

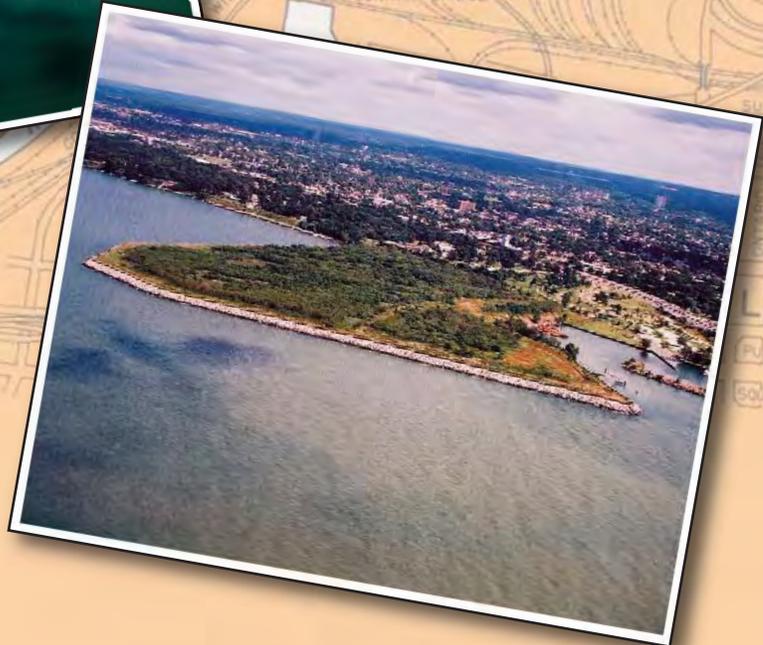
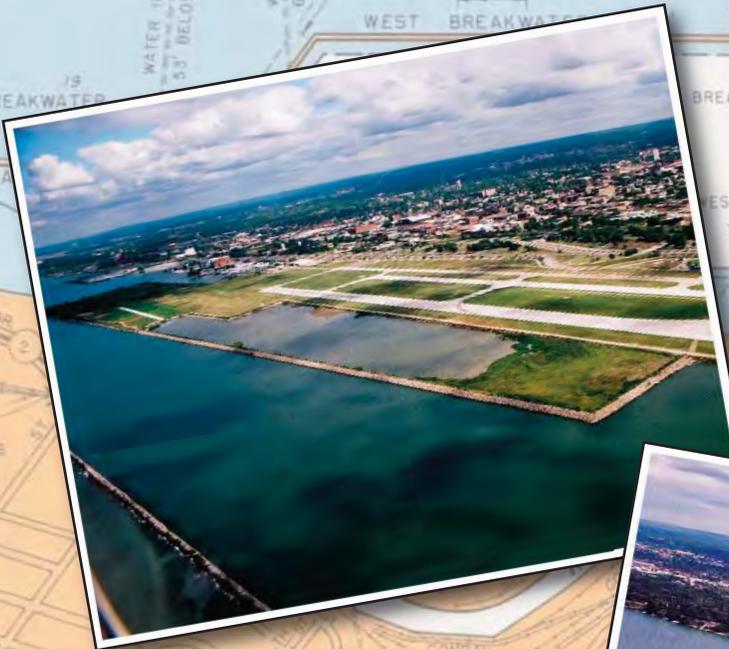


US Army Corps
of Engineers®
Buffalo District

Cleveland Harbor
Cuyahoga County, Ohio

Draft

Cleveland Harbor Dredged Material Management Plan & Environmental Impact Statement



August 2009

**Dredged Material Management Plan and
Environmental Impact Statement
for
Cleveland Harbor, Cuyahoga County, Ohio**

Type of Action: Draft

Responsible Federal Agency:

U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207-3199

Cooperating Agencies:

Cleveland-Cuyahoga County Port Authority
City of Cleveland
Federal, State, and local agencies
U.S. Environmental Protection Agency (USEPA)
U.S. Fish and Wildlife Service (USFWS)
Ohio Department of Natural Resources (ODNR)
Ohio Environmental Protection Agency (OEPA)

Abstract:

This draft Dredged Material Management Plan/Environmental Impact Statement (DMMP/EIS) presents the U.S. Army Corps of Engineers (USACE), Buffalo District plan for maintenance dredging and disposal of dredged materials from the Cleveland Harbor, Ohio Federal Navigation Project. It integrates the Corps planning process and the CEQ guidelines for preparation of an environmental impact statement into one publication to reduce redundancy and to aid the reader. Inherent in the planning of this project is the Corps requirement that a DMMP provide for a minimum of 20 years of dredged material disposal.

This DMMP/EIS summarizes the results of a detailed multi-year investigation of various measures and alternative plans for dredged material disposal at Cleveland, Ohio and evaluates the engineering, economic, and environmental benefits and consequences of those alternatives. This report also summarizes the public coordination done to date on the planning of this DMMP and accounts for the views of local interests (the non-Federal sponsor) who would be responsible for financially participating in the costs of construction of new disposal areas or the implementation of new disposal methods. Seven alternatives were analyzed including one alternative which would constitute no action taken.

For Further Information Regarding this Document, Contact:

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Buffalo, New York 14207-3199
Phone: (716) 879-4131

Comments: If you wish to comment, you may submit your comments by one of several methods. You may comment electronically by emailing: Christine.m.cardus@usace.army.mil or by mail to the address shown above, Attention: Christine Cardus. Review comments will be accepted until October 13, 2009.

**Cleveland Harbor
Dredged Material Management Plan and Draft Environmental Impact Statement
Cleveland Harbor, Cuyahoga County, Ohio**

EXECUTIVE SUMMARY

Purpose of Document

This Dredged Material Management Plan/Draft Environmental Impact Statement (DMMP/DEIS) presents the U.S. Army Corps of Engineers (USACE), Buffalo District plan for maintenance dredging and disposal of dredged materials from the Cleveland Harbor, Ohio Federal navigation project. Inherent in the planning of this project is the requirement that a DMMP provide for a minimum 20 years of dredged material disposal. This draft DMMP/DEIS summarizes the results of a detailed multi-year investigation of various measures and alternative plans for dredged material disposal at Cleveland Harbor, Ohio and will evaluate the engineering, economic, and environmental effects of those alternatives. This report will also summarize the public coordination accomplished to date on the planning of this DMMP in accordance with the National Environmental Policy Act (NEPA). It also accounts for the views of local interests (the non-Federal sponsor) who would be responsible for financially participating in the costs of construction of new disposal areas or the use of new disposal methods.

In the interest of reducing redundancy and producing a coherent document, the required planning document (DMMP) and NEPA document (EIS) have been consolidated into one volume with appendices. This document meets Council of Environmental Quality (CEQ) guidance for preparation of an EIS, and USACE requirements for preparation of a feasibility study, with added modifications which are required by USACE specifically for preparing DMMPs.

Customers

The primary external customer, and presumed non-Federal cost-sharing partner, for this DMMP is the Cleveland-Cuyahoga County Port Authority. Other customers include the City of Cleveland as well as Federal, State, and local agencies such as the U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USF&WS), Ohio Department of Natural Resources (ODNR), and Ohio Environmental Protection Agency (OEPA). Additional industrial customers include terminal operators at the port (Essroc Cement, Federal Marina Terminals, Kenmore Construction Company, Lake Carriers' Association, Flats Industry, Flats Oxbow Association, Cargill Salt, Cuyahoga Concrete, Great Lakes Towing, Lafarge Cement, Ontario Stone, St. Mary's Cement, River Dock Inc., Osborne Concrete and Stone, Sand Products Inc., Marathon Petroleum, United Ready-Mix) and ArcelorMittal Steel USA. Numerous local manufacturers within a 75 mile radius of Cleveland rely on the port to provide raw materials and to ship locally produced products to U.S. and foreign markets (Cleveland-Cuyahoga County Port Authority, 2006).

The customer expectation is to have the USACE, Buffalo District continue to dredge Cleveland Harbor and the full extent of the Federal navigation channel in the Cuyahoga River to authorized depths, which will require disposal of dredged material in an environmentally acceptable manner. Dredging in Cleveland Harbor is typically performed every year.

Scoping:

During the Preliminary Assessment (Phase I) it was determined that the alternative plans that would be considered in the dredged material management study would be major in scope and have significant public interest. Therefore it was decided to prepare an EIS in accordance with the NEPA. The Notice of Intent to prepare a DEIS for the proposed DMMP was published in the Federal Register on March 17, 2006 (Appendix D). No public or agency comments were received as a result of this notice.

The requirements for public and agency scoping and coordination under the NEPA have been directly incorporated into Phase II of this study. On March 16, 2006, a Public Scoping Information Packet (Appendix D) was mailed to numerous Federal, State, Tribal, and local agencies. The scoping packet discussed alternative measures for dredged material management at Cleveland Harbor and gave the parties opportunity to provide input and recommendations for the study. All comments, concerns and recommendations received have been considered in the continued formulation of alternative plans and measures for dredged material management at Cleveland Harbor.

Alternatives and Major Conclusions

The analysis follows the USACE six-step planning process and started with identifying problems and opportunities, establishing study objectives (both national and local), and identifying planning constraints. Fourteen individual measures were identified including beneficial use, best management practices, and construction of a new CDF. The measures were assessed and, if viable, carried forward into detailed planning and analysis. The analysis included potential social, economic, and environmental benefits and impacts that would result from each alternative plan. A total of seven alternative plans were developed; each alternative is comprised of several measures. The environmental effects and total average annual cost for the alternative plans is summarized in the table below:

Alternative	Measures	Environmental Effects	Total Average Annual Cost
Alternative Plan 1	None; No Action Plan	Direct, long-term negative effect on commercial navigation. Indirect, negative long-term effect on water quality since contaminated sediment would remain in the harbor and continue to accumulate.	0

Alternative	Measures	Environmental Effects	Total Average Annual Cost
Alternative Plan 2	FMPs; Construction of CDF at Site 2	Direct, long-term positive effect on commercial navigation and removal of contaminated sediments. CDF will create 108 acres of upland, but will result in permanent loss of 108 acres of aquatic habitat.	\$21,006,100
Alternative Plan 2a	FMPs; Construction of CDF at Site 2a	Direct, long-term positive effect on commercial navigation and removal of contaminated sediments. CDF will create 130 acres of upland, but will result in permanent loss of 130 acres of aquatic habitat.	\$19,124,400
Alternative Plan 3	FMPs; Construction of CDF at Site 3	Direct, long-term positive effect on commercial navigation and removal of contaminated sediments. CDF will create 117 acres of upland, but will result in permanent loss of 117 acres of aquatic habitat.	\$17,946,300
Alternative Plan 3a	FMPs; Construction of CDF at Site 3a	Direct, long-term positive effect on commercial navigation and removal of contaminated sediments. CDF will create 129 acres of upland, but will result in permanent loss of 129 acres of aquatic habitat.	\$24,849,900
Alternative Plan 4 (NED)	FMPs; Construction of CDF at East 55 th Street site	Direct, long-term positive effect on commercial navigation and removal of contaminated sediments. CDF will create 157 acres of upland, but will result in permanent loss of 157 acres of aquatic habitat. Direct, negative, long-term effects to publicly accessed marina, park, and shoreline facilities due to collocation of CDF. Allows for potential future development.	\$17,120,700

Alternative	Measures	Environmental Effects	Total Average Annual Cost
Alternative Plan 4a (LPP)	FMPs; Construction of CDF at East 55 th Street site with more robust dikes	Direct, long-term positive effect on commercial navigation and removal of contaminated sediments. CDF will create 157 acres of upland, but will result in permanent loss of 157 acres of aquatic habitat. Direct, negative, long-term effects to publicly accessed marina, park, and shoreline facilities due to collocation of CDF. Allows for potential future development.	\$19,480,200

No Action Plan: The No Action Plan was established to provide a benchmark against which to measure the economics of each alternative. It was developed for the 20 year period 2009 through 2028. Under the no action plan, the Federal Government would do nothing to address the need for future placement of dredged material. Dredging of the Federal navigation channels would cease in the immediate future when disposal facilities are no longer available.

National Economic Development (NED) Plan: Contributions to the NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed. Alternative Plan 4 is the same as the NED Plan.

Tentatively Selected Plan: The tentatively selected plan is Alternative Plan 4a (FMP and East 55th Street site). Alternative 4a is tentatively identified as a locally preferred plan (LPP) because the more robust perimeter bulkheads make the site more suitable for potential future development of the site once the CDF is filled and transferred to the sponsor. The non-Federal sponsor understands that all costs above that of the NED are borne entirely by the non-Federal sponsor. Therefore, the tentatively selected plan is the LPP.

Areas of Controversy Including Issues Raised by Agencies and the Public

During scoping and subsequent public and agency coordination, the USACE received input that included concerns/issues regarding dredging and disposal management, potential CDF sites, environmental matters, and potential beneficial uses of dredged materials. Comments are summarized below:

- Opposition to create an in-water CDF at Cleveland Harbor due to potential impacts to recreation, aquatic habitat, waterfowl migratory and feeding patterns, water quality, waterfront use/access, and aesthetics.

- Continued concern for endangered species.
- Continued concern for wildlife hazards to aircraft at the nearby Burke Lakefront Airport.
- Continued support for watershed management to reduce sediment load.
- Concern regarding high costs of alternative plans.
- Continued concern over responsible disposal of dredged materials.
- Continued support for vertical expansion and continued use of the existing CDFs.

Issues to be Resolved

The Buffalo District has been working closely with the Cleveland-Cuyahoga County Port Authority to collaborate on the additional design features and parameters that must be incorporated into the final design (at full non-Federal sponsor expense) in order to make the CDF viable for potential future development.

The Cleveland Cuyahoga County Port Authority will be required to provide the non-Federal cost share and necessary lands, easements, rights-of-way, and relocation (LERR). For the Cleveland Harbor CDF, the non-Federal cost share is 25 percent of all project costs paid for at time of construction, ten percent of project costs paid over a maximum 30-year period with interest (LERR are creditable against this portion of the cost-share), and all costs associated with the LPP over and above that of the NED. A Project Partnership Agreement (PPA) will be negotiated with the Port Authority that addresses their agreement to provide the full non-Federal cost share and all LERR required. These agreements will ensure capacity for Federal dredged material management for a minimum 20-year period.

The selection of the locally-preferred plan (and tentatively selected plan) Alternative 4a, would require the Assistant Secretary of the Army (Civil Works) to approve an exception to policy, given that Alternative 4 has been identified as the NED plan.

Implementation of the tentatively selected plan (Alternative Plan 4a) will require modification to the Federal navigation channel. The project modification necessary to implement Alternative Plan 4a could be achieved either by specific Congressional legislation or possibly through the discretionary Approval Authority Delegated to Division Commanders as detailed in Appendix G of ER 1105-2-100. The proposed modification affects less than five percent of the project authorized by Congress, does not affect cost, causes impacts insignificant compared to the impacts assessed for the authorized navigation project, and does not add or delete a project purpose. Therefore, the change meets all the criteria listed in Paragraph G-13a, ER1105-2-100 and it is the opinion of Buffalo District counsel that the delegated authority to implement the change resides with the Division Commander.

Project Status

An Issue Resolution Conference was held on June 14, 2006, at Cleveland City Hall, Cleveland, Ohio. The meeting was held with local stakeholders, Federal, State, and local agencies, and necessary personnel from the USACE Buffalo and Nashville Districts,

Lakes and Rivers Division, and Washington D.C. Headquarters offices. The primary purpose of this meeting was to bring together a forum of open communication with all interested parties to present and discuss the USACE plan formulation process; concerns associated with the alternative measures and plans for the dredged material management study; and to gather suggestions from the stakeholders. The USACE explained the primary objective of a DMMP study is to verify that all Federally maintained navigation projects have sufficient capacity for dredged material disposal for a minimum of 20 years. Specific study requirements to meet that objective include: (1) establish a Base Plan for the project; (2) assess the potential for beneficial use of dredged material; (3) establish a Management Plan for the project; and, (4) demonstrate that continued maintenance is economically warranted based on high-priority (non-recreational benefits).

The second Issue Resolution Conference, also known as the Alternative Formulation Briefing (AFB), was held in September 2007. The purpose of the AFB is to confirm the plan formulation, selection process, tentatively selected plan, and the definition of Federal and non-Federal responsibilities are consistent with applicable laws, statutes, Executive Orders, regulations, and current policy guidance. The end product was a HQUSACE issued formal memorandum called the AFB Guidance memorandum. The AFB Guidance Memorandum was used by the Buffalo District to complete all required detailed analysis and make final preparations of the draft DMMP/DEIS for public review.

However, shortly after the completion of the September 2007 AFB, the Alternative Plan 4 (East 55th Street site) was re-introduced into the planning process by the non-Federal sponsor. Since then, efforts were devoted to conducting detailed analysis of Alternative Plan 4. A third Issue Resolution Conference was held April 16, 2009 and provided the same output as the AFB.

The Division Commander has approved released of the draft DMMP/EIS to agencies and the public for a minimum 45-day comment period in compliance with NEPA. Following the comment period, and once all substantial comments are addressed, a final DMMP/FEIS will be prepared and a Record of Decision signed.

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Issues to be Resolved

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Project Status

An Issue Resolution Conference was held on June 14, 2006, at Cleveland City Hall, Cleveland, Ohio. The meeting was held with local stakeholders, Federal, State, and local agencies, and necessary personnel from the USACE Buffalo and Nashville Districts,

Lakes and Rivers Division, and Washington D.C. Headquarters offices. The primary purpose of this meeting was to bring together a forum of open communication with all interested parties to present and discuss the USACE plan formulation process; concerns associated with the alternative measures and plans for the dredged material management study; and to gather suggestions from the stakeholders. The USACE explained the primary objective of a DMMP study is to verify that all Federally maintained navigation projects have sufficient capacity for dredged material disposal for a minimum of 20 years. Specific study requirements to meet that objective include: (1) establish a Base Plan for the project; (2) assess the potential for beneficial use of dredged material; (3) establish a Management Plan for the project; and, (4) demonstrate that continued maintenance is economically warranted based on high-priority (non-recreational benefits).

The second Issue Resolution Conference, also known as the Alternative Formulation Briefing (AFB), was held in September 2007. The purpose of the AFB is to confirm the plan formulation, selection process, tentatively selected plan, and the definition of Federal and non-Federal responsibilities are consistent with applicable laws, statutes, Executive Orders, regulations, and current policy guidance. The end product was a HQUSACE issued formal memorandum called the AFB Guidance memorandum. The AFB Guidance Memorandum was used by the Buffalo District to complete all required detailed analysis and make final preparations of the draft DMMP/DEIS for public review.

However, shortly after the completion of the September 2007 AFB, the Alternative Plan 4 (East 55th Street site) was re-introduced into the planning process by the non-Federal sponsor. Since then, efforts were devoted to conducting detailed analysis of Alternative Plan 4. A third Issue Resolution Conference was held April 16, 2009 and provided the same output as the AFB.

The Division Commander has approved released of the draft DMMP/EIS to agencies and the public for a minimum 45-day comment period in compliance with NEPA. Following the comment period, and once all substantial comments are addressed, a final DMMP/FEIS will be prepared and a Record of Decision signed.

For additional information, contact: Mr. Frank O'Connor, Project Manager, U.S. Army Corps of Engineers, 1776 Niagara Street, Buffalo, New York 14207-3199, (716) 879-4131.

**Cleveland Harbor
Draft DMMP/DEIS
Agency Technical Review**

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CHAPTER 1 - INTRODUCTION

1.1 Introduction - This Dredged Material Management Plan/Environmental Impact Statement (DMMP/EIS) presents the U.S. Army Corps of Engineers (USACE), Buffalo District plan for maintenance dredging and disposal of dredged materials from the Cleveland Harbor, Ohio Federal navigation project. Inherent in the planning of this project is the requirement that a DMMP provide for a minimum of 20 years of dredged material disposal. The plan also accommodates a reasonable amount of non-Federal dredging and dredged material disposal for the same time period. For the purposes of this study and to maintain current dredging operations at Cleveland, the minimum 20 year time period commences in 2009.

This DMMP/EIS will summarize the results of a detailed multi-year investigation of various options and alternative plans for dredged material disposal at Cleveland, Ohio and will evaluate the engineering, economic, and environmental pluses and minuses of those alternatives. This report will also summarize the public coordination done to date on the planning of this DMMP and account for the views of local interests (sponsors) who would be responsible for financially sharing construction costs of a new disposal area(s) or method(s).

1.2 DREDGED MATERIAL MANAGEMENT/PROBLEM STATEMENT

The basic problem or opportunity at Cleveland Harbor, Ohio is the lack of dredged material disposal capacity which is needed to continue operation and economic viability of Cleveland as a commercial navigation port on the Great Lakes. Based on 2006 data of total tonnage handled, Cleveland Harbor is the 5th busiest port on the Great Lakes and 44th busiest port in the nation (USACE-IWR, 2008). Inherent in the operations and maintenance of any port is maintenance dredging and disposal of dredged materials from the commercial navigation channels and dredging and disposal by local port interests. Complicating the need for dredging and dredged material disposal at Cleveland is the fact that most if not all sediments dredged are considered 'contaminated' and generally have to be confined in some environmentally acceptable manner.

Past and current practice for dredged sediment disposal in Cleveland has been to dispose of materials in stone dike enclosures called confined disposal facilities (CDFs) constructed along the Cleveland waterfront. Once filled or in some instances partially filled, the dikes are turned over to the owner for future disposition. Since 1998 an average of approximately 300,000 cubic yards (cy) of sediments have been dredged yearly and transported to CDFs at Cleveland for disposal. At the conclusion of the 2008 dredging season, it is expected that all existing CDFs at Cleveland, barring the implementation of CDF management measures, will be filled to capacity. From 2008 through 2014, it is expected that sufficient additional capacity can be obtained at the existing Cleveland CDFs using fill management plans (FMP) internal to the CDFs (e.g. dewatering, consolidation of dredged material, construction of internal berms). This is based on a much reduced annual rate of 225,000 cy. By the year 2015, a new disposal facility or method will have to be in place in order to continue dredging Cleveland Harbor.

1.3 DREDGED MATERIAL MANAGEMENT PLANS

1.3.1 DMMP Study Authority and Process – The basic directions to conduct DMMP studies is contained in ER 1105-2-100, Appendix E, the Planning Guidance Notebook. This study is 100 percent Federally funded through the Operations and Maintenance (O&M) Program to verify the Federally maintained navigation project has sufficient capacity for dredge material disposal for a minimum of 20 years. The studies are conducted pursuant to existing authorities for individual navigation feasibility studies, Preconstruction Engineering and Design (PED) investigations, construction, or O&M, as provided in Congressional Committee study resolutions and public laws authorizing specific projects. The DMMP process has four basic principles for existing navigation projects as follows:

- Establish the Base Plan for the project.
- Assess the potential for beneficial use of dredged materials.
- Establish a Management Plan for the project.
- Demonstrate the continued maintenance is economically warranted based on high-priority (non-recreational benefits).

1.3.2 Base Plan Defined - Critical to the entire process is defining and establishing the Base Plan. It is USACE policy to dispose dredged material in the least costly and environmentally acceptable manner. Disposal is to be consistent with sound engineering practice and meet all Federal environmental standards; this constitutes the base plan. The Base Plan, as currently developed for the Cleveland Harbor navigation project is discussed further in Chapter 2 and Appendix A of this document.

1.3.3 DMMP Process - A phased plan development process was used to determine the need for and to prepare the DMMP for Cleveland Harbor. A Preliminary Assessment was conducted to determine whether continuation of operations and maintenance of the overall project was warranted, to determine what potential impediments to continued maintenance existed, and to evaluate the consistency of existing environmental compliance documents with ongoing O&M activities. The Preliminary Assessment (Appendix B) produced a summary of Findings and Recommendations which confirmed that continued dredging and dredged material disposal at Cleveland Harbor is economically viable. In addition, the Preliminary Assessment determined that there is insufficient space in the operational CDF 10B, to hold dredged material for the next 20 years (USACE, 2004). The Preliminary Assessment therefore concluded that a detailed Dredged Material Management Study should be conducted for Cleveland Harbor, Ohio. The Preliminary Assessment and Scope of Work (Appendix C) were approved by the Corps of Engineers, Great Lakes and Ohio River Division (CELRD) on November 9, 2004 as the basis for conducting this DMMP study.

