and primary contact and aesthetic quality were not assessed. The causes for these impairments include mercury, PCBs, and dissolved oxygen, and the sources were the same ones listed for the Calumet River. The same document reports that the western, 5.74-mile portion of the Cal-Sag Channel is fully supporting of aesthetic quality but it is not supporting of indigenous aquatic life or fish consumption, and primary contact was not assessed. The causes for the impairments include mercury, PCBs, dissolved oxygen, total suspended solids (TSS), pH, and total phosphorus, and the sources include impacts from hydrostructure flow as well as the same ones listed for the Calumet River. Sediment quality is described in Section 2.2.3.



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Table 13: 303(d) list of water quality impairments for the CAWS.

Waterway	Designated Use	Cause of Impairment	Priority
Chicago Harbor	N/A	N/A	N/A
Chicago River	Fish Consumption	Mercury, Polychlorinated biphenyls	Medium
	Aquatic Life	pH, Total phosphorus	
	Primary Contact Recreation	Fecal coliform	
South Branch Chicago River	Fish Consumption	Mercury, Polychlorinated biphenyls	Medium
CSSC	Fish Consumption	Mercury, Polychlorinated biphenyls	Medium
	Indigenous Aquatic Life	Dissolved oxygen, pH, Total phosphorus	
Calumet Harbor	N/A	N/A	N/A
Calumet River	Primary Contact Recreation	Fecal coliform	Medium
	Fish Consumption	Mercury, Polychlorinated biphenyls	

Source: Illinois Environmental Protection Agency 2018.

### 2.5 Air Quality

Congress established the basic structure of the Clean Air Act (CAA) in 1970, and then made major revisions in 1977 and 1990. It is a comprehensive law that regulates emissions from stationary and mobile sources of air pollution. One of the key provisions concerns the control of common, widespread air pollutants, known as “criteria” pollutants, and the CAA directs the USEPA to set and revise the national ambient air quality standards (NAAQS) for these pollutants. Presently, there are NAAQS for the following six criteria pollutants: sulfur dioxide, carbon monoxide, particulate matter (PM), nitrogen dioxide (one of a group of highly reactive gasses known as “nitrogen oxides (NOx)”), ozone, and lead. The USEPA also has the authority to add additional pollutants.

Implementing the air quality standards is a joint responsibility of the states and USEPA. States are responsible for the development of state implementation plans (SIPs), and the USEPA assists the states by providing technical and policy guidance. The CAA has minimum requirements for SIPs to achieve the NAAQS, and the states are required to develop and manage the SIPs to improve areas with poor air quality and protect clean air from degradation. The USEPA issues national emission standards for new stationary sources and reviews the SIPs to ensure compliance. Geographical areas that do not meet the NAAQS are designated as “nonattainment areas,” and, conversely, areas that meet the NAAQS are called “attainment areas.”

According to the most recent data on the USEPA Green Book website (current as of March 31, 2019), the study area, Cook County, Illinois and Lake County, Indiana, are designated as non-attainment areas for ozone. Cook County was a non-attainment area for lead as recently as 2017, but it was re-designated as a maintenance area for lead on March 28, 2018. Ozone is a secondary pollutant formed primarily by chemical reactions from emissions of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) that occur in the presence of sunlight, and NOx and VOCs are referred to as precursors of ozone.

## 2.6 Climate

The climate of the study area is typical of northeastern Illinois and may be classified as humid continental, characterized by warm summers, cold winters, and daily, monthly, and yearly fluctuations in temperature and precipitation. National Weather Service data collected from the area around Chicago report average temperatures of 24.9° F in winter and 71° F in summer. Mean annual precipitation is 36.57 inches with the majority of the precipitation occurring April through October. Accumulated snowfall averages 46.2 inches for the study area. Wind speed averages 11 to 12 miles per hour. Early spring floods may occur when snow accumulations extend into a period of increasing temperature that results in melting. If this occurs when soils are already saturated, and given the amount of impervious surfaces within the study area, runoff increases dramatically.

## 2.7 Noise

The noise levels in the study area are typical of a major metropolitan area with mixed residential, commercial, and industrial areas. Noise levels typically peak during daylight hours as traffic, construction work, and activity levels increase. Noise levels are generally highest along major roadways and where there are higher concentrations of industrial land uses.

## 2.8 Biological Resources

Analysis of biological resources within the study area was conducted as part of the GLMRIS Report Appendix B. Additional information on this topic can be found in Section B.1.3 of Appendix B and is incorporated here by reference. The following provides pertinent information on ecological, biological and habitat resources within the study area.

### 2.8.1 Lacustrine Habitat

Natural lacustrine functions and structure of the Calumet Harbor, Chicago Harbor, and Lake Calumet are impaired by alterations to the natural shoreline including lakefill and updrift coastal structures constructed during the development of the City of Chicago and the Calumet region. However sandy expanses of lake bottom do exist in Lake Michigan at points adjacent to the study area. Manmade structures, such as the breakwaters also provide shelter for various aquatic organisms and create a rocky, dolomitic habitat.

The Calumet Harbor and River navigation channel forms a unique non-conformity with drop-offs in the flat sand surface of coastal Lake Michigan. The clearing of the channel via maintenance dredging (USACE 1975, 1982) also exposes the dolomitic bedrock that naturally forms reefs and alvars across the Great Lakes. The combination of the breakwaters and navigation channel seem to provide a desired habitat for the yellow perch (*Perca flavescens*) and smallmouth bass (*Micropterus dolomieu*), which are native species of concern within Lake Michigan in terms of ecology and fisheries.

### 2.8.2 Riverine Habitat

Natural riverine functions and structure have been largely lost throughout the study area due to the modifications that occurred to facilitate navigation, commercial and industrial activities. The CAWS is currently maintained as a large navigation network with vertical walls to facilitate commercial shipping activities. Various turning basins, slips, and rock revetments provide limited habitat structure.

There are a few sand bars with aquatic vegetation in the Study area, primarily located under the I-90 tollway, in which yellow perch and northern pike (*Esox lucius*) species have been observed by USACE biologists in the past.

### 2.8.3 Aquatic Macroinvertebrates

Several studies on aquatic macroinvertebrates in Southern Lake Michigan have been completed as well as a few within the Grand Calumet River and Indiana Harbor Canal. Garza & Whitman (2004) of the United States Geological Survey investigated macroinvertebrate assemblages of Southern Lake Michigan and observed macroinvertebrates from forty taxa. Approximately 81% of the observed taxa consisted of a species of segmented worm (*Chaetogaster diastrophus*) and a variety of round worms (*Nematoda* spp).

Nalepa et al. (1998) also conducted surveys throughout southern Lake Michigan that encompassed areas adjacent to the City of Chicago. The study identified three main groups of macroinvertebrates including amphipods (*Diporeia*), worms (*Oligochaeta*), and bivalves (*Sphaeriidae*). Another study investigating the diet of lake whitefish (*Coregonus clupeaformis*) from 1985 to 2000 revealed a shift in the macroinvertebrate prey items with the establishment of the zebra and quagga mussels (*Dreissena polymorpha* and *Dreissena burgensis*). As *Dreissena* spp. filtered the water of Southern Lake Michigan it reduced the food availability to native macroinvertebrates and severely impacted populations of amphipods (*Diporeia* spp), the dominant food source for Lake Whitefish. At the turn of the century, Lake Whitefish along the southeast coast of Lake Michigan had turned to consuming Chironomidae as their primary prey item with *Dreissena polymorpha*, *Mysis relicta* and *Sphaeriidae* supplementing the diet. Yellow Perch diets were analyzed under yet another study in southeast Lake Michigan in 1998 and 1999. These fish were found to be consuming primarily *Mysis relicta*, *Chironomidae*, *Gammarus* spp. and isopoda.

### 2.8.4 Freshwater Mussels

Native freshwater mussels that may occur within the Calumet Region include giant floater (*Pyganodon grandis*), paper pondshell (*Uterbackia imbecillis*), fat mucket (*Lampsilis siliquoidea*), and lilliput (*Toxolasma parvum*). All of these mussel species are indicative of low gradient riverine or lacustrine, sandy and silty habitats. The three-ridge (*Amblema plicata*) was recently discovered in historic side-cast dredge materials at the mouth of the Burns Harbor in Indiana by USACE biologists. Consequently, there is potential for this species to be present in Lake Michigan and tributaries; however, because the condition of the mussel shell was that of a very old specimen, the potential is considered very small.

### 2.8.5 Fishes

The CAWS is primarily a man-made system that was not intended to support aquatic communities. Fish and macroinvertebrate assemblages in the study area are transient and somewhat tolerant of poor water quality, inadequate habitat, and poor fluvial function.

A total of 48 species has been recorded within a 2-mile radius of the Calumet Harbor and River mouth, (riverine records included). Records were queried from the Fishes of Chicago Region Fish Database (CRFD) (in publishing process, University of Chicago Press), which have voucher specimens housed at the Illinois Natural History Survey, Field Museum of Natural History, and Southern Illinois University (Table 14). Data provided by the USFWS 2015 invasive species sampling are anecdotal with no voucher specimens provided; however, the species list corroborates with the CRFD

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with a few exceptions. Species of concern within the study area include longnose sucker (*Catostomus catostomus*), mottled sculpin (*Cottus bairdii*), chestnut lamprey (*Ichthyomyzon castaneus*), smallmouth bass (*Micropterus dolomieu*), and yellow perch (*Perca flavescens*), due to low abundance and occurrence, importance to fisheries, or are considered a “species in decline”. Three species have been extirpated from southern Lake Michigan: lake char (*Salvelinus namaycush*); the brook char coaster strain (*Salvelinus fontinalis*); and, the northern longear sunfish (*Lepomis peltastes*) (however there is a recent collection of *L. peltastes* in confluent Wolf Lake by Dr. Willink from Shedd Aquarium). Nine of the 48 species recorded are non- native, these include the three Pacific salmonids (*Oncorhynchus* spp.), the european brown trout (*Salmo trutta*), common carp (*Cyprinus carpio*), goldfish (*Carrassius auratus*), alewife (*Alosa psuedoharengus*), white perch (*Morone americana*), and round goby (*Neogobius melanostomus*).

Although the banded killifish (*Fundulus diaphanus*) is listed as State Threatened (ST) in Illinois, it is readily found within the Calumet Region.

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Table 14: Fishes recorded from within a 2-mile radius of Calumet Harbor 1878-2010

Common Name	Species	CRFD1	USFWS2	Status
Alewife	<i>Alosa pseudoharengus</i>		X	non-native
Rock Bass	<i>Ambloplites rupestris</i>	X	X	abundant
Black Bullhead	<i>Ameiurus melas</i>	X	X	abundant
Brown Bullhead	<i>Ameiurus nebulosus</i>		X	rare
Freshwater Drum	<i>Aplodinotus grunniens</i>	X	X	abundant
Goldfish	<i>Carassius auratus</i>	X	X	non-native
Longnose Sucker	<i>Catostomus catostomus</i>	X		SE (IL)
White Sucker	<i>Catostomus commersonii</i>		X	abundant
Mottled Sculpin	<i>Cottus bairdii</i>	X		species of concern
Common Carp	<i>Cyprinus carpio</i>	X	X	non-native
Gizzard Shad	<i>Dorosoma cepedianum</i>	X	X	abundant
Banded Killifish	<i>Fundulus diaphanus</i>	X	X	ST (IL)
Nine-Spine Stickleback	<i>Gasterosteus aculeatus</i>	X		common
Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>		X	species of concern
Channel Catfish	<i>Ictalurus punctatus</i>		X	common
Smallmouth Buffalo	<i>Ictiobus bubalus</i>		X	common
Black Buffalo	<i>Ictiobus niger</i>	X		common
Brook Silverside	<i>Labidesthes sicculus</i>	X	X	common
Green Sunfish	<i>Lepomis cyanellus</i>		X	abundant
Pumpkinseed	<i>Lepomis gibbosus</i>	X	X	abundant
Bluegill	<i>Lepomis macrochirus</i>	X	X	abundant
Northern Longear Sunfish	<i>Lepomis peltastes</i>	X		extirpated
Smallmouth Bass	<i>Micropterus dolomieu</i>	X	X	common
Largemouth Bass	<i>Micropterus salmoides</i>	X	X	common
White Perch	<i>Morone americana</i>	X	X	non-native
White Bass	<i>Morone chrysops</i>	X	X	common
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	X	X	common
Round Goby	<i>Neogobius melanostomus</i>	X	X	non-native
Golden Shiner	<i>Notemigonus crysoleucas</i>	X		common
Emerald Shiner	<i>Notropis atherinoides</i>	X	X	common
Spottail Shiner	<i>Notropis hudsonius</i>	X	X	abundant
Sand Shiner	<i>Notropis stramineus</i>	X		abundant
Coho Salmon	<i>Oncorhynchus kisutch</i>	X		non-native
Rainbow Trout	<i>Oncorhynchus mykiss</i>	X	X	non-native
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	X	X	non-native
Yellow Perch	<i>Perca flavescens</i>	X	X	common
Bluntnose Minnow	<i>Pimephales notatus</i>	X	X	abundant
Fathead Minnow	<i>Pimephales promelas</i>	X		common
White Crappie	<i>Pomoxis annularis</i>	X		rare
Black Crappie	<i>Pomoxis nigromaculatus</i>		X	common
Three-Spine Stickleback	<i>Pungitius pungitius</i>	X		common
Flathead Catfish	<i>Pylodictis olivaris</i>		X	rare
Longnose Dace	<i>Rhinichthys cataractae</i>	X		common
European Brown Trout	<i>Salmo trutta</i>	X	X	non-native
Brook Char	<i>Salvelinus fontinalis</i>	X		extirpated
Lake Char	<i>Salvelinus namaycush</i>	X		extirpated
Walleye	<i>Sander vitreus</i>		X	common
Central Mudminnow	<i>Umbra limi</i>	X		common

1 Chicago Region Fish Database (Verardi/Pescitelli/Willink, under publication review)

2 USFWS invasive species survey of Calumet Harbor 2015

### 2.8.6 Reptiles & Amphibians

A few native amphibians and reptiles occur within the waters of the CAWS. The most important species, which is a species of concern in Indiana and listed as Threatened in Illinois, is the mudpuppy (*Necturus maculosus*) salamander. This is a permanently aquatic species with external gills. It is known to occur in dolomitic rock habitats, both natural and manmade, along the entire coast of Lake Michigan. This species has temporal aspects of occupying nearshore littoral habitats during the winter, and then deeper offshore habitats in the summer due to water temperature affinities. Native amphibians that may be found in the area could include common species such as bullfrog (*Rana catesbiana*) and leopard frog (*Rana pipiens*). Common native reptiles that may be found in the CAWS include common snapping turtle (*Chelydra serpentina*), painted turtle (*Chrysemys picta*), red-eared slider (*Trachemys scripta elegans*) and northern water snake (*Nerodia sipedon*).

### 2.8.7 Birds

The study area offers refugia habitat for a variety of resident and migratory birds. The harbored lacustrine zone provides safe resting and foraging habitat. It is also important to note that the study area is within the Great Lakes route of the Mississippi Flyway, a globally significant migration route for hundreds of bird species and in particular, migratory song birds. Additional detail on birds within the Calumet region is provided by Brock (1999), where a minimum of 163 species were identified to utilize the nearby Grand Calumet River watershed. Common birds directly using the immediate study area over the affected work zone would be water fowl, which could include at different times of the year, but not limited to coot (*Fulica americana*), mallard duck (*Anas platyrhynchos*), common loon (*Gavia immer*), northern shoveler (*Anas clypeata*), black duck (*Anas rubripes*), merganser (*Mergus merganser*), teal (*Anas carolinensis*), and canvasback (*Aythya valisneria*). Certain wading birds utilize the breakwaters for foraging, which include great blue heron (*Ardea herodias*) and black-crown night-heron (*Nycticorax nycticorax*). Birds of prey observed by USACE biologists in the past have included red tail hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperi*), osprey (*Pandion haliaetus*) and snowy owl (*Bubo scandiacus*).

### 2.8.8 Mammals

Common native mammals that have may be observed in the vicinity of the CAWS include eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), Virginia opossum (*Didelphis virginiana*), racoon (*Procyon lotor*) and coyote (*Canis latrans*). Coyotes have actually been observed on breakwaters in the past. Non-native, invasive mammals include Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), European house mouse (*Mus musculus*), feral dog (*Canis familiaris*) and feral cat (*Felis domesticus*).

### 2.8.9 Threatened and Endangered Species

#### Federally-Listed Species

The proposed project is within the range of the federally-listed endangered Indiana bat (*Myotis sodalis*), piping plover (*Charadrius melodus*), and Karner blue butterfly (*Lycaeides Melissa samuelis*), and the threatened northern long-eared bat (*Myotis septentrionalis*), rufa red knot (*Calidris canutus rufa*), Pitcher's thistle (*Cirsium pitcheri*) and Mead's milkweed (*Asclepias meadii*). However, these species or their critical habitats do not exist in the highly urbanized and/or industrial landscapes that are typical of the CAWS.



### **State-Listed Species**

The IDNR scoping response letter dated 23 January 2019 identified the state-threatened banded killifish as being known to occur in the area. Additionally, IDNR notes that the state-endangered osprey are known to nest in the general area.

## **2.9 Cultural Resources**

### **2.9.1 Archaeological and Historical Properties**

Analysis of archaeological and historical properties within the study area was conducted as part of the GLMRIS Report Appendix B. Additional information on this topic can be found in Section B.1.4 of Appendix B and is incorporated here by reference.

Historic structures in the general study area include three properties on the National Register of Historic Properties (NRHP): AVR 661, a 1925-1949 naval defense structure, located in Calumet Harbor (added to the National Register in 1980), Calumet Park located on the Lake Michigan shoreline just south of Calumet Harbor (added to the National Register in 2003), and the Material Service, a barge constructed in 1929 that sank off the coast of Indiana in 1936. The Calumet Park field house was made a Chicago City Landmark in 2006. To the southeast of Calumet Harbor, near Avenue G and 102nd Street, is the oldest structure within the City of Chicago, the Illinois-Indiana Boundary Marker. Dating to 1833, this stone obelisk was made a Chicago City Landmark in 2002. The Calumet Harbor Lighthouse is also located within the harbor, atop the outer breakwater.

### **2.9.2 Social Setting**

Before the 1870's, the Calumet River was a series of marshes, beach ridges, and shallow lakes. Since the 1870's the Calumet River shoreline has been dominated by steel mills, grain elevators, rail yards and factories. The steel industry dominated the area until the 1980s. The Chicago neighborhoods of South Chicago, South Deering, East Side, and Hegewisch were built as residential housing for the immigrant workers for these industries. Modern waterfront use is almost entirely industrial, consisting of steel mills, rail yards, tank farms, scrap yards, and abandoned factories.

### **Demographics**

The City of Chicago is located in Cook County, Illinois. The city has an estimated population of 2,722,568. Chicago is a racially and ethnically mixed city with the biggest racial groups being white (32.7%), black or African American (30.1%), and Latino or Hispanic (29.0%).

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Table 15: Population and demographic information for Cook County, Illinois and Chicago, Illinois

	City of Chicago		Cook County, IL	
<b>Total Population</b>	2,722,586		5,238,541	
<b>Hispanic or Latino AND Race</b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>
White	890,322	32.7	2,235,598	42.7
Black or African American	820,180	30.1	1,226,134	23.7
American Indian or Alaska Native	3,354	0.1	5,216	0.1
Asian	167,575	6.2	363,084	6.9
Native Hawaiian/Other Pacific Islander	442	0.0	1,123	0.0
Some other race	4,983	0.2	9,461	0.2
Two or more races	46,017	1.7	85,621	1.6
Hispanic or Latino (of any race)	789,713	29.0	1,312,304	25.1
<b>Percent Minority (Not White Alone)</b>	67.3		57.3	

2013-2017 American Community Survey 5-Year Estimates

### 2.9.3 Native American Coordination

The following federally-recognized Native American tribes were most recently contacted by letter dated 07 January 2019 regarding the proposed project and seeking input on the planning process: Kickapoo Tribe of Oklahoma, Kickapoo of Kansas, Miami Tribe of Oklahoma, Citizen Potawatomi Nation, Forest County Potawatomi, Nottawaseppi Huron Potawatomi, Hannahville Potawatomi, Prairie Band Potawatomi, Pokagon Band of Band of Potawatomi Indians, Ho-Chunk, Sac and Fox Nation of Missouri in Kansas and Nebraska, and Sac and Fox Nation of Oklahoma. Mailing list and coordination letters are included in the Coordination and Public Involvement Appendix (Appendix A).

### 2.9.4 Recreation

The City of Chicago offers a multitude of recreation opportunities near or on the CAWS, including boating, kayaking, swimming beaches, public parks, fishing, wildlife watching, and multi-use recreation paths, including the 18.5-mile Lakefront Trail on Lake Michigan. Recreation opportunities vary locally, but tend to be concentrated in residential and land use areas.

Two large city parks are near the study area, providing swimming, soccer and softball fields for area residents. Rainbow Park and Beach is located to the north of Calumet Harbor. Just south of Calumet Harbor is Calumet Park with its historic field house, athletic facilities, public beach, and public boat launch. Located on the Illinois portion of Wolf Lake to the east-southeast is the William W. Powers Recreation Area, a popular birdwatching, boating, and fishing area.

Calumet Harbor and River provide access to Lake Michigan from mooring and storage areas on the Cal-Sag Channel. Recreation lockages through the O'Brien Lock on the Calumet River exceed 7,000 craft annually. Recreational traffic is primarily privately owned vessels docked at marinas on the Cal-Sag Channel using the Calumet River for access to Lake Michigan.

### 2.10 Socioeconomic/Environmental Justice

Executive Order 12898 of 1994 directs federal agencies to identify and address any disproportionately high adverse human health or environmental effects of federal actions to minority and/or low-income

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populations, which the DoD implemented through the Department of Defense's Strategy on Environmental Justice of 1995. These documents are publically available online, but have also been included as Appendix K to this report and posted to the project website for convenience and accessibility. <https://www.lrc.usace.army.mil/Missions/Civil-Works-Projects/Calumet-Harbor-and-River/>

Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. The demographic data presented in

Table 15

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Table 16 serves as the ‘general population’ against which more site specific populations along the CAWS are compared during plan formulation and analysis. Localized comparisons of racial and/or ethnic minority populations related to the alternative plans developed in this report are included in Section 4.9.

EO 12898 does not provide criteria for determining whether an area consists of a low-income population. For the purpose of this assessment, the CEQ criteria for defining a low-income population has been adapted to determine whether a minority population occurs in the watershed. A low-income population exists within a given geographic area where:

- The percentage of low-income households is at least 50% of the total number of households
- The percentage of low-income households is meaningfully greater than the percentage in the general population or other appropriate unit of geographic analysis.

Low-income populations as of 2019 cover those whose income is \$25,750 for a family of four and are identified using the Census Bureau’s statistical poverty threshold. The Census Bureau defines a “poverty area” as a Census tract with 20 percent or more of its residents below the poverty threshold and an “extreme poverty area” as one with 40 percent or more below the poverty level. This is updated annually at <https://aspe.hhs.gov/poverty-guidelines>. The income data presented in

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Table 16 serves as the ‘general population’ against which more site specific populations along the CAWS are compared during plan formulation and the impact analysis. Localized comparisons of socioeconomic data related to the alternative plans developed during this study are included in Section 4.9.

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Table 16: Household income data for the City of Chicago, Illinois and Cook County, Illinois.

	City of Chicago		Cook County, IL	
Number of Households	1,046,789		1,956,561	
Household Income	Total <sup>[1]</sup>	Percent (%)	Total <sup>[1]</sup>	Percent (%)
Less than \$10,000	107,687	10.3	159,561	8.2
\$10,000 - \$14,999	57,490	5.5	89,384	4.6
\$15,000 - \$24,999	113,976	10.9	189,773	9.7
\$25,000 - 34,999	95,984	9.2	173,798	8.9
\$35,000 - \$49,999	124,810	11.9	232,740	11.9
\$50,000 - \$74,999	164,936	15.8	321,931	16.5
\$75,000 - \$99,999	114,428	10.9	234,621	12.0
\$100,000 - \$149,000	132,548	12.7	278,593	14.2
\$150,000 - \$199,999	60,954	5.8	126,015	6.4
\$200,000 or Greater	73,976	7.1	150,319	7.7
Median Household Income (\$)	52,497		59,426	
Percent of Individuals below Poverty Level	20.6		15.9	

2013-2017 American Community Survey 5-Year Estimates

[1] 2017 inflation-adjusted dollars

### 2.11 Land Use

Land use in the study area is typical of a major metropolitan area, with a blend of residential, commercial, and industrial uses. Residential uses are dispersed throughout the study area. Commercial uses are concentrated along major roadways. And industrial uses are predominantly located adjacent to the CAWS, rail lines, and major roadways (Figure 6).

The historical land use data show that the land cover in the CAWS basin in the past couple decades has not changed significantly. In addition, the coverage and strictness of stormwater management ordinances have grown continuously in the CAWS basin since the first ordinance promulgated by the MWRDGC in 1972. By 1986, the State of Illinois passed legislation that authorized northeastern Illinois counties to develop their own regional stormwater management programs. These stormwater management programs restricted the increase of peak runoff from the new developed land or reconstructed pavement surfaces. The impact of the stormwater detention can be confirmed by analyzing the annual maximum series of the streamgage records at the gaging stations in the CAWS or surrounding watersheds. A recent U.S. Geological Survey (USGS) study (Over et al. 2012) attempted to correlate the timeframe of countywide ordinance with the observed trends in the flood-peak records. The flood peaks did not show a definitive increase in the past two decades.

In addition to the land use change and implementation of stormwater management ordinances, the hydrology of the CAWS basin may also be affected by major flood control projects, climate change, and green infrastructure implementation.

Calumet Harbor and the banks of the Calumet River have been dedicated to long-term industrial use since the 1870's. Modern waterfront use is almost entirely industrial, consisting of steel mills, rail yards, tank farms, grain elevators, scrap yards, and abandoned factories. The banks of the river are also lined



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with thirty-six docks, wharves, and terminals for the handling of grain, iron ore and concentrates, coal, cement, and general cargo.

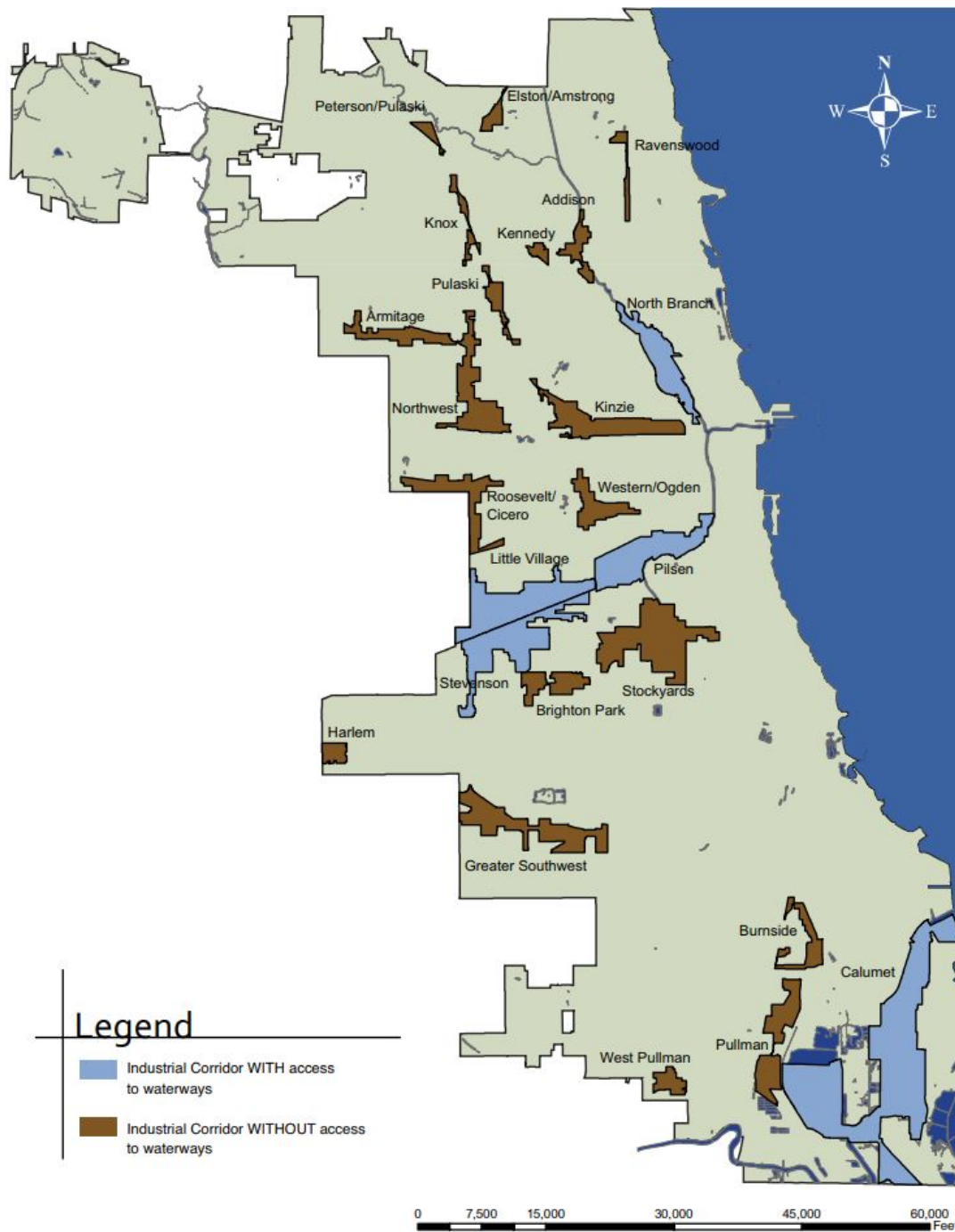


Figure 6: Industrial corridors in Chicago. Light blue polygons signify industrial corridors with water access. Brown polygons signify industrial corridors without waterfront access. (Source: City of Chicago)

## **2.12 Hazardous, Toxic, and Radioactive Waste (HTRW)**

There is a long history of “hazardous, toxic, or radioactive waste” (HTRW) contamination in the study area. Early steel mills were abundant in the study area from the late 1890s up until the 1980s and slag and other by-products from heavy manufacturing were disposed of according to the methods of that era. In general, for the decades between 1870 and 1970, industries frequently discarded their wastes into the nearest stream or on low ground (Colten 1985). Starting in the 1960s, there were heightened public concerns about pollution, and, in 1970, President Nixon called for the establishment of the USEPA. The Federal government has since promulgated much stronger environmental rules and regulations to protect public health and the environment.

Recent sources for HTRW concerns are documented by the EPA at the following website <https://www.epa.gov/il/environmental-issues-southeast-chicago>, and <https://www.epa.gov/il/environmental-issues-chicagos-little-village-pilsen-neighborhoods>

## **2.13 Aesthetic Quality**

Aesthetic quality and high quality aesthetic resources throughout Chicago, Illinois and Cook County, Illinois vary locally. In Chicago, prominent aesthetic resources near the CAWS include the city skyline, the shoreline of Lake Michigan, city parks, forest preserves, public art installations, and recognizable architecture. Other notable aesthetic resources along the CAWS in Cook County outside of Chicago include numerous forest preserves and the Des Plaines River.

## **2.14 Public Health and Safety**

There are significant restrictions on public use of the Calumet River and Harbor due to ongoing contamination issues. Consuming fish from these waterways or aquatic recreation involving primary contact with the water in the Calumet River is not recommended.

The EPA is tracking a number of potential sources of dust and contaminants that may impact human health in the study area. A summary of these sites can be found at <https://www.epa.gov/il/environmental-issues-southeast-chicago>, and <https://www.epa.gov/il/environmental-issues-chicagos-little-village-pilsen-neighborhoods>

## **2.15 Traffic and Transportation**

The study area has traffic and transportation patterns indicative of a major urban center and intermodal hub. It is served and transected by multiple highways, including I-55, I-57, I-90, I-94, I-290, and I-294. Public transportation is provided by commuter trains, light rail, and surface bus routes. Chicago is also an intermodal city, with multiple heavy rail lines, stockyard, and transfer facilities. The CAWS is used primarily to move large quantities of goods to and within the study area and it provides direct connections to other Great Lakes markets and the Inland Waterway System. Movement of commodities by water reduces road traffic.

## **2.16 Waterborne Commerce**

The following inventory of historic waterway traffic and projected traffic demand is specific to the waterways in the CAWS that require maintenance dredging, based on historical records, and would potentially be most affected by this DMMP.

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Waterway traffic demand forecasts are a necessary input for navigation system modeling. Projections help guide waterway system investments by outlining future demand for waterway services at critical points in the system. When coupled with transportation costs, these forecast demands also provide a first order estimate of the benefits waterway shippers gain from using the system and their willingness-to-pay for different levels of service (NED benefits). These are both necessary for estimating the relative benefit-cost ratios (BCRs) for project-specific investments.

Refer to Appendix B – Economic Analysis and its associated attachments for a complete description of historic traffic levels and the methods, data sources, and findings of the Calumet Harbor and River and Calumet-Sag traffic demand forecasts.

### Commodity Movements at Calumet Harbor

Calumet Harbor and River are currently maintained at dimensions that allow for deep-draft vessels (those that draft greater than 12 feet) to utilize the channels. The U.S. Army Corps of Engineers (USACE) Waterborne Commerce Statistics Center (WCSC) provides data regarding annual tonnage movements on U.S. waterways and is utilized to establish tonnage trends at Calumet Harbor and River.

Calumet Harbor & River moved an average of approximately 7.5 million tons of commodities over the last three years (2015-2017) with an average of 63% of those tonnages being moved on deep-draft vessels and the rest being transported on shallow-draft barges. Tonnage to and from docks along Calumet Harbor and River has been declining over recent years and has not been over 13 million since 2007, prior to the economic downturn in 2008.

Table 17: Historical Calumet Harbor and River tons by commodity group: 2000-2017 (000s) <sup>1</sup>

Year	2000	2005	2010	2015	2016	2017	Base Year (Average: 2015-2017)
Tons (1000s)	13,051	12,683	10,094	8,642	6,706	7,302	<b>7,550</b>

1/ All values shown in thousands. Data source: Waterborne Commerce Statistics Center.

The Calumet Harbor and River traffic demand forecast was developed for nine commodity groups aggregates, chemicals, coal, grains, iron and steel, ores and minerals, petroleum products, crude petroleum, and others. Key market drivers were considered for each commodity group that was determined to likely have a significant impact on the forecast. The traffic demand forecast for Calumet Harbor and River made use of the tonnage trends at Calumet Harbor and River (USACE WCSC data) as well as projections from Criton Corporation when available. The Criton Corporation projections include forecasts for 24 separate dry commodities moving by barge on the Mississippi River and its connecting waterways.

A 3 year average tonnage from 2015 through 2017 was used as the base year tonnage for the forecast. An average of years is used to avoid forecasting based on an unusually low or high traffic year. This study uses a 20 year period of analysis from 2026 to 2045. Due to uncertainty surrounding changes within commodity markets and associated policies over the entirety of this period, changes in traffic demand are only projected until 2021, and then held constant. This forecast period reflects the years for which indexes are available from the Criton Corporation. The Microsoft Excel Forecast Function for linear regression was used to forecast future traffic demand changes for commodities without a Criton

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Corporation index (Criton, 2017). The resulting expected traffic demand forecast is presented in Table 18.

Table 18: Expected traffic demand forecast: Calumet Harbor and River tons by commodity group (000s) <sup>1</sup>

Year	Coal	Petro. Prod.	Crude Petrol.	Aggreg.	Grains	Chem.	Ores/ Min.	Iron/ Steel	Others	Total
2018	623	1,795	0	477	215	166	1,629	2,006	1,535	8,446
2019	623	1,772	0	478	235	166	1,649	2,032	1,535	8,490
2020	623	1,714	0	478	235	166	1,692	2,080	1,535	8,523
2021	623	1,641	0	480	235	166	1,655	2,149	1,535	8,484
2022-2045	623	1,547	0	480	235	166	1,605	2,199	1,535	8,389

1/ Annual tonnage levels were held constant as of 2022. All values shown in thousands.

Best-available information was used to develop the expected (most likely) forecast for Calumet Harbor and River. However, there is uncertainty surrounding this forecast because of uncertainties about future changes in commodity markets and associated policies.

While there is a low likelihood that the expected forecast underestimates what the actual traffic demand will be in the future, there is a high likelihood the expected forecast overestimates what future traffic demand will be. This is because historical trends and market research indicate a declining trend in key markets impacting the channel. For example, while the expected forecast assumes that coal will remain constant for the period of analysis, which accounts reflects low tonnages in recent years, it is also reasonable to speculate that coal traffic may continue to decline (eventually approaching zero tons in the channel). Since commodity traffic forecasts and associated transportation rates are a key input for determining project benefits, both a high and low forecast scenario were developed to characterize the uncertainty surrounding the expected traffic demand forecast.

As indicated in Table 18, the expected forecast, total tons to/from the federal channel are expected to stay around 8.4 million for the period of analysis. For the high forecast, tonnage reaches approximately the 12.4 million mark, and on the low end tonnage drops to around 5 million. Refer to Appendix B (Economics) and its attachments for further information regarding the data and methods used to develop these forecast scenarios.

### **Commodity Movements along the Cal-Sag Channel**

The Cal-Sag Channel has an authorized channel depth of 9 feet and an authorized channel width of 225 feet. Maintenance is authorized to a useable depth of 9 feet below the normal pool elevation, which is normally maintained at -2 feet referenced to Chicago City Datum (CCD). Since the standard jumbo barge is 35 feet wide, this channel width allows for 2-barge wide tow configurations (70 feet wide) to pass each other. The U.S. Army Corps of Engineers (USACE) Waterborne Commerce Statistics Center (WCSC) provides data regarding annual tonnage movements on U.S. waterways and was utilized to establish tonnage trends at Calumet Harbor and River.

Tonnage through the channel has been on a slight decline over recent years, but has remained fairly close to its 8-year average of 5.3 million tons (2010 through 2017, the years following the 2007 to 2009 recession). The iron and steel, petroleum products, ores and minerals, and others commodity groups

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represent approximately 80% of the tonnage shipped through the Cal-Sag Channel. Historically, coal has also represented a large percentage of tonnage traffic but this was no longer the case by 2014.

Historical tonnage through Cal-Sag Channel is displayed in Table 3. As shown, tonnage through the channel has been on a slight decline over recent years, but has remained fairly close to its 8-year average of 5.35 million tons (2010 through 2017, the years following the 2007 to 2009 recession). The iron and steel, petroleum products, ores and minerals, and others commodity groups represent approximately 80% of the tonnage shipped through the Cal-Sag Channel. Historically, coal has also represented a large percentage of tonnage traffic but this is no longer the case by 2014.

Table 19: Historical tonnage (in 1000s) for the Cal-Sag Channel.

Year	2000	2005	2010	2015	2016	2017	Base Year (2017)
Tons (1000s)	8,007	8,483	5,074	4,746	4,357	5,202	5,202

1/ Source: WCSC. Tonnages presented at 5-year increments between 2000 and 2015. All values presented in thousands.

The Cal-Sag Channel traffic demand forecast was developed for nine commodity groups: aggregates, chemicals, coal, grains, iron and steel, ores and minerals, petroleum products, crude petroleum, and others. The forecasting effort conducted for the Great Lakes and Mississippi River Interbasin Study (GLMRIS) Brandon Road Integrated Feasibility Study and Environmental Impact Statement – Will County, IL (GLMRIS-BR Report) released November 2018, was used to inform the traffic projected traffic demand on the Cal-Sag Channel. The use of that information was determined to be appropriate for this effort, as the GLMRIS-BR traffic demand forecast accounted for waterway movements transiting Brandon Road Lock and Dam, which is located on the Des Plaines River downstream of the confluence of the Cal-Sag Channel and the Chicago Sanitary and Ship Canal. The GLMRIS-BR forecast was subject to USACE technical and policy reviews, an Independent External Peer Review (IEPR), and public review.

The base year used for the GLMRIS-BR traffic demand forecast was a 3-year average of 2012 to 2014. A comparison of recent observed traffic has shown that the forecasted traffic for GLMRIS-BR is still appropriate. For the current Cal-Sag Channel forecast, the base year was revised to 2017 to account for additional years of observed traffic. Typically, an average of years is used to avoid forecasting based on an unusually low or high traffic year (as was done with GLMRIS-BR). However, since 2015 and 2016 tonnages were low compared to the years prior, the single most recent year of WCSC data (2017) was used as the base year for this traffic demand forecast.

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Table 20: Expected traffic demand forecast: Cal-Sag tons by commodity Group (in 1000s)

Year	Coal	Petro. Prod.	Crude Petrol.	Aggreg.	Grains	Chem.	Ores/ Min.	Iron/ Steel	Others	Total
2018	130	726	-	296	280	277	501	2,074	579	4,863
2019	128	735	-	300	281	317	502	2,075	592	4,930
2020	127	743	-	300	283	318	502	2,081	592	4,946
2021	125	745	-	300	284	319	503	2,088	593	4,958
2022	123	752	-	300	286	320	504	2,096	595	4,977
2023	122	757	-	300	288	321	505	2,097	594	4,984
2024	120	762	-	301	289	322	505	2,103	595	4,997
2025	119	765	-	301	291	323	506	2,110	596	5,010
2026	117	766	-	301	291	324	507	2,120	597	5,023
2027	116	769	-	301	292	326	508	2,129	598	5,038
2028	114	770	-	301	292	327	508	2,140	599	5,052
2029	113	772	-	301	292	328	509	2,150	601	5,066
2030	112	773	-	302	293	329	510	2,160	602	5,080
2031	112	773	-	302	293	330	511	2,161	603	5,084
2032	112	773	-	302	294	331	511	2,162	604	5,088
2033	112	773	-	302	294	332	512	2,163	605	5,092
2034	112	773	-	302	295	333	513	2,163	606	5,097
2035	112	774	-	303	295	334	514	2,164	607	5,102
2036	-	775	-	303	296	335	515	2,165	608	5,108
2037	-	777	-	303	296	336	515	2,166	608	5,114
2038	-	778	-	303	297	338	516	2,167	609	5,119
2039	-	777	-	303	297	339	517	2,167	610	5,123
2040-2045	-	775	-	303	298	340	518	2,168	611	5,125

1/ Annual tonnage levels were held constant as of 2040. All values shown in thousands.

Best-available information was used to develop the expected (most likely) forecast for Calumet Harbor and River. However, as with the Calumet-Harbor and River traffic demand forecast, there is uncertainty surrounding the expected forecast for the Cal-Sag channel because of uncertainties about future changes in commodity markets and associated policies.

While there is a low likelihood that the expected forecast is underestimates what the actual traffic demand will be in the future, there is a high likelihood the expected forecast overestimates what future traffic demand will be. This is because historical trends and market research indicate a declining trend in key markets impacting the channel. For example, the assumption that iron and steel tonnages will remain mostly unchanged is the future uncertain in the current global economic climate, as the domestic market is currently aided by import tariffs. The petroleum products commodity group is another area of uncertainty due to the unknown potential capacity of pipelines that could replace the shipment of commodities by barge. Since commodity traffic forecasts and associated transportation rates are a key input for determining project benefits, both a high and low forecast scenario were developed to characterize the uncertainty surrounding the expected traffic demand forecast.

Overall, total traffic through the Calumet-Sag Channel is estimated to be 5 million tons per year (i.e., expected forecast) for the period of analysis (2027 to 2046). For this same period, the high forecast scenario remains at the 2017 traffic level of 5.2 million per year (5% higher than the expected forecast), and the low forecast scenarios is estimated to be 4.1 million tons per year (17% lower than the expected

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forecast). Refer to Appendix B (Economics) and its attachments for further information regarding the data and methods used to develop these forecast scenarios.

### Regional Economic Development

Calumet Harbor and River and the Cal-Sag Channel are part of a larger transportation network in the Chicagoland area and Illinois. Shippers make use of cargo handling services at the port, as well as locally available rail and truck transportation, warehousing, and fuel sources. These industry interactions and associated monetary transactions contribute to Illinois' economy with sales, employment, labor income, and gross regional product.

The Principles and Guidelines (1983) established the Regional Economic Development (RED) account to register changes in the distribution of regional economic activity that result from each alternative plan. In addition to the benefits accounted for within the NED account, the implementation of the Recommended Plan would support local economic activity which is accounted for within the RED account. Two RED evaluations were completed to estimate the following: (1) regional economic contribution associated with deep-draft movements to and from Calumet Harbor and River; and (2) regional economic contribution associated with movements transiting the Cal-Sag Channel. The Calumet Harbor and River shallow-draft movements were not included in this evaluation, as shoaling in Calumet Harbor and River is not anticipated to experience adverse impacts due to shoaling.

The USACE Regional Economic System (RECONS) is a regional economic impact modeling tool that was developed to provide accurate and defensible estimates of regional economic impacts associated with USACE spending. It is the only USACE certified Regional Economic Development model for agency wide use. RECONS incorporates impact area data, as well as multipliers, direct ratios (jobs to sales, income to sales, etc.), and geographic capture rates to estimate jobs, labor income, and other critical impacts to the local, state, and national economy. Table 21 provides an overview of the impact areas utilized for this RED analysis.

Table 21: RECONS impact areas.

Economic Impact Areas	
Local Impact Area (Counties)	Cook (IL), DeKalb (IL), DuPage (IL), Grundy (IL), Kane (IL), Kendall (IL), Lake (IL), McHenry (IL), Will (IL), Jasper (IN), Lake (IN), Newton (IN), Porter (IN), Kenosha (WI)
State Impact Area	Illinois (IL), Indiana (IN), Wisconsin (WI)
National Impact Area	United States (US)

- Measures of regional economic activity include:
- Output: Economic output or total industry output is the value of production by industry for a given time period. It is also known as gross revenues or sales.
- Labor Income: Labor income represents all forms of employment earnings.
- Jobs (Employment): The work in which one is engaged; an occupation by which a person earns income. Employment includes both part-time and full-time jobs. All jobs are presented in full-time equivalence (FTE).



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- Value Added: These are payments made by industry to workers, which also include interest, profits, and indirect business taxes. Value-added is an estimate of the gross regional or state product.

### Calumet Harbor and River RED Evaluation

Estimates in Table 22 reflect regional economic supported by deep-draft movements to and from Calumet Harbor and River, which are those that could be impacted by shoaling in the FWOP condition. Estimates were developed using the USACE Regional Economic Model and the average annual deep-draft tonnage level for Calumet Harbor and River for years 2015-2017 (4.8 million tons) (USACE Waterborne Commerce Statistics Center), which represent the base year tonnages for the traffic demand forecast. Refer to Appendix B (Economics) for further information about historical tonnage volumes at Calumet Harbor and River.

Table 22: Estimated economic contribution of commercial navigation activities associated with deep-draft movements at Calumet Harbor and River (2019 prices)\*.

Impact Area	Output (\$000)	Jobs*	Labor Income (\$000)	Value Added (\$000)
<b>Local</b> (Chicago Metropolitan Statistical Area)				
Direct Impact	\$97,520	242	\$20,867	\$32,882
Secondary Impact	\$112,215	559	\$39,250	\$66,022
Total Impact	\$209,735	801	\$60,117	\$98,904
<b>State</b> (Illinois, Indiana, and Wisconsin)				
Direct Impact	\$97,521	250	\$21,563	\$34,301
Secondary Impact	\$113,304	589	\$39,251	\$66,023
Total Impact	\$210,825	838	\$60,814	\$100,324
<b>US</b>				
Direct Impact	\$106,451	266	\$23,552	\$39,983
Secondary Impact	\$186,999	934	\$61,198	\$100,370
Total Impact	\$293,449	1,199	\$84,750	\$140,353
* Jobs are presented in full-time equivalence (FTE), and rounded to the nearest whole FTE. Sales, labor income and GRP estimates rounded to the nearest thousand. Estimates developed using the Corps-certified RECONS model, using an average of 2015-2017 tonnages (4.8 million) for the Calumet Harbor and River.				

Deep-draft navigation tonnage transported to and from Calumet Harbor and River would result in \$106,455,000 in revenues to waterway industries, port services, warehousing industries, transportation sectors, and fuel providers. Of this total expenditure, \$97,520,000 will be captured within the local impact area (Chicago Metropolitan Statistical Area). The remainder of the expenditures will be captured within the state impact area and the nation. These direct expenditures generate additional economic activity, often called secondary or multiplier effects. The direct and secondary impacts are measured in output, jobs, labor income, and gross regional product (value added) as summarized in the following tables.

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The regional economic effects are shown for the local, state, and national impact areas. In summary, the total expenditures (\$106,455,000) support about 800 full-time equivalent jobs, \$60,117,000 in labor income, \$98,904,000 in the gross regional product (value added), and \$209,735,000 in economic output in the local impact area. More broadly, these expenditures support about 1,200 full-time equivalent jobs, \$84,750,000 in labor income, \$140,353,000 in the gross regional product, and \$293,449,000 in economic output in the nation.

### Cal-Sag Channel RED Evaluation

Estimates in Table 23 presents regional economic supported by shallow-draft movements through the Cal-Sag Channel, which could be impacted by shoaling in the FWOP condition. Estimates were developed using the USACE Regional Economic Model and the annual deep-draft tonnage level for the Cal-Sag Channel for year 2017 (5.2 million tons) (USACE Waterborne Commerce Statistics Center), which was the base year used to develop the traffic demand forecast. Refer to Appendix B (Economics) for further information about historical tonnage volumes through the Cal-Sag Channel.

Table 23: Estimated economic contribution of commercial navigation activities associated with shallow-draft movements through the Cal-Sag Channel (2019 prices)\*.

Impact Area	Output (\$000)	Jobs*	Labor Income (\$000)	Value Added (\$000)
<b>Local</b> (Chicago Metropolitan Statistical Area)				
Direct Impact	\$114,883	302	\$25,866	\$39,929
Secondary Impact	\$131,970	663	\$46,293	\$77,743
Total Impact	\$246,853	965	\$72,159	\$117,672
<b>State</b> (Illinois, Indiana, and Wisconsin)				
Direct Impact	\$114,884	312	\$26,644	\$41,515
Secondary Impact	\$133,400	700	\$46,293	\$77,744
Total Impact	\$248,284	1,012	\$72,937	\$119,259
<b>US</b>				
Direct Impact	\$118,448	323	\$28,016	\$45,937
Secondary Impact	\$208,977	1,053	\$68,569	\$112,339
Total Impact	\$327,425	1,376	\$96,585	\$158,275
* Jobs are presented in full-time equivalence (FTE), and rounded to the nearest whole FTE. Sales, labor income and GRP estimates rounded to the nearest thousand. Estimates developed using the Corps-certified RECONS model, using year 2017 tonnages (5.2 million) for the Cal-Sag Channel.				

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The navigation tonnage transported through the Cal-Sag Channel would result in \$118,448,000 in revenues to waterway industries, port services, warehousing industries, transportation sectors, and fuel providers. Of this total expenditure, \$114,883,000 will be captured within the local impact area. The remainder of the expenditures will be captured within the state impact area and the nation. These direct expenditures generate additional economic activity, often called secondary or multiplier effects. The direct and secondary impacts are measured in output, jobs, labor income, and gross regional product (value added).

The regional economic effects are shown for the local, state, and national impact areas. In summary, the expenditures \$118,448,000 support a total of 965 full-time equivalent jobs, \$72,159,000 in labor income, \$117,672,000 in the gross regional product, and \$246,853,000 in economic output in the local impact area. More broadly, these expenditures support 1,376 full-time equivalent jobs, \$96,585,000 in labor income, \$158,275,000 in the gross regional product, and \$327,425,000 in economic output in the nation.

### **2.17 Future without Project (FWOP) Conditions**

The FWOP describes what conditions would be like in the study area in the future if no action is taken. In the FWOP condition, contaminated legacy sediment that currently exists unconfined in the environment in the Calumet River and Cal-Sag Channel. Sediment is transported by currents, storms and wave action, and added to from primarily upland sources such as overland flow and stormwater outlets. Without management of this sediment, it has increased potential for exposure, which could cause adverse impacts to humans, flora and fauna, natural habitats, and water quality in the study area.

The projected FWOP conditions would cause significant economic losses. Shoaling would continue to occur and eventually begin to impact shipping on the waterways, forcing carriers to light-load or seek alternate transportation methods. Both deep-draft vessels at Calumet Harbor and River and barges (shallow-draft) moving commodities through the Cal-Sag Channel have the potential to be impacted by reduced channel dimensions. Continued maintenance of a waterway allows vessels to move commodities through the given channel at a specific transportation cost. Shoaling caused by discontinued maintenance of a channel would result in increased vessel trips to move the same amount of tonnage, and thus, increased transportation costs.

#### **2.17.1 Sediment Quality**

The legacy sediment that currently exists in the Calumet River and the Cal-Sag Channel needs to be confined in a CDF to protect humans and the environment because it has elevated levels of certain contaminants. However, the existing Chicago Area CDF is expected to be at capacity after 2022. Once it is at capacity, maintenance dredging activities will cease if there is not an approved DMMP in place that outlines a viable sediment management strategy based on sediment quality and composition, and forecasted dredging needs over the next 20 years. Sediment in Calumet Harbor currently does not require confined disposal based on its quality, but it is not suitable for open water placement either. In the FWOP condition, the Chicago Area CDF will close and the sediment that accumulates in these waterways will not be dredged due to the lack of identified management strategies and placement locations.

### **2.17.2 Shoaling Rates**

#### **Projected Shoaling**

Calumet Harbor and River are the only waterways in the CAWS in which regular maintenance dredging occurs. Without regular maintenance dredging, sediment would continue to accumulate, forming shoals along the federal channels, and impeding navigation, particularly in Calumet Harbor and River. Shoaling in the Cal-Sag Channel has the potential to cause significant impacts on shipping in Calumet Harbor and River, as it forms the connection between the Calumet Area and the Mississippi River and the Inland Navigation System. A critical shoaling analysis was conducted for the Calumet Harbor and River, and the Cal-Sag Channel in order to define shoals in areas of the channel where the most shoaling occurs, resulting in reduced channel dimensions for navigation. These analyses estimated the rate of accumulation and the depth of shoaling that would occur during the period of analysis.

#### **Calumet Harbor and River Shoaling Rates**

Areas where shoals develop within the actively maintained channel were identified by comparing surveys conducted at the beginning and end of a period where no dredging had occurred in that portion of the channel. In particular, shoals in areas where decreased channel depth could reduce available channel drafts for navigation were identified for analysis. The periods of comparison vary for each shoal as dredging locations vary for each dredging event, and consistent sounding data was not always available. Nine consistent shoals were identified by comparing elevation data between soundings. The analysis focused on the end of the river channel closest to Lake Michigan; the formation of shoals closer to the lake would impede movements of deep-draft vessels throughout the channel.

Using Geographic Information Systems (GIS) software, a spatial analysis of apparent shoaling was conducted to approximate the rate of shoaling in the federal navigation channels. The retained shoals showed consistent accumulation between two comparison periods (a maximum of 0.2 feet of variation in the calculated annual shoaling rate). The estimated shoaling rates at each shoal are shown in

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Table 24.

Long-term shoaling rates were informed by shoaling observations at the neighboring Indiana Harbor Canal federal project, which was not dredged for approximately 40 years. When maintenance dredging was resumed in 2012, significant shoals had accumulated along the sides of the channel, limiting vessel access and forcing deep-draft vessels to light-load in order to navigate the channel. Hydraulic conditions in Indiana Harbor Canal are similar to Calumet Harbor and River and it is expected that sediment accumulation would slowly decline and, at a certain depth, stop. To approximate this pattern, projected shoaling was assumed to decrease by 5% each year and that the minimum available draft would be 17 feet. A summary of the cumulative draft at each shoal locations is shown in

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Table 24.

The location of the shoals is illustrated in Figure 7. The shoals are labeled according to their location in the channel, ranging from 01, closest to the mouth of the river, to 08, the furthest inland. One shoal, designated as HBR, is located in the harbor channel. The analysis assumes that the channel has been dredged to authorized depths as of 2019.

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Table 24: Projected shoaling rates at Calumet Harbor and River.