1.4 NEPA DOCUMENTATION

1.4.1 National Environmental Policy Act (NEPA) - Multiple authorities allow the planning and National Environmental Policy Act (NEPA) documentation to be integrated into one volume. In the interest of efficiency and cost effectiveness, the DMMP and the EIS will be combined into one document and issued for public comment in both draft and final versions.

1.4.2 Environmental Scoping - The NEPA, and Council on Environmental Quality (CEQ) regulations implementing NEPA, require an early and open process for the public and agencies to provide input to the planning and EIS process for major Federal projects. This process has been termed scoping and was formally initiated by the widespread mailing of a Public Scoping Information Packet in mid-March 2006 (Appendix D1). Written comments, and responses to those comments, received to date in response to circulation of the scoping packet are also included in Appendix D2. Individual responses to these scoping comment letters are located in Chapter 6 – Coordination; suggestions and/or concerns have been addressed during the study and incorporated into this draft DMMP/DEIS.

1.4.3 Notice of Intent to Prepare an Environmental Impacts Statement - Due to the complexity, potential large financial investments (both Federal and non-Federal), potentially large scale project size, and considerable public and agency interest the Buffalo District has concluded that preparation and coordination of a draft and final EIS is the best method to comply with the requirements of NEPA. The “Notice of Intent to Prepare a Draft Environmental Impact Statement for a Proposed Dredged Material Management Plan for Cleveland Harbor, OH” was published in the Federal Register on March 17, 2006 (Appendix D3).

1.5 LOCATION AND HISTORY

1.5.1 Location - Cleveland Harbor, Cuyahoga County, Ohio, is located on the south shore of Lake Erie at the mouth of the Cuyahoga River. The port is 28 miles east of Lorain, Ohio and 33 miles west of Fairport, Ohio (Figure 1.1). Cleveland Harbor is a major commercial port on Lake Erie. Cleveland Harbor tonnages in 2005 were 13,641,000 short tons and in 2004 15,775,000 short tons. Iron ore and limestone account for 71 percent of the ports activity. Iron ore receipts (5,974,000 short tons in 2005) are received at Cuyahoga River docks located near the head of navigation and on Whiskey Island for transshipment to inland steel plants. Limestone receipts (3,757,000 short tons in 2005) are destined for docks located on the Old River, and the middle and upper portion of the Cuyahoga River. The limestone is used by a local steel company and building trades. Sand and gravel receipts (802,000 short tons in 2005) are destined for docks located on the Old River and the lower portion of the Cuyahoga River. The major commodity shipped from Cleveland Harbor is rock salt (1,148,000 tons in 2005) which is used for road deicing.

1.5.2 History - The City of Cleveland was founded in 1796 near the mouth of the Cuyahoga River on Lake Erie. Cleveland grew slowly until 1832 after completion of the Ohio and Erie Canal linking the City and Lake Erie with the Ohio River. Cleveland was incorporated as a City in 1836 and the later addition of major railroad lines caused further growth in manufacturing and population. In the late 1800’s, Cleveland was a natural half-way point for iron ore coming from Minnesota across the Great Lakes and for coal and other raw materials from the south. Cleveland became the home to several major steel firms and Standard Oil. By 1920 Cleveland was the fifth largest city in the country with a population of almost 800,000. Rapid declines in the steel and manufacturing industries started in the 1960’s and lasted until the 1990’s, and movement by city residents to the suburbs, led to major economic declines in Cleveland.

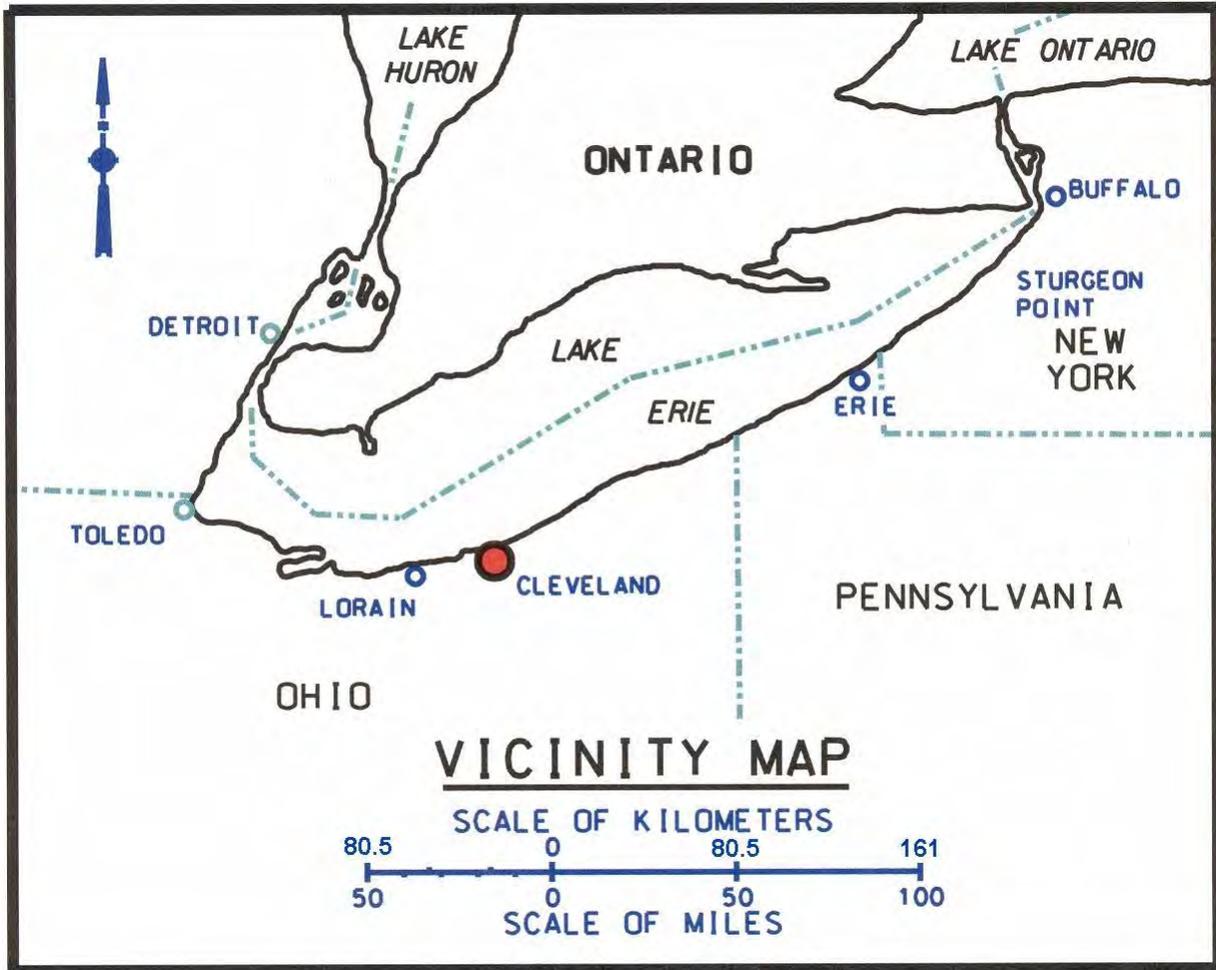


Figure 1.1 – Location of Cleveland Harbor, Ohio

1.5.3 Cleveland Today - The economy of Cleveland today has largely stabilized with much of the heavy industry and manufacturing replaced by financial services, insurance and the healthcare industry. As of the 2000 census the city ranked 33rd in the nation with a population of 478,000 while the Cleveland standard metropolitan statistical area (SMSA) ranks 23rd in the nation with a population of over 2,200,000. Major redevelopment of portions of the waterfront and downtown has occurred with construction of the Rock and Roll Hall of Fame, Cleveland Browns Stadium, and Great Lakes Science Center (Figure 1.2).

1.5.4 Port of Cleveland – The Port of Cleveland is managed by the Cleveland-Cuyahoga County Port Authority established in 1968 by the City of Cleveland and Cuyahoga County. Port facilities include nine berths and 6,500 linear feet of dock space. The port is a designated Foreign Trade Zone. Eight international cargo docks occupy 100 acres of land along Lake Erie and the Cuyahoga Bulk Terminal transshipment facility occupies 44 acres just west of the Cuyahoga River. Primary inbound cargo includes steel, heavy machinery and bulk commodities such as limestone and grain. Outbound commodities include machinery and steel. Connecting transportation modes include three major interstates (71, 77, 90), and the Norfolk and Southern and CSX railroads (Cleveland-Cuyahoga County Port Authority, 2006).



Figure 1.2 – Downtown Cleveland, Ohio

1.5.5 Burke Lakefront Airport – Of major importance to the potential location of shoreline CDFs for dredged material is the presence of Burke Lakefront (BKL) Airport on the Lake Erie shoreline, just north of downtown Cleveland (Figure 1.3). The airport, located five minutes from downtown Cleveland has two parallel runways about 5,200 and 6,200 feet in length. The airport, owned and operated by the City of Cleveland, in conjunction with Cleveland Hopkins International Airport, today serves corporate jets and air taxi services as well as numerous private aircraft. In recent years (2000-2006) approximately 87,000 operations (takeoffs and landings) occurred at BKL Airport yearly. The airport also serves as the location for the annual Cleveland Grand Prix and National Air Show.

BKL Airport was constructed entirely on fill placed on the Lake Erie bottom. Officially opening in 1947 as the Cleveland Lakefront Municipal Airport, it has been expanded in size over the years by the disposal of dredged material and construction debris. Today the airport is approximately 480 acres in size and has modern airport facilities to land commercial jetliners and serves as a reliever airport for Cleveland Hopkins International (Gruber and Kaufman, 2002).



Figure 1.3 – Burke Lakefront Airport, Cleveland, Ohio

1.6 FEDERAL NAVIGATION IMPROVEMENTS AT CLEVELAND



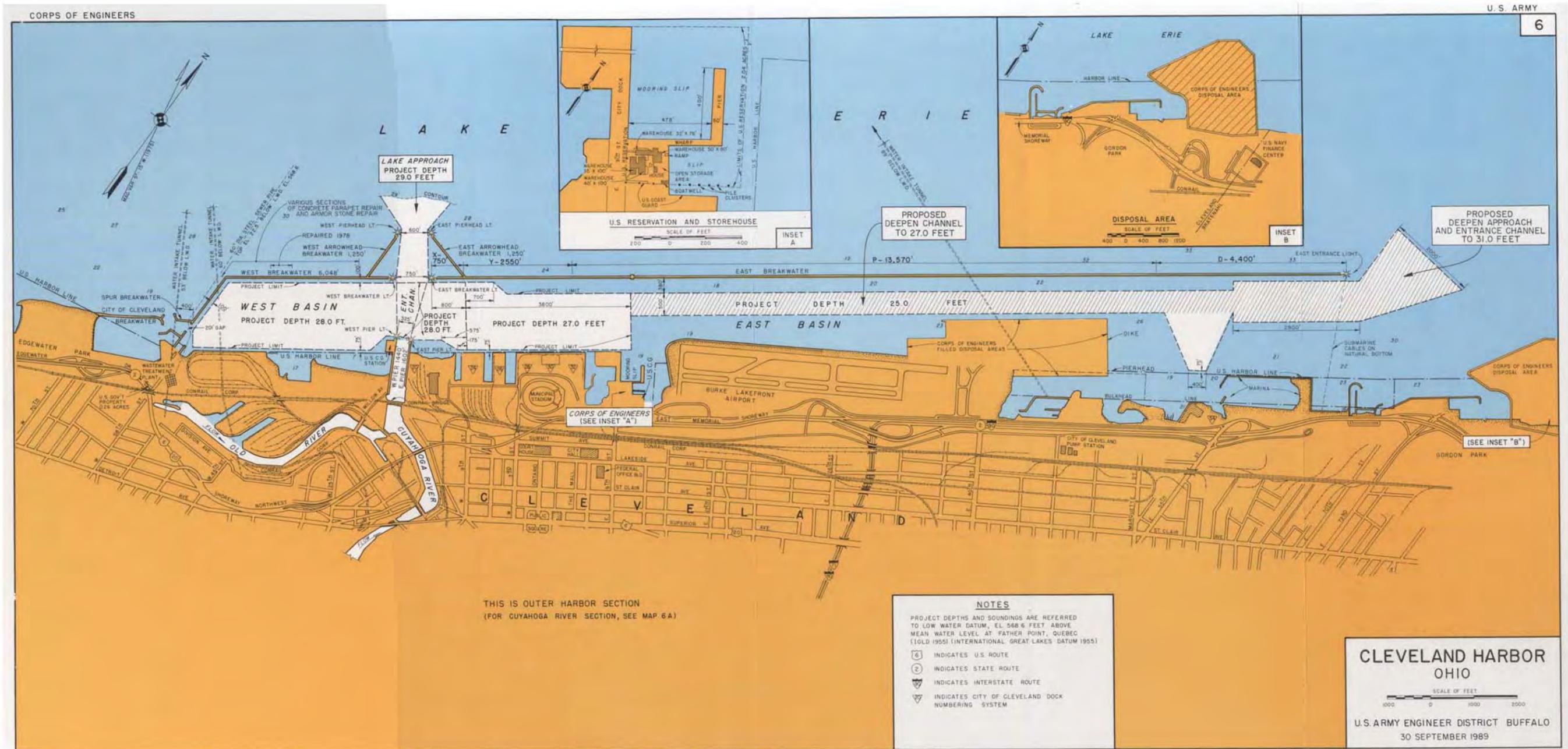
1.6.1 Authorization - Cleveland Harbor, Ohio, was initially authorized as a Federal harbor by Congress in the River and Harbor Act of 1875. The 1875 authorization was modified in 1886, 1888, 1896, 1899, 1902, 1907, 1910, 1916, 1917, 1935, 1937, 1945, 1946, 1958, 1960, and 1962 River and Harbor Acts. Various modifications to the project were also authorized under the 1976 and 1986 Water Resource Development Acts (WRDA), the 1985 Supplemental Appropriations Act, and the 1988 Energy and Water Appropriations Act.

1.6.2 Harbor Features - The harbor consists of a lakefront, breakwater protected Outer Harbor (Figure 1.4) and Inner Harbor (Figure 1.5). The Inner Harbor is the lower deep draft section of the Cuyahoga River, and the connecting Old River. Federally authorized and maintained channel dimensions are presented in Table 1.1.

The Outer Harbor is a breakwall-protected area of about 1,300 acres. The Outer Harbor, five miles long and 1,600 to 2,400 feet wide, is protected by an east breakwater (20,970 feet long) and a shore connected west breakwater (6,048 feet long). There is a 201-foot gap in the west breakwater about 662 feet from the shore end. The Entrance Channel has east and west arrowhead breakwaters, both of which are 1,250 feet long. The arrowhead breakwaters are 600 feet apart.

There are two entrances to the Outer Harbor. The main entrance (Lake Approach Entrance Channel) is located between the east and west breakwater. The other entrance is at the east end of the east basin, between the east breakwater and the shore. Authorized channel depths in these entrance areas are at least 29 feet below Low Water Datum (LWD). LWD for Lake Erie is 569.2 feet above mean sea level as measured at Rimouski, Province of Quebec, Canada, International Great Lakes Datum (IGLD) 1985. Authorized channel depths in the Outer Harbor are 28 feet below LWD in the west basin and 25 to 28 feet in the east basin.

Figure 1.4 - Cleveland Outer Harbor



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Figure 1.5 – Cleveland Inner Harbor

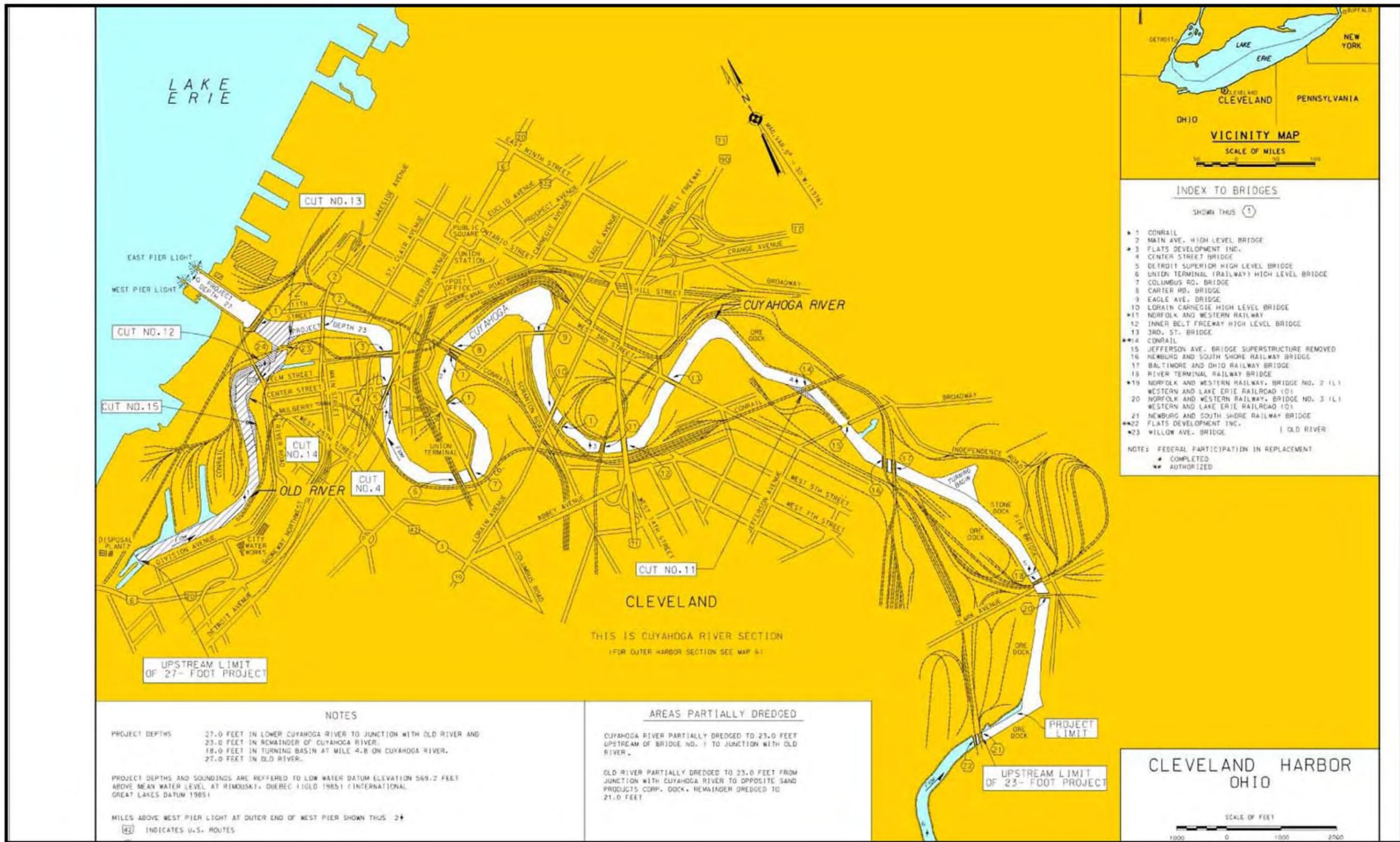
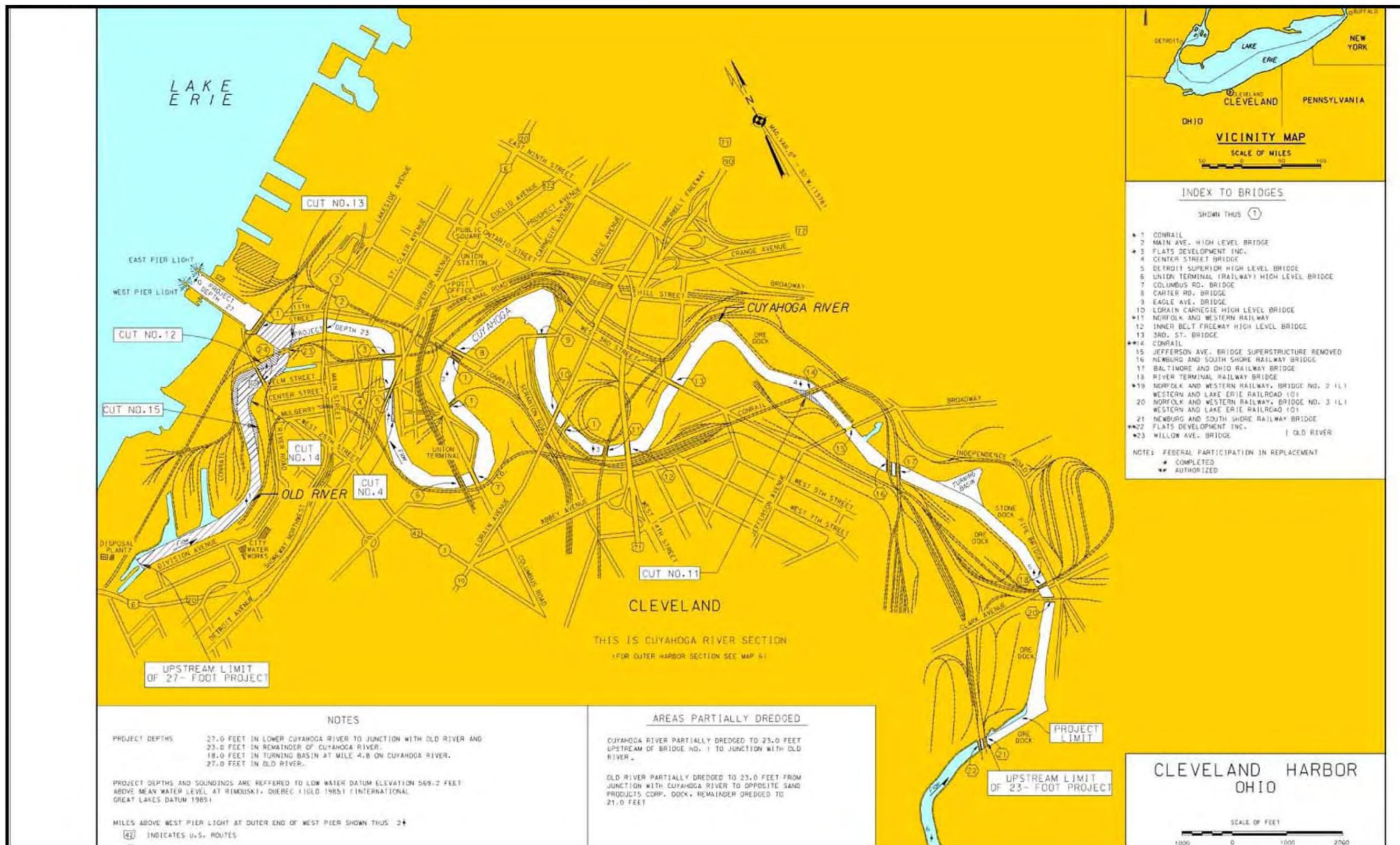


Figure 1.5 - Cleveland Outer Harbor



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TABLE 1.1 AUTHORIZED CHANNEL DIMENSIONS (LWD)					
REACH OR SEGMENT	NOMINAL CHANNEL DEPTH		NOMINAL CHANNEL WIDTH		MAX. SAILING DRAFT
	(as auth.)	(as maint.)	(as auth.)	(as maint.)	
Lake Approach	29'	29'	600'-750'	600'-750'	29'
Outer Harbor West Basin	28'	28'	1,500'	1,500'	28'
Outer Harbor East Basin	25'-28'	25'-28'	Varies 500'-1,5500'	Varies 500'-1,500'	25'-28'
Cuyahoga River	23'	23'	Varies 130'-325'	Varies 130'-325'	23'
Old River	27'	21'-23'	200'-400'	200'-400'	21'-23'
Turning Basins	18'	18'	690'	690'	--

The Inner Harbor includes the lower 5.8 miles of the Cuyahoga River and approximately one mile of the Old River. The Cuyahoga River is in line with the main entrance to the Outer Harbor from the lake. The Entrance Channel is protected by two parallel piers, 325 feet apart. The width of the Cuyahoga River varies from 130 to 325 feet. A turning basin is located approximately 4.8 miles upstream of the mouth of the Cuyahoga River. The Old River extends westward from a point about 0.4 miles above the mouth of the Cuyahoga River. The Old River varies in width from 200 to 400 feet.

The project provides an authorized navigation channel depth of 27 feet in the lowermost part of the Cuyahoga River, from the lakeward end of the piers to a point immediately above the junction with the Old River. Authorized channel depths in the remaining portions of the Cuyahoga River are 23 feet. The Old River navigation channel is maintained to 21 and 23 feet.

1.6.3 Investment at Cleveland - Since its inception as a Federal harbor in the late 1800's, over \$293,000,000 has been invested in the navigation structures and dredging and dredged material disposal at Cleveland. This includes \$37 million in new work, \$231 million in O&M, \$16 million in major rehabilitation, and, \$9 million in non-Federal contributions (USACE, 2003).

1.7 HISTORICAL DREDGING AND DISPOSAL AT CLEVELAND

Cleveland Harbor is dredged every year, in the spring and fall. The average dredging volume per year is 300,000 cy. Sedimentation and shoaling within the Federal channel is, and has historically been, the primary driver of the need to perform dredging at Cleveland Harbor. The Cuyahoga River conveys a large sediment load, and the enlarged prism of the Federal channel creates a zone of sharply reduced flow velocity which acts as an efficient trap for those sediments. As sediments deposit and accumulate they tend to obstruct navigation in the channel, and require dredging to be removed.

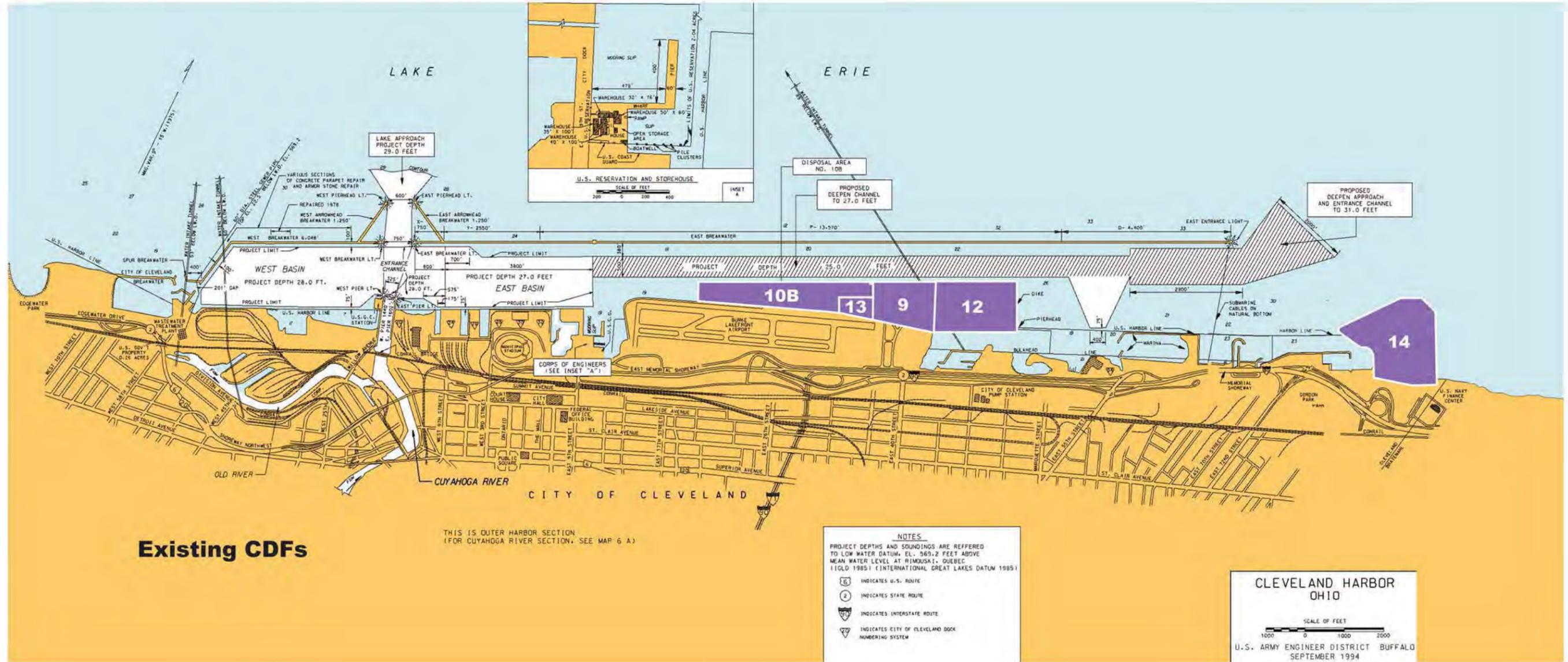
Historically, the USACE has employed a number of dredged material disposal methods for sediments dredged from the Federal channels at Cleveland Harbor including unconfined open water placement and disposal into a CDF. A CDF refers to a site where dredged sediments are confined in an enclosed space because of the potential for release of contaminants into open water. CDFs can be upland or located adjacent to or as an island along the lakeshore. In practice, due to the high costs of overland transportation of dredged sediment, most CDFs are located along the lakeshores of the Great Lakes.

Since the late 1960's several CDFs have been constructed in-lake adjacent to shore at Cleveland Harbor (Figure 1.6):

- CDF 13 was operational from 1967 to 1968. The facility was constructed as a demonstration project; the actual design capacity is unknown. The City of Cleveland was the local sponsor.
- CDF 9 was operational from 1969-1974. The facility was constructed as a demonstration project; the approximate design capacity was 2.0 million cy. The City of Cleveland was the local sponsor.
- CDF 12 was operational from 1974 to 1979. The facility cost approximately \$6.8 million and was constructed at 100 percent Federal cost; the approximate design capacity was 2.8 million cy. The Cleveland-Cuyahoga County Port Authority was the local sponsor.
- CDF 14 was operational from 1979 to 1998. The facility cost approximately \$28.3 million and was constructed at 100 percent Federal costs; the approximate design capacity was 6.8 million cy. CDF 14 was transferred to the local sponsor, Cleveland-Cuyahoga County Port Authority in 2001 when it was approximately 95 percent full. That same year, the City of Cleveland resolved to use the facility as a wildlife preserve, essentially preventing the possibility of future filling.
- CDF 10B opened for operation in 1998 and continues to be used by the USACE. The facility cost approximately \$21 million and was constructed at 100 percent Federal costs; the approximate design capacity was 2.9 million cy. The City of Cleveland was the local sponsor.

By December 2005, CDF 10B was approximately 97 percent full and had a remaining estimated capacity of 100,000 cy. The remaining capacity would accommodate disposal of dredged material through 2006. Use of 10B was extended by implementing an FMP. Table 1.2 summarizes Federal and non-Federal disposal quantities at CDF 10B through 2007. From 2008 until a new CDF is operational, USACE will implement FMPs at additional Cleveland Harbor CDFs to accommodate dredged material disposal (1.8.6).

Figure 1.6 - Existing Cleveland Harbor CDEFs



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Year	Federal Disposal Quantities In Place (cy)	Non-Federal Disposal Quantities In Place (cy)
1998	335,885	24,738
1999	281,709	25,067
2000	225,633	107,441
2001	401,799	23,703
2002	182,026	11,779
2003	333,850	27,575
2004	219,097	32,257
2005	189,127	21,591
2006	154,010	9,712
2007	225,000	18,163
Total	2,548,136	302,025

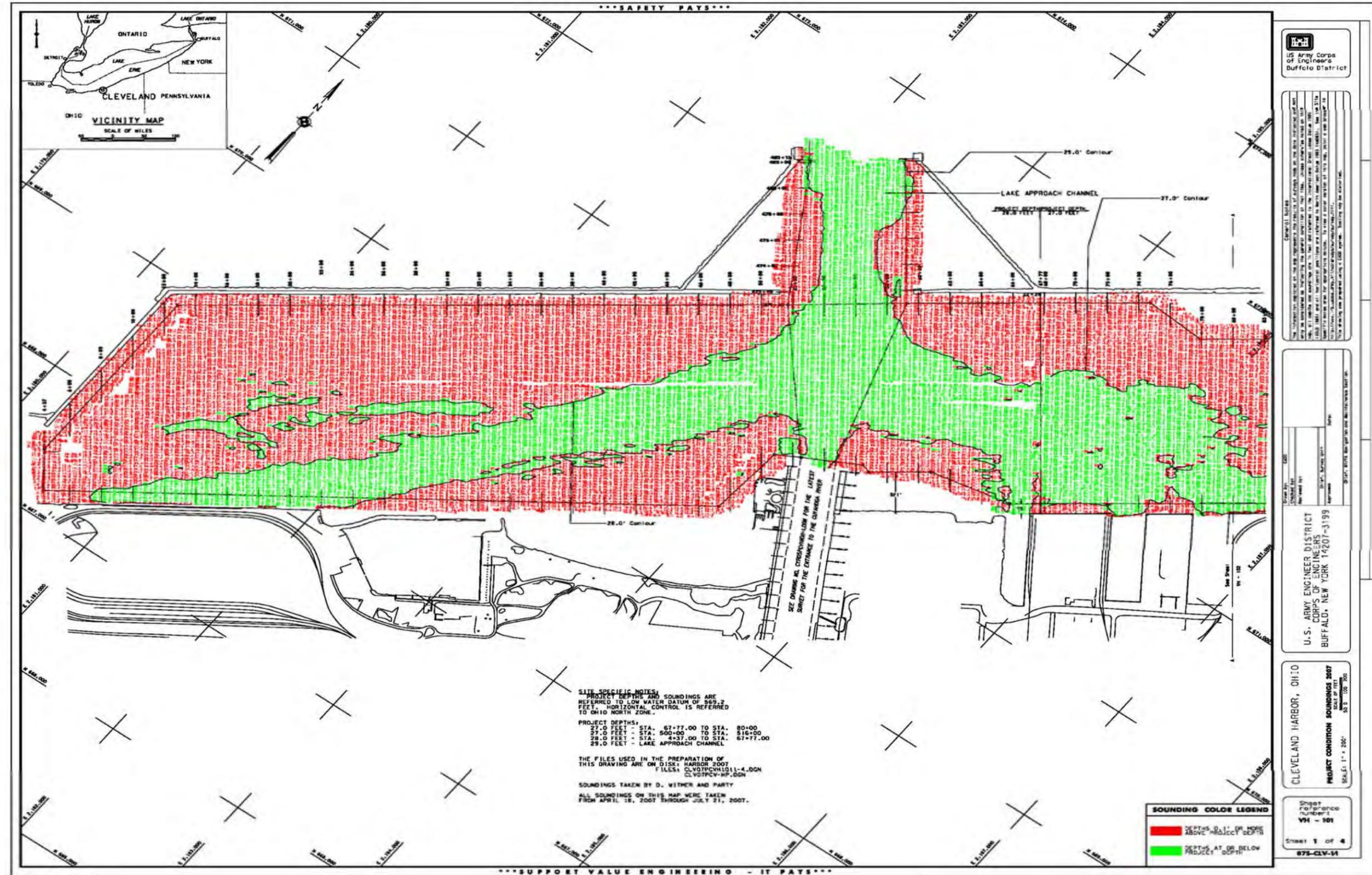
1.8 RELATED USACE ACTIVITIES AT CLEVELAND

A number of USACE activities, related to commercial navigation and the dredging and disposal of dredged materials are currently being conducted at Cleveland Harbor as described in the following paragraphs.

1.8.1 Dredging Program - The primary objective of the Buffalo District dredging program is to maintain adequate navigation depths within the authorized Federal navigation channel and to meet the expectations of dredging customers/stakeholders consistent with Federal dredging and disposal rules, policies, and available Federal funding. Work includes initial budget development for each harbor project, coordination with harbor users, preparation of plans and specifications, obtaining appropriate environmental and regulatory approvals and authorizations, and execution of dredging contracts. Funding for commercial harbor dredging on the Great Lakes, including Cleveland Harbor, has been curtailed in recent years resulting in a dredging program on the Cuyahoga River that attempts to dredge areas that most impact commercial ship traffic while leaving other less critical areas not dredged. Therefore the Cuyahoga River channels have not been dredged to their fully authorized depths and widths for several years.

Federal dredging in Cleveland Harbor is typically accomplished by contract, and annual dredging contract quantities are primarily constrained by available funding. Areas to be dredged are selected based on the severity of shoaling and impact to commercial navigation in the harbor. Selected areas are identified through annual project conditions surveys, known commercial traffic patterns, and direct communication with harbor users. Typically, the USACE maintains project depth along the entire length of the Federal channel in the upper Cuyahoga River, portions of the Old Cuyahoga River, and in areas of the Outer Harbor serving the Port of Cleveland's piers, wharfs, slips, and bulk terminals (Figure 1.7). The eastern end of the harbor, beyond the Port of Cleveland facilities, is generally not dredged due to its relatively infrequent use and significantly lower shoaling rates.

Figure 1.7: Cleveland Harbor Project Condition Survey showing areas typically maintained to project depth in green



1.8.2 Dredging and Disposal Methods at Cleveland - Maintenance dredging of the Cleveland Federal navigation channel is conducted twice per year due to the high rate of shoaling that occurs in the Cuyahoga River. Both a spring and fall dredging event are included in the annual maintenance dredging contracts. Spring dredging typically begins in late May. Spring dredging is normally performed throughout the Federal channel and includes about 85 percent of the total quantity of sediment that is removed every year. Fall dredging typically begins in early November, and consists of dredging in the extreme upper reaches of the river channel where the worst shoaling occurs.

The unit cost of maintenance dredging in Cleveland Harbor is among the highest of any of the commercial harbors in the Buffalo District (Lake Erie and Lake Ontario) due to the difficulty in performing the work. The serpentine layout of the river and the high traffic levels impact the rate at which dredging vessels can move within the channel. The majority of dredging (during both spring and fall events) is performed in the upper river which is the area furthest from the CDF and results in the highest transit time (and costs) to and from the work area. In addition, multiple lift-bridges must be operated to allow dredging vehicles to transit the work area. Dredging rates are further impacted when operations must be halted and equipment relocated to allow commercial river traffic to progress through the work zone.

In addition to channel traffic, dredging efforts are also impacted by the nature of the sediment, and the requirement for contained disposal. The sediments in the upper channel consist of heavy sand and high amounts of organic materials that are difficult to excavate, transport, and place into the CDF. These sediments contrast with shoals in most harbors that consist of soft, silty material that are more readily excavated and pumped.

The means and methods used to perform the dredging are not mandated by the District, but determined by the successful (e.g., low) bidder on each dredging contract. However, the same dredging methods are normally used each year because they have proven to be the most cost-competitive under the given harbor conditions. Typically dredging at Cleveland is performed by a mechanical, clamshell dredge (Figure 1.8). The clamshell loads the sediment onto scows which are moved by tugboats from the work area to the CDF. The scows typically have a capacity of about 1,000 to 2,000 cy. A “pump-out” and pipe system is then used to pump the sediment from the scow into the CDF. This pump-out process requires that the sediment be mixed with large quantities of water to provide a material consistency that can be pumped without plugging the pipe system (Figure 1.9). The additional water requires that the CDF have a capacity at least three times greater than the quantity of sediment being removed (i.e., 330,000 cy of dredging requires 1,000,000 cy of CDF capacity).



Figure 1.8 – Clamshell dredge loading a scow on the Upper Cuyahoga River



Figure 1.9 – Pumping dredged material from a scow at CDF 10B

1.8.3 Project Condition Surveys (PCS) - A PCS consists of a hydrographic survey of the Federally authorized channels at Cleveland Harbor. The Buffalo District generally conducts the depth surveys using small craft positioned by differential global positioning system (GPS) to survey harbor depths accurate to 1/10 of a foot. Surveys are usually conducted prior to and after dredging to confirm depths and the amount of material dredged. The data is processed in the Buffalo District New York and Pennsylvania O&M Area Office. Products from the survey data made available include maps in hard copy form, portable document format (PDF), "Notice to Navigation Interests", metadata, and digital computer aided drafting and design (CADD) files. PCS data for Cleveland is available through the Buffalo District web site at <http://www.lrb.usace.army.mil/WhoWeAre/WaterMgmt/survey/survey.html>.

1.8.4 Real Estate Management - The Detroit District Real Estate Office accomplishes the real estate mission of the Buffalo District by managing Cleveland Harbor, OH, real property holdings under the control, care and custody of the Buffalo District. Real estate management activities include granting to others the use of property, appraising, when necessary, to determine fair market value, negotiating the terms of and executing the real estate outgrant document; performing compliance inspections of outgranted property, completing compliance inspection reports, and taking corrective measures in instances of noncompliance; executing outgrant renewals and cancellation/termination documents; performing utilization inspections of real property under the control of the USACE; reconciling real estate and financial records to maintain compliance with the Chief Financial Officer's (CFO) findings on real property accountability, and performing real property physical inventories; responding to general inquiries relating to real property. Current activities include outgrants to various entities such as the City of Cleveland, Cleveland-Cuyahoga County Port Authority, U.S. Coast Guard, Great Lakes Environmental Research Lab, and Northeast Ohio Regional Sewer District (NEORSD). The purpose of these outgrants include pier access, mooring space, dock usage, warehouse space, and a park and recreational area.

1.8.5 Structure Maintenance - The Buffalo District maintains the breakwater and pier system in Cleveland Harbor including East and West Arrowheads, East Breakwater, West Breakwater, East Pierhead, West Pierhead, West Pier, and Buffalo District Ohio Area Office Finger Pier. Maintenance work on breakwaters can be performed by government equipment and personnel or by contract with private marine construction companies.

Breakwater and pier repairs are required to maintain the structural integrity of the navigation structures and ensure that the navigation project functions properly. The navigation structures protect the harbor shoreline, aids to navigation, and docks and businesses along the Cleveland lakefront. Major local facilities protected include BKL Airport, Rock and Roll Hall of Fame, Voinovich Park, Cleveland Port, Cleveland Science Center, and Cleveland Browns Stadium. The breakwaters also protect existing CDFs 9, 10B, 12, and 13 at Cleveland Harbor from wave damages. The navigation structures suffer annually from both wave action (6-8 ft) and ice damage which causes deterioration of the rubble mound/laid up stone, loss of core stone and damage to steel sheeting. Repairs to the navigation structures are required to ensure harbor commercial and recreational boat traffic, and lakefront infrastructure remain protected. Without the breakwater and pier structures in proper condition the harbor has an increased potential for shoaling, unsafe navigation, dangerous mooring, and bank erosion. The structures provide a

foundation for, and protection to, aids to navigation along the Cleveland lakefront including harbor lights and lighthouses.

1.8.6 Management of Existing CDFs at Cleveland - Since the 1960's, five CDFs have been constructed in Cleveland Harbor. Four of the five facilities, 9, 12, 13, and 14 were transferred to the local project sponsor once the facilities reached design capacity. However, USACE is implementing FMPs at CDFs 9, 10B, and 12 in order to provide sufficient capacity through 2014 at which time a new facility or disposal alternative, to be constructed under the DMMP, is expected to be operational.

- **CDF 10B FMP** - The primary function of the FMP at CDF 10B is to meet FAA safety criteria while simultaneously reaching design elevation and original design capacity. The FMP took place over several years and included movement of existing consolidated dry dredged material at CDF 10B. Dry dredge material was relocated with heavy machinery from the west end of CDF 10B to the south perimeter. The material was used to construct a gradual northward slope. In addition to meeting the design capacity, the FMP process filled ponded areas minimizing loafing and feeding grounds for waterfowl that pose a nuisance to airport operations and cause aviation safety concerns.
- **CDF 12 FMP** - The FMP at CDF 12 involves the construction of two 8-foot high telescoped berms, and a weir with outfall pipe. The telescoping berms will be constructed in two stages, using existing dredge material from CDF 12. The first berm and the weir were constructed in FY07 and FY08 to a top elevation of +18 LWD. The second berm shall be constructed to +24 LWD after the CDF has reached the capacity provided by the first berm. Construction of the second berm is currently planned for FY11. The first berm construction effort provided 810,000 cy of airspace capacity within the CDF. The second berm raising is expected to provide an additional 436,000 cy of capacity.
- **CDF 9 FMP** - The FMP at CDF 9 involves the construction of multiple telescoping berms along the perimeter of the CDF, and inlet and outlet pipes connecting to CDFs 10B and 12. The telescoping berms will likely be constructed in two stages using existing dredge material from CDF 9. The top elevation of the first berm will be +18 LWD. The second berm shall be constructed to +24 LWD after the CDF has reached the capacity provided by the first berm. Fresh dredged material will be allowed one year to dry prior to construction of the second stage berms. No weir will be necessary as the adjoining CDFs have available weirs for use during dredging operations in CDF 9. The FMP is expected to provide approximately 130,000 cy of capacity for dredged material and provide additional room to completely fill the adjoining CDFs through use of the inlet and outlet pipes.

1.8.7 Risk Assessment - In 2004 sediment and water samples were analyzed within CDF 10B and in the waters immediately adjacent to the facility, in support of a contaminant monitoring assessment of the CDF. This assessment was performed in order to determine whether or not further management actions need to be taken at the CDF under the jurisdiction of the USACE, Buffalo District in order to ensure protection of human health and the environment. This evaluation followed a tiered approach, utilizing guidance from *Evaluation of Dredged Material*

Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual (UTM) (USACE 2003). The first tier was completed in September 2005. Tier three evaluation was completed in 2006. The complete report is in Appendix E. The preliminary draft results indicate that water quality outside the CDF is compliant with Federal and State water quality standards and contaminated sediment in CDF 10B are below numerical criteria deemed suitable for beneficial uses. However, at this time the suitability for beneficial uses may not be determined acceptable by such comparisons alone. It is recommended that beneficial use of the CDF and/or sediment could be used for recreational use including habitat for wildlife.

1.8.8 Sediment Sampling Analysis - Sediment sampling in Cleveland Harbor is typically conducted once every five years. Physical, chemical, biological, and toxicological data is analyzed. The purpose of the sediment sampling is to assess sediment chemistry and determine the suitability of the dredged material for disposal in a CDF, or placement in the designated open lake or nearshore sites. Appendix F provides results of the 2007 sediment sampling event and Chapter 3 provides a detailed sediment analysis.

1.9 RELATED NON-FEDERAL FACILITIES AT CLEVELAND

1.9.1 Port Facilities at Cleveland - The Cleveland-Cuyahoga County Port Authority was formed in 1968 to manage the Port of Cleveland. The authority is a governmental agency with a nine member board, who serve staggered four year terms. The Mayor of Cleveland appoints six directors and Cuyahoga County commissioners appoint three directors. Today the Port Authority is a multi functional governmental agency with a Maritime and Finance and Regional Development group. The Authority's Mission Statement is to:

“Assist private industry in retaining and creating jobs by provisioning waterborne cargo/transportation services and by providing economic developments facilitation through financing services and other development tools in partnership with local and state development agencies.”

The maritime portion of the agency has facilities located to the east and west of the mouth of the Cuyahoga River (Figure 1.10 and 1.11). Both complexes provide Seaway depth slips of 27 feet. The east side complex consists of 110 acres and ten docks. The east side facilities handle mainly international cargo, with imported steel being the major commodity. It also receives heavy machinery, and liquid/dry bulk. There are four warehouse storage facilities providing 350,000 square feet of covered storage, one million square feet of open outdoor storage, seven Manitowoc overhead cranes (30 ton lift capacity per crane), and a stationary heavy lift crane with a 150 ton lift capacity. The west side complex has 44 acres and contains the Cleveland Bulk Terminal Facilities. These facilities can receive and load bulk commodities from and onto vessels up to Class 10 (1,000 feet in length, 100 feet in width) in size. The facility can also load bulk commodities into rail cars. Foreign vessel trips average around 70 per year, and dry bulk around 50 vessel movements per year.