Shoal	Calculated base shoaling rate (ft/yr)	Available Draft at Year (ft below LWD)					
		2019 <sup>1</sup>	2026	2031	2036	2041	2046
HBR	0.3	-28.0	-26.9	-25.9	-25.1	-24.5	-24.0
01	0.2	-27.0	-26.3	-25.6	-25.1	-24.6	-24.3
02	0.2	-27.0	-26.3	-25.6	-25.1	-24.6	-24.3
03	0.3	-27.0	-25.9	-24.9	-24.1	-23.5	-23.0
04	0.5	-27.0	-25.2	-23.5	-22.1	-21.1	-20.3
05	0.3	-27.0	-25.9	-24.9	-24.1	-23.5	-23.0
06	0.3	-27.0	-25.9	-24.9	-24.1	-23.5	-23.0
07	0.7	-27.0	-24.5	-22.1	-20.2	-18.7	-17.6
08	0.4	-27.0	-25.6	-24.2	-23.1	-22.3	-21.6

[1] The analysis assumes that the channel has been dredged to authorized depths as of 2019 and will be maintained at these depths through 2022, at which point no additional capacity is anticipated to be available at the existing Chicago Area CDF. It is assumed maintenance dredging would be discontinued as of 2023.

[2] The “base” shoaling rates represent the initial shoaling rates. A 95% decay rate is applied to each consecutive year.

The critical shoals represent those where sediment accumulates and reduces channel depth faster than any downstream shoals. In this case, there are three points at which critical shoals impact deep-draft navigation: Shoal 04, Shoal 07, and the mouth of the river (Shoal 01 & HBR).

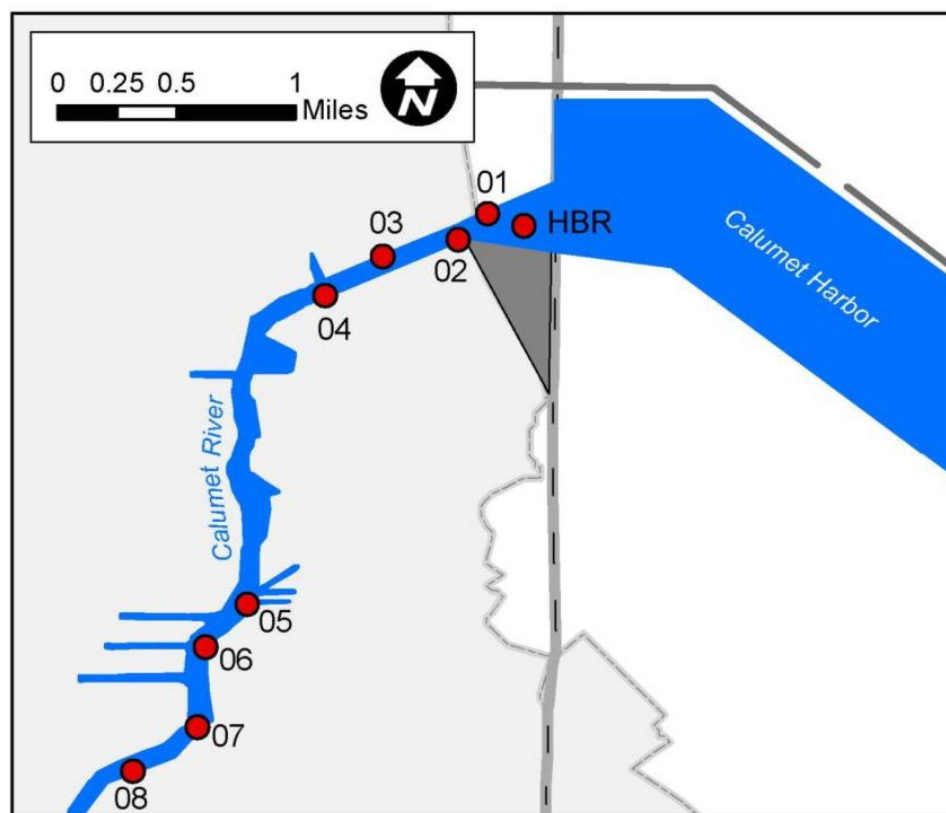


Figure 7: Identified shoaling locations in Calumet Harbor and River.



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### Cal-Sag Channel Shoaling Rates

To determine critical shoal locations along the Cal-Sag Channel, channel bathymetry collected between 2001 and 2013 was reviewed by engineers at the USACE Rock Island District to identify areas where shoaling has had the greatest impact on channel dimensions. Three critical areas were identified and changes in channel cross-sections over time were analyzed in these areas using GIS software to determine the rate of shoaling. Figure 8 shows the shoal locations.

**RM 303 to 304:** At the junction of the Cal-Sag Channel with the CSSC vessels require additional width to turn navigate the bend in the channel. The highest observed shoaling rate in this reach is at RM 303.9.

**RM 315 to 320:** Observed shoaling rates in this stretch of the channel (from approximately I-294 to I-57) are higher than in other reaches. The highest observed shoaling rate in this reach is at RM 317.5.

**RM 321 to 322:** A sharp bend in the Little Calumet River at Riverdale, known as ACME Bend, requires greater channel width for safe navigation. Current conditions only provide minimum clearances. The highest observed shoaling rate in this reach is at RM 321.7.

The shoaling rates and projected cumulative depths are shown in Table 25. The Cal-Sag Channel has not been dredged since the deepening and widening project was complete. The shoaling rates are therefore based on long-term rates. The shoaling rates shown in the table reflect observed shoaling rates. As with Calumet Harbor and River, these rates are projected to decrease over time. The projected rate of decrease, 7%, is based on observed trends in the channel bathymetry. Because there is currently no designated placement area for Cal-Sag Channel sediment, the analysis assumes that shoaling continues to accumulate in the channel as of the most recent channel survey in 2013, which showed an approximate 10 foot available draft.

As discussed in Section 1.5, the majority of vessel traffic along the Cal-Sag Channel is through traffic. Therefore, the shoal at RM 303.9 is effectively the critical shoal for all traffic, limiting the transport of goods between the CSSC and Calumet Harbor and River.

Table 25: Projected shoaling rates along the Cal-Sag Channel.

Shoal RM	Average shoaling rate	Available Draft at Year (ft below -2 Chicago City Datum)							
		2014 <sup>1</sup>	2019	2023	2026	2031	2035	2039	2043
303.9	0.17	-10.0	-9.3	-8.9	-8.7	-8.4	-8.2	-8.1	-8.0
317.5	0.08	-10.0	-9.7	-9.5	-9.4	-9.2	-9.2	-9.1	-9.1
321.7	0.08	-10.0	-9.7	-9.5	-9.4	-9.2	-9.2	-9.1	-9.1

<sup>1</sup>The analysis assumes continued shoaling, reducing the available draft as of 2023. The “base” shoaling rates represent the initial shoaling rates. A 93% decay rate is applied to each consecutive year.

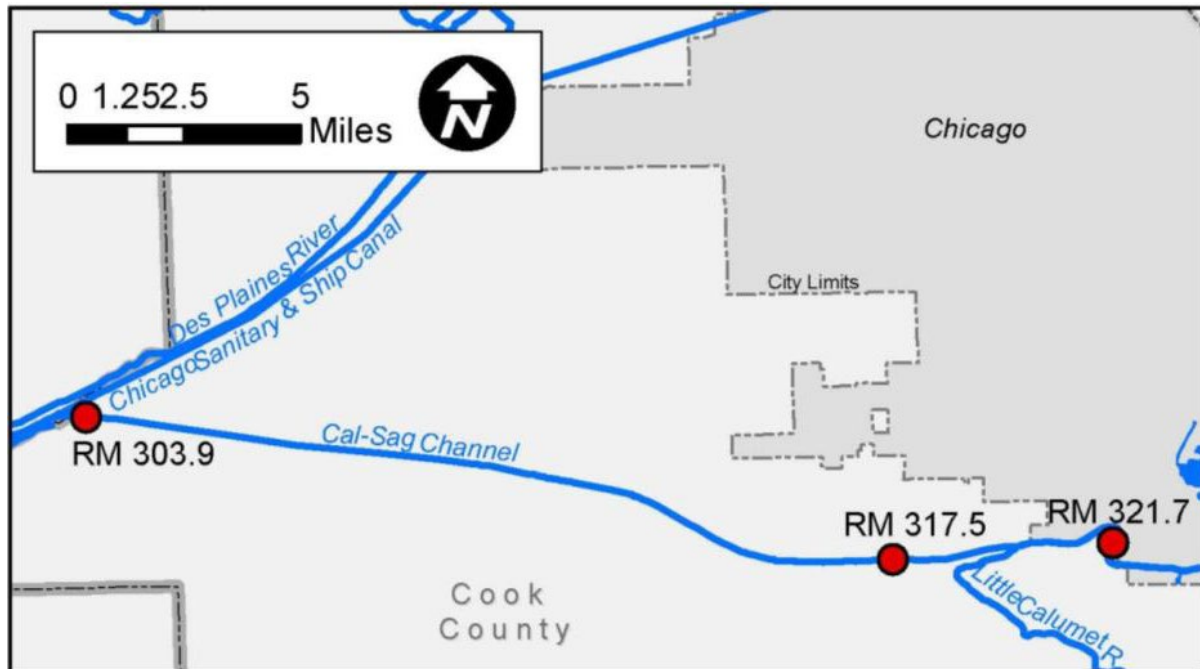


Figure 8: Shoaling areas on the Cal-Sag Channel.

## 3.0 PLAN FORMULATION

### 3.1 Study Process

Plan formulation is an iterative process resulting in the development, evaluation, and comparison of alternative plans to address identified study problems. Plan formulation for DMMP studies involves estimating future dredging quantities, determining appropriate material management techniques based on sediment quality and composition, identifying a Base Plan, and formulating an array of potential alternative projects. Then design, cost, environmental, and economic analyses are carried out in order to identify the alternative that is the least-cost, environmentally acceptable, and technically feasible alternative for recommendation, per USACE policy.

This feasibility study followed the six-step planning process defined in the Water Resource Council and the Planning Guidance Notebook, ER 1105-2-100. The six steps are

- Step 1 – Identifying problems and opportunities
- Step 2 – Inventorying and forecasting conditions
- Step 3 – Formulating alternative plans
- Step 4 – Evaluating alternative plans
- Step 5 – Comparing alternative plans
- Step 6 – Selecting a plan

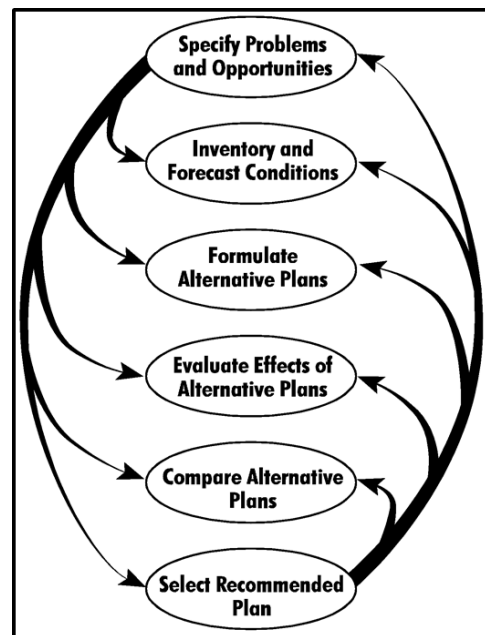


Figure 9: USACE six-step planning process.

Identification of problems and opportunities begins at the outset of the study and forms the foundation of the planning process. The identified problems and opportunities for the CAWS DMMP are described in Section 1.14.

Developing an inventory of existing conditions and forecast of future conditions, Step 2, creates a comprehensive picture of the study area. By gathering both qualitative and quantitative data as outlined in Chapter 2.0 of this report, the study team was able to develop and evaluate alternative plans. Forecasted conditions provide a basis for the comparison and evaluation of alternative plans.

Management measures were identified based on the study objectives, screened based on various criteria, and then combined in the formation of the Base Plan. From this Base Plan, an array of potential alternative projects was developed, evaluated, and compared (Steps 3-5).

### 3.2 Risk-Informed Planning

Planning has continued to evolve since the 1983 Planning Guidance Notebook, an evolution that now includes risk analysis. Risk-informed planning (described in IWR Publication 2017-R-03) pays careful attention to uncertainty and it uses a set of risk performance measures, together with other considerations, to *inform* planning. Risk-informed planning is an analytic-deliberative process that aims to reduce uncertainty, but acknowledges that it can never be eliminated entirely. The goal, in a world of limited time and budget, is to efficiently reduce uncertainty by gathering only the evidence needed to make the next planning decision and to manage the risks that result from doing so without more complete information. Under risk-informed planning, the six-step planning process may be demonstrated more effectively as shown in Figure 10.

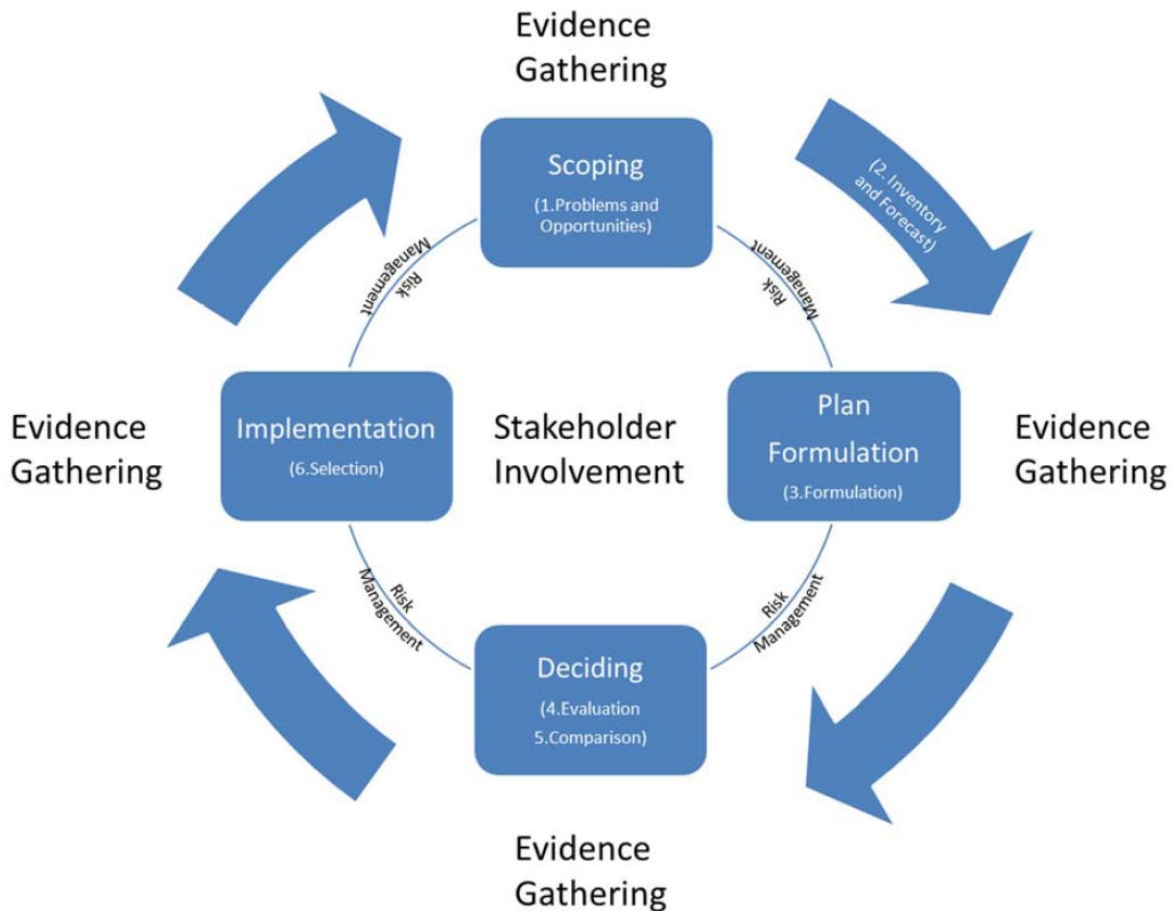


Figure 10: USACE Risk-informed planning process.

Stakeholder involvement is at the center of this planning process, which takes place within a continuous process of evidence gathering and uncertainty reduction. The thread that unites the steps, surrounds the stakeholder engagement and mirrors the evidence gathering is risk management. The cyclical nature of the figure depicts the iterative nature of the planning process.

### **3.3 Plan Formulation Strategy**

A DMMP is a long-term planning tool to accommodate at least 20 years of maintenance dredging. Therefore, forecasts were made of the quantity, quality, and location of material that is expected to be dredged over this period. These quantities were developed using Chicago District dredging records dating back to 1984 (when the existing Chicago Area CDF was constructed). Quantities of material for the waterways managed by the USACE Rock Island District (the Cal-Sag Channel) were developed by that district based upon its experience managing those federal navigation projects. Once the total volume of material for management was identified, sediment quality information was collected to determine the quality of dredged material from different sources. The quality of the sediment determines the potential appropriate uses or handling requirements.

Next, a list of potential management measures was developed for handling the dredged material. Then, the management strategies were matched up with the forecasted dredging needs, based on sediment quality. Based upon preliminary analysis of feasibility, cost, and environmental considerations, the final array of alternatives was identified and more detailed designs and cost estimates were developed.

To determine whether the study alternatives were economically justified, an economic analysis of the CAWS was undertaken to quantify the benefits of continued operation of the waterways at their authorized depths and the damages (increased shipping costs) from shoaling if maintenance were to cease. Economically justified alternatives are any of those for which the average annual benefits exceed the average annual cost of implementation and O&M (i.e., benefit to cost ratio is greater than 1).

### **3.4 Federal Standard – Least Cost, Environmentally Acceptable, Technically Feasible Management Strategy**

It is the Corps of Engineers' policy to accomplish the disposal of dredged material associated with the construction or maintenance dredging of navigation projects in the least costly manner; this is referred to as the Federal Standard. Disposal is to be consistent with sound engineering practice and meet all federal environmental standards including the environmental standards established by Section 404 of the Clean Water Act of 1972 or Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended.

#### **3.4.1 Federal Standard Determinations**

The Federal Standard is defined in 33 C.F.R. § 335.7 as the dredged material disposal alternative which represents the least-costly alternative consistent with sound engineering practices and meets the environmental standards established by the CWA Section 404(b)(1) evaluation process or ocean dumping criteria. The determination of the Federal Standard is important for selecting the appropriate dredged material management alternative, and it is utilized for the calculation of cost-sharing with the local sponsor and determining suitable beneficial use alternatives (USEPA and USACE, 2007). Regional guidance prepared by the USACE, Great Lakes and Ohio River Division (LRD) was developed to ensure all Federal Standard Determinations are consistent with the other Districts within the Division (CELRD-PD-G 2013). Potential dredged material management alternatives or measures typically include open-water placement, in-water or shoreline beneficial uses (such as near-shore beach nourishment or environmental restoration), upland beneficial uses (such as fill for athletic fields, parks, and other recreational areas, landscaping, road construction, structural fill, cover for brownfields, landfill cover, etc.), or confined placement in a dredged material disposal facility (DMDF); formerly referred to as a

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confined disposal facility (CDF). In accordance with the regional guidance, documentation that describes the rationale and provides supporting information for the preliminary / conceptual Federal Standard Determination must be submitted to the LRD technical review team to ensure the determination is regionally consistent and technically sound (CELRD-PD-G 2013).

Dredged material management strategies were determined based on the Federal Standard for for each waterway that has a projected dredging need over the 20-year life of the study. The federal navigation projects in the CAWS that were estimated to have such projected dredging needs include the Calumet Harbor and River and the Cal-Sag Channel. It was presumed that the remaining federal navigation projects in the CAWS would not need to be dredged during the period of analysis, but, if this presumption is incorrect and dredging is required for one or more of these projects, additional sampling and analysis would need to be conducted to determine the corresponding Federal Standard. It is noted that any sediment that would be regulated under TSCA would need to meet those legal requirements for disposal.

The preliminary / conceptual approach for Calumet Harbor sediment is unconfined upland use in a beneficial manner, and this approach was approved by LRD in 2015. Sediment from the Calumet River would continue to require confined disposal. Based on historical investigations of the Cal-Sag sediment, like the Calumet River, this material would continue to require confined disposal.

### **3.4.2 Beneficial Use**

A DMMP must consider potential beneficial uses of dredged material, for meeting both navigation and non-navigation objectives, including fish and wildlife habitat creation and restoration, hurricane and storm damage reduction, and recreation. Where beneficial use is part of the Base Plan, it shall be treated as a general navigation O&M component. Beneficial uses which are not part of the Base Plan shall be considered separable elements of the management plan, and will be pursued in accordance with guidance implementing other available authorities. However, even though funded from different sources, the beneficial use planning effort must be pursued in conjunction with the overall management plan effort to assure the timely availability of dredged material for the beneficial use project. The beneficial use project sites must be available to meet maintenance dredging disposal needs.

### **3.4.3 Contaminated Sediment**

Dredged material that is not suitable for unconfined disposal or beneficial using according to the Federal Standard Determination must be managed to protect both human health and the environment.

### **3.4.4 Federal Standard Development Strategy Summary**

In summary, identification of the Federal Standard generally proceeds as follows:

1. Identify dredging needs – locations and quantities
2. Determine and document sediment quality – Federal Standard Determination
3. Match potential management measures to the Federal Standard Determination
4. Consider beneficial use of dredged material, as appropriate
5. Identify the least cost management strategy that is technically feasible and meets all applicable federal environmental standards

### 3.5 Maintenance Dredging and Disposal

Prior to industrial development in the area, the Chicago Area waterways were shallow channels surrounded by wetlands. The federal channels, as they stand today, were created through a variety of deepening and straightening activities by local, state, and federal entities. This construction occurred in the late 19<sup>th</sup> and through the 20<sup>th</sup> centuries.

#### 3.5.1 Dredging and Disposal Practices

Prior to 1969, dredging operations at the Calumet Harbor and River, Chicago Harbor, and Chicago River were conducted by dipper dredge and the material was taken by barge to authorized deep water placement sites in Lake Michigan. However, in 1969, the sediments were determined to be unsuitable for open-lake disposal due to historical contamination.

After 1969, dredging at Chicago Harbor and Chicago River was suspended until a suitable placement site could be identified. Material dredged from Calumet River was placed at an upland site near Calumet River at East 122<sup>nd</sup> Street and South Stony Island Avenue. The site was, and still is, owned by MWRD. This upland site was used from 1969 until 1980. In 1970 and 1971, some material was placed along a temporary dike that had been constructed in Lake Calumet. In all cases, material was directly pumped from the channel to the placement site by USACE-owned hydraulic dredges. Overflow was discharged to the Calumet River, as authorized by the U.S. Environmental Protection Agency (USEPA). In 1980, USEPA determined that untreated overflow discharges to the Calumet River would no longer be allowed. Without a way to discharge water, the site was no longer a feasible alternative for dredged material placement.

Section 123 of the River and Harbor Act of 1970 (Title I of Public Law 91-611) authorized the construction of confined disposal facilities (CDFs) in the Great Lakes region. These facilities were intended to confine contaminated material dredged from the affected federal navigation channels for a period of 10 years. A subsequent planning study was conducted by the USACE Chicago District in partnership with several stakeholder agencies to investigate management alternatives for dredged material from Calumet Harbor and River, Chicago Harbor, and Chicago River. The study, which ultimately recommended the construction of the Chicago Area CDF, was approved in 1981. An EIS was also prepared to consider significant impacts to natural resources in the area.

The Chicago Area CDF was designed to contain the estimated volume of sediment to be dredged from the Calumet Harbor and River and, additionally, the Chicago River and the Chicago Harbor for a period of 10 years. Due to elevated levels of PCBs in sediment in the North Branch of the Chicago River from the junction of the North Branch with the mainstem Chicago River, this area was excluded from the projection of dredging needs. Construction of the Chicago Area CDF was completed in 1984 and since that time, Calumet Harbor and River has been dredged fourteen times by the USACE Chicago District. Sediment from these dredging events, along with sediment from a Chicago Harbor dredging event in 1986, from non-USACE dredging (private dock owners and U.S. Coast Guard), and rock removed from Calumet Harbor has been placed in the Chicago Area CDF.

Table 26 shows the volume of each dredging event that has placed material in the CDF and the accumulated total volume.



### 3.5.2 Projected Dredging Needs

Of the six federal navigation projects included in this study, only three are projected to require (or potentially require) dredging over the next 20 years. Based on dredging records between 1984 and 2018, approximately 44,000 cy of material is dredged from Calumet Harbor and River annually. Roughly the same amount of material is dredged from each waterway. However, due to a lack of capacity in the existing CDF, the USACE Chicago District has not been able to maintain full channel widths for many years. Therefore, a conservative projection 50,000 cy of annual dredging, alternating between Calumet Harbor and River, is assumed over the 20-year study period.

Table 26: Annual dredging quantities placed in the existing Chicago Area CDF from its opening in 1984 through 2018

Year	Dredged Volume (cy) <sup>1</sup>	Cumulative Volume
1984	99,000	99,000
1985	108,000	207,000
1986 <sup>2</sup>	62,000	269,000
1989	83,000	352,000
1994	68,000	420,000
2000	205,000	625,000
2001	291,000	916,000
2003	135,000	1,051,000
2007	131,000	1,182,000
2009	167,000	1,349,000
2011	56,000	1,405,000
2012	27,000	1,432,000
2013	30,000	1,462,000
2014	70,000	1,532,000
2016	60,000	1,592,000
<b>Yearly Avg</b>	<b>44,000</b>	

<sup>1</sup>All volumes shown are dredged from federal channels for navigation maintenance. Additional material, totaling less than 10,000 cy, has also been placed in the CDF by private users and the USCG.

<sup>2</sup>1986 dredged material is from Chicago Harbor Entrance Channel and is not included in yearly average for Calumet River and Harbor maintenance

Based on coordination with the USACE Rock Island District, the Cal-Sag Channel has not been dredged since the 1970s and there are currently no specific plans to dredge it in the future. However, a small amount of capacity is being included for this waterway in this analysis because there are known shoaling locations along its length and if any of these were to impede navigation, it would effectively cut-off water-borne transit between the Great Lakes and the Inland Waterway system. As such, 30,000 cy of capacity is assumed for maintaining the Cal-Sag Channel at some point during the study period (currently forecasted for year 10).

### **3.6 Management Measures**

Management measures are features or activities that can be implemented at a specific geographic location to address one or more planning objective. Measures can be either structural or nonstructural. For this study, the following measures were considered for their potential to contribute to a 20-year dredged material management strategy for the CAWS:

#### **Open-Water Placement**

Place sediment in Lake Michigan where it would not impact commercial navigation. This is often the most cost-effective management option for dredged material but its suitability is dependent on sediment composition and quality.

#### **Beneficial Use**

Use sediment for other suitable purposes based upon its composition and quality. Beneficial uses of dredged material are powerful tools for harmonizing environmental values and navigation purposes. It is USACE policy that all dredged material management studies include an assessment of potential beneficial uses for environmental purposes including beach nourishment, fish and wildlife habitat creation, ecosystem restoration and enhancement and/or storm damage reduction.

#### **Reducing Dredging Requirements**

Reduction could include simple changes in O&M practices, modifications to general navigation features or channel dimensions, or recommendations to others for best management practices to reduce non-point source pollution.

#### **Reducing Dimensions and Minimized Dredging**

Reducing the maintained width of a channel can reduce the need for dredged material management. This measure is actively used by USACE to efficiently manage the navigation projects with limited O&M funding.

#### **Source Reduction**

Reduction could include a range of measures such as upland source controls, sediment traps in the channel, or in-water structures that change shoaling patterns. Evaluation of such measures requires a detailed understanding of watershed sediment sources as well as hydraulics and sediment transport in the system.

#### **Private Management (Landfill)**

For small quantities of contaminated material, placement in a special waste disposal or other privately-owned facility that can safely isolate the material could be an effective means of managing the dredged material.

#### **Sediment Treatment/Remediation**

Technologies have been developed that can remove or isolate contaminants, allowing the sediment to be used as a resource. Implementation of these measures could increase the number of beneficial use

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and/or placement options, but many technologies require extensive handling or transportation, are energy intensive, and may generate different wastestreams that also require disposal.

### **Confined Disposal**

Confined disposal at a DMDF is an effective means of placing sediment without causing impacts to the surrounding environment. Based on the quality of the sediment, an engineered cell is designed to contain the sediment and any associated contaminants. Water discharged from the DMDF is treated and monitored to ensure the removal of contaminants so that the effluent from the facility will not adversely impact the water quality of the receiving river or lake. DMDFs provide a barrier between the sediment and the surrounding environment to prevent adverse impacts.

### **3.7 Preliminary Screening of Measures**

Once the initial list of dredged material management measures was assembled, each measure was then considered in the context of the waterways with anticipated dredging needs and the CAWS as a whole. The realities of sediment quality, dredging needs, land use history in the study area, and ongoing operation and maintenance strategies reduced the list of viable options. The preliminary justifications used to screen out certain potential management measures are included below.

### **Open Water Placement**

Currently, the sediment in the projects anticipated to be dredged over the next 20 years has not been suitable for open water placement. However, dredged material from Calumet Harbor is close to being suitable, and its quality is expected to continue to improve over time. Since open water placement is expected to be the least-cost method of managing dredged material, it will be retained, pending possible future demonstration of suitable quality based on sampling/testing during the 20 year period of analysis.

### **Beneficial Use**

Beneficial use measures must be technically and economically feasible, have public support, and address legal and regulatory issues. Implementation will require an evaluation of various end uses to determine whether the sediment meets criteria established to protect human health and the environment. Once it is established that the material meets these criteria, it can be made available for any of the approved uses. For upland uses, an intermediate step of dewatering and stockpiling will likely be necessary before users can accept the material. Beneficial use will be retained in all study alternatives for material that is of appropriate quality.

### **Reducing Dredging Requirements**

The USACE Chicago District is already practicing reduced dredging requirements in the CAWS and will continue to only dredge material when it is necessary to maintain the federal navigation channels to their respective authorized depths. Therefore, this management measure will be incorporated as an assumption in all study alternatives.

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### **Reducing Dimensions and Minimized Dredging**

Reduced dimensions are already maintained at both Calumet Harbor and River and the Cal-Sag Channel—only minimum safe channel widths are maintained at Calumet Harbor and River. The Cal-Sag Channel has been allowed to accumulate sediment, reducing the effective width of the channel.

### **Source Reduction**

While dredging needs would not be completely eliminated, reducing dredging requirements could provide cost savings and extend the life of sediment management alternatives. Best management practices that address sediment sources can improve the financial and environmental sustainability of the navigation projects and may provide significant benefits. However, these opportunities may also require significant detailed analyses to determine their effectiveness. The USACE Chicago District has been working with the Engineer Research and Development Center (ERDC) in Vicksburg, MS to investigate potential principal sources of sediment and associated contamination deposited in the Calumet River (Perkey, Chappell, and Seiter 2017). Based on the results of their preliminary investigation, it appears the sediment sources are primarily stormwater and combined overflow sewer outfalls, channel outlets (particularly the channel outlet known as Pullman Creek), non-point sources and overland flow.

### **Private Management (Landfill)**

This measure is potentially viable for small-scale applications. However, due to the increased cost of pursuing private management at the scale of this study and the lack of assured capacity, it was not retained for inclusion in the study alternatives.

### **Sediment Treatment**

ERDC prepared a technical report evaluating four available sediment treatment technologies (Estes et al. 2011). The four technologies evaluated include JCI/Ucycle Rotary Kiln, Cement-Lock, Minergy Glass Furnace Technology, and BioGenesis SM Sediment Washing Technology. The report discusses criteria for comparing the technologies, including an approximate cost per cubic yard for implementation. Mining sediment from CDFs is a concept that has been applied in Ohio but this is dependent on material quality. The ERDC study discussed above indicates that material from the Chicago Area CDF cannot be readily mined or 'reclaimed'.

Use of sediment remediation technologies would depend on whether the processes would provide a lower cost placement alternative. Preliminary cost estimates for these technologies were compared to estimated CDF costs and it was determined that these measures would be significantly more costly to implement. Based upon these findings, combined with environmental concerns, a lack of demonstrated success at the required scale, and the remaining need to dispose byproducts of processes, these sediment treatment measures were not retained for inclusion in the study alternatives.

### **Confined Disposal**

Confined disposal has been successfully used to contain material dredged from numerous federal harbors and waterways. The Chicago Area CDF has been in safe operation for more than 30 years and it has provided a cost-effective means for managing contaminated dredged material from Calumet Harbor and River and Chicago Harbor. For sediment with contaminant concentrations that have the potential to

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adversely impact human health or the environment, confined disposal continues to be an appropriate and effective management strategy, so it will be retained in all study alternatives.

Table 27: Summarized screening of management measures

Management Measure	Retained? (Y/N)	Justification for Screening	Quality
Reducing Dredging Requirements	N	Currently practicing; Assumed to continue	All
Reducing Dimensions and Minimized Dredging	N	Currently practicing; Assumed to continue	
Source Reduction	Y	Pending, based on Perkey et al. study (2017)	
Open Water Placement	Y	-	Clean
Beneficial Use	Y	-	Suitable for Beneficial Use
Private Management (landfill)	N	Cost; Scale; No guarantee of capacity	Contaminated
Treatment/Remediation	N	Cost; Effectiveness; Environmental concerns	
Confined Disposal	Y	-	

### 3.8 Federal Standard Determinations

#### 3.8.1 Calumet Harbor and River

The quality of the material dredged from Calumet Harbor and River varies with location in the federal channel. Three segments of the channel were defined for the environmental analysis; the approach channel, outer harbor, and river, and these segments are depicted in Figure 11. The Federal Standards for each segment are discussed below:

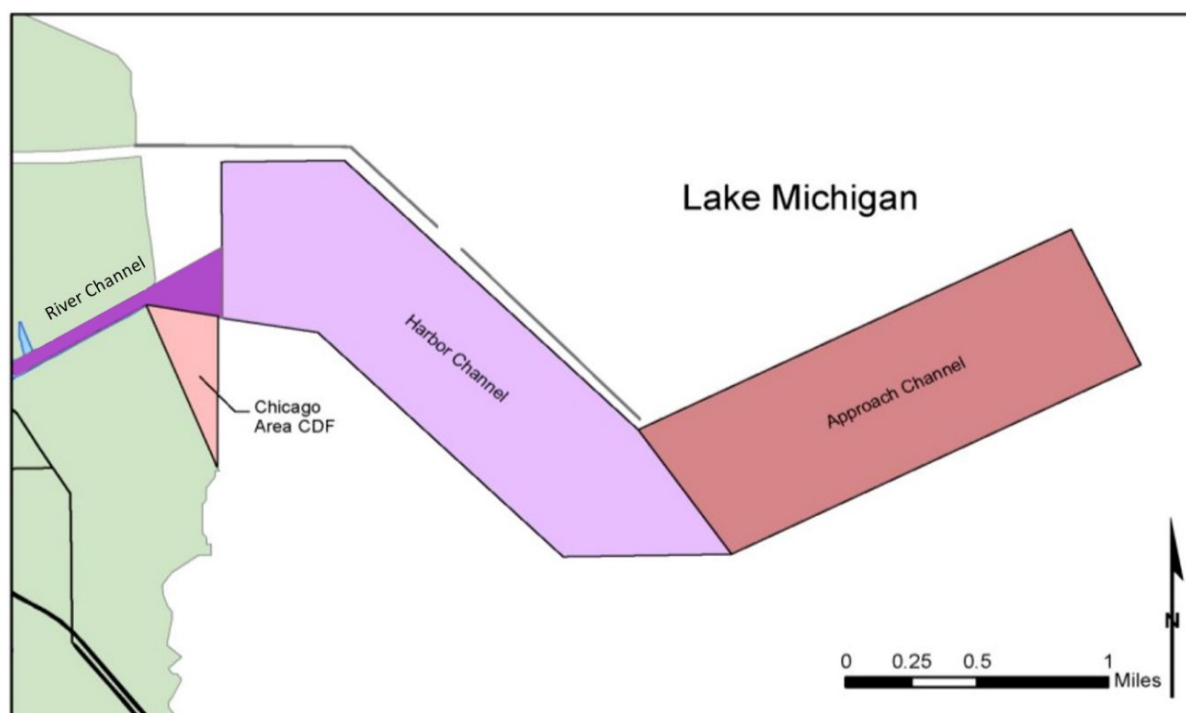


Figure 11: Calumet Harbor and River environmental channel segments.

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### **Approach Channel**

Sediment in the Approach Channel, which does not currently and is not projected to require dredging, may meet open-lake placement requirements or may require upland unconfined placement based on future test results. Since environmental analysis has historically been conducted on samples collected in association with dredging events, no data are available for this portion of the channel. While available data from a nearby reference site suggests that open-lake placement would be acceptable for Approach Channel sediment, testing would be required if this area requires future dredging. Sediment placement would be coordinated with appropriate regulatory agencies.

### **Calumet Harbor**

Contaminant levels in the Calumet Harbor sediment are significantly lower than in the Calumet River sediment, but the sediment is silty and fine-grained, and contains elevated levels of nutrients. Sediment samples were collected in 2011 to further characterize the sediment and evaluations of open-water and upland unconfined placement options were conducted to determine the Federal Standard.

To determine whether upland unconfined placement would be appropriate, a human health risk-based screening was performed to determine whether the analytical results from the 2011 sampling event were less than risk-based concentrations developed by the USEPA and the IEPA (Appendix C). The screening did not identify any constituents of concern that would preclude unconfined upland beneficial use for the proposed settings, such as recreational parkland (athletic fields), urban redevelopment, roadbeds, and/or structural fill or landfill cover. Unconfined upland placement of the sediment is concluded to be an environmentally acceptable means of managing dredged material from Calumet Harbor.

Due to the fine grained nature of the material, the sediment would not be suitable for beach nourishment. However, deep water placement of fine grained sediment has been found to be acceptable for other harbors in Indiana. Initial modeling indicates that open water placement might be acceptable, but based on the levels of ammonia in the results from elutriate testing and the results from biological testing, open-water placement is not recommended at this time. Future evaluation, including sediment and elutriate chemical analysis and biological testing, should be conducted to re-evaluate open water placement and fully investigate this placement alternative.

Screening level cost estimates were prepared for the various dredging and placement alternatives considered, shown in

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Table 28. Open water placement costs are less than upland placement costs when considering first costs, however an additional analysis was conducted to evaluate the potential cost savings associated with the use of the material in construction of a DMDF and/or facility capping. Other options for sourcing material needed in DMDF construction include general fill (clean fill for commercial use), which has limited and variable availability, or clay. The cost associated with each material source is presented in Table 29.



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Table 28: Placement method screening level cost comparison.

Placement Location	Dredging Method	Cost/cy <sup>1</sup>
Open-water	Mechanical	\$9
	Hydraulic	\$14
Upland Unconfined	Mechanical	\$25

<sup>1</sup> Values are presented at 2015 price levels

Table 29: Fill material screening level cost comparison.

Cost for fill material	Cost/cy <sup>3</sup>
Transport and place dewatered sediment	\$8
Purchase, transport, and place general fill <sup>1,2</sup>	\$16
Purchase, transport, and place clay <sup>2</sup>	\$31

<sup>1</sup> Availability of general fill is limited and variable.

<sup>2</sup> Cost is for an equivalent volume of placed material, accounting for dewatering and consolidation.

<sup>3</sup> Values are presented at 2015 price levels.

The range of potential total costs associated with the various dredging and placement methods and fill material options are summarized in Table 30. However, these costs do not capture the risk associated with material availability. The apparent lowest cost, which includes purchasing commercial general fill, has the highest risk of non-availability. Using dredged material from Calumet Harbor, has a low risk given the amount of material projected to be dredged.

Table 30: Potential beneficial use screening level cost comparison.

Potential Dredge Placement/Methods and DMDF Construction Material Options	Cost/cy <sup>3</sup>
Open-water placement / Mechanical dredging + Purchase, transport and place general fill <sup>2</sup>	\$25 <sup>1</sup>
Open-water placement / Mechanical dredging + Purchase, transport and place clay material <sup>2</sup>	\$40
Open-water placement / Hydraulic dredging + Purchase, transport and place general fill <sup>2</sup>	\$30 <sup>1</sup>
Open-water placement / Hydraulic dredging + Purchase, transport and place clay material <sup>2</sup>	\$45
Upland unconfined placement / Mechanical dredging + Transport and place dewatered dredged material	\$33

<sup>1</sup> Availability of general fill is limited and variable.

<sup>2</sup> Placement costs are for an equivalent volume of placed material, accounting for dewatering and consolidation.

<sup>3</sup> Values are presented at 2015 price levels.

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The lowest cost alternative for the DMDF alternative, considering the reliable availability of material, is to use Calumet Harbor sediment. Constructing the cap and berms from general clean fill materials is not recommended due to a general lack of clean fill availability in the southern area of Chicago. The harbor sediment would be dewatered and used for two specific project needs: constructing berms for a new DMDF and capping the new facility once filled.

Expansion of the Chicago Area CDF would require the USACE Chicago District to revise the closure plan for the CDF, as part of the overall facility redesign. The proposed new plan for closure of a DMDF includes a cover of two and half (2.5) feet of clean sediment overlain by a half (0.5) foot of topsoil. The cover would be sloped to drain precipitation and would have a vegetated layer (grass) on the surface to prevent erosion. Land use restrictions would be used to ensure maintenance and the prevention of digging or the planting of trees/shrubs that have deep root systems that could penetrate the cover. The proposed cover layer would prevent uptake by plants and animals, and it would be consistent with the TACO regulations for an engineered barrier to prevent soil ingestion. In addition, it would be the same cover utilized for closing another CDF in Lake Michigan (Renard Island, Green Bay, WI), which contains sediment of similar quality and is intended for recreational use.

The use of the mechanically dredged and dewatered sediment from Calumet Harbor would result in significant savings for the project overall, and would be a reliable source of material to support the future construction activities at the existing Chicago Area CDF, a new DMDF facility, or other potential uses. Based on this consideration, it was determined that the least-cost, environmentally acceptable alternative for Calumet Harbor sediment is mechanical dredging followed by unconfined upland placement, specifically for use by USACE. Upland placement or beneficial use of the Calumet Harbor dredged material will be in accordance with all applicable environmental regulations.

### **Calumet River**

Since there are elevated levels of contaminants and nutrients in the Calumet River sediment and the material is silty and fine-grained, the material is not appropriate for open-water placement or beach nourishment. In order to determine the requirements for upland placement of the material, an assessment of the quality of the material was made according to existing environmental standards. Although the State of Illinois does not have specific regulations for assessing risks associated with dredged materials, in the past IEPA has referred to the Tiered Approach to Corrective Action Objectives (TACO), described in Title 35 of the Illinois Administrative Code (IAC), Part 742 (35 IAC 742), or the regional background concentrations in TACO, as a basis for their decision-making. Because the concentrations of certain contaminants in the sediment exceed this state regulatory criteria, sediment from the Calumet River must be placed in a DMDF.

### **3.8.2 Cal-Sag Channel**

Since there are elevated levels of contaminants and nutrients in the Cal-Sag Channel sediment and the material is silty and fine-grained, the material is not appropriate for beach nourishment or open-water placement. In order to determine the requirements for upland placement of the material, an assessment of the quality of the material was made according to existing environmental standards (Foth Infrastructure & Environment 2010 – Appendix C). A number of regulatory standards were used for comparison purposes, including Ecological Screening Levels; TACO (IEPA 35 IAC 742); RCRA Hazardous Waste (40 C.F.R. 261); and IEPA Surface Water Standards for Secondary Contact. The results of the sediment and elutriate testing indicates that the sediment exceeds all of these standards except RCRA

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hazardous waste criteria. Although the sediment is not hazardous waste, contamination in the sediment exceeds the other regulatory criteria. Therefore, sediment from the Cal-Sag Channel must be placed in a CDF or an appropriate landfill. The quality of the material is not expected to improve significantly enough to meet unconfined placement criteria over the period of analysis.

### 3.8.3 Chicago Harbor, Chicago River, South Branch, and CSSC

As mentioned in Section 3.4, based on current channel dimensions, shipping practices, and historic shoaling patterns there are no projected dredging needs for Chicago Harbor, Chicago River, South Branch, or CSSC. Because dredging has not been conducted in nearly 30 years in any of these channels, there are no current data on sediment quality.

### 3.8.4 Federal Standard Summary

The sediment in Calumet River and the Cal-Sag Channel contains elevated levels of contaminants and the Federal Standard for this material continues to be confined disposal. Contaminant levels in the Calumet Harbor sediment are significantly lower than in the Calumet River sediment and, as mentioned in Section 3.4.1, the Federal Standard for this material was determined to be unconfined upland use in a beneficial manner. For the remaining channels, including the Calumet Harbor Approach Channel, if a dredging need is identified, sediment samples will be collected to determine the Federal standard. The standard for each channel is summarized in Table 31.

Table 31: Federal Standard summary.

Project	Reach	Federal Standard <sup>1</sup>
Calumet Harbor and River	Approach	To be determined (TBD)
	Harbor	Upland Unconfined
	River	Confined Disposal
Cal-Sag Channel		Confined Disposal
CSSC		TBD
South Branch		TBD
Chicago River		TBD <sup>2</sup>
Chicago Harbor		TBD <sup>2</sup>

<sup>1</sup> Where no dredging need has been identified and therefore no sediment testing has been conducted, Federal Standard is shown as "TBD". If a dredging need is identified for these channels, sediment samples would be collected to characterize the material and determine the appropriate placement strategy.

<sup>2</sup> Although confined disposal was previously determined to be the Federal Standard for Chicago Harbor and River, the channel has not been dredged since 1986 and no sediment sampling has been conducted since the early 1980s.

## 3.9 Identification of the Base Plan

The Base Plan is very similar to the Federal Standard, but includes more site specific considerations. The Federal Standard first identifies whether the material is suitable for open water placement, suitable for beneficial use, or not suitable for either. Then, a Base Plan is developed that includes information such as: where open water placement would occur; what beneficial uses are covered and where; what management measure(s) will be used for material that is not suitable for open water placement or beneficial use and where will it be implemented.

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Based upon the analysis presented in Sections 3.5 through 3.8, the Base Plan can be described as follows:

1. The USACE Chicago District anticipates that regularly occurring maintenance dredging will be required in Calumet Harbor and River in the next 20 years. The USACE Rock Island District anticipates that a possible minor dredging event in the Cal-Sag Channel may be required during the next 20 years.
2. Based on average dredging quantities since the opening of the existing Chicago Area CDF, approximately 50,000 cubic yards of material will be dredged annually (on average), split evenly between the Calumet Harbor and the Calumet River. It is estimated that if a dredging event is required to address shoaling in the Cal-Sag Channel, approximately 30,000 cubic yards of material would be dredged.

**Totals:**

- a. **Calumet Harbor:** 20 years x (50,000/2) cubic yards per year = **500,000 cubic yards**
  - b. **Calumet River:** 20 years x (50,000/2) cubic yards per year = **500,000 cubic yards**
  - c. **Cal-Sag Channel:** 1 years x 30,000 cubic yards = **30,000 cubic yards**
  - d. **TOTAL:** **1,030,000 cubic yards** dredged from the CAWS over 20 years
3. Federal Standard Determination for the waterways
    - a. **Suitable for open-water placement:** Not applicable based on most recent testing
    - b. Suitable for certain unconfined upland beneficial uses: Calumet Harbor
    - c. **Not Suitable for beneficial use:** Calumet River; Cal-Sag Channel
  4. Suitable material will be beneficially used first as part of the federal project to reduce overall project costs in the Base Plan before being used for other purposes. Beneficial uses which are not part of the Base Plan shall be considered separable elements of the management plan, and will be pursued in accordance with guidance implementing other available authorities.
  5. The waterways were matched with the appropriate least-cost, environmentally acceptable, and technically feasible retained management measures based on sediment quality and the Federal Standard Determination:
    - a. **Calumet Harbor:** Beneficial use in certain unconfined upland applications.
    - b. Calumet River & Cal-Sag Channel: Confined disposal in a DMDF.

### 3.10 Development of Alternatives

The Base Plan identified in Section 3.9 identifies the overall management strategy for dredged material generated through maintenance of the CAWS over the next 20 years. However, the Base Plan does not address the design or location of the proposed DMDF for contaminated dredged material from the Calumet River and Cal-Sag Channel.

### **3.10.1 Assumptions**

Per the Base Plan, the final array of alternatives (excluding the No Action Plan) share the following assumptions in common:

- Dredging operations in the CAWS will continue to utilize reduced/minimized dredging while maintaining the waterways to their authorized depth and at a safe width.
- Open water placement will be prioritized in the future if sediment quality can be demonstrated to have improved to an acceptable level. Wherever sediment is of suitable quality, open water placement is assumed to be the least-cost alternative for its management.
- All material that is neither suitable for open water placement nor beneficial use will go to confined disposal in a DMDF.
- All material that is suitable for beneficial use will be used beneficially. Priority for beneficial use will be in constructing new DMDF berms and eventual capping of the proposed facility (Figure 12). Additional material suitable for beneficial use will be utilized by the Federal Government and the non-federal sponsor according to the terms of a beneficial use agreement that is under development.
- No material suitable for open water placement or beneficial use will go to confined disposal.

### **3.10.2 Confined Disposal in a DMDF**

Confined disposal is currently being practiced for contaminated sediment dredged from the Calumet River at the existing Chicago Area CDF, off of 95<sup>th</sup> Street at the mouth of the Calumet River. The terminology used to discuss these facilities changed from “CDF” to “DMDF” in the Water Resources Development Act of 1986, but the principles behind their construction and operation remain the same. Typically, impervious walls and bottom liner separate the dredged material from the surrounding environment. Wet dredged material is either dried and then move into the facility, or unloaded directly inside the facility and allowed to dry in place. Either way, wet dredged material is allowed to air dry, a process that takes approximately a year depending on water management methods.

The existing Chicago Area CDF is slightly different because it was, at the time of its original construction, an in-water facility. First, the bottom of the existing CDF is the naturally occurring clay bottom “bed” material of Lake Michigan, rather than a constructed liner. Also, because the facility was built in the waters of Lake Michigan, the sediment was placed into water and remained under water until the facility became full enough to reach the surface. It did not start to “air dry” until the facility was nearly filled with sediment.

### **3.10.3 Conceptual DMDF Design**

The conceptual design of the DMDF incorporates dredged material to fulfill USACE’s guidance on consideration of beneficial use of dredged material and to increase cost-effectiveness. Construction of the facility would include berms composed of dredged material from Calumet Harbor that is suitable for beneficial use. Similarly, suitable material from Calumet Harbor would be used to cap the site at the end of its life. The preliminary design also includes an impervious liner of compacted clay (to separate the facility from potential existing contamination if a contaminated site is selected, and to prevent seepage of effluent from contaminated dredged material) and structures to collect effluent before directing it to treatment cells prior to discharge.

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The berms of beneficial use material will be constructed in two stages. Once the capacity provided by the initial ~11-foot berm is reached, a second berm will be constructed adding additional height and capacity. When the facility is full at the end of the projected 20-year project life, a 3-foot cover consisting of clean dredged material and topsoil would be placed on top of the contaminated material and seeded for final site closure. At this point, the facility would be an approximately 25-foot tall grassy hill that the USACE Chicago District would hand over to the non-federal sponsor for operations and maintenance in perpetuity. This conceptual design was the subject of a Value Engineering (VE) study that took place in 2015 during a previous iteration of the Draft CAWS DMMP. This report can be found on the project website at <https://www.lrc.usace.army.mil/Missions/Civil-Works-Projects/Calumet-Harbor-and-River/>.

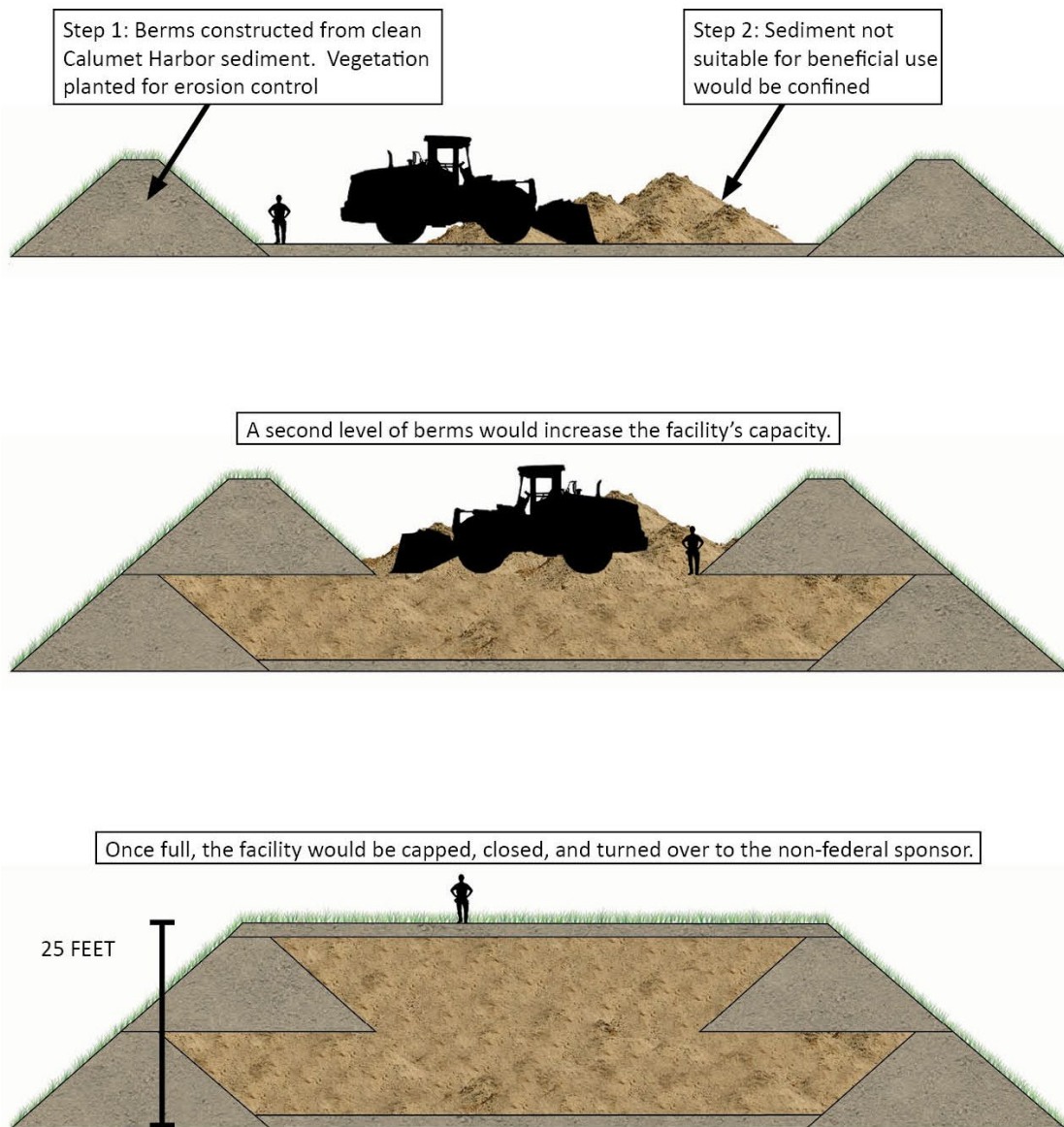


Figure 12: Conceptual design of a DMDF that utilizes beneficial use of dredged material to safely confine contaminated dredged material that is not suitable for open water placement or beneficial use.



### 3.10.4 Site Identification

The process of identifying potential sites for a DMDF has gone through multiple iterations over the life of this study based on technical analyses, policy changes, availability of property, public and stakeholder input, and coordination with the non-federal sponsor and natural resource agencies. A short summary of past iterations of the site identification process is included here. A more detailed discussion of the previous iterations is excluded from this report in the interest of conciseness, but is publically available in the Site Selection Appendix (Appendix I).

- **Original site identification process:** 61 sites were located along the Calumet River and Cal-Sag Channel (those waterways with anticipated maintenance dredging requirements over the next 20 years), using aerial imagery to locate open and undeveloped sites and through coordination with IIPD and the Metropolitan Water Reclamation District (MWRD) of Greater Chicago. The process of identifying and screening sites resulted in the identification of three potential sites that were included in the 2015 final array of alternatives.

The Tentatively Selected Plan for this iteration of the site identification process was called the Republic Steel Site and was located on the east side of the Calumet River at Turning Basin #3 near South Carondelet Avenue and 122<sup>nd</sup> Street. The non-federal sponsor at the time was ultimately not able to perform the requirements of a non-federal sponsor. By the time that the current non-federal sponsor (CDOT) came on board in 2017, the Former Republic Steel Site was no longer available due to development plans that supported a significant new employment source in the area.