Figure 1.10 – Port facilities at Cleveland, Ohio



Figure 1.11 – Port facilities to the east of the Cuyahoga River at Cleveland, Ohio

Dock 20 is located on the east side of the mouth of the Cuyahoga River and handles dry bulk commodities, as does Dock 22. The remaining nine berths are located on Docks 24-32 and handle international cargo. Pier 24 receives and ships steel products and containerized general cargo. The pier has two berths (east and west side), as well as indoor storage at Warehouse 24 (79,000 square feet) and Warehouse A (144,000 square feet). Warehouse A has heated storage inside rail loading capability, and 30 ton overhead cranes. Pier 26 has two berths (east and west side), 76,300 square foot storage facility and receives and ships containerized general cargo. Piers 24 and 26 have seven diesel crawler cranes which can handle loads from 65 tons to 230 tons and is serviced by 42 forklift trucks (Figure 1.12).



Figure 1.12 – Cleveland-Cuyahoga County Port Authority - Piers, Cranes and Warehouses

The next five berths are at Stadium Wharf and share loading and unloading equipment, and forklift support. There are three diesel crawler cranes with lift capabilities from 150 to 200 tons and 21 forklift trucks that service the five berths. All have access to rail and can receive and ship conventional and containerized general cargo, steel products and heavy lift items. Berth 28 West is 710 feet in length and has a stiff leg electric derrick with an 85 foot boom, 150 ton lift capacity. Berths 28 (533 feet), and 30 and 32 North (1,073 feet combined) are located on the north end of Stadium Wharf. There are two warehouses with a total of 117,000 square feet of storage. Finally, Berth 32 East (712 feet) is located on the east of Stadium Wharf (Figure 1.13).



Figure 1.13 - Stadium Wharf (Cleveland Browns Stadium in the background)

The main Port facility located to the west of the mouth of the Cuyahoga River is Cleveland Bulk Terminal which is located on Whiskey Island. Cleveland Bulk terminal receives bulk commodities delivered in Great Lakes self unloading vessels (Figure 1.14). The facility accommodates around 150 vessel movements per year. The 44 acre facility consists of an automated bulk commodity loading system, ground storage and rail service connections. The facility has 1,800 feet of dockface, can receive, store, and load bulk commodities including iron ore, coal, sand, limestone, salt, and coke. Iron ore is the main commodity handled. The iron ore comes from the head of the Lakes (Lake Superior) in Class 7 through 10 vessels, and uses the vessels unloading equipment to place the commodity on the ground. An automated loader system then places the iron ore either on smaller Class 5 vessels (Figure 1.15) for delivery to ArcelorMittal Steel located at the upper reach of the Cuyahoga River, or on rail cars for delivery to a steel plant located in Weirton, West Virginia.



Figure 1.14 – Self-unloading vessel at Cleveland Bulk Terminal



Figure 1.15 – Loading Class 5 vessel for upriver transshipment

1.10 NAVIGATING THE CUYAHOGA RIVER

1.10.1 Cuyahoga River Vessel Traffic - The Cuyahoga River has played an important part in the development of the City of Cleveland from the city's first beginnings. The Cuyahoga River drains approximately 813 square miles of land in six counties and empties into Lake Erie. The river is over 100 miles long, has 37 tributaries, and the lower 5.8 miles have been improved to accommodate commercial vessels, as well as one mile of the Old River. There are 36 docks located on the Cuyahoga (30) and Old Rivers (6); the shoreline in this part of the river has been heavily developed for commercial and industrial use. These docks are highly utilized and have four main uses: receipt of bulk materials for industrial use, bulk storage distribution, marine services, and recreation and entertainment (Figures 1.16 and 1.17).



Figure 1.16 - David Z Norton heading upstream



Figure 1.17 – Richard Reiss unloading at Ontario Dock 4

Commercial vessel traffic needed to supply the docks with raw materials typically involves around 700 ships per year. This results in 1,400 vessel transits per season and averages approximately four transits a day on the river during mid March through December.

The river has taken on a new role of not only serving commercial navigation, but also serving recreational craft. Three marinas located along the river channels provide access to the river and lake for over 800 recreational craft. The recreation and entertainment industry has increased particularly along the river banks near the mouth of the Cuyahoga River. This area is known locally as “The Flats” and has become a destination point for recreational craft increasing the amount of recreational boating traffic on the lower reaches of the Cuyahoga River and Old River. The Flats, an area of old warehouses and manufacturing companies, has been transformed into a restaurant, entertainment, and retail destination area in the City of Cleveland, with over seven million people visiting 50 restaurant and entertainment venues in a given year (Figure 1.18).



Figure 1.18 – Recreational use on the Lower Cuyahoga River

Recreational craft usage of the river typically peaks on the weekends, although the river can be crowded any weekday with boaters when weather conditions are favorable. This usage pattern creates transit challenges for commercial vessels operating in the lower river area. Recreational boat use on the river peaks in June, July, and August equating to approximately 92 days when recreational and commercial craft usage of the river is equally high. The river attracts thousands of boaters per month who wish to use the river or frequent the many restaurants located on the river, especially in the Flats. This interface of recreational craft and commercial vessel creates congestion and maneuvering challenges for the commercial vessels (Figures 1.19 and 1.20).



Figure 1.19 - Tight squeeze passing docked tour boat

Figure 1.20 Approaching upbound recreational craft

Commercial craft serving the industries located on the Cuyahoga and Old River Channels have become increasingly larger in size to maximize the amount of products they can carry per trip. Typical commercial vessels are now over 600 feet; the equivalent length of approximately two football fields. Typical vessels that deliver bulk commodities to docks located on the Cuyahoga and Old River Channels include American Republic, Buffalo, David Z. Norton, Earl W. Oglebay, Fred R. White Jr, and Wolverine. These are all Class 5 vessels with lengths greater than 630 feet and 68 foot widths. All are equipped with bow thrusters to provide additional maneuverability in the tight turns of the Cuyahoga River. These vessels typically move up the river at five miles per hour or less. A trip to a commercial dock located near the head of navigation may take two to three hours.

Commercial vessels encounter many challenges while navigating the Cuyahoga River: narrow passages between bridge abutments, tight turns, narrow channel widths, recreational boat traffic, high currents, etc. The Maritime Training and Research Center conducted a study in the 1990's to identify the main hazards to commercial navigation on the Cuyahoga River. Four key hazards were identified and are listed in order of importance: underway recreational traffic, visibility, rafted recreational traffic, and underway commercial traffic.

When entering or leaving the Cuyahoga River to and from Cleveland Harbor, the first obstacle encountered is the Conrail Lift Bridge located at the mouth of the Cuyahoga River (Figure 1.21). This lift bridge accommodates dozens of daily railroad crossings. At least one locomotive crosses the bridge every 15 minutes; this causes a waiting time as long as 30 minutes at the main entrance of the river. The bridge has a low steel beam measuring approximately three and a half feet above the water surface. The bridge is usually in the down position and is automatically locked down whenever a train is on the tracks within three miles of the bridge. This track is the mainline route between Boston and Chicago, and is also used for switching cars. Traffic on the River queues on both sides of the bridge when the bridge is in the down position. Once the bridge is raised, commercial vessels may be faced with numerous recreational craft attempting to pass. The presence of the recreational craft make the use of bow thrusters and the presence of prop wash dangerous.



Figure 1.21 – Commercial self-unloader transiting the Conrail Lift Bridge

There are 22 bridges spanning the Cuyahoga River, six of which are fixed. The remaining 16 must be opened by Bridgemen to allow commercial vessels to transit the river. Bridgemen are available 24 hours a day during the navigation season. Commercial vessels must be cautious of recreational craft when making transits and maneuvering the vessel through the limited height and width of the bridge openings (Figures 1.22 and 1.23).



Figure 1.22 - Heading under Eagle Street Bridge



Figure 1.23 - Heading under Veterans Memorial Bridge

Physical constriction of the navigation channel due to rafted recreational craft is another problem on the river (Figures 1.24 and 1.25). Due to the sharp turns that commercial vessels have to make on the River, and their vessels length and beam, commercial vessels often need the full width of the navigation channel in order to perform these turning maneuvers (Figure 1.26). The presence of rafted recreational craft in the narrow segments of the channel make maneuvering through these areas dangerous. Consequently, the U.S. Coast Guard has identified ten Safety Zones on the river to lessen the interactions between commercial and recreational vessels. The Safety Zones are in areas where commercial vessels have limited room to maneuver and prohibit vessels from mooring, standing, or anchoring in the designated area. This provides commercial vessels more room to maneuver in these tight locations.

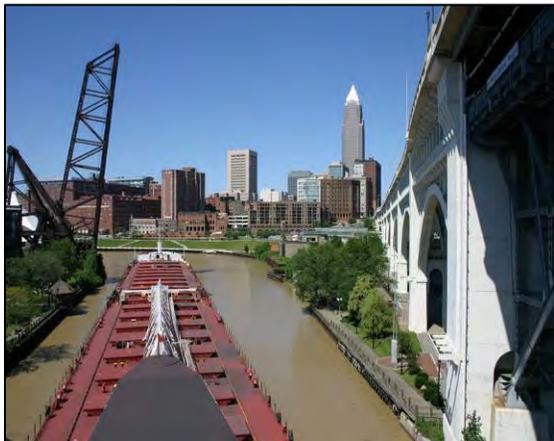


Figure 1.24 - Approaching the turn at Center Street



Figure 1.25 - Approaching the turn downbound at Collision Bend



Figure 1.26 – Tight turns and recreational craft along the Cuyahoga River

1.11 STEEL MAKING ON THE CUYAHOGA RIVER

Steel making operations in Cleveland and its association with the Cuyahoga River and Cleveland Harbor has had a long history. Steel making operations straddle the east and west banks of the Cuyahoga River. East bank operations began as Corrigan, McKinney and Company in 1910, was acquired by Republic Steel (1935), LTV (1984), International Steel Group (ISG) (2002), Mittal (2005), and most recently ArcelorMittal (2006). The west bank plants were originally owned by Otis Steel (1914), acquired by Jones & Laughlin Steel (1942), Ling-Temco-Vought(1968), LTV Steel (1977), ISG(2002), Mittal (2005) and most recently ArcelorMittal (2006). (Figure 1.27).



1.27 – Steel plant operations along the Cuyahoga River

1.11.1 ISG Steel - ISG made major changes in LTV operations at Cleveland to make a more efficient and profitable steel making facility. ISG was organized by WL Ross & Co. LLC in February 2002 to acquire world-class steelmaking assets. ISG acquired the principal steelmaking assets of LTV Corp. (April 2002); Acme Steel compact strip production facility in Riverdale, IL., (October 2002); Bethlehem Steel Corp. in Buffalo, NY (May 2003); Weirton Steel in Weirton, WV (May 2004); and Georgetown Steel in Georgetown, SC (June 2004). Prior to its merger with Mittal Steel, ISG was one of North America's largest integrated producers of steel with annual shipping capability in excess of 16 million tons. ISG operated facilities in ten states including fully integrated steel works in Cleveland, Ohio; East Chicago, IL; Burns Harbor, IN; and Sparrows Point, Maryland.

ISG brought LTV steel out of bankruptcy in 2002. ISG subsequently reopened LTV operations in Cleveland, first its east side facility (2002) and then west side facilities (2004). ISG invested about \$10 million for maintenance and engineering in the Cleveland facilities, which had been idle since the former owner LTV Corp. had closed the facility in June 2001. ISG invested \$85 million in operating and maintenance of environmental controls at the plant from 2002 through 2005. During that same time, the company added \$5 million in new environmental capital projects. ISG renegotiated a new labor agreement with the United Steel Workers Association (USWA) in 2003. The company cut its workforce by a third, reduced the number of job classifications, instituted flexible work rules, and hired outside contractors for non-core and surge work.

1.11.2 Mittal Steel - Mittal Steel bought ISG in 2005 for \$4.5 billion. Mittal Steel was a truly global steel company. It was formed by the combination of Ispat International N.V. and LNM Holdings N.V. The company had operations in 16 countries, on four continents. It employed 224,000 people spanning 49 different nationalities and served a customer base of 5,000 across 150 countries. Mittal Steel encompassed all aspects of modern steelmaking, produced high

quality finished and semi-finished products for both the flat and long steel products to meet a wide range of customer needs. It served all major steel consuming sectors including automotive, appliance, machinery, and construction. The company had steel shipments of 49.2 million tons and revenues of over \$28.1 billion in 2005.

Mittal had also made investments in the Cleveland plant. Mittal added an automotive-quality hot dip galvanizing line at the Cleveland works in April 2006 at a cost of about \$70 million. This was accomplished by converting an idled continuous anneal line maximizing asset utilization. Since most of the existing line was used, conversion of the existing line was less expensive than constructing a new galvanizing line. The new hot-dip galvanizing line produced coated steel for both exposed and unexposed automotive parts. The new line had the capability to produce up to 500,000 tons of steel a year and support an automotive market growth strategy by providing high-quality, anti-corrosive galvanized sheet steel tailored to automotive applications. The new line complemented existing automotive coated-product capabilities, enhanced the plants operational flexibility, and expanded product offerings.

1.11.3 ArcelorMittal Steel - In June 2006, Mittal Steel merged with Arcelor Steel and became the world's largest steel company, ArcelorMittal. ArcelorMittal headquarters are in Luxembourg, Germany. The company has 310,000 employees in 60 countries with annual steel production in excess of 100 million tons. ArcelorMittal product lines include steel of all types for use in the automotive, construction, household appliances, and packaging industries. The company has production facilities in Europe, Asia, Africa and the Americas. The company has extensive R&D facilities, sizable captive supplies of raw materials, extensive distribution networks, and is looking to develop positions in the Indian and Chinese steel markets. ArcelorMittal had revenues of \$105.2 billion in 2007, producing 116 million tons of crude steel, about 10 percent of the world's total output.

In 2007, ArcelorMittal Steel added galvannealing capability to its new steel galvanizing line in Cleveland. The galvannealing addition will be used to meet anticipated future automotive customer requirements. The Cleveland plant produced 2.7 million tons of steel in 2005, 3.4 million tons in 2006, and now has the capability to produce 3.6 million tons of raw steel annually.

ArcelorMittal estimates that more than \$1 billion a year in cost savings and revenue gains still remain in the ISG facilities. The corporate plan is to integrate the eight ISG U.S. mills, mostly clustered around the Great Lakes, into a regional composite facility. Running the facilities as a single unit will allow the company to seek better terms from suppliers of iron ore, coal, and electricity. The plants would be managed such that they would no longer compete against each other for customers, thus allowing the parent company ArcelorMittal to negotiate better prices and guarantee clients a stable supply source. The reorganized ArcelorMittal Steel Company will provide approximately 40 percent of the flat-rolled steel used in the U.S automobile industry.

ArcelorMittal's Cleveland plant is well positioned to continue supplying a variety of hot and cold rolled steel products to its customers in the automotive, appliance, service center, and construction and converter markets. The future of steel making operations in Cleveland has been greatly strengthened by the acquisition of ArcelorMittal Steel. ArcelorMittal Steel can provide

raw material resources and customer base needed to keep production levels high, and raw material resource costs low, thus insuring the future profitability of the facility.

1.12 ECONOMIC JUSTIFICATION OF CONTINUED HARBOR MAINTENANCE

1.12.1 Introduction - As part of the overall DMMP/EIS, an economic evaluation of continued harbor maintenance was completed (Appendix G) and summarized below. The purpose of this economic evaluation is to determine if continued maintenance of the harbor is justified and to develop a system for ranking (economically) the various DMMP alternatives developed during this study. Economic benefits attributable to continued maintenance of Cleveland Harbor consist of savings in transportation costs that would be expected from continuing to maintain Cleveland Harbor Federal navigation channels. The analysis is based on tonnages moved through Cleveland Harbor during the 2005 shipping season. The main commodities handled were iron ore, limestone, salt, cement, and coal (Table 1.3). These commodities accounted for 86 percent of the tonnage moved through the harbor in 2005. These commodities were used to develop net benefits associated with continued maintenance of the harbor.

Table 1.3 – Cleveland Harbor Tonnages – 2005	
Commodity	Tons
Iron Ore	5,974,000
Limestone	3,757,000
Salt	1,148,000
Cement	904,000
Coal	9,000
Other	1,849,000
Total	13,641,000

1.12.2 Vessel Transportation Costs by Channel Depth - The 2005 tonnages, and corresponding vessel movements, were used to develop the vessel transportation costs associated with dredging Cleveland Harbor to various depths. Channel depths range from authorized maintenance depths (28 feet below LWD in the Outer Harbor and 23 feet below LWD on the Cuyahoga and Old River Channels) to channels with up to six feet less of water column in one foot increments. Shoaling of channels requires shippers to load their vessels with fewer commodities or use smaller vessels thereby increasing transportation costs for movement of that commodity. Based on 2008 dollars, annual transportation cost increases associated with reductions in channel depth from one to six feet were calculated and are illustrated in Table 1.4. These transportation cost increases incorporated a one foot underkeel clearance safety factor for all vessels using the harbor.

Table 1.4 – Cleveland Harbor Increase in Annual Vessel Transportation Costs							
Commodity	Maintained Channel Depth 28/23 feet	Maintained Channel Depth 27/22 feet	Maintained Channel Depth 26/21 feet	Maintained Channel Depth 25/20 feet	Maintained Channel Depth 24/19 feet	Maintained Channel Depth 23/18 feet	Maintained Channel Depth 22/17 feet
Iron Ore Outer Harbor	\$6,791,052	\$7,148,942	\$7,563,556	\$8,047,961	\$8,618,411	\$9,297,887	\$10,119,760
Iron Ore Cuyahoga River	\$33,781,088	\$35,561,362	\$37,623,800	\$40,033,399	\$42,871,017	\$46,250,973	\$50,339,256
Limestone	\$15,633,621	\$16,045,748	\$16,530,151	\$17,127,250	\$17,893,490	\$18,868,784	\$20,097,864
Salt	\$9,024,097	\$9,519,308	\$10,175,290	\$10,984,621	\$11,973,457	\$13,202,542	\$14,769,825
Cement	\$9,971,754	\$10,388,882	\$10,945,535	\$11,646,221	\$12,498,219	\$13,537,034	\$14,809,309
Coal	\$20,270	\$20,451	\$20,954	\$21,839	\$22,966	\$24,245	\$25,674
Total Cost	\$75,221,882	\$78,684,693	\$82,859,286	\$87,861,291	\$93,877,560	\$101,181,465	\$110,161,688

1.12.3 Without Project Condition Average Annual Transportation Costs – The increases in vessel transportation costs were used to develop vessel transportation cost time streams for the Outer Harbor and River Channel based on a 20 year project evaluation period. Shoaling rates vary between 0.2 feet per year in the Outer Harbor, and one to three foot per year in the Cuyahoga and Old River Channels. The detailed 20 year time stream is included in Appendix G. The evaluation assessed two different shoaling rates on the river: one foot and two feet per year. The river channels equilibrium channel depth was assumed to be 17 feet. These time streams were converted to average annual values using a 20 year project life and a 4.875 percent annual interest rate. Assuming no maintenance of Cleveland Harbor channels for the next 20 years, the without project condition average annual transportation costs range from \$98,580,800 and \$102,277,300 (Table 1.5).

Table 1.5 – Cleveland Harbor Without Project Condition Average Annual Vessel Transportation Costs by Commodity		
Commodity	Shoaling Rate (0.2 ft/yr 1 ft/yr)	Shoaling Rate (0.2 ft/yr 2 ft/yr)
Iron Ore – Outer Harbor	\$7,432,400	\$7,432,400
Iron Ore – Cuyahoga River	\$45,756,100	\$47,653,800
Limestone	\$18,815,600	\$19,350,600
Salt	\$13,122,700	\$13,810,700
Cement	\$13,429,900	\$14,005,100
Coal	\$24,100	\$24,700
Total	\$98,580,800	\$102,277,300

1.12.4 Average Annual Harbor Transportation Cost Savings - Average annual harbor transportation cost savings associated with continuing to maintain harbor channel depths is the difference between without project condition (\$98,580,800 and \$102,277,300) and currently maintained depths of 28 feet (\$75,222,000). Average annual harbor transportation cost savings associate with maintaining a 28/23 foot channel depth are between \$23,358,800 and \$27,055,300 (Tables 1.6 and 1.7)

1.12.5 Net Harbor Benefits –Net harbor average annual benefits can be calculated by subtracting average annual dredging costs from average annual harbor transportation cost savings. Maintaining current channel harbor depths of 28/23 feet, has net average annual transportation savings of between \$21,306,100 and \$25,002,600. These net benefits can then be converted to equivalent first costs, which represent the investment that can be supported by Cleveland Harbor. According to the net harbor benefits calculation, the harbor can support improvement projects between \$268 and \$315 million (Table 1.8).

Table 1.6 – Cleveland Harbor Average Annual Transportation Cost Savings Associated with Maintaining a 28/23 Foot Channel Depth			
<i>Shoaling Rate: Outer Harbor 0.2 ft/yr, River 1 ft/yr</i>			
Commodity	Without Project Condition Average Annual Transportation Cost	With Project Condition Average Annual Transportation Cost	Average Annual Transportation Benefits
Iron Ore - Outer Harbor	\$7,432,400	\$6,791,100	\$641,300
Iron Ore – Cuyahoga River	\$45,756,100	\$33,781,100	\$11,975,000
Limestone	\$18,815,600	\$15,633,600	\$3,182,000
Salt	\$13,122,700	\$9,024,100	\$4,098,600
Cement	\$13,429,900	\$9,971,800	\$3,458,100
Coal	\$24,100	\$20,300	\$3,800
Total	\$98,580,800	\$75,222,000	\$23,358,800

Table 1.7 – Cleveland Harbor Average Annual Transportation Cost Savings Associated with Maintaining a 28/23 Foot Channel Depth			
<i>Shoaling Rate: Outer Harbor 0.2 ft/yr, River 2 ft/yr</i>			
Commodity	Without Project Condition Average Annual Transportation Cost	With Project Condition Average Annual Transportation Cost	Average Annual Transportation Benefits
Iron Ore - Outer Harbor	\$7,432,400	\$6,791,100	\$641,300
Iron Ore – Cuyahoga River	\$47,653,800	\$33,781,100	\$13,872,700
Limestone	\$19,350,600	\$15,633,600	\$3,717,000
Salt	\$13,810,700	\$9,024,100	\$4,786,600
Cement	\$14,005,100	\$9,971,800	\$4,033,300
Coal	\$24,700	\$20,300	\$4,400
Total	\$102,277,300	\$75,222,000	\$27,055,300

Table 1.8 – Viable Project Improvement Costs						
Plan Depth	Shoaling Rate/Yr	Total Avg. Annual Harbor Benefits	Total Avg. Annual Dredging Costs¹	Net Avg. Annual Benefits	Present Worth of 1\$/Period	Coverable Project Costs
28/23	Harbor - 0.2 ft River – 1.0 ft	\$23,358,800	\$2,052,700	\$21,306,100	12.595360	\$268,358,000
28/23	Harbor – 0.2 ft River – 2.0 ft	\$27,055,300	\$2,052,700	\$25,002,600	12.595360	\$314,916,700

1. Average annual dredging costs are based upon Federal cubic yards removed from 2009-2028 provided in Table 2.1

1.13 LOCAL SPONSORS, CUSTOMERS AND STAKEHOLDERS

The City of Cleveland and Cleveland-Cuyahoga County Port Authority jointly signed a Letter of Intent in 2004 to serve as the non-Federal sponsors. However, an updated LOI signed 31 March 2007 states that the Port Authority will be the sole non-Federal sponsor. Additional agency customers include Federal, State, and local agencies including the Federal Aviation Administration (FAA), U.S. Environmental Protection Agency (USEPA), Ohio Department of Natural Resources (ODNR), Ohio Environmental Protection Agency (OEPA), Ohio Department of Transportation (ODOT), Cuyahoga County Planning Commission, and Department of Port Control at BKL Airport.

Additional industrial customers include terminal operators at the port (Essroc Cement, Federal Marina Terminals, Kenmore Construction Company, Lake Carriers’ Association, Flats Industry, Flats Oxbow Association, Cargill Salt, Cuyahoga Concrete, Great Lakes Towing, Lafarge Cement, Ontario Stone, St. Mary’s Cement, River Dock Inc., Osborne Concrete and Stone, Sand Products Inc., Marathon Petroleum, United Ready-Mix, and ArcelorMittal Steel USA. Numerous local manufacturers within a 75 mile radius of Cleveland rely on the port to provide raw materials and to ship locally produced products to U.S. and foreign markets (Cleveland-Cuyahoga County Port Authority, 2006).