- **Lake Calumet sites analysis:** In 2017, the PDT was asked by CDOT and IIPD to evaluate or re-evaluate a number of potential sites for a DMDF in and around Lake Calumet. The PDT undertook a preliminary analysis of these sites and determined that each of them had significant technical and/or environmental challenges, and that none of them would be likely to represent the least-cost alternative, per USACE guidance. The major finding from this process was that in-water DMDFs would not represent the least-cost alternative or the least environmentally damaging practicable alternative under Section 404(b)(1) of the Clean Water Act (40 C.F.R. Part 230).
- **Re-examination of original site identification process:** In 2017-2018, the PDT reviewed the original site identification process that was carried out leading up to the 2015 Draft DMMP. After the passing of two years, this effort was worthwhile because properties may have become available or unavailable and the re-evaluation would allow for the application of lessons learned during preliminary design and cost analyses from previous site identification processes. Other key components of this process are summarized below:
- *Restricted potential sites to locations along and directly adjacent to the Calumet River.* The PDT learned from previous analysis that transportation costs were a measurable difference by which to evaluate potential alternatives against one another. Since 97% of the anticipated dredging in the CAWS is forecasted to occur in Calumet Harbor and River, transporting material over large distances would be inconsistent with the Base Plan. Similarly, sites that are not located adjacent to the river would require additional transportation costs and associated environmental risks.
- *Public outreach opportunity.* As part of this renewed site identification process, the PDT recognized an opportunity and a need to re-involve the public and key stakeholders in the site

identification process, based on feedback received during the public review period in 2015. The PDT convened a series of Stakeholder Roundtable Meetings, public workshops, updated NEPA scoping and a pilot application of a web-based crowdsourcing tool to disseminate key information about the study and solicit feedback about potential sites. Specifically, the team sought to determine whether it was overlooking any potentially viable sites or key information about the sites under consideration.

- **Land and Lakes Site Evaluation:** In August 2018, the USACE Chicago District received a proposal from Land and Lakes Environmental Construction Services for development of a DMDF at a previously unconsidered site. The proposal was to create a DMDF that would fill the “wedge” between two existing landfills. Once the PDT and the non-federal sponsor determined that the site would potentially satisfy all of the preliminary screening criteria (see Section 3.10.5), they requested the appropriate technical information to inform the decision about whether or not to retain this alternative moving forward, including information about the existing caps and liners on the site, quality of the material in the landfill, regulatory status and history of the facilities, and details of the existing facilities’ closure plans and responsibilities.

Following review of the materials provided, a face-to-face conference was held at the Chicago District in September 2018 with the PDT, the non-federal sponsor, and representatives from Land and Lakes. Following this meeting, the PDT and the non-federal sponsor made the risk-informed decision not to pursue this alternative based on such concerns as potential future liability, technical risks related to landfill gas and leachate management, and ongoing responsibilities related to the sites’ closure and monitoring requirements. In sum, the study team believes these factors make it unlikely that this alternative would represent the least cost, environmentally acceptable, and technically feasible alternative.

### 3.10.5 Site Selection/Screening

The primary differences between the final study alternatives are the location, layout, and existing infrastructure at the sites identified for the implementation of a new DMDF. Over the life of this study, more than 60 potential sites for a DMDF have been evaluated. Through the processes described above, a list of nine screening criteria was ultimately developed to help the team identify the location for a facility that would be the least-cost, technically feasible, and environmentally acceptable option. Those screening criteria are described below:

1. **Size: At least 30 Acres** – A suitable site must be large enough to provide the required capacity of dredged material that is not suitable for beneficial use that is projected over the next 20 years. 30 was a conservative number used to screen out only sites that would be much too small. The actual size required to provide the necessary capacity was closer to 45-50 acres.
2. **Natural Resources: Avoid High Quality habitat** – Per policy, sites that would meet all federal environmental standards including those established by Section 404 of the Clean Water Act of 1972 were considered.
3. **Current Site Use: Preference for Under-Utilized Land** – Due to the historical and changing industrial development patterns, the Calumet area is home to many vacant former industrial sites. Vacant or generally under-utilized sites were identified as potential DMDF locations. This strategy aims to avoid large disruptions to the local work force and, consequently, tended to select sites with less existing infrastructure.



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4. **Environmental Conditions: No Unresolved Contamination Issues** – Hazardous, toxic, and radioactive waste (HTRW) is a major concern in formerly industrial landscapes. Unresolved regulatory status or litigation over contaminated sites and/or requirements for the non-federal sponsor to carry out remediation actions prior to implementation would have negative, and potentially major, impacts on the implementation schedule. This could result in economic damages from not being able to continuously maintain the waterways.
5. **Cultural Resources: No Historic Landmarks** – Impacts to significant existing cultural resources, particularly those identified on the National Register of Historic Places (NRHP), existing parks, etc. should be avoided.
6. **Operational feasibility: Practical to Build and Fill** – This criterion considers whether a site is flat and how it is laid out. Irregularly shaped or hilly sites would be more costly to operate, and sites with hard-to-move infrastructure would require additional site preparation prior to construction.
7. **Direct Waterway Access: Safer and More Efficient Handling of Material** – Sites that are directly adjacent to the waterway allow for more efficient and cost-effective offloading of dredged material from the barges that it is transported in. Sites removed from the water's edge would require hydraulic offloading or overland hauling, as opposed to mechanical offloading directly to the facility. More distant offloading would also create additional risk of spillage, and thus increased potential adverse impacts to human health and the environment.
8. **Located on the Calumet River: Minimizes Transportation** – Calumet Harbor and River are the source of virtually all of the anticipated dredged material being removed from the CAWS (~1,000,000 cy) over the study period, with only a small amount of capacity (~30,000 cy) being set aside for material from the Cal-Sag Channel. Therefore, building a DMDF along the Cal-Sag Channel (which would require transiting the TJ O'Brien Lock and Dam for each barge of dredged sediment) represents an additional cost compared to sites located along the Calumet River where the bulk of the dredging will occur.

There is also a potential Environmental Justice issue associated with taking contaminated material out of an area with potential viable DMDF sites and locating it elsewhere in the urban environment without compelling cost, technical-feasibility, or environmental reasoning.

9. **Upland Site: Beneficial Use Opportunity** – The existing Chicago Area CDF was constructed in Lake Michigan in the early 1980s. Currently, in-water construction of a new DMDF is not being considered due to high initial costs, potential for significant impacts to the natural environment (not the Least Environmentally Damaging Practicable Alternative), and potential issues obtaining a coastal zone consistency determination with the State of Illinois or Indiana. Further, an upland facility creates an opportunity for beneficial use of suitable material from Calumet Harbor for dike construction and capping (Figure 12).

### 3.10.6 Site Evaluation

A list of potential sites was identified for the development of a DMDF that included all of the sites previously identified in 2015 that were in close proximity to the Calumet River, as well as newly identified sites that were brought forward by study stakeholders during the outreach effort that was undertaken throughout 2018. The complete array of these sites is shown in Figure 13.

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This larger array of sites was then narrowed down by applying the screening criteria listed above in Section 3.10.5. The remaining sites (shown in Figure 14) appeared to potentially satisfy all of the preliminary screening criteria. These sites were then exposed to specific design-related considerations to further screen sites that would not represent the least-cost alternative of the remaining options. These considerations were the primary drivers that would likely make the same conceptual DMDF costs, environmental impacts, and/or operability significantly worse at one site compared to another:

- The presence or absence of existing dock wall infrastructure that could support or be easily improved to support a crane pad for offloading dredged material from barges into the facility. This is the primary cost driver between sites to implement the conceptual facility design presented in Section 3.10.3.
- The shape of the berms. More regular and compact facility layouts would reduce the cost of berm construction and sediment management. All else being equal, long skinny or very irregular sites would not be likely to represent the least cost, environmentally acceptable, and technically feasible alternative.
- A more detailed analysis of site specific conditions was undertaken to determine the presence of site characteristics that would increase the risk or magnitude of significant adverse impacts, or make operating the facility less feasible or efficient.

The results of this next level of analysis and corresponding decisions that were made are as follows (and are shown in Figure 14):

1. **Former KCBX South Terminal:** Investments in existing site infrastructure related to ongoing bulk material handling, including storage structures and conveyor systems, increase the value of the property. These features would need to be removed prior to construction of a DMDF at this site. This indicates that this site would not be likely to represent the least-cost, environmentally acceptable, technically feasible alternative. Further, operation of a DMDF at this active industrial location would be more likely to have negative impacts on current employment opportunities in the study area compared to the vacant or less utilized remaining sites. Accordingly, this site was **Screened Out**.
2. **Wisconsin Steel #2:** Investments in existing site infrastructure to develop a construction storage, laydown, and staging area increase the value of the property. This indicates that this site would not be likely to represent the least-cost, environmentally acceptable, technically feasible alternative. Further, operation of a DMDF at this active industrial location would be more likely to have negative impacts on the construction employment opportunities in the study area compared to the vacant or less utilized remaining sites. Accordingly, this site was **Screened Out**.
3. **Stony Island:** This site lacks existing dockwall infrastructure which is the primary cost driver between the remaining sites in the preliminary array. Further, the property is owned by MWRD and is leased to Ford Motor Co., presumably to the benefit of MWRD ratepayers. While this second consideration isn't specifically a screening criteria of this project, it warrants consideration as potential sites are compared against one another. The Stony Island site is not likely to represent the least-cost, environmentally acceptable, and technically feasible alternative and was, therefore, **Screened Out**.
4. **Southwest Lake Calumet Site:** This site, which is owned by IIPD, was identified as a potential DMDF location during one of the stakeholder roundtable meetings in 2018. Upon further

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analysis, it was determined the site lacks existing dockwall infrastructure in the associated slip and that the slip itself would likely requiring dredging in order to provide sufficient barge access for unloading dredged material. For these reasons, the Southwest Lake Calumet Site is not likely to represent the least-cost, environmentally acceptable, and technically feasible alternative and was, therefore, **Screened Out**.

5. **Park no. 576:** Park no. 576 is an MWRD property under a long-term lease with the Chicago Park District. However, there is currently neither public access nor park facilities on the site. The site contains a drop shaft that was part of the Chicago Underflow Plan, a water body called Whitford Pond, and a heron rookery. It is surrounded by landfills to the north, west, and south, with the Calumet River and the TJ O'Brien Lock and Dam to the east. The team evaluated the potential of the site for a DMDF, but due to the presence of the lock and the Whitford pond, there is no direct access that would allow a facility to be constructed immediately adjacent to the Calumet River. The team continued to evaluate other layouts at the site, particularly on the northwest portion of the property where there were previous plans to build a Chicago Police Department shooting range. However, this alternative would require hydraulic offloading of the dredged material, a more labor intensive and costly method than the mechanical offloading considered for all other sites. Additionally, there is no existing dockwall infrastructure at this site. For these reasons, the Park no. 576 site was **Screened Out**.

Table 32: Screening summary of the preliminary array of alternatives.

Site	Screened Out or Retained	Justification
Vertical Expansion of existing Chicago Area CDF	<b>Retained</b>	-
Former KCBX North Terminal	<b>Retained</b>	-
Former KCBX South Terminal	Screened Out	Active facility; additional site work to remove existing infrastructure
Wisconsin Steel Site #1	<b>Retained</b>	
Wisconsin Steel Site #2	Screened Out	Active facility; recent investments in site improvements
116 <sup>th</sup> Street and Burley Avenue	<b>Retained</b>	
LTV	<b>Retained</b>	
Stony Island	Screened Out	Lacks existing dockwall; active use, beneficial to MWRD ratepayers
Southwest Lake Calumet	Screened Out	Lacks existing dockwall; may require additional dredging for access
Park no. 576	Screened Out	Lacks existing dockwall; difficult to access; natural resource concerns on the site



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Figure 13: All of the original sites from the 2015 Draft CAWS DMMP considered for re-evaluation with additional sites not previously considered. The area was primarily restricted to sites along and adjacent to the Calumet River based on lessons learned during previous iterations of the site identification process. This map was presented at a March 2018 stakeholder meeting.





Figure 14: Following preliminary screening, the array of potential sites for a DMDF was reduced to nine sites that seemed to possibly satisfy all of the preliminary screening criteria. These sites were then exposed to additional design considerations.





Figure 15: Sites further screened based on the presence or absence of existing dockwall infrastructure, site use, other existing infrastructure on the site (cost drivers).



### 3.11 Final Array of Alternatives

The final array of alternatives includes one 'No Action' Plan and five sites that were identified by application of the assumptions and the screening process described above. More detailed HTRW information on the sites is Included in Appendix C (Environmental Engineering). All of the alternatives in the final array (except for the No Action Plan) would include open water placement and/or beneficial use if the material is suitable, but the strategy for handling material that is not suitable would differ.



Figure 16: Final array of alternatives for the construction of a new DMDF

### 3.11.1 No Action

In the No Action Plan, the federal navigation channels are not dredged and vessels using the channels are forced to light-load, resulting in transportation cost increases.

### 3.11.2 Vertical Expansion

Vertical expansion of the existing Chicago Area CDF would use the same footprint as the existing ~45-acre site on the south bank of the Calumet River at the mouth of Calumet Harbor near 95<sup>th</sup> Street. In this alternative, new berms would be built directly on top of the material currently confined in the interior of the site; a new bottom liner would not be needed due to the fact that the current facility was built on top of naturally occurring clay bottom “bed” material of Lake Michigan, rather than a constructed liner. Later, an additional ‘sand blanket’ was placed at the facility (more information in a 1998 Supplemental Environmental Impact Statement). Wick drains would be installed beneath where new berms are planned in order to consolidate and preload the sediment. The site would have separate drying pads for contaminated and beneficial use material, as well as a new dock, along the north-northeast side of the triangular site. Excess water would be directed to the existing drainage pond on the south end of the site before being piped to filter cells.

This site represents a low HTRW risk because it utilizes the same footprint as the existing facility, which was constructed on Lake Michigan bottom and, therefore, would have had little or no prior industrial usage. This alternative does not include any expansion on to the adjacent Iroquois Landing property, which is owned by IIPD.

### 3.11.3 Former KCBX North Terminal

The Former KCBX North Terminal is a ~54-acre site located just south of 100<sup>th</sup> Street on the west bank of the mainstem of the Calumet River. This site was most recently used for storage of petroleum coke (petcoke). The facility was closed in 2015 following community opposition to airblown deposition of fine grained petcoke across the area due to a lack of material management by the former owners. The site has direct waterfront access directly along the Calumet River as well as through an adjacent slip. Construction of the facility would include berms constructed from clean dredged material from Calumet Harbor, an underlying impervious liner of compacted clay to prevent seepage of effluent from contaminated dredged material, and decant structures to collect effluent before directing it to filter cells and ultimately discharging to the existing sewer system for further treatment.

The KCBX Property has several potential RECs that require additional investigation to determine the existing condition of the site. The IEPA Bureau of Land (BOL) database suggests that KCBX facility had unresolved violations dated November 2013 for causing or allowing open dumping and violations of RCRA waste determination requirements. Any required remediation of the site would need to be borne 100% by the non-federal sponsor prior to implementation of the federal project; additional regulatory coordination would be required to determine exact site requirements.

### 3.11.4 Former Wisconsin Steel Site #1

The Former Wisconsin Steel Site #1 is a ~50-acre site that makes up the north portion of the old Wisconsin Steel plant, dating back to 1875. It is located just south of 106<sup>th</sup> Street on the west bank of the mainstem of the Calumet River. The site has direct waterfront access along the Calumet River and is currently vacant. Construction of the facility would include berms constructed from clean dredged



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material from Calumet Harbor, an underlying impervious liner of compacted clay to prevent seepage of effluent from contaminated dredged material, and decant structures to collect effluent before directing it to filter cells and ultimately discharging to the existing sewer system for further treatment. Due to the lack of an existing seawall that would be suitable for docking and unloading barges, a new dock face is included in this alternative (See PLATE 3).

This site has historic RECs that have been addressed. In 1996, IEPA and Navistar, the property owner at the time, entered into a cooperative agreement to address environmental concerns at the Wisconsin Steel Works site. The cooperative agreement allowed Navistar to assume the lead in conducting environmental assessment activities at the site within the State Voluntary Cleanup Program. The name of the property owner changed to International Truck and Engine Corporation in 2001, and the property owner continued with the assessments and remedial activities at the site. The site was apparently cleaned up and is currently covered by several No Further Remediation (NFR) letters from the IEPA.

### **3.11.5 116<sup>th</sup> and Burley**

The site at approximately 116<sup>th</sup> Street and Burley Avenue is ~83 acres, but only ~50 acres would be utilized in the construction of a new DMDF. This site is located on the east bank of the mainstem of the Calumet River. This industrial property appears to have a history of bulk material handling, with some materials (presumably salt) still being stored on site. Currently, the majority of the site is being utilized to store recalled Volkswagen vehicles. The site has direct waterfront access directly along the Calumet River and appears to have adequate seawall infrastructure in place to support docking and unloading of dredged material from barges via crane. Construction of the facility would include berms constructed from clean dredged material from Calumet Harbor, an underlying impervious liner of compacted clay to prevent seepage of effluent from contaminated dredged material, and decant structures to collect effluent before directing it to filter cells and ultimately discharging to the existing sewer system for further treatment (See PLATE 4).

The property, previously owned by LTV Steel, has obtained a focused NFR for a PCB spill on a portion of the previously owned LTV parcel south of the site, no comprehensive NFR has been issued for the property. There are several potential RECs that require additional investigation to determine the existing condition of the site, and additional regulatory coordination would be needed to determine future actions required for the non-federal sponsor to implement prior to site use.

### **3.11.6 LTV Site**

The LTV site is a ~59-acre site that is currently operated as a scrap metal recycling facility. The site is located on the east bank of the mainstem of the Calumet River directly south of the site at 116<sup>th</sup> and Burley Streets. The site has direct waterfront access directly along the Calumet River and appears to have adequate seawall infrastructure in place to support docking and unloading of dredged material from barges via crane. Construction of the facility would include berms constructed from clean dredged material from Calumet Harbor, an underlying impervious liner of compacted clay to prevent seepage of effluent from contaminated dredged material, and decant structures to collect effluent before directing it to filter cells and ultimately discharging to the existing sewer system for further treatment (See PLATE 5).

The LTV site has unresolved environmental conditions and an unclear regulatory status. The Republic/LTV steel site has a previous entry in the USEPA superfund database known as the

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Comprehensive Environmental Response, Compensation and Liability System (CERLCIS) No Further Remedial Action Planned (NFRAP) list, but it did not qualify for the National Priorities List (NPL) (aka “Superfund list”). The Republic/LTV steel facility had several air and water permit violations during operation, as well as multiple spills and releases documented. Some of the spills and releases were indicated as addressed, but many were not. LTV Steel is listed in the Resource Conservation and Recovery Act (RCRA) corrective action database as a site requiring further action. A RCRA facility assessment (RFA) was completed in September 1987, a RCRA facility investigation (RFI) was recommended and the facility assigned medium corrective action priority. The RFA was repeated in May 2009, RFI was determined not necessary. One-1000 gallon Underground Storage Tank (UST) may remain on the property.

Site Remediation Program (SRP) Entry 1: South Chicago Property Management Company LLC enrolled a portion of the project site in the State of Illinois voluntary SRP program on 23 May 2001 under the name Republic Engineered Steels. Review of documents included in the Republic Steel Site online folder (IEPA BOL ID# 0316515025) suggests that while the applicant was pursuing an NFR for remedial activities conducted at the site, the applicant chose to use only groundwater samples, with no comprehensive soil sampling, to characterize the overall conditions of the property, which is not an acceptable approach to the IEPA. Groundwater and soil sampling was requested for each REC identified at the site in order to successfully pursue a comprehensive NFR; however, the property owner considered the site characterization requirements an enormous burden. The site was terminated from the SRP program by the IEPA for failure to comply with the provisions of 740.230(a)(1)-(4). Groundwater sampling results suggest that lead and chromium may be present on the site above TACO Class I groundwater exposure route value. This portion of the site would require additional coordination with the regulatory agencies to determine the status and any actions needed by the local sponsor prior to use.

SRP Entry 2: LTV Steel enrolled a different portion of the project site into the SRP program and completed all necessary remedial action completion reports, including verification sampling and analysis, to receive a focused NFR in February 1999 on the LTV South Chicago Works property. The remediation consisted of 48.7 acres of PCB contaminated materials, resulting from a spill. This portion of the property has an industrial/commercial land use restriction.

## 4.0 ENVIRONMENTAL CONSEQUENCES

In the following impacts analysis, the term ‘upland sites’ will refer to the four upland industrial sites that adjacent to the Calumet River and share many of the same characteristics: KCBX, LTV, 116<sup>th</sup> & Burley, and LTV. The Vertical Expansion alternative is considered separately due minor differences in the conceptual design, such as wick drains and the lack of a sewer connection) as well as the fundamental differences in land type and history of this former lake bottom site compared to the upland industrial sites.

### 4.1 Earth Resources

The impacts of the proposed project on earth resources is detailed below.

#### 4.1.1 Geology and Topography

For the no action alternative, no action will be taken and no facility will be constructed, therefore there will be no impact on geologic or topographic resources.

All of the proposed upland site action alternatives will be constructed on sites with prior industrial uses. The proposed construction, which would include the installation of a clay liner, will ensure that there is no disturbance to the subsurface geology of the site. The topography of the site will change, as the proposed DMDF design will result in a ~25 foot high grassy hill when the project is closed and turned over for operations and maintenance.

All proposed alternatives are surface storage facilities. The facilities will be constructed without impacts to the geologic resources within the study area.

#### 4.1.2 Maintenance Dredging and Disposal

For the no action alternative, no action will be taken and the current Chicago Area CDF will eventually run out of space and dredging activities will be impacted.

Measures are currently underway to extend the life of the Chicago Area CDF facility. In order to accommodate anticipated dredging needs for the federal channels, additional capacity will be needed. All proposed action alternatives provide sufficient capacity for projected dredging over a 20 year period.

#### 4.1.3 Sediment Quality

For the no action alternative, no action will be taken and the current Chicago Area CDF will eventually run out of space and dredging activities will be impacted.

Sediment quality will not be adversely affected by the construction of any of the action alternatives. The ability to confine contaminated sediment will be a beneficial effect on the riverine/aquatic habitat. The presence of contaminants in the sediments of the study area will not be directly affected by the presence of any of the proposed alternatives. Contaminated sediments will be collected and confined within the CDF thereby removing them from the environment. Over time, it is possible that overall contamination levels in the Calumet River will decrease due to the ongoing confinement of contaminated material. As discussed in Section 2.2.3, the sediment in Calumet River and the Cal-Sag Channel contains elevated levels of contaminants and the Federal Standard for this material is confined

disposal. The Federal Standard for the clean Calumet Harbor material is upland unconfined placement, beneficially using the material in federal project construction. The plan formulation focuses on these channels for which dredging needs are projected over the period of analysis.

#### **4.1.4 Sediment Physical Properties**

For the no action alternative, no construction will occur and existing river sediments will not be impacted.

All proposed action alternatives include drying facilities to enable sediments to be sufficiently dried before being utilized for construction of berms or for beneficial use. Once dried, the sediments will have permeability sufficient to control seepage. None of the proposed alternatives will impact the physical properties of the sediment.

#### **4.2 Hydrology & Hydraulics**

For the no action alternative, no construction will occur and hydrology and hydraulics will not be impacted.

None of the proposed action alternatives would have a significant impact on hydrology and hydraulics within the study area. At the site scale, each of the proposed alternatives would alter localized runoff patterns due to construction of a DMDF. These changes in runoff patterns would not have a significant adverse impact to the human or natural environment.

#### **4.3 Water Resources & Water Quality**

For the no action alternative, no construction will occur and existing river sediments will not be impacted. Existing contaminants will remain in the area waterways.

All proposed action alternatives have the potential to benefit water quality within the study area. As contaminated sediments are removed and confined in the CDF the water quality of the study area may improve. The legacy contaminants present in the Calumet River were introduced prior to current water quality regulations, and those contaminants should be slowly removed by dredging. Water entrained in dredged material will either runoff or evaporate. Water from the dewatering operations will be sent through filter cells before being either discharged to an MWRD sewer for treatment at a water treatment plant (upland sites) or discharged back to the Calumet River (Vertical Expansion)

#### **4.4 Air Quality**

For the no action alternative, no construction will occur and air quality will not be impacted.

The proposed action alternatives would cause localized, temporary increases in exhaust emissions from equipment and vehicles during construction and placement activities. These impacts would be limited through emissions controls during activities, in compliance with USACE, USEPA, IEPA, and local laws and regulations. The action as proposed will not result in significant or long-term adverse impacts to air quality.

Section 176(c) of CAA has a “general conformity” requirement to ensure that any activity funded by or approved by a federal agency conforms to the State Implementation Plan (SIP) for a nonattainment area (or for a “maintenance area,” which is a former nonattainment area re-designated to attainment).

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“Conform” means that the activities will not cause or contribute to new air quality violations, worsen existing violations, or delay attainment of air quality standards. In addition, there are “transportation conformity” provisions that require any transportation plan, program, or project approved by a federal agency or metropolitan planning organization to conform to the approved SIP for the nonattainment or maintenance area.

The general conformity rule consists of three major parts; applicability, analysis, and procedure. For the first part, applicability, the determination is based upon three (3) sub- parts; attainment areas, threshold (*de minimis*) emissions levels, and regional significance. The second part, analysis, examines net impacts of the direct and indirect emissions from mobile and stationary sources, and emissions from any reasonably foreseeable federal action. Lastly, the third part, procedure, has reporting requirements for the federal agency making the conformity determination.

In order to determine whether the proposed alternatives will conform to the SIP and applicable CAA requirements, USACE reviewed the rule requirements for the proposed work. For the first part, the Chicago Area CDF is within Cook County, Illinois, which currently is non-attainment area. The proposed emissions would be limited to mobile source (equipment and vehicle) emissions and general dust emissions, since the facility would not include any processes or operations that are stationary source emissions. Because of the attainment status and the possibility for emissions from mobile sources, the general conformity analysis is potentially applicable.

For the second part, the level of emissions was considered. Mobile source emissions from construction equipment are regulated; construction equipment must use appropriate fuel and technology to minimize diesel exhaust emissions. Based on extensive modeling for much larger construction projects (including several large flood risk management studies and a very large dredging project that included sediment with contaminant concentrations more than 100 times higher than the Calumet River), the small footprint of the proposed constructed facility, and the short duration of the construction work, the emissions associated with the proposed confined disposal facility will be much less than the threshold (*de minimis*) emissions levels. The future operation will be similar to the current operation, except that the footprint of the facility will be smaller. Dust from the current facility has not been an issue during the past 30 years of operation. It is assumed that future operations will continue to incorporate dust management practices as needed, including the use of vegetation, watering as needed, silt fencing or foams if necessary.

Because the CAWS DMMP construction is expected to have a minimal impact on air quality in the study area, it was determined to be unnecessary to conduct a detailed analysis using air quality models. Diesel exhaust emissions are not expected to be a long term issue, and USACE requires that all construction operations meet current environmental and safety laws and regulations. Particulate emissions are not expected to be a concern as long as the DMDF operation incorporates proper controls to reduce the potential dust emissions that may occur under certain weather conditions. Total emissions are anticipated to be well below threshold levels for all criteria pollutants.

### 4.5 Climate Change

For the no action alternative, no construction will occur and there will be no climate change related impacts.

None of the proposed action alternatives would directly or indirectly affect the regional climate. The rationale behind this determination of no affects is that the proposed action is confined to a specific area and there are no aspects of the project that would affect climate. Additionally, changing climatic conditions in the future would not have a significant impact on a proposed DMDF on any of the alternative sites. A more in-depth discussion related to climate change in the study area is included in Appendix H.

### **4.6 Noise**

For the no action alternative, no construction will occur and there will be no noise impacts.

The proposed action alternatives will result in temporary and minor impacts to noise levels during construction and of the facility. Once construction is complete, noise levels will be elevated during operation of the facility, particularly when material is being unloaded, however, this noise is not expected to be beyond the normal range for industrial uses within the study area. Due to the seasonality of dredging operations, elevated noise levels are expected only in the summer months. The proposed site is not located near residential areas and thus should not cause noise disturbance to community activities.

### **4.7 Biological Resources**

#### **4.7.1 Lacustrine habitat**

For the no action alternative, no construction will occur and there will no impacts to lacustrine habitat.

Most aquatic vegetation is absent within the Calumet Harbor, as shifting sands do not allow for aquatic beds to form. The proposed action alternatives would not adversely impact this habitat.

#### **4.7.2 Riverine Habitat**

For the no action alternative, no construction will occur and there will be no impacts to riverine habitat.

The proposed action alternatives would not directly or indirectly significantly affect the riverine habitat of the CAWS. However, the majority of the study area is defined by nearly perpendicular channel walls that offer little or no littoral zone for aquatic species, and this would not change. Construction and use of the DMDF would not adversely affect the riparian plant communities of the study area. The five alternative sites are located on highly disturbed lands that are already largely unvegetated.

#### **4.7.3 Aquatic Communities**

For the no action alternative, no construction will occur and there will be no impacts to aquatic communities.

The proposed action would not change the adverse impacts that native fish and macroinvertebrate assemblages presently encounter at the study area.

#### **4.7.4 Non-Aquatic Communities**

For the no action alternative, no construction will occur and there will be no impacts to non-aquatic communities.

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It is anticipated that the action alternatives would have no adverse or significant effects on other non-aquatic wildlife. The lack of natural cover and food sources and general human activity around the alternative sites would continue to deter most terrestrial wildlife. Construction traffic and staging areas for equipment and materials would not disrupt any nature preserve lands.

### **4.7.5 Threatened and Endangered Species**

For the no action alternative, no construction will occur and there will be no impacts to threatened and endangered species.

The action alternatives are not likely to adversely affect any federally-listed endangered or threatened species or their habitat. Because the alternative sites are located in disturbed urban environments, no significant impacts to any state-listed endangered or threatened species are expected to result from DMDF development and use.

### **4.8 Cultural Resources**

For the no action alternative, no construction will occur and there will be no impacts to cultural resources.

None of these resources would be adversely impacted by the development of a DMDF according to any of the action alternatives.

USACE notified the Deputy State Historic Preservation Officer by letter (dated 7 January 2019) of the proposed dredging and dredged material placement alternatives in compliance with the National Historic Preservation Act (NHPA), as amended (Appendix A). The correspondence documented a finding of “no historic properties” since the dredging occurs within an existing navigation channel and all of the proposed dredged material placement site locations had been recently and extensively been disturbed by modern industrial, paving, and remediation activities. Pursuant to the NHPA and to meet the responsibilities under NEPA of 1969, USACE has developed a preliminary Interested and Consulting Parties Distribution List comprised of government organizations or agencies, tribes, landowners, historical societies, and other interested parties. This list is included in the Coordination and Public Involvement Appendix (Appendix A). The development and maintenance of the Distribution List allows agencies, tribes, individuals, organizations, and other interested parties an opportunity to provide views on any effects of this undertaking on historic properties resulting from the CAWS DMMP and to participate in the review of the Draft Dredged Material Management Plan and Integrated EIS.

The Deputy State Historic Preservation Officer concurred by letter dated January, 31, 2019 [Appendix A (SHPO LOG #004010919)] with the USACE finding of “no historic properties” for the CAWS dredging and development of the proposed DMDFs alternatives. By letter dated February 12, 2019 the Kickapoo Tribe of Oklahoma contacted the District and had no objections to the CAWS DMMP, and desired to be notified in event burial remains or artifacts were discovered during the contraction phase (Appendix A). Based on these communications and an assessment of the potential project sites, it is determined that none of the action alternatives will have an impact on cultural resources.

Although USACE provides evidence of no historic properties within the proposed dredged material placement or access, if any undocumented historic properties are identified or encountered during the undertaking, USACE will discontinue all construction and dredged material placement activities and



resume coordination with the Deputy State Historic Preservation Officer, Illinois Historic Preservation Agency, Springfield, Illinois and the USACE archaeologist to identify the significance of the historic property and determine potential effects under Section 106 of the NHPA of 1966 and 36 C.F.R. Part 800.

### 4.8.1 Recreation

For the no action alternative, no construction will occur and there will be no impacts to recreation resources.

None of the action alternatives would have a significant adverse impact on existing recreational opportunities. No current parkland or existing recreational facilities will be impacted by any of the action alternatives. In the long term, recreation would be a compatible possible end use option for the closed DMDF.

### 4.9 Socioeconomic/Environmental Justice

Executive Order 12898 of 1994 directs federal agencies to identify and address any disproportionately high adverse human health or environmental effects of federal actions to minority and/or low-income populations, which the DoD implemented through the Department of Defense's Strategy on Environmental Justice of 1995.

Minority populations are those persons who identify themselves as Black, Hispanic or Latinx, Asian American, American Indian/Alaskan Native, and Pacific Islander. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population.

A preliminary review of the USEPA Environmental Justice Screening and Mapping Tool (<https://ejscreen.epa.gov/mapper/>) on 29 March 2019 indicates that both low-income and minority populations are present within the study area. The area analyzed with this tool was composed of a two-mile buffer along the course of the Calumet River, from the approach channel of Calumet Harbor to the river's intersection with Interstate 94. Based on these results from the EJSscreen tool, a more in-depth analysis of demographics related to race, ethnicity, and income was conducted.

Within the study area, all of the action alternatives fall within three neighborhoods that span the majority of Calumet Harbor and River: South Deering, East Side, and Hegewisch. Each of these neighborhoods has a minority population greater than 50 percent. Combined, racial and ethnic minorities make up approximately 83 percent of the population in the study area (

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Table 33). Additionally, minority populations in the study area are meaningfully greater than the general populations of Chicago and Cook County (

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Table 34), which are 67 percent and 57 percent minority, respectively.

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Table 33: Population and demographic information for three representative neighborhoods that cover the majority of Calumet River and Harbor.

	South Deering		East Side		Hegewisch		South Deering, East Side, & Hegewisch Combined	
<b>Total Population</b>	14,614		23,771		9,384		47,769	
<b>Hispanic or Latino AND Race</b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>
White	600	4.1	3,850	16.2	3,645	38.8	8,095	16.9
Black or African American	9,360	64.0	695	2.9	341	3.6	10,396	21.8
American Indian or Alaska Native	0	0.0	24	0.1	0	0.0	24	0.1
Asian	1	0.0	65	0.3	0	0.0	66	0.1
Native Hawaiian or Other Pacific Islander	0	0.0	0	0.0	0	0.0	0	0.0
Some other race	0	0.0	9	0.0	0	0.0	9	0.0
Two or more races	62	0.4	11	0.0	18	0.2	91	0.2
Hispanic or Latino (of any race)	4,591	31.4	19,117	80.4	5,380	57.3	29,088	60.9
<b>Percent Minority (Not White Alone)</b>	95.9		83.8		61.2		83.1	

2013-2017 American Community Survey 5-Year Estimates.

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Table 34: population and demographic comparison of the study area to the general population of Chicago, Illinois and Cook County, Illinois.

	Chicago, Illinois		Cook County, Illinois		South Deering, East Side, & Hegewisch Combined	
Total Population	2,722,586		5,238,541		47,769	
Hispanic or Latino AND Race	Total	Percent (%)	Total	Percent (%)	Total	Percent (%)
White	890,322	32.7	2,235,598	42.7	8,095	16.9
Black or African American	820,180	30.1	1,226,134	23.7	10,396	21.8
American Indian or Alaska Native	3,354	0.1	5,216	0.1	24	0.1
Asian	167,575	6.2	363,084	6.9	66	0.1
Native Hawaiian or Other Pacific Islander	442	0.0	1,123	0.0	0	0.0
Some other race	4,983	0.2	9,461	0.2	9	0.0
Two or more races	46,017	1.7	85,621	1.6	91	0.2
Hispanic or Latino (of any race)	789,713	29.0	1,312,304	25.1	29,088	60.9
Percent Minority (Not White Alone)	67.3		57.3		83.1	

2013-2017 American Community Survey 5-Year Estimates.

The South Deering neighborhood's individual poverty rate is meaningfully greater than the general population within the study area (see

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Table 35). However, the whole study area combined has an individual poverty rate that is similar (plus/minus 10 percent) to that of Chicago as a whole, but meaningfully greater than that of Cook County, Illinois (

Table 36).



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Table 35: Household income information for three representative neighborhoods that cover the majority of Calumet River and Harbor.

	South Deering		East Side		Hegewisch		South Deering, East Side, & Hegewisch Combined	
<b>Total Number of Households</b>	5,009		6,843		3,499		15,351	
<b>Household Income<sup>[1]</sup></b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>
Less than \$10,000	819	16.4	452	6.6	204	5.8	1475	9.6
\$10,000 - \$14,999	379	7.6	284	4.2	331	9.5	994	6.5
\$15,000 - \$24,999	797	15.9	997	14.6	285	8.1	2079	13.5
\$25,000 - 34,999	553	11.0	953	13.9	373	10.7	1879	12.2
\$35,000 - \$49,999	732	14.6	1085	15.9	416	11.9	2233	14.5
\$50,000 - \$74,999	836	16.7	1148	16.8	646	18.5	2630	17.1
\$75,000 - \$99,999	460	9.2	934	13.6	424	12.1	1818	11.8
\$100,000 - \$149,000	322	6.4	721	10.5	552	15.8	1595	10.4
\$150,000 - \$199,999	97	1.9	148	2.2	179	5.1	424	2.8
\$200,000 or Greater	14	0.3	121	1.8	89	2.5	224	1.5
<b>Percent of Individuals Below the Poverty Line</b>	28.9		21.0		15.9		22.4	

2013-2017 American Community Survey 5-Year Estimates.

[1] 2017 Inflation-adjusted dollars

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Table 36: Household income comparison of the study area to the general population of Chicago, Illinois and Cook County, Illinois

	Chicago, Illinois		Cook County, Illinois		South Deering, East Side, & Hegewisch Combined	
<b>Total Number of Households</b>	1,046,789		1,956,561		15,351	
<b>Household Income<sup>[1]</sup></b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>	<b>Total</b>	<b>Percent (%)</b>
Less than \$10,000	107,687	10.3	159,561	8.2	1475	9.6
\$10,000 - \$14,999	57,490	5.5	89,384	4.6	994	6.5
\$15,000 - \$24,999	113,976	10.9	189,773	9.7	2079	13.5
\$25,000 - 34,999	95,984	9.2	173,798	8.9	1879	12.2
\$35,000 - \$49,999	124,810	11.9	232,740	11.9	2233	14.5
\$50,000 - \$74,999	164,936	15.8	321,931	16.5	2630	17.1
\$75,000 - \$99,999	114,428	10.9	234,621	12.0	1818	11.8
\$100,000 - \$149,000	132,548	12.7	278,593	14.2	1595	10.4
\$150,000 - \$199,999	60,954	5.8	126,015	6.4	424	2.8
\$200,000 or Greater	73,976	7.1	150,319	7.7	224	1.5
<b>Percent of Individuals Below the Poverty Line</b>	20.6		15.9		22.4	

2013-2017 American Community Survey 5-Year Estimates.

[1] 2017 Inflation-adjusted dollars

Whether or not the study area meets the definition of an environmental justice population based on income, it certainly meets the definition of a minority community and, therefore, must be identified under E.O. 12898 and any disproportionately high adverse human health impacts or environmental effects must be addressed. The potential alternatives presented in this DMMP were identified as a result of applied site selection criteria that are based upon operational efficiency, environmental considerations, and responsible investment of federal funds, as documented in Sections 3.10 and Final Array of Alternatives. Nearly all (97 percent) of the projected dredging needs in the CAWS over the next 20 years will be in Calumet Harbor and River. As such, a DMDF sited in this same vicinity would decrease waterway traffic, the use of fuel, the risk of spillage during transportation, and lower overall transportation costs. These factors are not dependent on, or related to, the socioeconomic status of the study area.

For the no action alternative, no construction will occur and there will be no impacts to socioeconomic/environmental justice.

The potential action alternatives are all located on industrial land and construction of the facility will not displace any existing community facilities or disrupt existing social patterns or activities. Construction of the facility may have minimal short term impacts to residents but these impacts would be the same regardless of race or income. No significant adverse impacts to the human and natural environment are

anticipated as a result of constructing a DMDF at any of the alternative sites. Therefore, no minority or low-income populations would be exposed to disproportionately high adverse human health impacts or environmental effects. Further, shoaling in the Calumet Harbor and River, and the Cal-Sag Channel could force shippers to rely more heavily on trucks and rail to move commodities, increasing industrial traffic on local streets in the study area. Maintenance dredging reduces this risk of increased traffic while also helping to remove and safely contain a portion of the contaminated sediment that currently exists unconfined in close proximity to low-income and minority populations. For these reasons, none of the potential sites identified for the development of a DMDF in the final array of alternatives would represent a significant adverse Environmental Justice impact if selected. Results from implementation of the project would support local and regional economies dependent on navigation, which is considered a benefit to neighboring communities, the region, and the Nation.

### **4.10 Land Use**

For the no action alternative, no construction will occur and there will be no impacts to land use.

All proposed upland sites are currently industrial or former industrial uses. During operation of the DMDF, these sites would continue to be used for industrial purposes. The Vertical Expansion alternative is located at the existing Chicago Area CDF. This site was built on the bottom of Lake Michigan. In the long term, this site must be used for recreation, parkland, or open space in perpetuity. All of the action alternatives would likely be converted to parkland or some other low intensity use once the DMDF has been closed in order to protect the integrity of the cap.

### **4.11 Hazardous, Toxic, and Radioactive Waste (HTRW)**

For the no action alternative, no construction will occur and there will no HTRW impacts.

While there are similarities among the alternative sites based upon the shared industrial history of the study area, each site is unique and needs to have its potential HTRW impacts analyzed independently. Analysis of HTRW concerns at each of the potential alternative sites is included in Section 3.11 because concerns related to HTRW risks were also one of the key site selection criteria during plan formulation.

### **4.12 Aesthetic Quality**

For the no action alternative, no construction will occur and there will no impacts to aesthetic quality.

All of the sites in the final array of alternatives are located in or adjacent to industrial land uses along the Calumet Harbor and/or River. These are all either active industrial sites or brownfields without public access or significant aesthetic resources. The primary potential aesthetic impact evaluated in this impacts analysis was the potential to block views of iconic or locally significant viewsheds, such as that of Lake Michigan. The conceptual DMDF design described in Section 3.10.3 would not be directly in the line of sight from any significant public amenities such as parks, or a large number of residences if constructed at any of the upland sites identified in the Final Array. The Vertical Expansion alternative is located adjacent to both Lake Michigan and Calumet Park. However, there is neither public access nor sight lines onto this property. Therefore, a DMDF would not have a significant adverse impact on aesthetic resources at any of the sites in the final array of alternatives compared to existing conditions.

Another key consideration regarding aesthetic resources is the potential to adversely affect viewsheds in the future based on possible changes in land use in the study area. The proposed design of a DMDF in

the study area would result in a final state that is, at a minimum, grassy open space. Provided the non-federal sponsor(s) protect the integrity of the eventual cap, the closed facility could be otherwise developed into a land use that has a beneficial impact on aesthetic resources compared to the existing condition, such as habitat or parkland development.

In the Vertical Expansion alternative specifically, the property's end state *must* be maintained as open space or parkland. This is consistent with the closure and long-term maintenance of the proposed facility. Elevated parkland/open space at this location has the potential to enhance viewsheds of Lake Michigan to the east, the Chicago skyline to the north, the urban/industrial fabric of the southeast side to the west, and Calumet Park to the south.

### 4.13 Public Health and Safety

For the no action alternative, no construction will occur and there will no impacts to public health and safety.

Water quality and use impairments may benefit from the removal of contaminated sediments from the Calumet River. The proposed facility will be secured and fenced to prevent public access or accidental trespass to the site. Earth moving equipment will be stored within the facility, reducing the need for machinery to be moved off site or through roadways in the study area.

Operation of the proposed facility will conform to all applicable environmental regulations. Vehicular missions from the site are expected to be minimal compared to other construction sites due to the seasonal nature of dredging work. Dust control and stabilization would be required during and after construction to prevent water or wind erosion. Runoff from drying sediments will evaporate. During dredging operations, effluent from the wet sediment will flow through filter cells and will be discharged to the Calumet River or sent to a water treatment plants via sanitary sewers.

By enacting the measures discussed above, the proposed DMDF and action alternatives would not have significant adverse impacts on public health and safety in the study area.

### 4.14 Traffic and Transportation

For the no action alternative, no construction will occur and eventually the existing CDF will reach capacity. At that time, impacts to local traffic is possible as shipping and access through the Calumet Harbor and River is impacted by shoaling, and as truck traffic potentially increases due to a reduction in waterborne freight.

The proposed alternatives will not have a long-term impact on road traffic in the study area. Local roads could experience temporary construction impacts due to the movement of vehicles or equipment needed for the DMDF construction. Waterborne transportation may experience minor temporary impacts due to barge traffic or dredging operations within the channel. These impacts are necessary to ensure the ongoing viability of the channel as a commercially navigable waterway. Without maintenance dredging, shoaling in the Calumet Harbor and River and the Cal-Sag Channel could result in increased local and regional truck traffic to move goods.

#### **4.15 Waterborne Commerce**

All proposed alternatives will allow waterborne commerce to continue with minor and temporary impacts. Waterborne commerce may experience minor temporary impacts due to barge traffic or dredging operations within the channel. These impacts are necessary to ensure the ongoing viability of the channel as a commercially navigable waterway.

#### **4.16 Cumulative Effects**

As part of this study, cumulative effect issues and assessment goals are established, the temporal boundaries and affected environment are determined, and the reasonably foreseeable future actions are identified. Cumulative effects are assessed to determine if the sustainability of any of the resources is adversely affected with the goal of determining the incremental impact to key resources that would occur should the proposal be permitted.

Affected Environment. The spatial boundary for the assessment is limited to the CAWS and upper reaches of the IWW system.

Temporal Boundaries Considered.

- Past (1908-2018): the timeframe in which construction of the IWW Navigation System, including the CAWS, was completed and in has been in operation.
- Present (2019): when the decision is being made on the location and design of the DMDF
- Future (2019 to 2039): the projected time frame used for constructing and operating the proposed DMDF facility.
- Reasonably Foreseeable Actions.
- Continued navigation in the IWW and CAWS
- Continued need for dredging for maintenance of the Project
- Continued maintenance and periodic rehabilitation of navigation structures
- Continued application of environmental requirements such as those under the Clean Water Act (CWA) and water quality improvement

The physical resources of the Study area (geology, soils, topography, land cover, hydrology) were altered from their natural condition with the creation of the CAWS. The implementation of the proposed action would have no adverse effect on the physical resources of the study area or the areas which it influences. Adverse effects stemming from the action upon physical resources are not incrementally apparent, thus cumulative adverse effects are not anticipated.

The ecological resources of the study area (plants, fish, birds, prairies, streams, wetlands, etc.) were altered from their natural condition with the creation of the CAWS and the increase in urbanization and commercial development in the region. The implementation of the proposed action would not restore ecological resources or degrade them, but would contribute to the protection of the present-day CAWS aquatic ecosystem through the removal of contaminated sediment from the channel. Cumulatively, adverse ecological effects are not anticipated through implementing the proposed action.

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The implementation of the potential alternatives has no affect upon archaeological or cultural resources. Adverse effects stemming from the action upon archaeological or cultural resources are not incrementally apparent, thus cumulative, adverse effects are not anticipated. The effects of the proposed action on aesthetic values are not incrementally apparent, thus cumulative, adverse effects are not anticipated.

Although minor short-term impacts are likely to occur to local animals and plants within the construction footprint, no significant cumulative impacts are expected. The placement of potentially contaminated dredged material in the DMDF should have minor long-term benefits to fish and wildlife populations utilizing the waterway. This project, cumulatively with other dredged material placement and future O&M activities on the CAWS, should help to maintain commercial navigation while reducing future adverse impacts to the riverine ecosystem such as sedimentation, pollution, and general decline in riverine and floodplain habitat. The impacts of the shallow-draft and deep-draft CAWS navigation channels are already in place. O&M activities are the primary cumulative impact. These impacts are anticipated to be minor and short-term in nature.

### **4.17 Irreversible and Irretrievable Commitment of Resources**

For the no action alternative, no construction will occur and there will be no commitment of irreversible or irretrievable resources.

For the action alternatives, the construction of the CDF will utilize material that is undesirable waste material. Small amounts of fuel and other non-renewable resources will be utilized in construction of this site, however, none of these expenditures are significant or above standard operating procedures.

### **4.18 Local Short-Term Uses of the Environment and Long-Term Productivity**

For the no action alternative, no construction will occur and there will be no impacts to local short-term uses of the environment or long-term productivity.

For the action alternatives, the proposed sites are all heavily impacted industrial sites. Short term environmental use at these sites is minimal, and use as a CDF with eventual conversion to parkland is one of the more productive uses of these sites over the long term.

### **4.19 Compliance with Relevant Federal Statutes and Regulations**

**Endangered Species Act.** Pending completion of coordination with the U.S. Fish and Wildlife Service (USFWS), it is anticipated that the USACE determination will be that development and use of the proposed DMDF is not likely to adversely affect any endangered or threatened species currently federally-listed, proposed for federal listing, or a candidate for federal listing. Comments received as a result of the coordination that has been conducted are included in the Coordination and Public Involvement Appendix (Appendix A).

Pending completion of coordination with the IDNR, the proposed action is not expected to have significant or long-term adverse effects to any state-listed threatened or endangered species. Comments received as a result of the coordination that has been conducted are included in Appendix A (Coordination).

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**National Historic Preservation Act of 1966, as amended.** The National Historic Preservation Act of 1966 (NHPA) established a program for the preservation of additional historic properties throughout the Nation, and for other purposes, approved October 15, 1966 (Public Law 89-665; 16 U.S.C. § 470 et seq.). Section 106 of the NHPA, as amended and its implementing regulations 36 C.F.R. Part 800: “Protection of Historic Properties,” establishes the primary policy, authority for preservation activities, and compliance procedures. Proposed dredging and placement of dredged material for the CAWS DMMP is a federal undertaking and requires coordination and compliance promulgated under the NHPA and its implementing regulations 36 C.F.R. Part 800: “Protection of Historic Properties.” The NHPA ensures early consideration of historic properties preservation in federal undertakings and the integration of these values in to each agency’s mission. The proposed action, as described in this report, is in full compliance.

**Clean Air Act.** The proposed action is expected to be in compliance with the Act. Mobile source emissions were estimated as discussed in Section 4.4, and were found to be *de minimis* for criteria air pollutants. Based on these findings, the proposed project demonstrates conformity.

**Clean Water Act (Sections 404 and 401).** Following development of detailed design, determination of regulatory requirements for the proposed action under Sections 404 and 401 of the Clean Water Act will be made in coordination with IEPA and IDNR Office of Water Resources. The proposed action would be in full compliance with these requirements prior to implementation.

**Federal Water Project Recreation Act.** No increases or decreases in current public recreational opportunities would be realized if this Project were implemented. The proposed action is in full compliance.

**Fish and Wildlife Coordination Act.** Project plans have been coordinated with the USFWS. Coordination responses can be found in Appendix A. The proposed action is in full compliance.

**Wild and Scenic Rivers Act of 1968, as amended.** The Study area is not listed on the National Rivers Inventory used to identify rivers or sections of rivers that may be designated by Congress to be component rivers of the National Wild and Scenic Rivers Systems. The proposed action is in full compliance.

**Farmland Protection Policy Act of 1981.** The proposed Project would not result in the conversion of any prime, unique, or state or locally important farmland to nonagricultural uses. The Preferred Alternative would be in full compliance.

**National Environmental Policy Act of 1969, as amended.** The compilation of this EA and the signing of the Finding of No Significant Impact by the District Engineer would fulfill National Environmental Policy Act (NEPA) compliance.

**Executive Order (EO) 11988, Wise Use of Floodplains.** The proposed project site is not located in the floodplain. No change in pre-construction flood heights or level of protection is expected to occur as a result of proposed DMDF development and use. This action should not adversely impact floodplains or floodplain values.



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**Hazardous, Toxic and Radioactive Waste.** Appropriate measures to address any hazardous, toxic, or radioactive waste concerns with proposed future actions will be addressed during plans and specifications. Site specific concerns are discussed in Section 3.11.

**EO 11990, Protection of Wetlands.** The proposed action would not involve significant adverse impacts to wetlands.

**EO 13112, Invasive Species.** On February 3, 1999, President Clinton issued EO 13112 to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause by establishing the National Invasive Species Council. The proposed action is consistent with EO 13112 as it will use relevant programs and authorities to prevent the introduction of invasive species and not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.

**EO 12898, Environmental Justice.** Executive Order 12898 of 1994 directs federal agencies to identify and address any disproportionately high adverse human health or environmental effects of federal actions to minority and/or low-income populations, which the DoD implemented through the Department of Defense's Strategy on Environmental Justice of 1995.

Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population.

Low-income populations as of 2019 cover those whose income is \$25,750 for a family of four and are identified using the Census Bureau's statistical poverty threshold. The Census Bureau defines a "poverty area" as a Census tract with 20 percent or more of its residents below the poverty threshold and an "extreme poverty area" as one with 40 percent or more below the poverty level. This is updated annually at <https://aspe.hhs.gov/poverty-guidelines>.

A potential disproportionate impact may occur when the percent minority (50 percent) and/or percent low-income (20 percent) population in an Environmental Justice study area are greater than those in the reference community. To identify low-income and minority populations within the study area the EPA's mapping tool was used (<http://www.epa.gov/environmentaljustice/mapping.html>).

Operation of a DMDF is not a new activity in the study area; the existing Chicago Area CDF is located within the proposed study area. The potential alternatives are all located on industrial or vacant land and construction of the facility will not displace any community facilities or disrupt existing social patterns or activities. No minority and/or low-income populations would be disproportionately impacted by the proposed project or its alternatives as determined above.

**EO 13653, Preparing the U.S. for the Impacts of Climate Change.** Executive Order 13653 requires federal agencies to undertake actions enhancing climate preparedness and resilience, including the identification and assessment of climate change related impacts on and risks to the agency's ability to accomplish its missions, operations, and programs. As documented in Section 4.5, USACE has considered and evaluated the risk associated with climate change on the effectiveness of the proposed action and is therefore considered to be in compliance with this Executive Order.

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**17 Points of Environmental Quality.** The 17 points are defined in Section 122 of the Rivers, Harbors and Flood Control Act of 1970 (P.L. 91-611). Effects to these points are discussed as follows:

1. **Noise** – The proposed project would cause minor and temporary increases in noise levels beyond the current conditions. This impact is fully analyzed in Section 4.6
2. **Displacement of People** – The proposed project would not displace any people.
3. **Aesthetic Values** – The proposed project would not impact aesthetic values. This impact is fully analyzed in Section 4.12
4. **Community Cohesion** – The proposed project would not disrupt community cohesion.
5. **Desirable Community Growth** – The proposed project would not affect community growth.
6. **Desirable Regional Growth** – The proposed project would not affect regional growth.
7. **Tax Revenues** – The proposed project would not adversely or beneficially affect tax revenues.
8. **Property Values** – The proposed project would not affect property values.
9. **Public Facilities** – The proposed project would not affect public facilities.
10. **Public Services** – The proposed project would allow public services to continue, including public safety and economic activities.
11. **Employment** – The proposed project would not adversely affect employment and would temporarily support employment during construction activities.
12. **Business and Industrial Activity** – The proposed project would support local businesses and industries that Calumet River and Harbor.
13. **Displacement of Farms** – There are no farms within the study area, therefore there will be no affect from the proposed project.
14. **Man-made Resources** – The proposed project would maintain man-made resources.
15. **Natural Resources** – The proposed project would not affect existing natural resources of the study area.
16. **Air** – Air quality impacts of the proposed project are fully analyzed in Section 4.4.

**Water** – Water quality impacts of the proposed project are fully analyzed in Section 4.3.

### 4.20 Evaluation of Alternative Plans

#### Natural Resources

There are no high quality natural resources at any of the sites included in the final array of alternatives. And there are no anticipated significant adverse impacts on natural resources at any of these sites should a new facility be developed there. The primary difference between the sites in the final array of alternatives is that the four upland sites would discharge the effluent from the wet sediment through the sanitary sewer system to a waste water treatment plant, whereas the vertical expansion would pump effluent from the wet sediment to filter cells for treatment before discharging it into the Calumet River. This would not represent a significant adverse impact on the Calumet River because the filter cells or water treatment plant will be monitored to ensure that effluent discharged from the facility

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meets the water quality standards and does not cause any adverse water quality impacts. The discharge of effluent from the vertical expansion alternative would require additional permitting and coordination with the IEPA, which would likely be nearly identical to what is currently required for the existing Chicago Area CDF.