The customer expectation is to have the USACE, Buffalo District continue to dredge the Cleveland Harbor and Cuyahoga River Channels which will require disposal of dredged material in an environmentally acceptable manner. Dredging in Cleveland Harbor is typically performed twice per year due to the significant shoaling that occurs within the channels.

1.14 LOCAL PLANNING EFFORTS

1.14.1 Introduction – A number of local planning efforts related to the Cleveland waterfront are currently underway. This DMMP/EIS does give consideration to these local planning efforts. However, their acknowledgement within this DMMP/EIS is in no way an endorsement of any recommendations or findings from them relative to the Regulatory authority of the USACE under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act. Known and current major local waterfront planning efforts are described in the following paragraphs.

1.14.2 Waterfront District Plan - On 17 December 2004, the Cleveland City Planning Commission adopted “Connecting Cleveland: The Waterfront District Plan”, a comprehensive planning effort that was begun in April 2002. This plan developed a community consensus for the future of eight miles of Lake Erie shoreline between Edgewater Park and Gordon Park. The lakefront planning team and the Cleveland City Planning Commission involved citizens, stakeholders, elected officials, property owners, design professionals and residents to develop what is intended to be a 50-year Master Plan (City of Cleveland, 2006). A copy of the General Recommendations associated with the plan has been reproduced in Figure 1.28.

1.14.3 Cuyahoga Valley Initiative - The goal of the Cuyahoga Valley Initiative (CVI) is to “revitalize the Valley and make it once again an economic force, environmental treasure, and unifying element for the region.” (Rocky Mountain Institute, 2006). The Cuyahoga County Planning Commission working with the Rocky Mountain Institute has developed a set of recommendations for regeneration of the Cuyahoga River Valley environment, economy, and the community (Rocky Mountain Institute, 2004). The CVI recognizes that the Cuyahoga River Federal navigation channel is one of the dominating physical factors along the lower river, inherently has environmental problems due to deep channels, highly modified (sheetpile) riverbanks, and factors such as non-point source pollution and combined sewer overflows.

1.14.4 Remedial Action Plan - The Cuyahoga River is one of 43 rivers identified in the Great Lakes Water Quality Agreement as an Area of Concern (AOC). The purpose of the Great Lakes Water Quality Agreement is to clean up the most polluted tributaries in the Great Lakes and commit the respective State(s) and Province(s) to develop Remedial Action Plans (RAPs) for the designated AOCs. In 1988 OEPA organized the Cuyahoga River RAP whose mission is to restore the environmental quality of the river through remediation of existing conditions, and implement pollution prevention techniques to minimize further degradation of the water quality. The goal of the RAP is to remove the Cuyahoga River from the list of Great Lakes AOCs. Currently 39 stakeholders are active participants in the Cuyahoga River RAP and include government agencies, businesses, local community groups, and citizens interested in protecting and conserving the waters of the Cuyahoga River.

1.14.5 CDF 14 Master Plan – In December of 2005 the City of Cleveland published a Master Plan for creation of a public natural area on CDF 14 (Figure 1.29). CDF 14 was used for the disposal of dredged material from Cleveland from 1979 until 1998. The site was never completely filled with dredged materials and has to some extent naturally vegetated creating unique habitats along the Cleveland shoreline. The ultimate goal of the Master Plan was to provide recommendations for habitat improvements and management at the site and to evaluate concerns associated with providing public access to the site as a natural area (Biohabitats, et. al., 2005).

Figure 1.28 - Cleveland Waterfront District Development Plan



Figure 1.29 – CDF 14 at Cleveland Harbor



1.14.6 Cleveland Port Study – In 2006, the Cleveland-Cuyahoga County Port Authority contracted URS Corporation to complete a port relocation study. The purpose of the study is to determine the physical and financial feasibility of relocating the Port and to formulate a phased relocation matrix to move Port Authority operations, with the exception of a proposed Trans-Erie ferry, from the east side of the Cuyahoga River to the west side. The work shall be in reasonable compliance with the City of Cleveland's current Lakefront Development Plan. The study is still under development.

1.15 INTERAGENCY COLLABORATIVE PLANNING

1.15.1 Introduction – In accordance with EC 1105-2-409 the USACE uses its planning capability to facilitate, convene, and advise, and to work collaboratively with other Federal and State programs in developing solutions that integrate programs, policies, and projects across public agencies. This DMMP/EIS will give full consideration to ongoing collaborative planning initiatives in ultimately recommending a method and site for the disposal of material dredged from Cleveland Harbor. Current collaborative planning efforts related to the Cuyahoga River and Cleveland Harbor is described in the following paragraphs.

1.15.2 Sediment Transport Model - Since 2003, the USACE has partnered with various Federal, State, County, and local interests to develop, under the Section 516(e) Great Lakes Tributary Sediment Transport Modeling Program, a Cuyahoga River Watershed model. Numerous stakeholder meetings, with an emphasis on Soil and Water Conservation District participation, were held to discuss the capabilities and limitations of the modeling tools. The purpose of the modeling tools is to identify and implement measures to reduce sediment loads from identified subwatersheds that produce the greatest sediment yields. USDA-Natural Resource Conservation Service (NRCS) attended several stakeholder meetings and the partners in this endeavor recognize that NRCS programs will likely be necessary for the implementation of BMPs that will result in sediment reduction. The model was complete and transferred to local interests in Fiscal Year 2007. The USACE continues to be involved by offering training, technical support, and guidance on use of the model.

1.15.3 Conceptual Designs for Improvement of Larval Fish Populations – In 2004, the USACE, Buffalo District partnered with the Ohio Environmental Protection Agency (OEPA) and the Cuyahoga River Community Planning Organization, on developing ways to improve survival of larval fish populations in the Cuyahoga River. Under Section 401 of WRDA of 1996, USACE provided planning and engineering assistance to develop conceptual and generic restoration designs to promote successful larval fish transits of the lower Cuyahoga River. The report included preliminary cost estimates for construction and recommendations for implementation including hang on features, pocket habitat, and partial Steel Sheet Pile (SSP) replacement, all of which have been coined with the term green bulkheads (USACE, 2004).

1.15.4 Habitat Restoration/Green Bulkheads Initiative Along the Cuyahoga River – Under the Section 594 Ohio Environmental Infrastructure Program (USACE, 2006), USACE received funding to pursue green bulkheads in support of environmental restoration and replacement of failing bulkheads along the lower Cuyahoga River (Figure 1.30). Project partners include but are not limited to OEPA, Cuyahoga County Planning Commission, Cuyahoga River RAP, ArcelorMittal Steel, and local Universities who assisted in implementation of habitat prototypes and green bulkhead alternatives. The first prototypes were deployed in summer 2008. The ultimate purpose of such projects is to perform affordable, effective, sustainable habitat restoration along the Cuyahoga River that is compatible with navigation and commercial needs.

1.15.5 Comprehensive Watershed Study – In 2004, the USACE received a Letter of Intent from the Cuyahoga River RAP, requesting initiation of a Comprehensive Watershed Study pursuant to Section 202 of WRDA 2000. The comprehensive watershed study would develop a multi-agency strategic plan for recommending and implementing measures to restore beneficial uses of the Cuyahoga River. The strategic plan would provide a comprehensive framework for sustainable development, ecosystem restoration, improvement to navigation features, analysis of flood control operations, and consolidation of GIS systems. There would be an emphasis on collaboration and consensus with all relevant Federal, State, and local stakeholders to maximize implementation of actions identified in the strategic plan, RAP, and Lake Erie Lake Management Plan. Although Federal funding has not been acquired to date, USACE, Cuyahoga River RAP, USEPA, USFWS, and OEPA continue to collaborate on a watershed approach. USACE specifically considers the interests of the partners while implementing the Section 594 and DMMP projects.



Figure 1.30 – Failed SSP bulkhead on the Cuyahoga River

1.15.6 Beneficial Use of Dredged Material – Littoral Nourishment - In 2004, ODNR applied for a \$100,000 implementation grant from the Great Lakes Commission to recover sand from Federal CDF 10B and place it in the littoral system east of Cleveland. The grant was awarded in 2005, and recovery and nearshore placement of sand was scheduled the same year. Prior to recovery and placement, ODNR, OEPA, and USACE tentatively planned to schedule public meetings to discuss the environmental benefits of the project. Movement of sand placed in the nearshore would be monitored by the Ohio Geological Survey using side scan sonar, sediment samples, bathymetric surveys, and aerial photographs/shoreline surveys. Success of the project would be measured on a technical and institutional level. Technical level success would be measured by the volume of sand that was recovered, the rate at which it disperses after nearshore disposal, and the decrease in area of clay exposed on the lakebed offshore of Bratenahl. Institutional level success would be measured by showing that nearshore disposal of sand recovered from the CDF is economical and adopted as a standard operating procedure at Cleveland (and other harbors). Unfortunately, USACE sediment core and surface samples collected from CDF 10B in the fall of 2004 determined the quality of sand to be unsuitable for nearshore placement in accordance with OEPA, ODNR, and USACE/USEPA protocols. The project was no longer feasible and ODNR returned the grant funds. USACE, OEPA, and ODNR continue to collaborate on opportunities to reclaim and reuse sediment from Cleveland Harbor.

1.15.7 Integrated Wildlife Damage Management Plan - U.S. Department of Agriculture (USDA), Wildlife Services has a Memorandum of Understanding (MOU) with the FAA to address wildlife hazards to aviation. The MOU establishes that Wildlife Services has the

expertise to provide technical and operation experience needed to reduce wildlife hazards to aviation on or near airports. Based on the existing MOU, USACE, FAA, and USDA, Wildlife Services developed an interagency agreement to provide integrated wildlife damage management at CDF 10B and 12 located immediately adjacent to BKL airport. The agreement was initiated in 2006 and allows application of pyrotechnics, propane canons, trapping, exclusion, lethal reinforcement, effigies, and other proven techniques, as necessary, by USDA. Management actions conducted by USACE include vegetation clearing, dredged disposal management, and trenching to collect and divert dredge slurry to minimize habitat at the CDF. Success of the interagency agreement is measured by the number of wildlife observed during bi-weekly monitoring, the number of wildlife strikes, monetary damaged caused by wildlife, and the size of birds involved in strikes at BKL airport each year. To date, the management plan has been effective in eliminating wildlife habitat at the CDFs, decreasing the number of waterfowl that historically use the project for food and shelter, resulting in increased aviation safety and compliance with FAA standards.

1.15.8 Cuyahoga River Emergency Contingency Plan - Catastrophic or emergency situations resulting from shoreline failure are rare. However, preparations for dealing with these emergencies require advanced planning. The Contingency Plan, developed by USACE and U.S. Coast Guard, provides Federal, State, and local response actions for cases of moderate to catastrophic shoreline or bulkhead failure affecting the safe navigation of ships in the Federal channel on the Cuyahoga River. The purpose of the planning and response is intended to minimize the economic impact to commerce in the region and ensure safe navigation along the river. State, local, and private interests include Congressional and Senate representatives, State environmental agencies, ODOT, Port Authority, Cuyahoga County, City of Cleveland, and business located along the river.

CHAPTER 2 – PLAN FORMULATION

PURPOSE AND STUDY AREA

2.1 Study Purpose - The purpose of this DMMP/EIS is to determine if there is a Federal and non-Federal justification and interest in developing a plan for continued maintenance dredging and disposal of dredged materials from the Federal navigation channels at Cleveland Harbor, Ohio. The study will formulate and evaluate the cost-effectiveness and economic and environmental impacts of alternative plans for dredged material management at Cleveland Harbor. This study will also present the results of investigations to provide a plan for a minimum of 20 years capacity of dredged material disposal at Cleveland Harbor. Harbor dredging operations were evaluated in the Final Environmental Impact Statement, Operation and Maintenance, Cleveland Harbor, Ohio dated April 1974 and USACE continues to sample and analyze channel sediment every five years.

2.2 Cleveland Harbor, OH – Refer to Chapter 1, Paragraphs 1.6.1 through 1.6.3 for a detailed description of the Federal commercial navigation project at Cleveland.

2.3 Congressional Districts – The Cleveland waterfront, including areas to the east of the Cuyahoga/Lake County line fall within Congressional District 11 (Marcia Fudge). To the west of Cleveland, the Lake Erie shoreline falls within Congressional District 10 (Dennis Kucinich).

2.4 Defined Study Area – Since Cleveland Harbor is a deep draft commercial navigation project it serves, and provides commerce to, the entire Great Lakes and facilitates international commerce and commodity transportation through the St. Lawrence Seaway. For the purposes of dredged material management at Cleveland Harbor, the primary study area has been narrowed to the immediate Cleveland area as described below.

- Cleveland Harbor, Ohio – Including all Federal navigation channels in the Cuyahoga River (upriver about 5.8 miles); Old River Channel; Harbor Channels, and all sites used previously and today for the confinement of dredged material at the harbor.
- Cleveland Waterfront – All alongshore areas west of Edgewater Park and east of existing CDF 14 in Bratenahl.
- Lake Erie – Deep water areas offshore of Cleveland to a depth of approximately 35 feet below LWD.

2.5 PLAN FORMULATION

2.5.1 Six Step Planning Process - This DMMP/EIS is consistent with guidance provided in USACE Regulation ER 1105-2-100, the Planning Guidance Notebook (USACE, 2005). In brief, the guidance requires a six step planning process as outlined below:

- 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

The planning process is iterative as a study progresses. This study has progressed to the stage where a “Tentatively Selected Plan” has been identified. The remainder of this Chapter will focus on explaining the planning process used and document the decision process leading to the Tentatively Selected Plan. Recommendation for implementation of the currently identified Tentatively Selected Plan is subject to a series of reviews by numerous local, State and Federal agencies, and the public. In addition, the decision process will involve several higher level reviews and approvals through the USACE.

2.6 PROBLEMS AND OPPORTUNITIES

2.6.1 Step 1 - Identifying Problems and Opportunities – A number of water resources problems and opportunities have been defined as part of this study and in prior studies involving Cleveland Harbor, Ohio. They include the following:

2.6.1.1 PROBLEMS

- Existing CDFs at Cleveland Harbor, Ohio have limited capacity to accept dredged material. Currently all existing Federal CDFs at Cleveland Harbor are at full or near full capacity. Several of the existing CDFs will be managed to accept limited amounts of dredged sediment from 2009 through 2014.
- Heavy annual shoaling in the Cuyahoga River Federal Channels is a continual problem from the perspective of dredging and disposal needs. Heavy bed loads and erosion of the Cuyahoga River banks are expected to continue in the future as no major local plans for sediment reduction on the river have been implemented.

2.6.1.2 OPPORTUNITIES

- The potential use of significant amounts of dredged material from Cleveland Harbor for productive purposes, defined as beneficial use of dredged material, rather than disposal in CDFs.
- The availability to develop the CDF once it has been filled to capacity and transferred.

2.7 PLANNING OBJECTIVES AND CONSTRAINTS

2.7.1 Study Planning Objectives – Planning objectives are statements that describe the desired results of the planning process by solving the problems and taking advantage of the opportunities identified. The planning objectives must be directly related to the problems and opportunities identified for the study and are used for the formulation and evaluation of plans. All study objectives are framed in terms of the Federal objective and specific study planning objectives (USACE, 2005). The Federal objective for water resources projects as defined in the Principles and Guidelines (USWRC, 1983) is provided below.

“The Federal Objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the Nation’s environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.”

2.7.2 Specific Study Objectives – To date, the following study specific objectives have been developed.

- To develop and evaluate alternative plans to maintain authorized navigation channels in the Outer Harbor, Cuyahoga River, and Old River at Cleveland Harbor for a minimum period of 20 years (approximately 6,600,000 cubic yards of dredged material).
- To develop and evaluate alternative measures and plans for managing Cleveland Harbor dredged material in a cost-effective, engineeringly feasible, environmentally acceptable and if possible beneficial manner.
- Alternative plans, particularly those involving construction of new waterfront CDFs, should, to the extent practicable, not preclude potential future development of the site once it is turned over to the local sponsor.

2.7.3 Planning Constraints – Constraints are restrictions that limit the planning process, which should not be violated and are unique to each study. Planning constraints are actions that should be avoided or situations that cannot be changed. This DMMP will consider resource, legal, and policy constraints. Resource constraints are associated with limits on knowledge, expertise, experience, ability, data, information, money and time. Legal and policy constraints are those defined by law and USACE policy and guidance. Alternative plans are formulated to meet study objectives and avoid violating constraints. The following constraints have been identified for this study.

- Cleveland Harbor and Cuyahoga River sediments are classified as contaminated and therefore currently preclude the possibility of unconfined placement into the open waters of Lake Erie.

- Planning actions and capital development projects will be subject to financial constraints and availability of funds, both Federal and non-Federal.
- Operational and safety requirements at BKL Airport limit options for CDF management and new CDF construction in vicinity of the airport.
- Cleveland officials adopted a \$4.6 million plan on December 19, 2005 to create a nature preserve at CDF 14, which effectively eliminates the possibility of placing additional dredged sediments in CDF 14 or in adjacent areas.
- Despite the increase in environmental laws and policies aimed toward pollution prevention, clean water and air, and environmental mitigation requirements, contamination levels of sediments in the Cuyahoga River and Outer Harbor are not decreasing. Historical sediment sampling data shows a migration of hot spots of contaminants of concern throughout the river that may be directly related to point and non-point source discharge including industry, combined sewer overflows, and runoff due to urban development.
- Federal and non-Federal Funding Constraints – The concept of constructing a CDF in one continuous process over a three year period at a total cost of \$200 to \$300 million is highly unlikely. More reasonable would be phased construction of cells, over a 20 year period, that when complete would comprise an entire CDF and disburse the requirements for Federal and non-Federal funding over time.

2.8 Forecasting Conditions

2.8.1 Step 2 – Inventorying and Forecasting Conditions – Step 2 of the planning process involves inventorying study area resources including the economic, social, demographic, physical, and ecological resources in the planning area. In addition, a forecast of future without project conditions is conducted. The future without project conditions provides the basis from which alternative plans are formulated and impacts assessed (USACE, 2005).

2.8.2 Existing Conditions - A discussion of the environmental, socio-economic, and economic conditions of the Cleveland Harbor environs is contained in Chapter 3 (Affected Environment) of this report.

2.8.3 Without Project Conditions Defined – Without project conditions are defined as the economic, social and environmental conditions that would be expected in the study area during the period of analysis in the absence of a plan for dredged material disposal. For the purposes of this DMMP study, the period of analysis is 20 years from 2009 through 2028. It provides the basis for estimating benefits of each alternative plan (with project conditions). Without project conditions are used as a benchmark to measure the economic, social, and environmental effects of the alternative plans considered. Without project condition is essentially the No Action plan. Without project condition assumes that normal operations and maintenance, to include maintenance of the CDFs, dredging, and breakwaters of the Federal navigation project at

Cleveland Harbor would cease after the 2008 dredging cycle. The current capacity of CDF 10B will have reached 100 percent and there are no operational USACE CDFs available at Cleveland Harbor with capacity to receive additional sediment. As a result, there would be no harbor dredging or breakwater maintenance by the USACE over the 20 year project evaluation period of 2009 through 2028.

2.8.4 Key Assumptions for the Without Project Conditions – A number of key assumptions concerning without project conditions have been developed for this study. A discussion of those key assumptions is below.

2.8.4.1 Key Assumption 1 (Cleveland Harbor, OH as a Viable Commercial Navigation Project) – As previously discussed, Cleveland is a major commercial port on Lake Erie requiring a significant annual expenditure of Federal funds for dredging and disposal operations. The key assumption is that, without a CDF or place to dispose contaminated dredged material, maintenance of Cleveland Harbor as a major commercial port on Lake Erie, requiring dredging approximately 250,000 to 300,000 cy annually would no longer be undertaken by the Federal government. Eventually, commercial navigation channels would shoal in, particularly in the Cuyahoga River, and commercial navigation interests would incur major increases in waterborne transportation costs including cost of raw materials. In addition, maintenance of the extensive Federal breakwater and pier structures at Cleveland would cease. It is highly unlikely that any State or local agency would have the funding necessary to provide for the continued maintenance of the commercial navigation project at Cleveland Harbor. Although not constructed as their primary purpose, the Cleveland breakwaters provide significant shoreline protection from storm driven waves of Lake Erie. Without maintenance the breakwaters would eventually deteriorate exposing the Cleveland shoreline with its major infrastructure (e.g. marinas, water intakes, sewer outfalls) and attractions (e.g. Cleveland Browns Stadium, Rock and Roll Hall of Fame) to the damaging effects of storm driven waves.

2.8.4.2 Key Assumption 2 (non-Federal Disposal of Dredged Material) – Historically non-Federal interests (local marinas, Cleveland Cuyahoga County Port Authority, etc.) have dredged areas in Cleveland and paid for disposal of the sediment in Federal CDFs. This disposal has averaged approximately 30,000 cy per year. Key Assumption 2 implies that the non-Federal need to dredge and dispose sediment will continue to occur in the future at about the same rate irrespective of the presence of Federal CDFs. This assumption indicates that if there is no Federal CDF, non Federal entities would be required to find an alternate disposal location or method. If the preferred alternative plan(s) through this DMMP is an alternative other than construction of a CDF, there would be no in-water/nearby CDF available at Cleveland for which non-Federals can pay a tipping fee. This would require non Federal interests to identify a separable means of disposing dredged material.

2.8.4.3 Key Assumption 3 (Quality of the Dredged Material) – Based on historical sediment testing, sediment dredged from the Federal navigation channels at Cleveland Harbor are contaminated and therefore unsuitable for open-lake placement. Key Assumption 3 implies that there will be no significant improvement in this sediment quality and that all sediment dredged in the foreseeable future will not be suitable for open-lake placement.

2.8.4.4 Key Assumption 4 (ArcelorMittal Steel Plant Remains in Cleveland) - Since the early 1900s significant steel making operations have taken place along the Cuyahoga River. Today, ArcelorMittal steel is operating a modern, profitable facility on the Cuyahoga River located at the upper most reach of the Federal navigation channel (Paragraphs 1.11.1 through 1.11.3). Key Assumption 4 is that steel making operations will continue on the Cuyahoga River during the 20 year period of analysis. The steel plant would be serviced by water and overland transportation networks to receive raw material and bulk commodity inputs.

2.8.4.5 Key Assumption 5 (Burke Lakefront Airport Stays in Operation) - BKL Airport has been in operation for many years on the Cleveland Waterfront. No current plans call for closing or otherwise modifying the operations of BKL as a secondary airport for Cleveland. Therefore, Key Assumption 5 is that BKL will remain in operation for the 20 year period of analysis.

2.8.4.6 Key Assumption 6 (Future Development Opportunities)

The City of Cleveland and other stakeholders will continue to have an interest in developing all, or portions of the CDF once it has been filled to capacity and transferred to the non-Federal sponsor.

2.8.5 Without Project Conditions – The currently envisioned without project condition is described in summary below and is based on the 20 year period of analysis.

- With no dredged material disposal area or method, Federal dredging of commercial navigation channels would not occur.
- Open lake placement of dredged material would not be permitted (material is contaminated).
- Gradual draft reduction for commercial navigation on the Cuyahoga and Old River Channels.
- Economic losses to industry dependent on commercial navigation in the Cleveland area.
- The existing Federal CDFs would not be maintained and would gradually convert to vegetated natural areas (e.g. CDF 14).
- No Federal wildlife management at the existing CDFs, particularly CDF 10B and 12, and the potential for increased bird strike problems at BKL Airport.
- The Federal breakwaters at Cleveland Harbor would not be maintained and would eventually deteriorate because harbor operations and maintenance would not be economically justified.

- Deteriorated breakwaters would create shoreline protection problems to infrastructure located along the Cleveland waterfront, including existing harbor CDFs.