### **Cultural Resources**

In their current state, none of the sites in the final array of alternatives have significant cultural resources. The four upland sites are all zoned for industrial use and not open to the public. The site of the existing Chicago Area CDF was previously Lake Michigan bottom and has strict future use restrictions. This site's final use must be maintained in perpetuity as open space or parkland. Vertical Expansion of the existing facility would delay the transition of this property back to the Chicago Park District, which could potentially also delay its development into open space or parkland. The Federal Government will not be a party to decisions about the future use and the development of the site other than to ensure that certain restrictions are upheld to protect the eventual site cap.

### **Socioeconomic Resources**

The four industrial sites along the Calumet River included in the final array of alternatives are all zoned for industrial use. While a DMDF facility would be consistent with the described uses in this zoning area, the eventual closed facility would have restrictions in place for future development to protect the site cap. Possible uses for a closed DMDF site in an industrial corridor may include parking, staging or storage, solar energy development, open space, and recreational lands; uses that would not require major excavation. These restrictions could potentially have negative impacts on industrial employment and revenue generation in the future. Vertical expansion of the existing CDF would not have a permanent negative impact socioeconomic resources in the study area because the site's long-term use must be as open space or parkland.

## 5.0 COMPARISON OF FINAL ARRAY OF ALTERNATIVE PLANS

### 5.1 Methods Used to Estimate Transportation NED Benefits

This section summarizes the results of the economic analysis assessing the FWOP and future with project (FWP) conditions. Detailed discussion of the procedures and methods used in the analysis can be found in Appendix B (Economic Analysis). Continued maintenance of a waterway allows vessels (deep-draft) and barges (shallow draft) to move commodities through the given channel at a particular transportation cost. Discontinued maintenance of a channel (future without-project condition; FWOP) would allow for shoaling. The reduction in channel dimensions may cause vessels to light-load, which would increase the of vessel trips to move the same amount of tonnage, and thus, increase transportation costs. The benefits associated with continued maintenance of the channels (future with-project condition; FWP) are the avoided increases in transportation costs.

The estimated average annual benefits (AAB) differ between the upland sites and vertical expansion due to differences in assumed maintenance dredging. The current Chicago Area CDF is estimated be at capacity in FY22. For the upland sites, dredging would cease until FY26 when the project is online. However, Vertical Expansion would be able accommodate an additional 100,000 cubic yards during its construction (50,000 cubic yards from the river in 2023 and 50,000 cubic yards from the harbor in 2024). A lapse in dredging would solely occur in FY25. For all project alternatives dredging would resume when the DMDF is online (FY26) and occur annually through FY45.

#### Calumet Harbor and River

Transportation costs for commodity movements at Calumet Harbor and River were estimated using the Great Lakes Systems Analysis of Navigation Depths (GL-SAND) model. GL-SAND is a regional model developed to measure economic navigation project performance in the Great Lakes region. The analysis incorporates variations in lake levels, vessel characteristics (size and draft), vessel costs, and the depths of harbors, locks, and connecting channels throughout the region. The model generates transportation costs associated with a range of potential channel depths for movements of major commodities in the Great Lakes. These costs are used to generate a time stream of transportation costs under with project and without project conditions. The GL-SAND model is certified by USACE for regional use in economic and planning studies on the Great Lakes. It was certified on 6 February 2014 and is certified through 6 February 2021. See signed authorization document in the GL-SAND section of Appendix B. Shipments of the major deep-draft commodities at the harbor were used to model economic activities, as discussed in Appendix B (Economic Analysis).

The FWOP condition presents and estimate of the transportation costs associated with moving commodities at the harbor and river assuming maintenance dredging is discontinued and reduced channel depths are available. The available draft resulting from the shoals defined in earlier in Section 2.17.2 was used to assign an available draft for commodity movements at each dock. Transportation cost increases resulting from this reduction in available draft were calculated using GL-SAND. Costs for each movement at the applicable reduced draft caused by projected shoaling rates were calculated and totaled for each dock.

The FWOP and FWP condition time streams were converted to an average annual value using a 20 year project life and the FY19 Federal Discount Rate of 2.875 percent at FY19 prices. The average annual

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transportation costs for Calumet Harbor and River movements in the FWOP condition (discontinued channel maintenance) less those in the FWP condition (continued channel maintenance) represent the estimated transportation benefits of channel maintenance.

### Cal-Sag Channel

Transportation costs for the Cal-Sag Channel were calculated using the Cal-Sag Shoaling Impact Tool (C-SSIT), for which model approval is underway. The C-SSIT combines SQL Server and Excel to pull data from USACE databases and identify the commercial cargo movements moving on the Cal-Sag Channel. The C-SSIT relies on historical movement data from the WCSC database, projected movement data through year 2045 from the USACE Inland Navigation Planning Center of Expertise, and cost and rate data gather from surveys conducted by the University of Tennessee, Center for Transportation Research for the Great Lakes Mississippi River Interbasin Study (GLMRIS). The output of the C-SSIT is a list of movements that transit the Cal-Sag Channel and the variables given for each movement include the waterway cost, the overland cost, the transportation rate saving, the projected tonnage for each movement, the number of barges used for the movements, and the draft of these barges. This list of movements allows for the identification of the movements that would be impacted by changing shoaling in the Cal-Sag Channel.

As with Calumet Harbor and River, the FWOP condition incorporates the transportation costs associated with moving commodities through the channel at reduced drafts resulting from projected shoaling. The available draft resulting from the shoals defined in Section 2.17.2 was used to assign an available draft for commodity movements through the channel. Because nearly all Cal-Sag Channel vessel traffic is through traffic, the greatest shoaling rate, at the Cal-Sag Channel/CSSC junction, RM 303.9, controls the available draft for most vessels. The analysis assumed the same amount of tonnage would be transported annually despite the shoaling, and, in response to the shoaling, barges would be loaded with less tonnage and the number of barges would be increased. The increase in the number of barges corresponds to direct increase in the waterway transportation costs.

The FWOP and FWP condition time streams were converted to an average annual value using a 20 year project life and the FY19 Federal Discount Rate of 2.875 percent at FY19 prices. The average annual transportation costs for the Cal-Sag movements in the FWOP condition (discontinued channel maintenance) less those in the FWP condition (continued channel maintenance) represents the estimated transportation benefits of channel maintenance.

### **5.2 Comparison of Transportation NED Benefits for Alternative Plans**

To compare the final array of alternatives, preliminary cost estimates were developed and an economic analysis was conducted to determine the net benefits for each alternative. Proposed implementation timing is shown in Table 37. The total average annual transportation NED benefits (to include Calumet Harbor and River and the Cal-Sag Channel) for the upland sites and Vertical Expansion are presented in Note: The schedule is dependent on availability of funds.

Table 38 and Table 39.

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Table 37: Tentative implementation schedules for upland alternatives and Vertical Expansion.

Alternative	Year	Phase	Activities	Dredging
<b>Upland Sites</b>	2023	Site Preparation	Grading, installation of clay liner, drying pad creation, dockwall construction or improvements, connection to sewer system	Existing CDF full, no dredging
	2024	Dredging, Drying, and Stockpiling	Gathering beneficial use material for berm construction; allow to dry on drying pads for ~1 year	Dredging of Calumet Harbor only No dredging of Calumet River
	2025	Construction of Stage 1 Berms	Shape berms using stockpiled beneficial use material; Install clay liner on in interior slopes	No dredging of Calumet Harbor or River
	2026	Completion of Stage 1	New facility opens, Begin accepting Calumet River sediment	Dredging of Calumet River resumes; Resume regular maintenance dredging cycle
	~2037	Construction of Stage 2 Berms	Shape berms using stockpiled beneficial use material; install clay liner on in interior slopes	Continue regular maintenance dredging cycle
	~2045	Closure	Place 3' cap (2.5' of beneficial use material and .5' of topsoil), seeding, turn over to non-federal sponsor	TBD
<b>Vertical Expansion</b>	2023	Site Preparation	Installation of wick drains, drying pad creation, dockwall construction	Continue regular maintenance dredging cycle
	2024	Dredging, Drying, and Stockpiling	Gathering beneficial use material for berm construction; allow to dry on drying pads for ~1 year	Dredging of Calumet Harbor only No dredging of Calumet River
	2025	Construction of Stage 1 Berms	Shape berms using stockpiled beneficial use material; install clay liner on in interior slopes	No dredging of Calumet Harbor or River
	2026	Completion of Stage 1	New facility opens, begin accepting Calumet River sediment	Dredging of Calumet River resumes; Resume regular maintenance dredging cycle
	~2037	Construction of Stage 2 Berms	Shape berms using stockpiled beneficial use material; install clay liner on in interior slopes	Continue regular maintenance dredging cycle
	~2045	Closure	Place 3' cap (2.5' of beneficial use material and .5' of topsoil), seeding, turn over to non-federal sponsor	TBD

Note: The schedule is dependent on availability of funds.

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Table 38: Average Annual Benefits (AAB) – Upland sites

	Calumet H&R	Cal-Sag Channel	Total
Average Annual Tonnage (2019-2045):	5,650,000	5,064,000	10,715,000
Transportation NED Benefits:	\$157,091,000	\$84,395,000	\$241,486,000
Present Value	\$106,575,000	\$57,474,000	\$164,049,000
Average Annual Benefits	\$7,081,000	\$3,819,000	<b>\$10,900,000</b>

<sup>1</sup> Monetary values in this table expressed in 2019 prices, assuming a base year of 2026 (FY26), and a 20-year period of analysis. Present values expressed in 2019 prices and discounted using the FY19 Federal Discount Rate (FDR) of 2.875%. The annuity factor (0.066) is determined by utilizing the FY19 FDR and a 20-year period of analysis; it is used to estimate average annual benefits (AAB). All values rounded to the nearest thousand.

Table 39: Average Annual Benefits – Vertical Expansion

	Calumet H&R	Cal-Sag Channel	Total
Average Annual Tonnage (2019-2045):	5,650,000	5,064,000	10,715,000
Transportation NED Benefits:	\$158,852,000	\$85,178,000	\$244,029,000
Present Value	\$108,372,000	\$58,271,000	\$166,643,000
Average Annual Benefits	\$7,200,000	\$3,872,000	<b>\$11,072,000</b>

<sup>1</sup> Monetary values in this table expressed in 2019 prices, assuming a base year of 2026 (FY26), and a 20-year period of analysis. Present values expressed in 2019 prices and discounted using the FY19 Federal Discount Rate (FDR) of 2.875%. The annuity factor (0.066) is determined by utilizing the FY19 FDR and a 20-year period of analysis; it is used to estimate average annual benefits (AAB). All values rounded to the nearest thousand.

Feasibility-level cost estimates were developed for all of the study alternatives, as shown in Table 40.

### 5.3 Selection of a Tentatively Selected Plan

It is USACE policy to accomplish the disposal of dredged material associated with the construction or maintenance dredging of navigation projects in the least costly manner. Disposal is to be consistent with sound engineering practice and must meet all federal environmental standards including the environmental standards established by Section 404 of the Clean Water Act of 1972 or Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended. This constitutes the base disposal plan for the navigation purpose.



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Table 40: Average Annual Costs – All Sites

		LTV	WI Steel	KCBX	116 <sup>th</sup> and Burley	Vertical Expansion
First Cost	Preconstruction Engineering and Design (PED)	\$5,015,000	\$6,036,000	\$4,554,000	\$5,024,000	\$4,944,000
	Construction Management	\$2,508,000	\$3,017,000	\$2,279,000	\$2,513,000	\$2,470,000
	Site Prep, Phase 1, Phase 2, Cap	\$25,081,000	\$30,151,000	\$22,762,000	\$25,110,000	\$24,702,000
	Real Estate	\$4,448,000	\$3,800,000	\$5,430,000	\$4,250,000	\$-
	Sediment Management	\$16,275,000	\$16,275,000	\$16,275,000	\$16,275,000	\$16,275,000
	Dredging (Contract, PED, S&A)	\$38,811,000	\$38,811,000	\$38,811,000	\$38,811,000	\$42,579,000
	<b>Total</b>	<b>\$92,138,000</b>	<b>\$98,090,000</b>	<b>\$90,111,000</b>	<b>\$91,983,000</b>	<b>\$90,970,000</b>
Present Value	PED	\$4,967,000	\$6,138,000	\$4,442,000	\$5,055,000	\$4,997,000
	Construction Management	\$2,367,000	\$2,919,000	\$2,122,000	\$2,407,000	\$2,379,000
	Site Prep, Phase 1, Phase 2, Cap	\$23,666,000	\$29,170,000	\$21,197,000	\$24,050,000	\$23,790,000
	Real Estate	\$4,843,000	\$4,137,000	\$5,912,000	\$4,627,000	\$-
	Sediment Management	\$12,092,000	\$12,092,000	\$12,092,000	\$12,092,000	\$12,092,000
	Dredging	\$29,184,000	\$29,184,000	\$29,184,000	\$29,184,000	\$33,116,000
	<b>Total</b>	<b>\$77,119,000</b>	<b>\$83,640,000</b>	<b>\$74,949,000</b>	<b>\$77,415,000</b>	<b>\$76,374,000</b>
Rounded Average Annual Cost	PED	\$330,000	\$408,000	\$295,000	\$336,000	\$332,000
	Construction Management	\$157,000	\$194,000	\$141,000	\$160,000	\$158,000
	Site Prep, Phase 1, Phase 2, Cap	\$1,572,000	\$1,938,000	\$1,408,000	\$1,598,000	\$1,581,000
	Real Estate	\$322,000	\$275,000	\$393,000	\$307,000	\$-
	Sediment Management	\$803,000	\$803,000	\$803,000	\$803,000	\$803,000
	Dredging	\$1,939,000	\$1,939,000	\$1,939,000	\$1,939,000	\$2,200,000
	<b>Total</b>	<b>\$5,124,000</b>	<b>\$5,557,000</b>	<b>\$4,980,000</b>	<b>\$5,144,000</b>	<b>\$5,074,000</b>

<sup>1</sup> Monetary values in this table expressed in 2019 prices, assuming a base year of 2026 (FY26), and a 20-year period of analysis. All values rounded to the nearest thousand. Present values expressed in 2019 prices and discounted using the FY19 Federal Discount Rate (FDR) of 2.875%. The annuity factor (0.066) is determined by utilizing the FY19 FDR and a 20-year period of analysis; it is used to estimate average annual costs (AAC).

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## 6.0 TENTATIVELY SELECTED PLAN

### 6.1 Trade-off analysis

It is policy that when all sites are environmentally compliant and technically feasible, then the selected alternative is the least costly option. In the current analysis, KCBX appears to be the least cost option. However, three of the other sites are within 2% of the cost of this alternative and have similar BCRs. Since, any of these alternatives could reasonably represent the least-cost option based on more detailed design and cost estimation in later phases of the study, it is appropriate to consider other factors in the risk informed decision-making process. A qualitative risk assessment was conducted for the 'upland sites' (KCBX, LTV, and 116<sup>th</sup> & Burley) and the Vertical Expansion alternative, which involved identifying the risks of selecting each alternative, rating the likelihood and consequences of the risks, and determining the overall risk rating (low, medium, or high). A summary of these risks are presented below. The Wisconsin Steel site is not considered here because the associated costs are more than 8% above the other sites.

This section is intended to document and compare the uncertainties associated with the sites in terms of both likelihood and consequence. These uncertainties give rise to risk. A qualitative assessment of these risks was conducted by rating the likelihood and consequences of the risk using the method presented in Table 41: consequences of the risk, likelihood of the risk, and confidence in the consequence and likelihood ratings. Definitions of the consequence, likelihood and confidence ratings are provided in Table 42.

Table 41: Risk Register Template – Determination of Risk Ratings <sup>1/</sup>

		Consequence Rating			
		Low	Medium	High	None
Likelihood Rating	Low	Low	Low	Medium	None
	Medium	Low	Medium	High	None
	High	Medium	High	High	None
	None	None	None	None	None

1/ Source: USACE Planning Community Toolbox. Refer to Table 42 for definitions of the consequence and likelihood ratings.

Table 42: Definition of Consequence, Likelihood, and Confidence Ratings <sup>1/</sup>

Consequence Rating Definitions	
High	the consequence of this risk is unacceptable
Medium	the consequence of this risk can be tolerated
Low	the consequence of this risk is of relatively insignificant concern
None	there are not undesirable consequences associated with the proposed action
Likelihood Rating Definitions	
High	the undesirable consequence is more likely than not to occur
Medium	the undesirable consequence is about as likely to occur as not occur
Low	the undesirable consequence is more likely not to occur than to occur
None	the probability of undesirable consequence is zero or so low as to be effectively treated as a zero based on evidence

1/ Source: USACE Planning Community Toolbox.

### 6.1.1 Key Uncertainties of Selecting any of the 'Upland Sites' (KCBX, LTV, or 116<sup>th</sup> & Burley)

**Real Estate** – Selection of any of the upland sites would represent increased real estate risks compared to Vertical Expansion. None of these sites are owned by a public entity, and there is an associated schedule risk based on the ability to acquire real estate in a timeframe that does not delay the implementation schedule. Delays in real estate acquisition would affect implementation and channel maintenance dredging by increasing the gap in which the USACE Chicago District would not be able to maintain the waterways. The likelihood of a delay in acquisition is 'MEDIUM' and the consequence is 'HIGH', making the associated risk rating '**HIGH**'.

Table 43: Real estate risk rating associated with the KCBX site.

		Consequence Rating			
		Low	Medium	High	None
Likelihood Rating	Low	Low	Low	Medium	None
	Medium	Low	Medium	<b>HIGH</b>	None
	High	Medium	High	High	None
	None	None	None	None	None

**HTRW** – Each of the upland sites has a long industrial history and several potential contamination concerns that require additional investigation. Any required remediation costs would be borne entirely by the nonfederal sponsor(s) and would need to be completed prior to implementation of the federal project. The sponsor has voiced opposition to investing in remediation for a site that would be used for a DMDF. In addition, remediation would delay project implementation and channel maintenance dredging, and would adversely affect navigation until maintenance dredging could resume. The likelihood of a remedial action being required is 'MEDIUM-HIGH' based on the industrial history of the site, and the consequence is 'HIGH'. Therefore, the associated risk rating of potential HTRW issues at the site is '**HIGH**'.

Table 44: HTRW risk rating associated with the KCBX site.

		Consequence Rating			
		Low	Medium	High	None
Likelihood Rating	Low	Low	Low	Medium	None
	Medium	Low	Medium	<b>HIGH</b>	None
	High	Medium	High	<b>HIGH</b>	None
	None	None	None	None	None

**Social/Socioeconomic Considerations** – Public feedback indicates that the construction of a DMDF at any of the upland sites along the Calumet River in proximity to residential areas is strongly opposed. Development of a DMDF at these sites would severely restrict options for future development on the property. These considerations represent a decision risk, as these sites may cause negative impacts to future economic development in the study area. The likelihood that the proposed facility would negatively impact future development in the study area is 'LOW-MEDIUM' and the consequence rating

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is 'MEDIUM'. Therefore, the associated risk related to social/socioeconomic considerations is '**LOW-MEDIUM**'.

Table 45: Social/socioeconomic risk rating associated with the KCBX site.

		Consequence Rating			
		Low	Medium	High	None
Likelihood Rating	Low	Low	<b>LOW</b>	Medium	None
	Medium	Low	<b>MEDIUM</b>	High	None
	High	Medium	High	High	None
	None	None	None	None	None

### 6.1.2 Key Uncertainties of Selecting the Vertical Expansion Alternative

**Real Estate** – The existing CDF property is owned by the Chicago Park District (CPD). Currently, CPD may not have plans or funding identified for park development and O&M at the existing CDF for post-closure. Further, there are limited options for post-closure public access to the site regardless of plans and funding, making use of the site for public recreation problematic. Through preliminary coordination, CPD has indicated that they would be supportive of vertical expansion of the CDF. Based on their own limitations for short term site use, CPD is willing to consider deferring their use of the site in support of the proposed DMDF. For the vertical expansion alternative, CPD would then need to sign on as a project co-sponsor for the providence of real estate for the twenty year project life. Therefore, this alternative has a low likelihood of causing delays in real estate acquisition that would affect implementation and channel maintenance dredging. The likelihood of a delay in acquisition under the Vertical Expansion alternative is 'Low' and the consequence is 'HIGH', making the associated risk rating '**MEDIUM**'.

Table 46: Real estate risk rating associated with the Vertical Expansion alternative.

		Consequence Rating			
		Low	Medium	High	None
Likelihood Rating	Low	Low	Low	<b>MEDIUM</b>	None
	Medium	Low	Medium	High	None
	High	Medium	High	High	None
	None	None	None	None	None

**HTRW** – The risk of contamination issues associated with the Vertical Expansion alternative is the lowest of all study alternatives. This is due to the fact that vertical expansion occupies the same footprint as the existing Chicago Area CDF. Prior to construction of the existing facility, the site was occupied by the near-shore waters of Lake Michigan. The current facility was completed in 1984, it has operated safely ever since. The likelihood of a remedial action being required is 'LOW' based on the industrial history of the site, and the consequence is 'HIGH'. Therefore, the associated risk rating of potential HTRW issues at the site is '**MEDIUM**'.

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Table 47: HTRW risk rating associated with the Vertical Expansion alternative.

		Consequence Rating			
		Low	Medium	High	None
Likelihood Rating	Low	Low	Low	<b>MEDIUM</b>	None
	Medium	Low	Medium	High	None
	High	Medium	High	High	None
	None	None	None	None	None

**Social Considerations** – Vertical Expansion may be the most favorable site for the local community to support. First, this alternative would not require the construction of an entirely new disposal facility in the 10<sup>th</sup> Ward. Secondly, due to its isolation, the existing CDF has operated successfully here for over 30 years without conflict with the surrounding communities. There are legitimate concerns that the selection of vertical expansion would further delay turning this land into parkland. Despite the delay, this parcel will eventually become parkland in perpetuity following cessation of the DMDF operation. The likelihood that the proposed facility would negatively impact future development in the study area is ‘LOW’ and the consequence rating is ‘MEDIUM’. Therefore, the associated long-term risk related to social/socioeconomic considerations is ‘LOW’.

Table 48: Social/socioeconomic risk rating associated with the Vertical Expansion alternative.

		Consequence Rating			
		Low	Medium	High	None
Likelihood Rating	Low	Low	<b>LOW</b>	Medium	None
	Medium	Low	Medium	High	None
	High	Medium	High	High	None
	None	None	None	None	None

### Trade-off Analysis Summary

For each of the identified key risks (real estate, HTRW, and social/socioeconomic considerations), the Vertical Expansion alternative was determined to represent a lower level of anticipated risk.

Table 49: Summary of key risks between the KCBX site and the Vertical Expansion alternative.

Source of Risk	Potential Risk Associated with the KCBX Site	Potential Risk Associated with the Vertical Expansion Alternative
Real Estate	<b>HIGH</b>	<b>MEDIUM</b>
HTRW	<b>HIGH</b>	<b>MEDIUM</b>
Social/socioeconomic Considerations	<b>MEDIUM</b>	<b>LOW</b>

## 6.2 Identification of a Tentatively Selected Plan

Based on a comparison of the risks associated with pursuing any of the apparent least-cost alternatives, the TSP is the Vertical Expansion of the Existing CDF. This project alternative represents a lower level of anticipated risk for each of the key risk categories discussed above.

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The Vertical Expansion alternative provides greater net benefits while producing a similar BCR of 2.2. The estimated first cost (2019 price level) of the TSP is \$90,970,000. This project life-cycle costs include construction, facility operation and maintenance, and closure costs for the new DMDF, and maintenance dredging costs over the life of the project. The total average annual cost of the TSP is estimated to be \$5,074,000 (FY 2019 price level). The average annual benefits of the TSP are \$11,072,000. The construction of the new facility itself is estimated at \$32,116,000 and would be cost-shared with an estimated federal investment of \$20,875,400. This would equate to an estimated nonfederal cost of \$11,240,600.

While the TSP is being referred to here as the Vertical Expansion Alternative, this name only directly describes the management for one type of dredged material: that contaminated material that must be confined. In reality, the TSP also includes a plan to manage dredged material that does not require confinement. A more complete description of the TSP describes all of the combined dredged material management strategies that go into this DMMP.

### **Open Water Placement**

The Corps of Engineers follows specific regional guidance in the Great Lakes Dredged Material Testing and Evaluation Manual (1998) to determine whether sediment will be suitable for open-water placement. Currently, none of the dredged material covered in this DMMP has been determined to be suitable for open water placement. The initial modeling of the Calumet Harbor sediment indicates that open water placement might be acceptable, but based on the levels of ammonia in the results from elutriate testing, open-water placement is not recommended at this time. If continued sampling of dredged material shows changes in the sediment characteristics, open-water placement will be re-evaluated. Future evaluation, including sediment and elutriate chemical analysis and biological testing, would be conducted to re-evaluate open water placement and fully investigate this placement alternative. Recall one of the assumptions in Section 3.10 was that no material suitable for open water placement or beneficial use will be placed inside a DMDF facility.

### **Beneficial Use Material**

Dredged material that is unsuitable for open-water placement but is otherwise suitable for upland uses will be used beneficially. Beneficial use of dredged material will be handled in two ways; recall the study assumption in Section 3.10 that no material suitable for open water placement or beneficial use will be placed inside a DMDF facility. First, this material will be used to construct the perimeter berms that make up the DMDF, as well as the proposed cap at the end of the facility's life. This reduces project costs and will eventually result in a closed facility that can be used for habitat and/or park space.

Second, any excess material that is suitable for beneficial use will be transported off-site according to terms that will be laid out between USACE and the non-federal sponsors. This material would be dredged mechanically and dried on a pad adjacent to the DMDF. Water that is released from the dredged sediment would be directed to the pond on site prior to treatment and discharge. Typical beneficial uses that the dredged harbor material may be used for include roadbed/embankment construction, clean cover over remediated sites being redeveloped, clean cover for remediated sites being converted to recreational uses, habitat restoration, general fill for excavation areas or after building demolition, restoration of marginal lands, landfill cover, as a raw material for the manufacture of construction materials (bricks, concrete, topsoil), and for mine land reclamation. For example, in 2004, 2007, and most recently in 2012, Lake Peoria sediment was used as cover and landscaping



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material on the former U.S. Steel site in Chicago. The material was found to be similar in texture and nutrient content to topsoil and was determined to be a suitable soil for establishing a vegetative cover on the site. Suitability of the dredged material proposed for other beneficial uses will be determined based on physical properties (grain size, compaction, other physical characteristics as appropriate for the intended use) and on chemical properties (consistent with Illinois and Indiana guidance for clean fill and site re-development). Material that is determined to be unsuitable for unconfined upland use would not be used beneficially, but would be disposed of at a confined location.

### **Vertical Expansion of the Existing CDF**

For dredged material that is neither suitable for open-water placement nor beneficial use, confined disposal is the least-cost, environmentally acceptable, and technically feasible alternative for its management. This will be accomplished by vertically expanding the existing Chicago Area CDF's capacity to provide safe placement of this material for at least the next 20 years (approximately 500,000 cy).

The vertically expanded facility will occupy the same footprint as the existing CDF. It will include separate drying pads for contaminated and beneficial use material (to prevent mixing) and a new dock to facilitate the unloading of dredged material. The confined disposal area within this site will consist of perimeter berms that are composed of beneficial use material inside of which contaminated dredged material will be placed. Prior to construction of the perimeter berms and wick drains will be installed and preloading/consolidation of the existing sediment in the facility will be carried out. During dredging operations, effluent from the wet dredged material will evaporate or drain into the dewatering pond at the south end of the site where it will be pumped to a filter cell for treatment and ultimately discharged to the Calumet River.