2.9 ALTERNATIVE MANAGEMENT MEASURES AND PLANS

2.9.1 Step 3 – Formulating Alternative Plans (Management Measures) – The first step in the Plan Formulation process is to identify management measures that could be implemented to meet some or all of the study objectives. Management measures can be structural and non-structural, and combined in various fashions to formulate alternative plans. The management measures developed for this study are briefly described below. Based on the objectives, constraints, and practicable management measures defined for this study, alternative plans have been developed and are described in later paragraphs. To avoid confusion, management measures are identified by capital letter designation and sub-measures with a capital letter and number (e.g. Measure A, B1, B2, C) while alternative plans are designated numerically and a variant of a plan will be identified with a lower case letter following the plan number (e.g. Plan 1, 1a, 1b, 2, 3):

2.9.1.1 Measure A – No Action: The No Action measure is the same as without project condition. Under this measure, the Federal Government would do nothing to address the need for future placement of dredged material. Dredging of the Federal navigation channels would cease in the immediate future when disposal facilities are no longer available. Without dredging, the navigation channel would progressively shoal in and impede commercial navigation. Commercial navigation users would have to light load their vessels as channel depths become shallower. Given the reduced carrying capacity and lack of unloading capability on barges, and the need to provide shore side unloading and stockpile space away from the dock, it is highly unlikely barges would continue commerce on the Cuyahoga River. Commercial vessels would continue to service docks located on the Cuyahoga River, Old River, and outer harbor, but at greatly reduced drafts. Shoaling of the channel is not expected to adversely impact shallow draft recreational boating needs. However, future Federal funding for operational and maintenance of recreation based navigation needs are unlikely.

2.9.1.2 Measure B – Beneficial Use: Beneficial use of dredged materials is defined as “Utilizing dredged sediments as resource materials in productive ways.” Beneficial use of dredged material has been classified into three broad categories: (1) engineered; (2) agricultural and product; and (3) environmental enhancement (USACE, 2006). Beneficial use of dredged material allows for recycling of those materials, particularly where the dredged materials are not contaminated or only mildly contaminated (Great Lakes Commission, 2006). Beneficial use of dredged material includes recreation, agricultural and habitat development, beach nourishment, and innovative engineering alternatives such as soil manufacturing. Beneficial use plans must be technically and economically feasible, have public support, and address legal and regulatory issues.

2.9.1.2.1 Measure B1 – Mine Reclamation: The idea of using lightly contaminated dredged materials that have been dried and processed with alkaline activated coal ash to form an almost impervious cement like fill for use in strip mine reclamation has recently

been implemented on a large scale demonstration basis (450,000 cy) at Bark Camp Pennsylvania (New York/New Jersey Clean Ocean and Shore Trust and Pennsylvania Department of Environmental Protection, 2006). This successful demonstration has illustrated the possibility of economically processing dredged material from shoreline areas on the Atlantic Coast of New York and New Jersey, and transporting the sediment inland to abandoned coal mines in Pennsylvania. The logistics (e.g. transport of dredged material by train; locating a suitable strip mine for reclamation), regulatory requirements (permits), and financing can be difficult but not impossible to overcome as illustrated at Bark Camp.

2.91.2.2 Measure B2 – Littoral Nourishment: In cases where dredged material is primarily sandy and inherently contains little or no chemical contamination the dredged sediment can often be used to nourish the littoral system. Littoral nourishment can be effective on eroded shoreline areas and in situations where, if the cost of this alternative is greater than the cost of other disposal options that meet the Federal standard, non-Federal interests are willing and capable in sharing the additional costs.

2.91.2.3 Measure B3 – Soil Manufacture: The concept of manufacturing soils using dredged material, often mixed with yard wastes or other biosolids, has been widely tested and has proven successful with smaller amounts of dredged material (up to 50,000 cy) (Lee, undated). The success of manufacturing soil depends upon the contamination levels present in the dredged material, the amount of decontamination and processing that would be required, and a ready market for the soil produced. The manufactured soil might range from poor quality, only suitable for landfill cover, to high quality topsoil.

2.9.1.2.4 Measure B4 – Wetlands (Habitat) Creation: Frequently, dredged material has been used to create wetlands and/or mixed wetland and upland habitats. This is particularly the case on the Great Lakes when filled or partially filled CDFs have not been used or maintained for many years. Excellent examples exist at CDF 14 in Cleveland and Times Beach in Buffalo, New York. In both cases, with relatively little human intervention, these areas have naturally vegetated and provide significant resting and feeding habitats for resident and migratory birds.

2.9.1.2.5 Measure B5 – Landfill Cover: Harvesting dry dredge material from existing CDFs for routine landfill cover could be a means of extending the useful life of existing facilities. A backhoe would excavate dry dredged material from the CDF and load dump trucks to transport sediment to nearby municipal solid waste landfills or brownfields where the dried dredged material could be used as a cap. Dump trucks would release the load; a bobcat or backhoe would place the material as cover where needed and a grader would smooth the sediment. Ideally, enough sediment would be excavated on an annual basis to maintain dredging approximately 300,000 cy per year.

2.9.1.3 Measure C – Open-Lake Placement: A designated open lake disposal site is located nine miles east of the north breakwater. This site has not been used since the early 1960's (prior to construction of the CDF).

2.9.1.4 Measure D – CDF: USACE, Buffalo District has identified nine potential locations, including iteration of proposed CDFs 2 and 3, for future CDF development (Figure 2.1). The proposed locations are categorized as Inner (south of the breakwater) and Outer Harbor (north of the breakwater) CDFs. The sites were selected by the Sponsors, USACE, and other City and County entities to include areas that were considered reasonably compatible with the City of Cleveland's Waterfront District Plan.

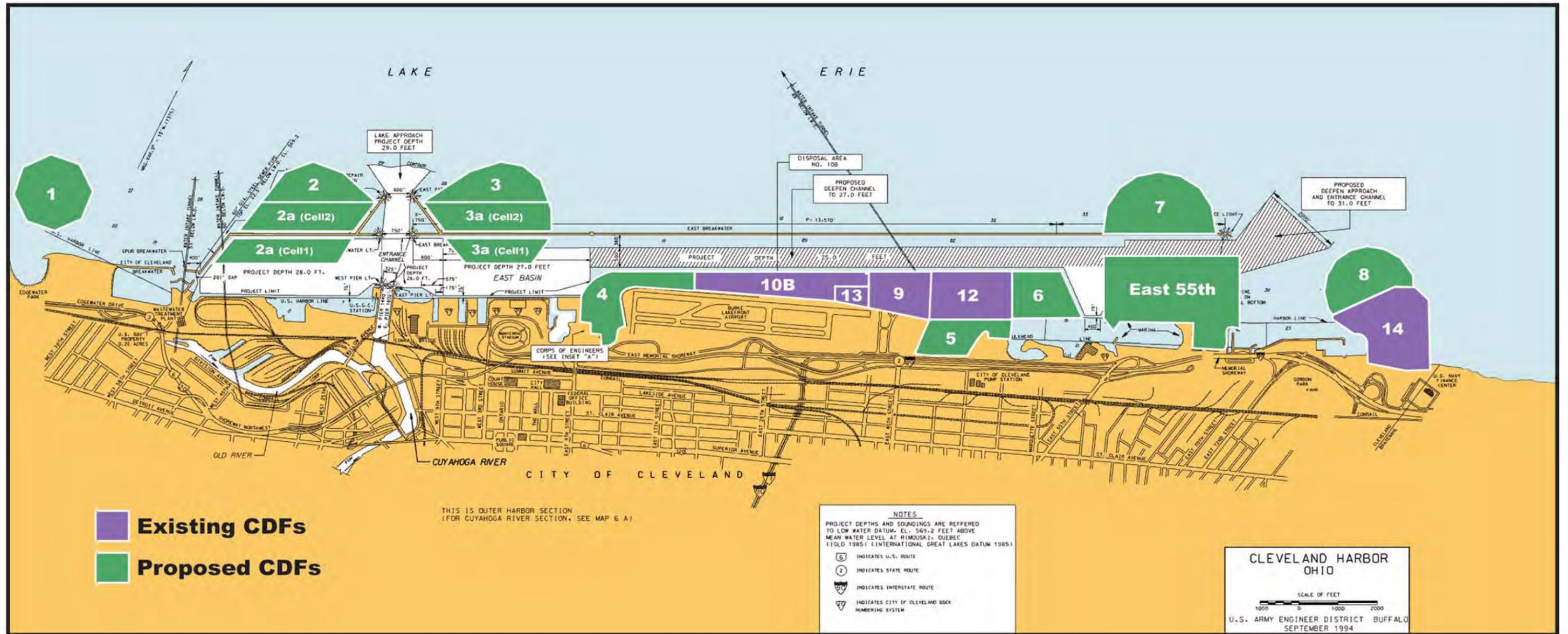
2.9.1.4.1 Measure D1 – Inner Harbor (lakeshore) CDF sites: Inner Harbor CDFs are connected to the immediate shoreline or to existing CDFs at Cleveland. Their size is limited by the amount of potentially available shoreline. These sites are designated as 4, 5, 6, 8, and East 55th Street.

2.9.1.4.2 Measure D2 – Outer Harbor CDF sites: A number of potential “outer” harbor CDF sites were also considered during the preliminary planning. Those sites have no particular limitations in terms of size, can easily be sized to meet a 20 year requirement, are more remote, and have less impact on the Cleveland Harbor shoreline. Five of the sites (designated as 2, 2a, 3, 3a, and 7) would be connected to existing breakwaters at Cleveland, thereby at least minimizing construction cost of one perimeter wall. Site 1, somewhat remote and to the west, would not be connected to any other structure or shoreline, and if built and filled would create a man-made island.

2.9.1.5 Measure E – Management of Existing CDFs: The USACE, Buffalo District has constructed five CDFs that have been filled or are essentially filled. Various actions such as grading activities or increasing the elevation of existing CDF perimeter walls could be implemented to extend the useful life of the existing CDFs.

2.9.1.6 Measure F – Sediment Load Reductions: Identified measures that have the potential to reduce sediment loading to the Federal channel include distributed watershed BMPs such as adoption of no-till farming, installation of vegetated filter strips/riparian buffer restoration, and streambank stabilization. These measures function by reducing erosion and/or by trapping eroded sediment on the land prior to delivery to the stream system.

Figure 2.1 Existing and Potential CDF Sites at Cleveland, OH



2.9.1.7 Measure G – Sediment Traps: Construction of in-stream sediment traps will also be considered in the study. An in-stream sediment trap would effectively trap sediments in the Cuyahoga River, upstream of the Federal navigation channels. Sediments would be periodically dredged from traps and disposed or used elsewhere.

2.9.1.8 Measure H – Using Nearby CDFs at Other Federal Harbors (Huron): Huron Harbor, Ohio is located about 47 miles west of Cleveland along Lake Erie. In 1975, a 2.6 million cy capacity CDF was constructed at Huron Harbor. Currently it is filled to approximately 75 percent capacity and is no longer used to dispose of dredged material from Huron Harbor. Based on that estimate, the Huron Harbor CDF would have about 650,000 cy of capacity, the equivalent of approximately two dredging cycles from Cleveland Harbor. It is possible that dredged material, either dewatered from CDF 10B or freshly dredged, could be transported to Huron for disposal.

2.9.1.9 Measure I - Treatment Technologies: Treatment technologies are available to destroy, extract, or immobilize contaminants contained within harbor sediments. Most of these technologies are still in the development stages and only a few have been used in a limited number of sediment remediation projects throughout the Great Lakes. Most developed technologies require sediments to be dredged, placed into a holding/storage area, and dewatered prior to treatment.

2.10 PRELIMINARY SCREENING OF MANAGEMENT MEASURES

2.10.1 Step 4 – Evaluating Alternative Plans (Comparing Measures to Objectives) – Table 2.1 provides a preliminary analysis and evaluation of dredged material disposal measures described above and compares the measures to the Planning Objectives (Section 2.7.2). The table is followed by detailed evaluation to determine which measures will be carried into detailed planning.

2.10.1.1 Measure A – No Action (Carried to Detailed Planning) - Under this measure, the Federal Government would do nothing to address the need for future long term placement of dredged material. Given the current CDF footprints, all USACE CDFs are essentially filled after the 2008 dredging season. Consequently, all federal action at Cleveland would cease after 2008. There would be no dredging, no breakwater maintenance, no CDF maintenance and no CDF management. Without dredging, the navigation channels would progressively shoal in and would result in reduced channel depths for commercial vessels. Reduced channel depths would result in light loading commercial navigation vessels over the 20 year evaluation period. Significant savings would be realized in the Federal budget as expenditures for operating and maintaining the Federal navigation projects at Cleveland Harbor would no longer be required. Consistent with USACE guidance ER 1105-2-100, ER 200-2-2 (Procedures for Implementing NEPA) and 40 CFR 1500-1508 (Regulations for Implementing the Procedural Provisions of the NEPA of 1969), this measure will be carried forward into detailed planning and fully evaluated in the array of final plans.

TABLE 2.1 - Comparison of Measures to Study Objectives

OBJECTIVE	Measure A - No Action	Measure B1 - Beneficial Use (Mine Reclamation)	Measure B2 - Beneficial Use (Littoral Nourishment)	Measure B3 - Beneficial Use (Soil Manufacture)	Measure B4 - Beneficial Use (Wetlands Creation)	Measure B5 - Beneficial Use (Landfill Cover)	Measure C - Open-Lake Placement	Measure D1 - New CDF (Along Shoreline)	Measure D2 - New CDF (Offshore)	Measure E - Management of Existing CDFs	Measure F - Sediment Load Reduction	Measure G - Sediment Traps	Measure H - Utilize Nearby CDFs (Huron, OH)	Measure I - Treatment Technology
Develop and evaluate alternative plans to maintain authorized navigation channels in the Outer Harbor, Cuyahoga River and the Old River at Cleveland Harbor for a minimum period of 20 years.	In accordance with USACE guidelines, No Action is always carried forward for detailed planning.	Not a viable measure - excavation, transport, and placement of sediment from existing CDFs to strip mines in SE Ohio would require years of research beyond the scope and timeline of this DMMP.	Not a viable measure - Sediments are unsuitable for littoral nourishment and therefore do not provide a placement alternative for the study period.	Not a viable measure - There has not been a market identified that could use 450,000 cy per year of manufactured soil for 20 years.	Not a viable measure - Construction of large scale wetlands in the Cleveland area are not practical.	Not a viable measure - No suitable landfills exist in close proximity to the dredging areas. It is unlikely that landfills could use 338,220 cy of dredged material per year for 20 years.	Not a viable measure - Dredged material is contaminated and not suitable for open-lake placement.	Not a viable measure - Construction of multiple small CDFs is not economically efficient and is considerable disruptive to future shoreline development and use.	Measure carried to detailed planning - CDFs can provide capacity for 20 year period.	Measure carried to detailed planning to provide near term disposal alternatives that are currently unavailable.	Not a viable measure - Reduction program impacts take 10 to 15 years to take effect.	Not a viable measure - Sediment traps require disposal of sediment from the trap on an annual basis to remain effective which does not eliminate the need for a disposal alternative.	Not a viable measure - Use of Huron Harbor CDF would have minimal benefit, incur high cost per cy, create a potential capacity problem at Huron Harbor in the event Huron Harbor sediments required containment.	Not a viable measure - Treatment technologies are generally limited to small quantities of contaminated sediment. In addition, after treatment, cleaned sediment would require trucking to offsite areas to be reused or disposed.
Develop and evaluate alternative measures and plans for managing Cleveland Harbor dredged material in a cost-effective, engineeringly feasible, environmentally acceptable and if possible beneficial manner.	n/a	Yes - Beneficial use plans are implementable by the USACE in conjunction with a non-Federal cost-sharing partner and when feasible.	Yes - Beneficial use plans are implementable by the USACE in conjunction with a non-Federal cost-sharing partner and when feasible.	Yes - Beneficial use plans are implementable by the USACE in conjunction with a non-Federal cost-sharing partner and when feasible.	Yes - Beneficial use plans are implementable by the USACE in conjunction with a non-Federal cost-sharing partner and when feasible.	Yes - Beneficial use plans are implementable by the USACE in conjunction with a non-Federal cost-sharing partner and when feasible.	n/a	Yes - USACE has authority to construct CDFs under Section 201 of WRDA 1996	Yes - USACE has authority to construct CDFs under Section 201 of WRDA 1996	Yes - USACE has authority to manage existing CDFs under Operation and Maintenance Authorities	Generally No - The USACE does not have authority to implement land use management with the intent of reducing sediment loads to rivers.	Yes, USACE has authority to implement.	Yes, if the nearby CDF is USACE owned or a privately owned CDF provided by a valid non-Federal sponsor.	Yes - The USACE could treat dredged sediments under O&M authorities, if warranted due to contamination levels of the sediments.
Alternative plans should, to the extent practicable, not preclude potential future development of the site once it is turned over to the local sponsor	The Waterfront District Plan recognizes the use of Cleveland waterfront for both recreation and commercial activities.	This measure would require the existing CDFs remain operational and no new CDF be constructed. Therefore development of existing CDFs would be prohibited.	This measure is not feasible. Sediment dredged from the harbor does not meet Federal and State guidelines for littoral nourishment.	This measure would require the existing CDFs remain operational and no new CDF be constructed. Therefore development of existing CDFs would be prohibited.	This measure would require the existing CDFs remain operational and no new CDF be constructed. Therefore development of existing CDFs would be prohibited.	This measure would require the existing CDFs remain operational and no new CDF be constructed. Therefore development of existing CDFs would be prohibited.	n/a	Depending upon the location, a shoreline CDF could support future development.	Depending upon the location, an offshore CDF could support future development.	Managing existing CDFs would still allow for potential future development, once USACE operations have commenced.	This measure, if implementable, would possibly eliminate the need for large scale CDFs.	This measure, if implementable, would eliminate the need for large scale CDFs but would require existing CDFs to remain operational. Therefore, the CDFs would not be transferred for future development..	n/a	This measure, if implementable, would eliminate the need for large scale CDFs but would require existing CDFs to remain operational. Therefore, the CDFs would not be transferred for future development..

Shaded Measures: Carried to detailed planning.

2.10.1.2 Measure B – Beneficial Use - Beneficial use of dredged material includes recreation, agricultural, and habitat development, beach nourishment, and innovative engineering alternatives such as soil manufacturing from dredged sediment. Consolidated dredged material could be mined from existing Cleveland Harbor CDFs and used elsewhere for beneficial purposes, or materials dredged on a yearly basis could be dewatered and used for beneficial purposes. In either event, the need for future CDFs could be minimized. In order to successfully implement beneficial use, the alternative must be technically and economically feasible, obtain public support, and address legal and regulatory issues. Sediment dredged from Cleveland Harbor is contaminated thus limiting the possibilities for beneficial use plans.

2.10.1.2.1 Measure B1 – Mine Reclamation (Not Carried to Detailed Planning) - The concept of using dredged material for reclamation of strip mines has been implemented in some small scale cases. Such a plan could be implemented either by dewatering freshly dredged material on site and shipping it by railroad to abandoned strip mines in southeast Ohio, or by digging dryer sediment out of existing CDFs at Cleveland Harbor and shipping the material by truck or train to abandoned mines. As discussed in New York/New Jersey Clean Ocean and Shore Trust and Pennsylvania Department of Environmental Protection (2006), the ultimate costs of such a plan would be dependent upon many factors including the proximity of mines that could be reclaimed, the availability of coal ash, the proximity of existing railroads, the chemical quality of the dredged material, State regulations concerning how dredged material is treated as a “waste” and numerous other factors. Two relevant positives to a mine reclamation plan would be the elimination of the “need” to build a rather expensive lakeshore CDF at Cleveland and the benefit of using the dredged material in a mine reclamation project.

Mine reclamation was not carried to detailed planning due to the logistical and cost problems associated with transporting dredged sediment from Cleveland to distant mine sites. In addition, the regulatory requirements to effectively implement this measure by 2015 were deemed insurmountable for such a short time period.

2.10.1.2.2 Measure B2 – Littoral Nourishment (Not Carried to Detailed Planning) - ODNR and OEPA have developed guidelines for the use of dredged material for littoral nourishment. These guidelines require that the material contain at least 60 percent coarse-grain sediment and have a Total Organic Carbon (TOC) content of less than 5,000 ppm. Based on this guidance, sediment from the upper reach of the Cuyahoga River channel may occasionally comply with the State’s 60 percent coarse-grain benchmark; however, the TOC level in sediments exceed State benchmark values (Paragraphs 3.14.3). The sediments dredged from the Cuyahoga River channels fail the two main criteria for nearshore and onshore nourishment and therefore are considered unsuitable for littoral nourishment.

2.10.1.2.3 Measure B3 – Soil Manufacture (Not Carried to Detailed Planning) – One conceptual measure is to use previously dredged sediments found in existing CDFs to make manufactured topsoil. Sediment currently in existing CDFs would be removed and used as a raw material input in a production process that would result in manufactured topsoil. The space created by removal of sediment from the CDF would be used to accommodate future dredged material disposal storage needs. Depending on the dredged material sediment type and

chemistry, a manufactured top soil can be created that has engineering, agricultural, and environmental uses (Table 2.2). This topsoil can be used in landscaping, parks, athletic fields, golf courses, wetland construction, landfill cover, Superfund restoration, Brownfield redevelopment, and restoration of disturbed mine lands.

In general manufactured soil is a blended combination of dredged material, available cellulose and bio-solids using the patented formulation of Recycled Soil Manufacturing Technology (RSMT). Manufactured soil has the following mixture components: 60 to 80 percent dredged material, 10 to 30 percent organic waste material (cellulose, sawdust, yard waste) and 10 percent reconditioned bio-solids (from sewage sludge).

Creating manufactured soil using dredged material from CDFs has been demonstrated as a feasible alternative in Mobile, Alabama. In 2002, dredged material from CDFs in Mobile was used to make a manufactured soil which was used as cap and cover for a 75 acre nearby landfill. Over 250,000 cy of manufactured soil was used in the project. The Environmental Laboratory at the U.S. Army Engineer Research and Development Center (ERDC) performed manufactured soil screening tests on dredged material from the CDFs. ERDC worked in conjunction with two national companies, one which provided bio-solids from reconditioned sewage sludge (N-Viro International) and the other provided RSMT.

Optimal blends for manufactured soils depend on the dredged materials physical and chemical characteristics as well as the types and amounts of cellulose and bio-solids locally available. The production process associated with creating manufactured soil results in some production parameters that help maintain reduced costs and allows quality control of the products final characteristics. Since the majority of the manufactured soil is dredged material, input blending located at the source of the dredged material reduces production costs, eliminates double handling, and allows quality control measures to be put in place. A guaranteed source of additive material and a fixed yearly demand for the final product is needed to make the creation of manufactured soil economically viable.

At Cleveland, the blending site would be located on or adjacent to the existing CDFs (10B, 12 etc). This would allow additives to be brought to the site, mixed, and harvested in one location. Soil components could be stockpiled, checked for quality, and moved by front end loaders. The final product could then be transported by truck to its end user(s). A number of factors would affect the viability of this measure at Cleveland including location of the blending facility, availability of other soil components, identification of end user(s), and the amount of truck traffic generated by this manufacturing process.

In order to access CDF 10B and 12 at Cleveland, all vehicular traffic would have to enter and exit BKL Airport property. Since, the CDFs are located adjacent to the airport runways, truck traffic would have to travel through the airport grounds, directly adjacent to the runways. This would pose safety concerns for the airport in general and plane traffic in particular. Front end loaders and truck traffic would be active adjacent to the airports main runway. This could pose safety concerns for plane activities, since the CDFs are within the runway safety area and obstacle free area (AC 150/5370-2E, 2003).

Table 2.2 Beneficial Use Options

Beneficial Use Options	Dredged Material Sediment Type				
	Rock	Gravel & Sand	Consolidated Clay	Silt/Soft Clay	Mixture
Engineered Uses					
Land creation	x	x	x	x	x
Land improvement	x	x	x	x	x
Barra creation	x	x	x		x
Shore protection	x	x	x		
Replacement fill	x	x			x
Beach nourishment		x			
Capping		x	x		x
Agricultural/Product Uses					
Construction materials	x	x	x	x	x
Aquaculture			x	x	x
Topsoil				x	x
Environmental Enhancements					
Wildlife habitats	x	x	x	x	x
Fisheries improvement	x	x	x	x	x
Wetland restoration			x	x	x

Secondly, organic waste materials and bio-solid additives need to be available for blending with the dredged material. The manufacturing process will have to use at least 338,220 cy of dredged material per year, equal to the amount of sediment expected to be dredged annually from 2009 through 2028. Assuming the dredged material accounts for 70 percent of the manufactured soil, at least 100,000 cy of additives would be needed each year. A reliable source for these additives has not been identified. Assuming delivery in a 10 cubic yard dump truck, this would result in 10,000 truck movements onto airport grounds in a given year.

Another key ingredient in the success of manufactured soil is identification of an end user who will be able to use approximately 450,000 cy of manufactured soil per year from 2015 through 2028. Although there are a number of potential applications for manufactured soil, no end user has been identified.

Finally, this manufacturing process will generate a large amount of truck traffic. Using 10 cubic yard dump trucks, approximately 10,000 truck movements would be needed just to bring the additives into the production site. Delivery of the manufactured soil to the final end user would require another 45,000 truck movements. This amount of truck traffic would tax the road system leading to BKL Airport, disturb airport operations, create significant airport operating safety concerns, and result in heightened security needs at the airport.

In conclusion, no efficient method for handling even smaller quantities of manufactured soils from the Cleveland Harbor CDFs has been identified and this measure was not carried forward to detailed planning.

2.10.1.2.4 Measure B4 – Wetlands/Habitat Creation (Not Carried to Detailed Planning) –

As previously discussed the concept of creating wetland and/or mixed wetland and upland habitats using dredged materials has been successfully implemented in numerous cases on the Great Lakes. Both non-contaminated and lightly contaminated dredged material has been used to create wetland/upland habitats. Due to the intense storm and wave action on the Great Lakes, such habitats are often created in protected areas, particularly within stone armored CDFs.

Several factors, including the relative contamination of the dredged material, lead to the conclusion that construction of wetlands using dredged material in the Cleveland area is not a practicable measure unless within the protective confines of a CDF. Virtually all historical wetlands of any substantial size that existed in Cleveland have been destroyed by the urbanization, commercialization, and industrialization of the city environment. Small isolated wetland pockets may still exist along the Cuyahoga River but any substantial increase in size of these wetlands would be limited by the physical characteristics of the river. Along the lakeshore, particularly outside of Cleveland Harbor proper, sufficient space exists to build large wetland areas but due to the high energy environment and possibility of wave attack, wetlands could not be constructed unless they were protected by substantial rock dikes (essentially construction of a CDF to take the dredged material to construct a wetland). CDF 14 constructed at the eastern end of Cleveland Harbor was mostly filled with dredged material and inadvertently developed into an 88-acre mixed upland/wetland habitat when left to naturally vegetate. Today, CDF 14 is owned by the City of Cleveland and is actively being promoted as a local wildlife habitat and refuge (Figure 2.2).

The idea of wetland creation using dredged material, as an independent measure, has not been carried into detailed planning based on the discussion above. However, the idea of constructing a CDF where the ultimate end use might include a wildlife area with mixed wetland and upland habitats will be considered in the evaluation.

2.10.1.2.5 Measure B5 – Landfill Cover (Not Carried to Detailed Planning) – As of 2008, there is only one solid waste municipal landfill in Cuyahoga County, located in the City of Brooklyn, approximately 12 miles from the existing CDFs 9, 10b, 12, and 13. The City of Brooklyn Landfill only accepts material (including fill) from City of Brooklyn residents. Of the six surrounding counties (Ashtabula, Lake, Lorain, Medina, Portage, and Summit), only three (Ashtabula, Lake, and Lorain) have a municipal solid waste landfill. The distance of these landfills from existing CDFs in Cleveland ranges from approximately 30 to 50 miles.



Figure 2.2 – CDF 14 at Cleveland, Ohio (Note filled condition and vegetative cover)

To maintain the anticipated average yearly dredging quantities from 2009 through 2028 at Cleveland Harbor, approximately 338,220 cy of material would have to be excavated from the existing CDFs yearly and transported to landfills for use as landfill cover. Standard dump truck capacity is 10 cy which would result in 33,822 truck loads of material to be transported via City streets and highways in a given year, equating to approximately 130 trucks per weekday each year. The cost to load and unload one dump truck is estimated at \$3.65 per cy. This cost includes additional labor and equipment necessary to assist and support the backhoe in excavation operations. The cost to load 338,220 cy of sediment from a CDF and unload that sediment at a landfill is \$7.30 per cy or \$2,469,000 per year. This cost does not include cost of the dump trucks and operators, mobilization and demobilization of equipment, haul road maintenance, mats to protect project surfaces, costs associated with the transit of 33,822 trucks traveling 30 to 50 miles, or additional security required to obtain access to BKL airport where the existing CDFs are located. The current cost associated with dredging and disposal practices at Cleveland Harbor is approximately \$15.25 per cy (\$6.50/CY for dredging, \$8.75/CY for disposal in CDF 10B). The measure of landfill cover has been eliminated from detailed planning primarily due to the costs associated with transport and disposal as well as the extreme impact of truck traffic movement through the city.

2.10.1.3 Measure C – Open-Lake Placement (Not Carried to Detailed Planning) - A designated open lake placement site for Cleveland Harbor sediment is located nine miles east of the North Breakwater. This site has not been used for many years due to the contaminated nature of the dredged material from Cleveland Harbor. In accordance with joint USEPA/USACE protocols contained in the Great Lakes Dredged Material Testing and Evaluation Manual (1998), all sediment dredged from Cleveland Harbor, the Cuyahoga River and Old River Channels is unsuitable for open lake placement. As discussed previously, it does not appear at this time that there will be any significant improvement in the quality of sediment dredged from Cleveland Harbor during the 20 year period of analysis. Therefore, Measure C – Open Lake Placement has been eliminated from further evaluation in this study.

2.10.1.4 Measure D – New Confined Disposal Facility (CDF) - The construction of in-water CDFs adjacent to the Cleveland shoreline and/or existing navigation structures in Cleveland Harbor has historically been proven implementable and successful. Therefore, this measure will be carried forward for further planning and evaluation. This measure has been split into two sub-measures: D1 (Inner Harbor or Lakeshore CDFs); and D2 (Outer Harbor or Offshore CDFs). CDFs involve the construction of robust dikes using quarry stone or other suitable materials to withstand Lake Erie wave action and storms, sized to accommodate the anticipated level of dredging and disposal estimated for the project life. Table 2.3 presents a relative comparison of the physical characteristics of the nine preliminary CDF configurations, including an iteration of proposed CDFs 2 and 3. It is important to note that the preliminary cost estimates for all CDFs were based on a readily available source of quarry stone which is unlikely and will be discussed later in this report. The costs in table 2.3 are simply for comparison purposes.

- Site 1: East of Edgewater State Park
- Site 2: North of the West Breakwater
- Site 2a: North (Cell 2) and south (Cell 1) of the West Breakwater
- Site 3: North of the East Breakwater
- Site 3a: North (Cell 2) and south (Cell 1) of the East Breakwater
- Site 4: Immediately west of Dike 10B
- Site 5: Immediately south of Dike 12
- Site 6: Immediately east of Dike 12
- Site 7: Northeastern most point of the East Breakwater
- Site 8: Immediately north of Dike 14
- Site 9: North and east of the East 55th Street Marina

2.10.1.4.1 Measure D1 – Inner Harbor (Lakeshore CDFs) (Carried to Detailed Planning)- Development of the Inner Harbor CDFs at Cleveland are limited in size due to the amount of available shoreline, with the exception of East 55th Street. The conceptual designs of CDFs 4, 5, 6, and 8 currently range from 36 to 63 acres in size providing capacity ranging from three to 12 years. The East 55th Street CDF would be approximately 157 acres and provide an estimated 20 years capacity. With the exception of East 55th Street site, Inner Harbor CDFs must be combined with another alternative to meet the study objective of providing a minimum 20 year capacity.

Table 2.3 – Preliminary CDF Characteristics

Proposed Site	Area (acres)	Perimeter (Feet)	Average Existing Lakebed Elevation (feet LWD)	Final Dredge Fill Elevation (feet LWD)	New CDF Perimeter (feet)	Typical X-Sectional Area for New CDF (square feet)	Preliminary Rough Cost Estimate (Millions)	Design Capacity (cy)	Design Capacity (years)*
CDF 1	71	6400	-22	20	6400	4900	\$198	4,300,000	13
CDF 2	108	9100	-26	20	9100	6000	\$247	7,200,000	21
CDF 2a (Cell 1)	65	8300	-20	10	8300	NA**	\$120	2,620,000	8
CDF 2a (Cell 2)	65	8540	-23	20	5250	6000	\$146	4,490,000	13
CDF 3	117	9180	-22	20	9400	4900	\$205	7,200,000	21
CDF 3a (Cell 1)	50	8300	-17	10	8400	NA**	\$139	1,800,000	5
CDF 3a (Cell 2)	79	10680	-22	20	6760	4900	\$201	4,650,000	14
CDF 4	61	11400	-17	8	3600	3100	\$35	2,300,000	7.0
CDF 5	36	6600	-14	8	700	2400	\$7	1,200,000	3
CDF 6	37	5200	-21	10	3900	3100	\$61	1,600,000	5
CDF 7	93	8100	-34	20	8100	8400	\$215	6,900,000	20
CDF 8	63	6700	-30	20	4400	7200	\$100	4,200,000	12
East 55 th	157	7900	-22	10	7900	NA**	\$238	6,850,000	20

*Based on 338,220 cy annual disposal rate.

**Cell 1 cross section for Alternatives 2a, 3a, and East 55th Street (LPP) includes both rubblemound and vertical steel sheet pile dikes (all other CDF alternatives are exclusively rubblemound; does not allow for equal comparison).

2.10.1.4.2 Measure D2 – Outer Harbor (Offshore CDFs) (Carried to Detailed Planning) -

Of the nine preliminary CDF locations, three are located in the Outer Harbor, north of the breakwater and one is a stand alone island CDF. CDFs 2 and 3 are located north of the West and East Breakwater, respectively. CDF 2a is located north (Cell 2) and south (Cell 1) of the West Breakwater and CDF 3a is located north (Cell 2) and south (Cell 1) of the East Breakwater. CDF 7 is located at the eastern most end of the East Breakwater. The island facility, CDF 1 is located immediately adjacent to Edgewater Park and swimming area. The size of the Outer Harbor CDFs range from 108 to 130 acres, are in depths ranging from -17 to -34 LWD, provide over 20 years capacity, and meet many study objectives. Due to the increased size of the CDFs, and deeper water, the cost to construct an Outer Harbor facility is much greater than most Inner Harbor CDFs.

Installation of the island CDF 1 in the immediate vicinity of public recreation areas would be a safety concern for passive recreation users (boaters and swimmers) due to the increased barge and scow traffic that would be present during dredging and disposal operations. In addition, there is a current health impact related to CSO discharges that could be confounded by construction of a CDF in the area. The configuration of the existing beach is an alcove bounded on the east by a landmass that creates water circulation problems by preventing a continuous easterly flow. CSOs are located immediately adjacent to Edgewater State Park; specifically CSO number 069 is located at upper Edgewater Park, 300 yards west of the beach. The CSOs experience overflows from the Westerly Wastewater Treatment Plant during significant storm events resulting in discharge of bacteria (e-coli) and other pollutants (NEORS, 2006). Cuyahoga County Board of Health e-coli standard is 235 e-coli colonies per 100 ml of beach water tested. Under Ohio's Beach Monitoring Program, a cooperative effort between Ohio Department of Health and ODNR, daily water samples are taken at Edgewater State Park during the swimming season. In 2005 this resulted in 77 samples; 17 percent of the samples exceeded e-coli standards and resulted in advisories or beach closings due to CSO discharges (Natural Resource Defense Council, 2006). Construction of CDF 1 would further inhibit the easterly flow of water, obstruct circulation of beach water which could potentially increase public health and safety concerns relative to bacteria and pollutant discharges.

CDF 7 is located much further from the Entrance and River Channels as compared to the other Outer Harbor CDFs. Inevitably this would increase annual dredging and disposal transportation costs. In addition, there is no known beneficial end use for the facility by the local sponsor at this location.

Therefore, of the Outer Harbor CDFs, only CDF 2, 2a, 3, and 3a were carried to detailed planning.

2.10.1.5 Measure E – Management of Existing CDFs (Carried to Detailed Planning) -

The USACE, Buffalo District has constructed a number of CDFs that have been filled or are essentially filled. These facilities can and have been managed to extend their useful life to accept dredged materials. Such measures typically involve construction of interior berms with sandy dredged material to increase the capacity of the CDF. Therefore, this measure will be carried forward for further planning and evaluation.

2.10.1.6 Measure F – Sediment Load Reduction (Not Carried to Detailed Planning) -

Identified measures that have the potential to reduce sediment loading to the Federal channel include distributed watershed BMPs such as adoption of no-till farming, installation of vegetated filter strips/riparian buffer restoration, and streambank stabilization. These measures function by reducing erosion and/or by trapping eroded sediment on the land prior to discharging into the waterway.

2.10.1.6.1 Cuyahoga River Restoration Study - Previous investigations of the feasibility of sediment load reduction measures on the Cuyahoga River were conducted as part of the Cuyahoga River Restoration Study (CRRS) in the 1970's and 1980's (USACE 1971; USACE 1981; and USACE 1986). The Cuyahoga River Restoration Study included a comprehensive assessment of erosion and sedimentation problems in the watershed, and developed measures designed to address these problems. Both channel (streambank) and upland erosion were considered. Although the Cuyahoga River drains an area of approximately 810 square miles, the scope of the erosion and sedimentation study was focused on the 303 square mile area of the watershed located between the U.S. Geologic Survey (USGS) gages at Independence and Old Portage, Ohio, the major source of sediment in the river system (Apmann, 1973). This finding was subsequently verified by a program of suspended sediment data collection conducted by the USGS.

The CRRS determined that critically eroding areas in the 303 square mile sub-watershed contribute 361,000 cy of sediment requiring maintenance dredging, or about 42 percent of the annual total at that time. Identifiable non-point sources of erosion (gully erosion and floodplain scour on disturbed areas) was estimated to contribute another 92,000 cy of sediment requiring maintenance dredging, or 11 percent of the annual total. Management programs were developed for implementation of distributed watershed BMPs to address these erosion problems. These programs were found to be economically feasible, but not within the authority of the USACE, and so this aspect of the study was terminated after information was provided to local interests.

2.10.1.6.2 March 2002 Study – In March of 2002 the Buffalo District completed a further investigation of the feasibility of sediment load reduction measures on the Cuyahoga River. Reduction of the sediment load by implementation of distributed watershed BMPs was found to be effective, with each incremental 10 percent reduction in sediment load to the channel resulting in one foot of additional draft between annual dredging events in the area of interest. It was recommended that a watershed sediment yield model of the area between the Independence and Old Portage gages be developed to aid in identification of eroding areas which could be targeted for BMP application. Such a model was developed by the Buffalo District as part of the 516(e) Great Lakes Tributary Sediment Transport Modeling Program. The Cuyahoga River Watershed model was complete and transferred to local interests in 2007.

2.10.1.6.3 Distributed Watershed BMPs - Previous studies have shown that upland erosion in the Cuyahoga River watershed is the most significant source of sediment dredged from the Federal channel, and that significant economic benefits would accrue both to individual land owners and to the Federal government from implementation of measures to control this erosion.

Although we are supporting the targeted application of BMPs by providing a watershed model to the local interests through the 516(e) authority, implementation of upland erosion control measures remains beyond the authority of USACE. Absent this authority, USACE cannot include potential reductions in sediment load as a planning measure in assessing dredged sediment storage needs. Therefore, distributed watershed BMPs will not be considered further in this DMMP.

2.10.1.7 Measure G - Sediment Traps (Not Carried to Detailed Planning) – The concept of construction of a sediment trap upstream of Federal navigation on the Cuyahoga River with the intent to capture dredged materials has some merit. A plan for construction of a sediment basin at a location approximately two miles upstream of the Federal channel was recommended for consideration as an early action program in the CRRS First Interim Report (USACE, 1971). However, local interests were not prepared at that time to provide the required items of local cooperation, and environmental issues were identified that would have required resolution prior to plan implementation, so the plan was not constructed.

As originally proposed, this sediment basin would have been approximately 5,000 feet long and 1,000 feet wide on the Cuyahoga River between river mile eight and nine. The final configuration of the basin was dependent on the type of dredging operation selected. The basin was designed to remove 550,000 cy of sediment per year and it was estimated that it would operate for only ten years. Material dredged from the settling basin was to be placed in two upland facilities nearby to the settling basin, or transported to the CDFs in the Cleveland Outer Harbor. Alternatives for removal of sediment from the basin included a Sauerman lift bucket with truck removal; hydraulic dredging with pipeline transport to the adjacent upland disposal sites; or hydraulic dredging with pipeline transport to the upstream end of the Federal channel, followed by ship transport to CDFs in the Outer Harbor.

This plan was reevaluated as part of the CRRS Third Interim Report (USACE, 1981), by which time the two upland disposal sites adjacent to the proposed settling basin were no longer available. No replacement sites were identified, and as the economic feasibility of the settling basin alternative was dependent on the availability of a local disposal area, the settling basin alternative was eliminated from further consideration. It was also noted that local interests had expressed continued opposition to this alternative.

Based on past studies, for sediment traps to be effective at Cleveland, the trap would have to capture nearly 338,220 cubic yards of sediments per year and be easily cleaned out every year. Although the sediment trap could possibly make yearly dredging easier, there would still be a need for some sort of confinement or reuse of the dredged material due to the contaminated nature of the dredged material. In addition, the construction of a large scale sediment trap and resultant operations in areas upstream of the Federal channels would probably have a deleterious effect on local efforts concerning streambank restoration of the Cuyahoga River and nearby areas. For those reasons sediment traps were not carried to detailed planning.

2.10.1.7.1 Cuyahoga River Sediment Reduction Study - Currently, the rate of sediment deposition in the upper end of the Federal channel necessitates a second, fall dredging event to

maintain navigable depths. This is a particular concern in the vicinity of ArcelorMittal Steel. In late 2000, USACE, Buffalo District initiated an investigation into the effectiveness of alternatives that could be implemented to eliminate fall dredging. Alternatives evaluated included: a sediment basin located just downstream of the railroad bridge at the upstream limit of the Federal channel; a sediment basin located just upstream of the railroad bridge at the upstream limit of the Federal channel; and advance dredging measures. To evaluate the effectiveness of these alternatives, one dimensional (HEC-6) and two dimensional (RMA2 and SED2D) hydraulic and sediment transport models of the Federal channel were developed, and calibrated to flow and sediment gage data, and dredging records from 1996.

The modeling effort demonstrated that sediment basins at the locations considered were not effective in reducing sedimentation in the Federal channel in the area of interest. The function of sediment basins depends on the creation of a zone of sharply reduced flow velocity that allows sediment to drop out of suspension. Since flow velocity in this reach of the Cuyahoga River is controlled primarily by backwater from Lake Erie, the effectiveness of sediment basins in this area is limited.

2.10.1.8 Measure H - Utilizing Nearby CDFs (Not Carried to Detailed Planning) - As previously discussed, the only existing Federal CDF not filled to capacity within reasonable distance of Cleveland Harbor is located at Huron Harbor, 47 miles west. The concept of using Huron Harbor CDF to dispose of Cleveland Harbor dredged material is considered impractical for a number of reasons. First and foremost is the limited capacity at Huron (about 650,000 cy of dry material). The actual workable space at Huron would accommodate 200,000 to 300,000 cy of freshly dredged material due to its high water content. One to two years of dredging from Cleveland Harbor would totally fill the Huron CDF. Although not estimated, the cost of transporting dredged material in 1,000 to 1,500 cy scows, pushed by tugs 47 miles each way from Cleveland to Huron would be extremely high. Lastly, sediments currently dredged at Huron Harbor are not contaminated and are placed in a designated open lake site in Lake Erie. This is a recent change from historical practices when Huron Harbor sediments were considered contaminated and placed in the CDF. The existing space in Huron Harbor CDF provides a safety valve for commercial navigation at Huron Harbor if for some reason Huron Harbor sediments fail Federal guidelines for open lake placement and require containment in a CDF. For these reasons Measure H was not carried to detailed planning.

2.10.1.9 Measure I - Treatment Technologies (Not Carried to Detailed Planning) - The concept of treating or decontaminating contaminated dredged material as it is dredged, and using the byproduct as fill material or manufactured soil has been investigated on small pilot programs in the past and is currently being evaluated on a larger scale field demonstration at the Port of New York and New Jersey (Jones, K.W. et. al., undated manuscript). Possible treatment technologies range widely from adding compost and manure; solidification by adding cement, fly ash, and other products; chemical washing; and thermal destruction of contaminants. Due to the relatively small scale treatment technology experiments to date, and the often high cost of treatment technologies, costs per cy of dredged material can often exceed \$100. In practice, when treatment technologies are applied, they are used to decontaminate small quantities of highly contaminated material. No known large scale economical production to treat dredged

material has been accomplished to date. At Cleveland it would require treatment of 338,220 cy of contaminated dredged material per year. For such reasons, treatment technologies (except where they might be an economical part of a larger mine reclamation alternative) have not been carried to detailed planning.

2.10.2 MEASURES AND PLANS SUGGESTED BY LOCAL INTERESTS

2.10.2.1 Introduction – Since completion of the measures analysis and as a result of numerous coordination meetings and public information sessions, several alternative measures and plans have been suggested by local interests. As discussed in the following paragraphs, the USACE, Buffalo District has evaluated those plans and measures for engineering feasibility, financial efficiency, and environmental impacts to determine if they should be carried into detailed planning and the final array of Alternative Plans.

2.10.2.2 Construction of an Alongshore CDF east of CDF 12 (Cleveland/Cuyahoga Port Authority) – This plan would involve construction of a 184 acre CDF along the shoreline immediately to the east of CDF 12. The CDF would have a capacity of about 11.7 million cy of dredged material if filled to 20 feet in height. Some problems with citing a CDF in this location appear to be the presence of a major water intake structure, submerged pipelines, and probable loss of recreational dock space along the shoreline. This was not carried to detailed planning as other alongshore plans located further to the east appear to better meet the study objectives

2.10.2.3 Construction of Multiple CDFs Along the Outer Side of the East Breakwater (Interested Citizen) - At several public meetings, it was suggested that the USACE could construct a series of outer harbor CDFs to the far east end of the harbor that could accommodate 100-years of dredged material from Cleveland. The primary problem with this location would be the excessive dike sizes caused by open water depths up to 35 feet and the somewhat long travel distance from the river. This plan was not carried to detailed planning stage due to the extremely high cost of CDF construction in such deep waters.

2.10.2.4 Brownfield Restoration (Value Recovery Partner North Coast) - Performance Site Environmental, one of a group of companies that comprise Value Recovery Partners North Coast (VRPNC). VRPNC is working with the City of Cleveland to remediate some of the City's brownfield properties. One of the 54-acre brownfield sites of interest is located along the banks of the Cuyahoga River at River Mile 5, in the vicinity of ArcelorMittal Steel, and was formerly used for steel production. At one time the site included an operational coke oven. VRPNC refers to this site as the Pershing Site and it requires a great deal of fill in order to be reclaimed. VRPNC proposes to excavate up to two million cy of dredged material from CDFs 10B or 12, transporting by barge to the project site, off-loading, and placing the material to provide the necessary cover. An additional one million cubic yards of cohesive clays from a separate source would be used to cap the site and render it suitable for use. VRPNC offered an unsolicited verbal proposal in February 2008 to harvest the sediment needed for this project at Federal government expense.

Due to the undetermined feasibility and significant outstanding questions related to cost and cost-sharing, this proposal was not carried to detailed planning. However, in 2009 USACE, Buffalo District received \$7.25 million through the American Recovery and Reinvestment Act, to excavate, transport, and place up to 500,000 cy of dredged material from CDF 10B at an upland site. This effort is not a long term solution and does not warrant additional evaluation of this measure.