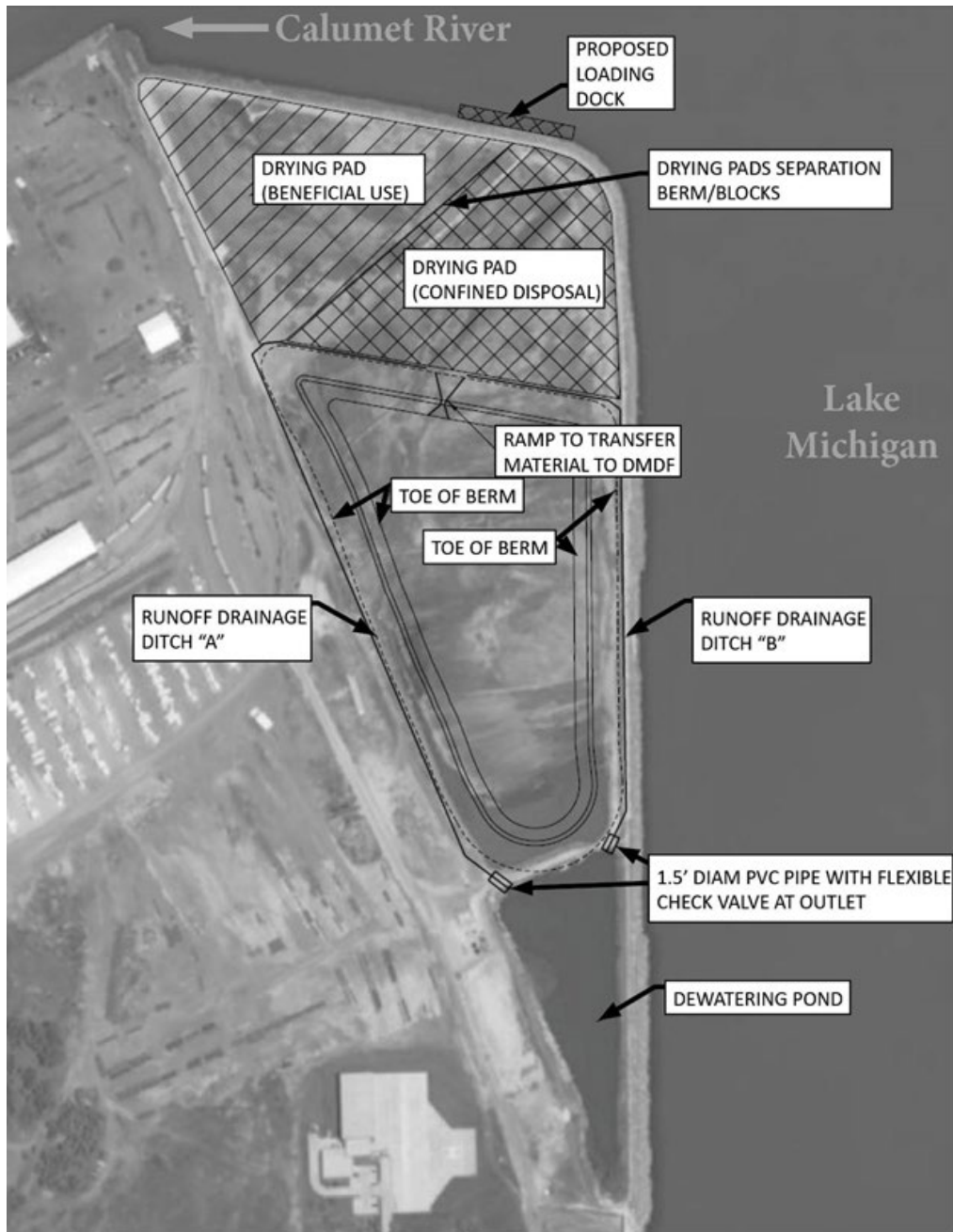


Figure 17: Preliminary plan view of a new DMDF under the Vertical Expansion Alternative.

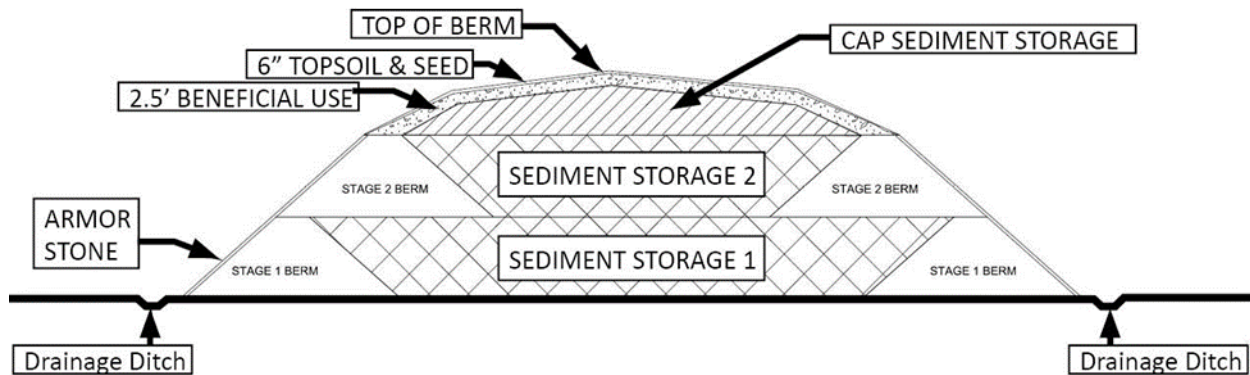


Figure 18: Preliminary elevation of a capped and closed DMDF under the Vertical Expansion Alternative. The berms are composed of beneficial use material and lined with clay.

### 6.3 OMRR&R

Once construction activities are completed, the project will be operated by the USACE Chicago District for the life of the facility. Once the DMDF no longer has capacity to support maintenance of the federal navigation projects, it will be closed, capped, and turned over to CPD. Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) of the site will be the responsibility of CPD. OMRR&R will include vegetation and erosion control, animal control, monitoring, and development that is compatible with maintaining the integrity of the cap. The USACE Chicago District will provide restrictions for use and development of the closed site to this effect, including exclusion of deep-rooted plants, burrowing animals, and certain structural footers.

### 6.4 Real Estate Considerations

The real estate considerations for this project include the property for the proposed DMDF, access to the proposed DMDF, and operation and maintenance of the drainage features and filter cells.

#### Proposed DMDF Property

As the fee owner of the proposed DMDF property (existing Chicago Area CDF), Chicago Park District (CPD) must be a non-federal co-sponsor with CDOT. CPD will be responsible only for providing real estate for the proposed DMDF.

#### Access to the Proposed DMDF

Access to the existing Chicago Area CDF is provided by IIPD (non-federal sponsor for that project) through Port property for as long as that facility continues to operate. In order to ensure access to the proposed DMDF, there are multiple potential outcomes:

1. CPD (or CDOT) acquires a real estate easement for site access through IIPD property at Iroquois Landing.
2. CPD provides access to the proposed DMDF directly through Calumet Park to the south.

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- IIPD signs on as a third non-federal sponsor, taking on responsibility for providing access through its property for the life of the proposed new facility.

### Drainage features and Filter Cells

USACE must have the ability to operate and maintain the drainage features and filter cells for the life of the proposed project. The TSP includes reuse of the existing drainage features and filter cells that are located on IIPD property at Iroquois Landing. In order to assure USACE's ability to operate and maintain these important project features, there are two potentially feasible outcomes:

- CPD (or CDOT) acquires a utility easement for the existing drainage features and filter cells at Iroquois Landing.
- IIPD signs on as a third non-federal sponsor, taking responsibility for providing USACE access to operate and maintain the drainage features and filter cells for the life of the project.

## 6.5 Costs and Benefits

### 6.5.1 Total Project Cost

		Vertical Expansion
<b>First Cost</b>	Preconstruction Engineering and Design (PED)	\$4,944,000
	Construction Management	\$2,470,000
	Site Prep, Phase 1, Phase 2, Cap	\$24,702,000
	Real Estate	\$-
	Sediment Management	\$16,275,000
	Dredging (Contract, PED, S&A)	\$42,579,000
	<b>Total First Costs</b>	<b>\$90,970,000</b>
<b>Rounded Average Annual Cost</b>	PED	\$332,000
	Construction Management	\$158,000
	Site Prep, Phase 1, Phase 2, Cap	\$1,581,000
	Real Estate	\$-
	Sediment Management	\$803,000
	Dredging	\$2,200,000
	<b>Total Average Annual Costs</b>	<b>\$5,074,000</b>

<sup>1</sup> Monetary values in this table expressed in 2019 prices, assuming a base year of 2026 (FY26), and a 20-year period of analysis. Present values expressed in 2019 prices and discounted using the FY19 Federal Discount Rate (FDR) of 2.875%. The annuity factor (0.066) is determined by utilizing the FY19 FDR and a 20-year period of analysis; it is used to estimate average annual costs (AAC).

### 6.5.2 Cost-Sharing

DMMP feasibility studies are carried out at 100% federal cost.

Design and construction phases are cost-shared, with the NFS providing 35% of the total. Additionally, the NFS must provide all lands, easements, rights-of-way, relocations, and disposal areas (LERRDs). While the sponsor may receive credit toward this cost-share for work-in-kind and LERRDs, a minimum cash contribution of 25% is required.

### 6.6 Environmental Operating Principles

The United States Army Corps of Engineers Environmental Operating Principles were developed to ensure that Corps of Engineers missions include totally integrated sustainable environmental practices. The Principles provided corporate direction to ensure the workforce recognized the Corps of Engineers role in, and responsibility for, sustainable use, stewardship, and restoration of natural resources across the Nation and, through the international reach of its support missions.

The Environmental Operating Principles relate to the human environment and apply to all aspects of business and operations. They apply across Military Programs, Civil Works, Research and Development, and across the Corps. The Principles require a recognition and acceptance of individual responsibility from senior leaders to the newest team members. Re-committing to these principles and environmental stewardship leads to more efficient and effective solutions, and enables the Corps of Engineers to further leverage resources through collaboration. This is essential for successful integrated resources management, restoration of the environment and sustainable and energy efficient approaches to all Corps of Engineers mission areas. It is also an essential component of the Corps of Engineers' risk management approach in decision making, allowing the organization to offset uncertainty by building flexibility into the management and construction of infrastructure.

**Foster sustainability as a way of life throughout the organization:** Development of the dredged material management considers sustainability. By developing a long-term plan and extending the life of the existing CDF, the number of DMDF sites is minimized. In addition, beneficial use of clean sediment is incorporated in the plan, using the sediment as a resource.

**Proactively consider environmental consequences of all Corps activities and act accordingly:** Potential impacts of engineering projects were considered during the planning process and, where impacts were identified, alternatives to avoid, minimize, rectify, reduce, eliminate, or compensate for the impacts were incorporated in alternative plans. The DMDF design includes berms and liners to isolate the contaminated sediment from the environment, as necessary based on local site conditions. Effluent will be collected and treated prior to being discharged. Erosion and dust controls, such as sprinkling with water, use of silt fences, and vegetation, will be integrated in the DMDF design to limit potential impacts to local air quality. In addition, the quality of the area waterways will continue to improve due to the enforcement of Clean Water Act regulations and as contaminated dredged material is removed from the environment and placed in the proposed facility.

**Create mutually supporting economic and environmentally sustainable solutions:** The proposed plan provides National Economic Development benefits by supporting dredging to allow for safe and efficient navigation of the federal channel. The proposed plan will safely confine contaminated sediment and would meet all federal environmental regulations.

**Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps which may impact human and natural environments:** Potential impacts of the proposed project were considered as documented in this EIS. These potential impacts were assessed by reviewing existing data, through coordination with the public and with resource agencies, and through consideration of comments received from stakeholders and the public.

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**Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs:** The proposed plan considers all life cycles of the project, including construction of the new DMDF, operation of the Chicago Area CDF and the new DMDF, and closure of the Chicago Area CDF and the new DMDF. Once the facilities are closed, a robust operation and maintenance plan will be provided to the non-federal sponsors to ensure that the facilities are maintained safely.

**Leverage scientific, economic, and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner:** This study has relied on detailed analyses of economic and environmental impacts associated with maintenance of the federal navigation channels of the CAWS. The study team has also made extensive efforts to collaborate with, and incorporate feedback from, stakeholders in the study area, the public, resource agencies, ERDC, the USACE Rock Island District, and the Vertical Team in the completion of this Draft DMMP.

**Employ an open, transparent process that respects views of individuals and groups interested in Corps activities:** The study team coordinated the development of the proposed plan with the Illinois International Port District, the City of Chicago, the Chicago Park District, and the Metropolitan Water Reclamation District of Greater Chicago. Alternative plans were coordinated with resource agencies and the draft report was provided to resource agencies and the public for review and comment. USACE has attempted to be responsive in addressing concerns and problems were addressed as they arose and solutions were developed. Multiple stakeholder and public meetings have been held to support review and comment on the plan.

### 6.7 USACE Campaign Plan

The mission of USACE is to provide vital public engineering services in peace and war to strengthen the Nation's security, energize the economy and reduce the risks from disasters. In order to meet this mission, the agency has developed the USACE Campaign Plan (FY18-22) as a component of the corporate strategic management process to establish priorities, focus on the transformation initiatives, measure and guide progress, and adapt to the needs of the future. The goals of the Campaign Plan are:

#### Goal 1 - Support National Security

- Objective 1a – Support Combatant Command and U.S. Government agency security objectives to advance our Nation's interests around the globe
- Objective 1b – Enable a ready, resilient, and capable installation support management community
- Objective 1c – Support the Nation and the Army in achieving our energy security, sustainability, and environmental goals
- Objective 1d – Support the Engineer Regiment's efforts to provide professional EN leaders and units ready for complex missions in any environment

#### Goal 2 - Transform Civil Works

- Objective 2a – Deliver Quality Water Resource Solutions and Services
- Objective 2b – Deliver the Civil Works Program and innovative solutions

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- Objective 2c – Develop the Civil Works Program to meet the future needs of the Nation
- Objective 2d – Manage the life-cycle of water resources infrastructure systems to consistently deliver reliable and sustainable performance

### **Goal 3 – Reduce Disaster Risk**

- Objective 3a – Enhance interagency disaster response and risk reduction capabilities
- Objective 3b - Enhance interagency disaster recovery capabilities
- Objective 3c - Enhance interagency disaster mitigation capabilities
- Objective 3d – Deliver and advance Army Geospatial Engineering

### **Goal 4 – Prepare for Tomorrow**

- Objective 4a – Maintain and advance DoD and Army critical enabling technologies
- Objective 4b – Build a secure cyber foundation and modernize IM /IT using sound investment strategies
- Objective 4c – Streamline USACE business, acquisition, and governance processes and optimize financial management
- Objective 4d – Build ready and resilient people and teams through innovative talent management and leader development strategies and programs

The TSP is responsive to these goals and objectives by accomplishing the following:

#### ***Deliver quality solutions and services.***

- The study will employ the use of District Quality Control, ATR, Risk Analysis, and IEPR to assist in the review and development of a technically sound recommendation of Federal Interest.

#### ***Manage the life-cycle of water resources infrastructure systems to consistently deliver reliable and sustainable performance.***

- Designing a project which avoids or minimizes environmental impacts while maximizing future economic benefits to the community.
- Incorporating beneficial use of dredged material in the TSP reduces the required size of the facility and identifies positive uses in the study area for material from Calumet Harbor.

#### ***Support the Nation and the Army in achieving our energy security, sustainability, and environmental goals.***

- The team organized and participated in NEPA scoping (including transparent publications in the Federal Register and through the USEPA), stakeholder meetings, public workshops, and piloted a web-based input tool to create increased opportunity for the public to be involved in the site identification/selection process. The PDT will continue coordination to achieve a balance of project goals and public concerns.



## **6.8 Study Schedule to Final Report and Record of Decision (ROD)**

The Draft DMMP/EIS was circulated for public and agency review for 45 days. Two public meetings will be held in May 2019. After completion of the public review period, comments have been considered and incorporated into the final integrated report and EIS, as appropriate. \*The Final Integrated Report will be provided to any public agency that provided comments on the Draft Report.\*

After its review of the Final Integrated DMMP and EIS, including consideration of public comments, USACE Great Lakes and Ohio River Division (LRD) will make the approval decision and prepare the Final Integrated Feasibility Report. Upon approval of the DMMP, the Record of Decision (ROD) for the EIS will be signed by the LRD Commander.

## **6.9 Project Schedule and Implementation**

After approval of the report, design phase would begin, followed by real estate acquisition, if necessary, and construction. PED would be initiated with the signing of a Design Agreement with the non-federal Sponsor. During PED, detailed design and cost estimates would be developed for the approved project. Once design is completed and funds are appropriated, a Project Partnership Agreement (PPA) would be signed with CDOT and the Chicago Park District as the project non-federal sponsors. After the sponsors provides their cash contribution and LERRDs, as well as other required assurances, the Federal Government would begin construction of the project.

Tentatively, implementation of the TSP would take three years to complete, beginning in 2023, and proceed as follows:

Year 1 (2023) – Site preparation to include installation of wick drains under the footprint of the new DMDF and development of separate drying pads for beneficial use material and contaminated material.

Year 2 (2024) – Dredge, dry, and stockpile Calumet Harbor material to be used in berm construction for the new DMDF, using both drying pads if necessary. No maintenance dredging of Calumet River would occur during Year 2.

Year 3 (2025) – Once the Calumet Harbor material has had approximately 1 year to dry, it would then be used to create the perimeter berms of the new DMDF. No maintenance dredging of Calumet River would occur during Year 2. The DMDF would begin accepting material the following year, 2026 (base year).

## **6.10 Permits Required**

The USACE Chicago District's operation of the CDF at the mouth of the Calumet River is covered by an IEPA water quality dual certification pursuant to Sections 401/402 of the Clean Water Act that was issued in 1992. Additionally, IEPA presently regulates the facility under a water pollution control permit that needs to be renewed every five years (current permit expires May 2021). This permit covers facility operations in addition to the discharge of effluent following treatment in the filter cells, neither of which is anticipated to change or cause significant adverse impacts, as documented in this integrated DMMP and EIS. The USACE Chicago District will continue to coordinate with IEPA during, and subsequent to, the 45-day public and agency review period.

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USACE is responsible for issuing permits under Section 404 of the Clean Water Act to regulate the discharge of dredged or fill materials into waters of the United States. However, USACE does not permit itself. A Section 404(b)(1) evaluation was prepared as part of the NEPA process and is included as Appendix J.

Through coordination with IDNR, the PDT will also document that the study and proposed project comply with Illinois' approved coastal management program and will be conducted in a manner consistent with such policies. A Coastal Zone Federal Consistency Determination will be coordinated with the IDNR Coastal Management Program pursuant to the Federal Coastal Zone Management Act.

### **6.11 Division of Responsibility**

#### **Federal Responsibilities**

Following authorization of the proposed project, USACE would enter the PED phase to develop detailed design and cost estimates for the approved project. Once the project is authorized and funds are appropriated, a Project Partnership Agreement (PPA) would be signed with CDOT and CPD as the NFS. After the sponsors provide their cash contribution, lands, easements, rights-of-way, relocations, and disposal areas, as well as assurances, the Federal Government would begin construction of the project.

#### **Non-federal Responsibilities**

A list of responsibilities of the NFS is included in Chapter 9.0.

#### **Financial Capability of the NFS**

The total estimated non-federal first cost (35%) of the project is \$11,240,600 for the TSP, including LERRDs, at the 2019 price level. Actual costs may be slightly greater at the time of construction due to inflation. The NFS will be required to provide self-certification of financial capability for the final report as required by USACE guidance.

#### **Project Cost-sharing Agreements**

Prior to PED, a Design Agreement must be executed between USACE and the NFS in order to cost share the development of detailed plans and specifications. Before construction is started, USACE and the NFS would execute a PPA. This agreement would define responsibilities of the NFS for project construction as well as OMRR&R, and other assurances. The scope for this project includes OMRR&R directly required for project features defined in this report as well as indirectly required to ensure the ongoing operation of the project as designed. As part of signing the PPA, CPD would assume eventual OMRR&R responsibilities for the completed project and its development into parkland.

### **6.12 Public/Other Agency Views and Comments**

*\*\*\*This is a placeholder for final report and will be updated with a summary of comments received during the 45-day public review of the Draft CAWS DMMP.\*\*\**

## **7.0 PUBLIC INVOLVEMENT, REVIEW, AND COORDINATION**

### **7.1 Public Involvement under NEPA**

The public, stakeholders, and non-federal sponsor have been actively involved in the scoping and planning process. Multiple stakeholder roundtable meetings and public workshops, in addition to a 30-day public and agency review period on a previous draft (2015) of the DMMP, have helped inform the study. More detailed information on public involvement and coordination that has occurred before release of this current Draft DMMP and integrated EIS is included in the Coordination and Public Involvement Appendix (Appendix A).

### **7.2 Coordination with Other Federal, State, Regional, and Local Agencies**

In general, resource agencies have concurred with the PDT's analysis that dredged material with elevated levels of contamination can be safely confined in a DMDF. With proper design and controls, the DMDF is unlikely to have significant adverse impacts on natural resources such as endangered species, high quality habitat, water quality, and air quality.

### **7.3 Coordination with Federally-Recognized Native American Tribes**

The PDT continues to coordinate with federally-recognized Native American tribes pursuant to CEQ Regulations and Section 106 of the National Historic preservation Act of 1966. Correspondence between USACE and the federally-recognized Native American tribes within the study area is documented in Appendix A.

### **7.4 Issues of Known or Expected Controversy**

The primary social and environmental factors that influenced the DMMP are the presence of varying levels of contaminants in the dredged material in the study area and the potential impacts of these contaminated sediments on human health and the environment. This is addressed through the identification of sediment-quality-based management measures (open water placement, beneficial use, and confined disposal) outlined in the TSP.

Local residents and community advocacy groups generally oppose any alternative that results in construction of a new DMDF in the study area. This opposition appears to be based primarily on environmental justice concerns and distrust of government entities based on the local legacy of industrial development in Southeast Chicago. These stakeholders have repeatedly stated a desire to see a TSP that includes treatment of contaminated sediment. However, this technology is unproven at the scale of this study and would not represent the least-cost, environmentally acceptable, and technically feasible alternative. It is imperative that the DMMP adequately documents that vulnerable populations do not bear the brunt of any significant adverse impacts associated with implementation of the TSP. This is accomplished through documentation of vulnerable populations present in the study area, potential adverse impacts to the human and natural environment, and why these communities would not be disproportionately burdened by the proposed action. A transparent public involvement process that involves the potentially affected community is important in fulfilling this responsibility. Implementation of the DMMP would result in the confinement of these contaminants, which would otherwise remain in the environment in the future without project condition. Strict controls would need to be implemented to avoid any potential adverse impacts resulting from implementation of the TSP and to safely confine contaminated dredged material.

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Park advocate groups appear to oppose utilization of the existing Chicago Area CDF property. They would prefer for this facility to be closed, turned over to CPD, and developed into parkland.

## 8.0 COMPLIANCE WITH APPLICABLE LAWS, POLICIES, AND PLANS

Reference	Environmental Statutes/Regulations	Project Compliance <sup>a</sup>
<b>Federal</b>		
42 U.S.C. 7401	Clean Air Act of 1970, as amended	P
33 U.S.C. 1251, et seq.	Clean Water Act of 1977, as amended	P
42 U.S.C. 9601	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980	P
16 U.S.C. 1531, et seq.	Federal Endangered Species Act of 1973, as amended	P
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	P
EO 13045	Protection of Children from Environmental Health Risks and Safety Risks	P
EO 13112	Invasive Species	P
16 U.S.C. 661	Fish and Wildlife Coordination Act, as amended	P
16 U.S.C. 1801, et seq.	Magnuson-Stevens Fish Conservation and Management Act	P
16 U.S.C. 1271, et seq.	Wild and Scenic Rivers Act of 1968	P
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	P
16 U.S.C. 703, et seq.	Migratory Bird Treaty Act of 1918, as amended	P
54 U.S.C. 300101, et seq.	National Historic Preservation Act, as amended	P
42 U.S.C. 4901, et seq.	Noise Control Act	P
42 U.S.C. 6901, et seq.	Resource Conservation and Recovery Act of 1976, as amended	P
16 U.S.C. ch. 33 § 1451, et seq.	Coastal Zone Management Act of 1972	P

<sup>a</sup> NA = not applicable, C = Compliance, P = Pending, and NC = Non-Compliant

## 9.0 RECOMMENDATIONS

This chapter describes the Items of Cooperation for the proposed navigation project. A Tentatively Selected Plan (TSP) has been identified that meets the objectives of the study and could potentially be recommended for implementation.

The apparent TSP has been identified as the Vertical Expansion alternative. The estimated first cost (2019 price level) of the TSP is \$89,839,000. The construction of the new facility itself is estimated at \$32,116,000 and would be cost-shared with an estimated federal cost of \$20,875,400. This would equate to an estimated non-federal cost of \$11,240,600.

Federal implementation of a recommended plan would be subject to the non-federal sponsor (NFS) complying with applicable federal laws and policies, including but not limited to:

- a. Share the cost of the federal project according to Section 101(a) of WRDA 1986, as follows:
  1. Provide 25 percent of the cost of constructing a disposal facility for that portion of a project with depths greater than 20 feet but not greater than 45 feet.
  2. Pay an additional 10 percent of the cost of constructing the disposal facility, as well as other general navigation features costs, over a period not to exceed 30 years but with the value of lands, easements, rights-of-way and relocations credited against this additional 10 percent.
  3. Provide all lands, easements and rights-of-way, including those required for relocations, the borrowing of material and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all modifications required on lands, easements and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction and O&M of the project;
- b. Shall not use funds from other federal programs, including any non-federal contribution required as a matching share, to meet any of the non-federal obligations for the project unless the federal agency providing the federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;
- c. Not less than once each year, inform affected interests of the extent of protection afforded by the project;
- g. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements and rights-of-way or the addition of facilities that may hinder O&M of the project, or interfere with the project's proper function;
- h. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91 646, as amended (42 U.S.C. §§ 4601-4655), and the Uniform Regulations contained in 49 C.F.R. 24, in acquiring lands, easements and rights-of-way required for construction and O&M of the project, including those necessary for relocations, borrowing of material or disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies and procedures in connection with said Act;

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- i. For so long as the project remains authorized, OMRR&R the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government in a manner compatible with the project's authorized purposes and in accordance with applicable federal and state laws and regulations, and any specific directions prescribed by the Federal Government;
- j. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the NFS owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;
- k. Hold and save the U.S. free from all damages arising from the construction, OMRR&R of the project and any betterments, except for damages due to the fault or negligence of the U.S. or its contractors;
- l. Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of three years after final accounting;
- m. Comply with all applicable federal and state laws and regulations, including but not limited to: Section 601 of the Civil Rights Act of 1964 (42 U.S.C. § 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; the Age Discrimination Act of 1975 (42 U.S.C. § 6102); the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794) and Army Regulation 6007 issued pursuant thereto; and 40 U.S.C. §§ 3141-3148 and 40 U.S.C. §§ 3701-3708 (labor standards originally enacted as the Davis-Bacon Act, the Contract Work Hours and Safety Standards Act, and the Copeland Anti-Kickback Act);
- n. Perform, or ensure performance of, any investigations that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Public Law 96 510, as amended (42 U.S.C. §§ 9601-9675), that may exist in, on or under lands, easements or rights of way that the Federal Government determines to be required for construction and O&M of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the NFS with prior specific written direction, in which case the NFS shall perform such investigations in accordance with such written direction;
- o. Assume, as between the Federal Government and the NFS, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on or under lands, easements or rights of way that the Federal Government determines to be required for construction and O&M of the project;
- p. Agree, as between the Federal Government and the NFS, that the NFS shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, OMRR&R the project in a manner that will not cause liability to arise under CERCLA; and
- q. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. § 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. § 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project, or separable element thereof, until each non-federal



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interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program nor the perspective of higher review levels within the Executive Branch.

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Date

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Aaron W. Reisinger

Colonel, U.S. Army

District Commander

## 10.0 REFERENCES

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CELRC-TS-DH Memorandum, dated 16 December 2015, Subject: Calumet Harbor Dredged Material – Federal Standard Determination.

CELRD-PD-G Memorandum, dated 04 January 2016, Subject: Calumet Harbor and River, Illinois & Indiana – Determination of Federal Standard for Beneficial Use of Material – LRD Concurrence.

CELRD-PD-G Memorandum, dated 26 August 2013, Subject: Great Lakes Dredged Material Management conceptual determination of the Federal Standard and Base Plan for Regional Consistency.

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## **11.0 LIST OF REPORT PREPARERS**

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