2.10.2.5 Disposal of Dredged Material in Subterranean Salt Mines (Interested Citizen) -

Under this measure, dredged material would be disposed in subsurface salt mines owned by Cargill, Inc. Cargill's subsurface de-icing salt mines are approximately 1,800 feet below grade in Cleveland Harbor. The southern extent of the mine is generally in the vicinity of Cargill's location near the confluence of the Old River and Cuyahoga River. The mines extend northward under the lake for approximately one to two miles. The eastern boundary is in the vicinity of BKL Airport and the western boundary is lakeward of Whiskey Island State Park. The northeastern portion of the mine is active. The remainder is inactive.

In a March 2008 meeting, a representative from Cargill Inc. indicated that disposing of waste material in mines has been proposed before. He did not cite specific examples and did not indicate if there are any operations currently in existence. However, Cargill is interested in the concept as an additional business line. Several initial problems were identified; the most significant are below.

- Total cost per cubic yard could be excessive when all costs are identified and tallied.
- It may not be feasible for Federal government to enter into a long term, sole-source-type contractual arrangement for operation.
- There may be industrial/environmental health issues due to handling of dry, fine grained, contaminated material in a confined environment.
- The ability to dewater the material to an acceptable level; a maximum moisture content threshold has not been established or studied.
- The proposed operation may not comply with the terms of Cargill's lease with the State of Ohio.
- The timeframe required for detailed feasibility analysis, engineering and design, environmental analysis, regulatory approval, contracting, and construction is not consistent with the DMMP schedule.

The concept of disposal of dredged materials in operating salt mines in Cleveland Harbor was not carried to detailed planning primarily because it could not meet the objective of providing a 20-year plan for dredged material disposal that could be implemented by 2015.

2.10.2.6 East 55th Street Marina CDF Site (Port Authority)– Constructing a CDF in the vicinity of East 55th Street (Measure D1 – Lakeshore CDF's) and along the harbor shoreline in general was originally eliminated as not implementable, due to its conflict with the City of Cleveland's Waterfront District Plan. However, recognizing the potential constructability, cost, access, engineering, and re-use advantages, the Buffalo District, the Cleveland Cuyahoga Port Authority, and the City of Cleveland partnered in early 2008 to renew efforts to develop an

alternative along the Cleveland Harbor shoreline. Through the collaborative planning process, a CDF in the vicinity of East 55th Street site was developed and identified as the best site based on the stated planning objectives and technical feasibility, environmental acceptability, and cost effectiveness criteria. The physical geometry and specific location of the facility was developed jointly with the Cleveland-Cuyahoga County Port Authority. Its current configuration maximizes capacity while minimizing impacts to the Federal navigation channel to the north, water circulation to the west, operation of the First Energy Power Generation plant cooling water intake and outfall to the east. The top of wall elevation ensures that the land mass is also suitable to accommodate potential future development. At the request of the City of Cleveland and the Cleveland-Cuyahoga County Port Authority, the concept of new CDF construction at the East 55th Street location was carried forward in detailed planning.

2.11 ALTERNATIVE PLANS SUBJECT TO DETAILED PLANNING

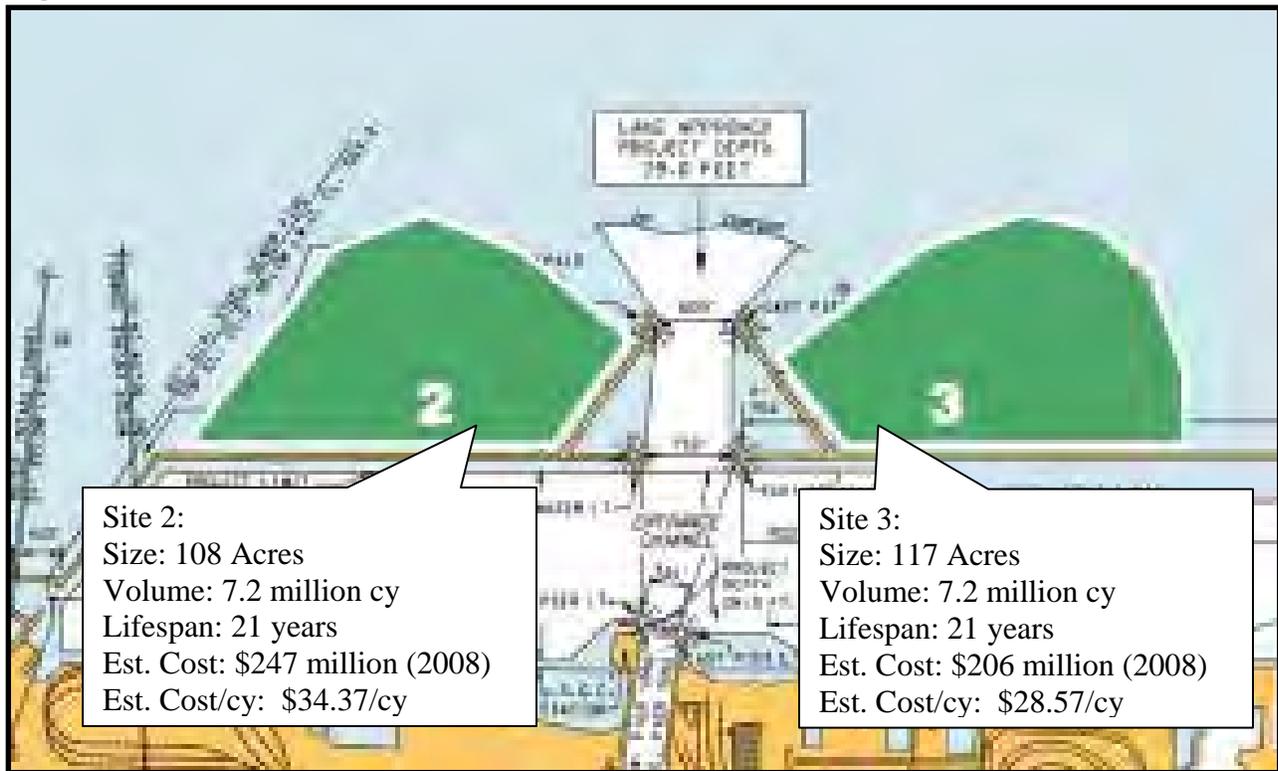
2.11.1 Introduction – Based on the initial screening of measures, six potential CDF construction sites were further developed and evaluated in detailed planning. These CDF measures were combined with Measure E - Management of Existing CDFs to form Alternative Plans. Incorporating this measure into all of the detailed alternatives will allow sufficient time for planning, design, financing, and construction of a new CDF. In addition, Alternative Plan 1 - No Action was further evaluated in detailed planning.

- Alternative Plan 2 – Management of Existing CDFs and Construction of CDF 2
- Alternative Plan 2a – Management of Existing CDFs and Construction of CDF 2a
- Alternative Plan 3 – Management of Existing CDFs and Construction of CDF 3
- Alternative Plan 3a - Management of Existing CDFs and Construction of CDF 3a
- Alternative Plan 4 – Management of Existing CDFs and Construction of new CDF at the foot of East 55th Street,
- Alternative Plan 4a – Management of Existing CDFs and Construction of new CDF at the foot of East 55th Street, with the CDF designed to accommodate Port relocation.

2.11.1.1 Alternative Plan 1 No Action – As discussed in Section 2.10.1.1, No Action implies that no short term or long term measure for management of dredged material from Cleveland Harbor will be found. For the short term (2009-2014), the USACE would not implement the components of Measure E (management of the existing CDFs). After 2008, no disposal facility or method would be available and the USACE would cease further dredging and disposal.

2.11.1.2 Alternative Plan 2 CDF 2 - CDF 2 would be a 108 acre facility located north of the west breakwater (Figure 2.3). The average water depth is 26 feet LWD. The design capacity is 7.2 million cy and has a 9,100 lineal foot perimeter. The expected life of CDF 2 is approximately 21 years assuming 338,220 cy annual disposal and would be operational 2015 through 2035. Due to significantly deeper water depths requiring a significantly larger dike cross section, the material quantities are much higher than that of the similarly sized CDF 3 described below. The typical dike cross sections are described in greater detail in Appendix J.

Figure 2.3 CDFs 2 and 3



2.11.1.3 Alternative Plan 2a CDF 2a – Alternative Plan 2a would involve the construction of a two celled CDF (Figure 2.4). Cell 1, to be constructed and available for disposal of dredged material in 2015, would be approximately 65 acres in size. Construction of cell 1 would include the existing wall of the West Breakwater as the northern perimeter. To the east and south, cell 1 would be constructed of new perimeter walls. This cell would be subdivided as necessary to improve the operational aspects of dredged material disposal. Cell 1 would be designed to have a life of about eight years assuming the average annual disposal of about 338,220 cy. Cell 1 would be operational from 2015 through 2022. Upon filling cell 1 the area would be transferred to the local sponsor. Cell 2 of alternative plan 2a would be constructed to include the West Breakwater as the southerly wall and would be operational from 2022 through 2034. It would have an estimated capacity of 4,490,000 cy or 13 years. The north wall of cell 2 would probably be constructed of stone to deflect wave action present in this unprotected area.

2.11.1.4 Alternative Plan 3 CDF 3 - CDF 3 would be a 117 acre facility located north of the east breakwater (Figure 2.3). The average water depth is 22 feet LWD. The design capacity is 7.2 million cy and has a 9,180 lineal foot perimeter. The expected life is approximately 21 years assuming 338,220 cy annual disposal and would be operational 2015 through 2037.

Figure 2.4 CDF 2a

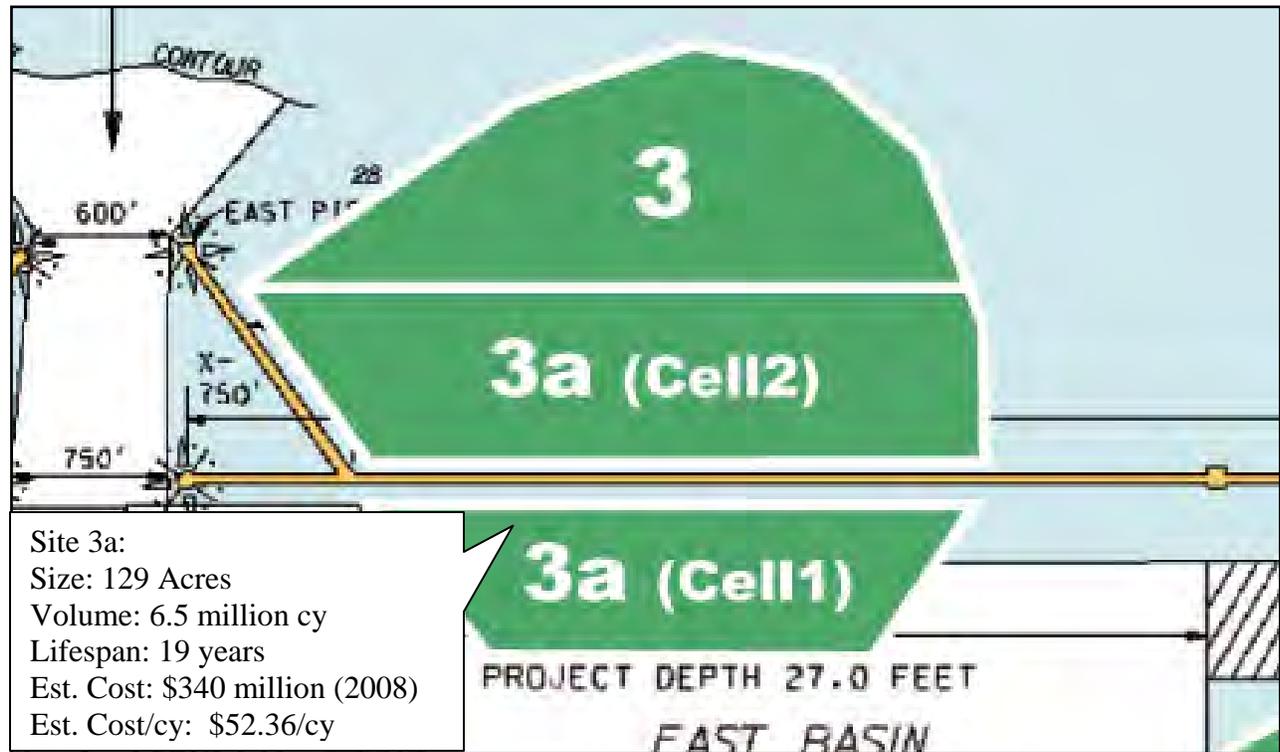
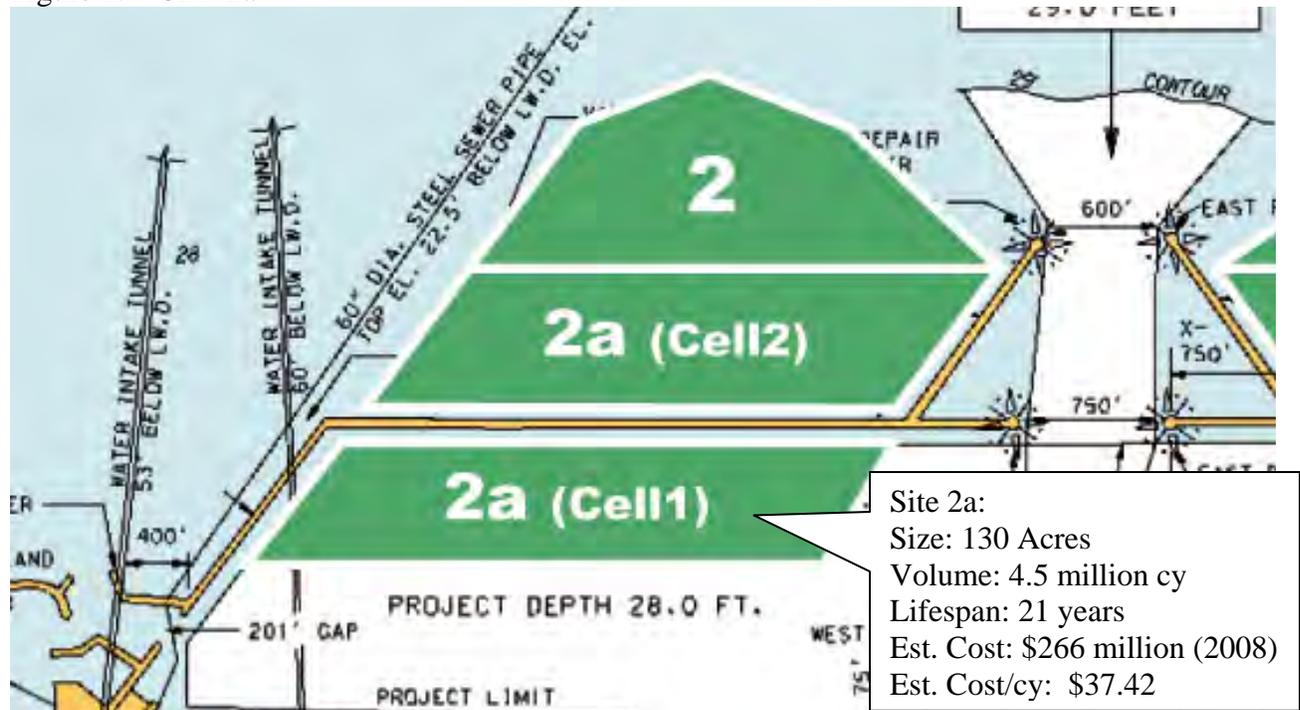


Figure 2.5 CDF 3a

2.11.1.5 Alternative Plan 3a CDF 3a– Alternative Plan 3a would involve the construction of a two celled CDF (Figure 2.5). The relationship between Alternative 2 and 2a is analogous to that of Alternative 3 and 3a, the primary difference is that Alternative 3a is in shallower water and therefore has less construction costs. Cell 1, to be constructed and available for disposal of dredged material in 2015, would be approximately 50 acres in size. Construction of cell 1 would include the existing wall of the East Breakwater as the northern perimeter. This cell would be subdivided as necessary to improve the operational aspects of dredged material disposal. Cell 1 would be designed to have a life of about five years assuming the average annual disposal of about 338,220 cy. Cell 1 would be operational from 2015 through 2019. Upon filling, Cell 1 would be transferred to the non-Federal sponsor. Cell 2 of Alternative Plan 3a would be constructed to include the West Breakwater as the southerly wall. It would be 79 acres, have a top of wall elevation of +20 LWD, and an estimated capacity of 4,650,000 cy. The CDF would be operational 14 years, from 2020 through 2033.

2.11.1.6 Alternative Plan 4 East 55th Street CDF - This plan would involve the construction of a single CDF as illustrated in Figure 2.6. The CDF is approximately 157 acres. To the south, East 55th Street site would be bound by an improved State Park Marina breakwater, the natural shoreline near the terminus of East 55th Street, and a to be constructed perimeter wall/dike. A portion of the eastern boundary would be formed by the existing First Energy circulating water intake (necessary improvements would be made to the structure) and the remainder of the perimeter would be formed by to be constructed walls. Anticipated volume is 6,850,000 cy, which would provide approximately 20 years of capacity and be operational from 2015 through 2034.

The geometry of the East 55th Street site was developed collaboratively with the Cleveland-Cuyahoga County Port Authority. The proposed geometry of the East 55th Street CDF provides the maximum amount of dredged material capacity within the constraints of the site and maximizes cost effectiveness. The western boundary extends from the northwestern terminus of the breakwater that defines the East 55th Street marina entrance. Extending the bulkhead further to the west would negatively impact the marina operation and would overly confine the basin immediately to the west, which receives outfall from two confined sewer overflows, causing unacceptable impacts to water circulation and quality. The northern limit of the CDF establishes maximum CDF capacity and allows for a 500-foot wide navigation channel consistent with the rest of the East Basin and offset 75-feet from the north face of the proposed CDF. Extending further to the north would reduce the navigation channel to less than 500 feet wide, causing unacceptable negative impacts to navigation. The eastern limit of the CDF is limited by the First Energy circulating water intake and outfall. Extending further to the east would have confine the thermal plume emanating from the outfall resulting in unacceptable impacts to the efficient operation of the power generation plant, water quality, and aquatic habitat. Increasing the perimeter bulkhead and maximum fill elevation beyond 10 feet above low water datum may constrain potential development efforts on the CDF in the future. Preserving the opportunity to develop the new CDF in the future is both a planning objective and a condition of the City of Cleveland's approval for use of the shoreline site in the vicinity of East 55th Street for construction of a CDF.

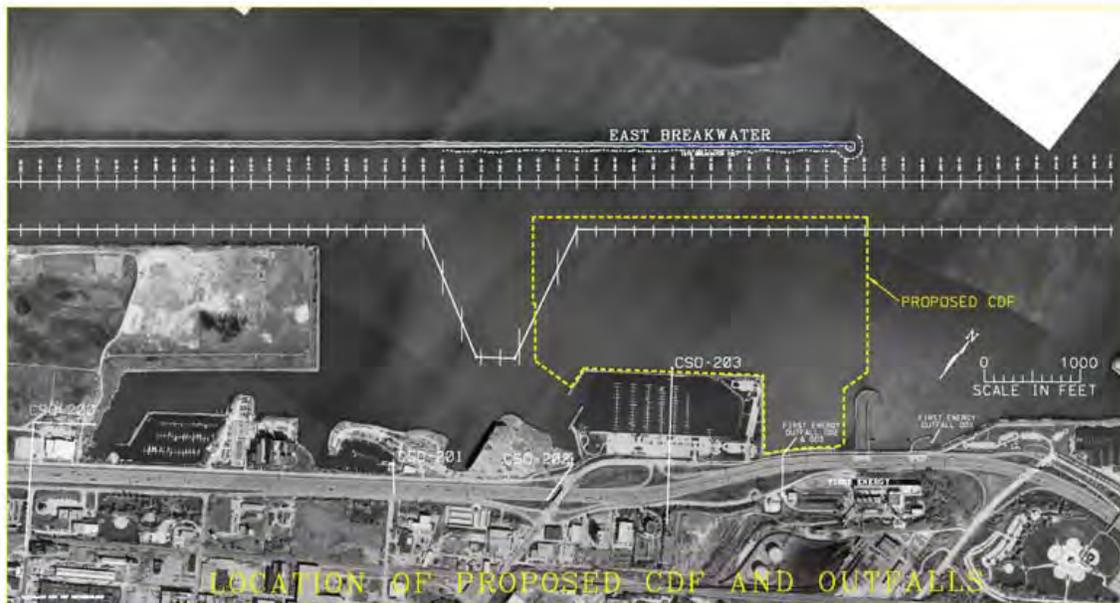


Figure 2.6 East 55th Street CDF

2.11.1.7 Alternative Plan 4a: East 55th Street CDF (Port) – This plan would be identical in acreage and capacity as Plan 4. However, the vertical perimeter walls would be required to accommodate possible future development activities on the CDF. The engineering components of the steel sheet pile (i.e. vertical and lateral strength) would thus be greater than that used to construct Alternative Plan 4.

Therefore, the material difference between Alternative Plan 4 and Alternative Plan 4a is confined to the maximum 10 foot vertical elevation and the vertical bulkhead wall systems that comprise the exterior perimeter of the CDF, for the purpose of preserving future development opportunities on the CDF. Alternative Plan 4 considers the loadings associated with construction and operation of the CDF in the design of the exterior vertical bulkheads. Alternative Plan 4a considers loading associated with the CDF as well as loadings associated with possible development activities in the design of the exterior vertical bulkheads. Any loadings from possible future development that do not directly bear on the exterior wall systems (e.g. loads from structures located away from the CDF perimeter) must be supported by foundations systems (e.g., pilings and grade beams) designed and constructed by the non-Federal sponsor and at the expense of the non-Federal sponsor following transfer of the facility to the non-Federal sponsor. If during Preconstruction Engineering and Design (PED) of the selected plan a need to incorporate features into the Federal project to support possible future development activities is identified, the features can be incorporated into the design and construction project. All design, construction, and operations and maintenance costs for these undefined elements of the Locally Preferred Plan will be borne by the non-Federal sponsor. These costs will be explicitly identified and documented in the Project Partnership Agreement prior to start of construction. Required operations and maintenance activities are identical for the CDFs proposed in Alternative Plans 4 and 4a. All features unique to Alternative Plan 4a (the locally preferred plan) are limited to the

vertical wall systems for which the operations and maintenance requirements are equal between the two plans.

In addition, any environmental compliance requirements associated with potential future development is the responsibility of the non-Federal sponsor. Furthermore, acknowledgement within this report of the sponsor's desire to develop the area once transferred is in no way an endorsement relative to the Regulatory authority of the USACE under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act.

2.11.2 Engineering Considerations – There is currently no single quarry on Lake Erie able to produce the size and quantity of stone required to construct the proposed CDFs. Multiple quarries would be tasked with producing stone and production would need to begin as soon as possible. Limitations on quantity and quality of stone required to construct large scale CDFs is the primary cause of the high preliminary cost estimates. Therefore, with the exception of Alternative Plan 4a, several construction alternatives have been considered including standard stone perimeters, geosynthetic containers, and prefabricated caissons.

2.11.3 Navigation Channel Modification – Implementation of Alternative Plan 2a, 3a, 4 and 4a would require modification of the authorized Cleveland Harbor Navigation Project. In the case of Alternatives 2a and 3a, rarely used and rarely dredged portions of the harbor would be overlain by Cell 1 of the respective CDFs and their purpose would have to be changed from commercial ship navigation to CDF. Implementation of East 55th Street CDF (either Alternative 4 or 4a as both have the same footprint) would require a substantial modification to the Federal navigation project known as the east basin and eastern flared portion of the 25-foot deep dock approach channel to the former Nicholson Cleveland Terminal Company pier (Figure 2.7). These portions of the existing Cleveland Harbor navigation project were authorized by the 1962 River and Harbor Act and deepening where needed to 25 feet in the East Basin, and 25 feet in the Dock Channel was accomplished in 1964 and 1965. According to a 1964 General Design Memorandum for modification of the Cleveland Harbor Navigation Project, approximately 225,000 cy of material would have been dredged from the entire East Basin Channel and Dock Channel. The project in the area of the East Basin and flared eastern entrance channel was further modified by the Supplemental Appropriations Act of 1988 (PL 99-88). That Act called for additional deepening in the East Basin Channel to 27 feet and deepening of the flared Eastern Entrance Channel to 31 feet. These modifications (deepening) were never accomplished (constructed).

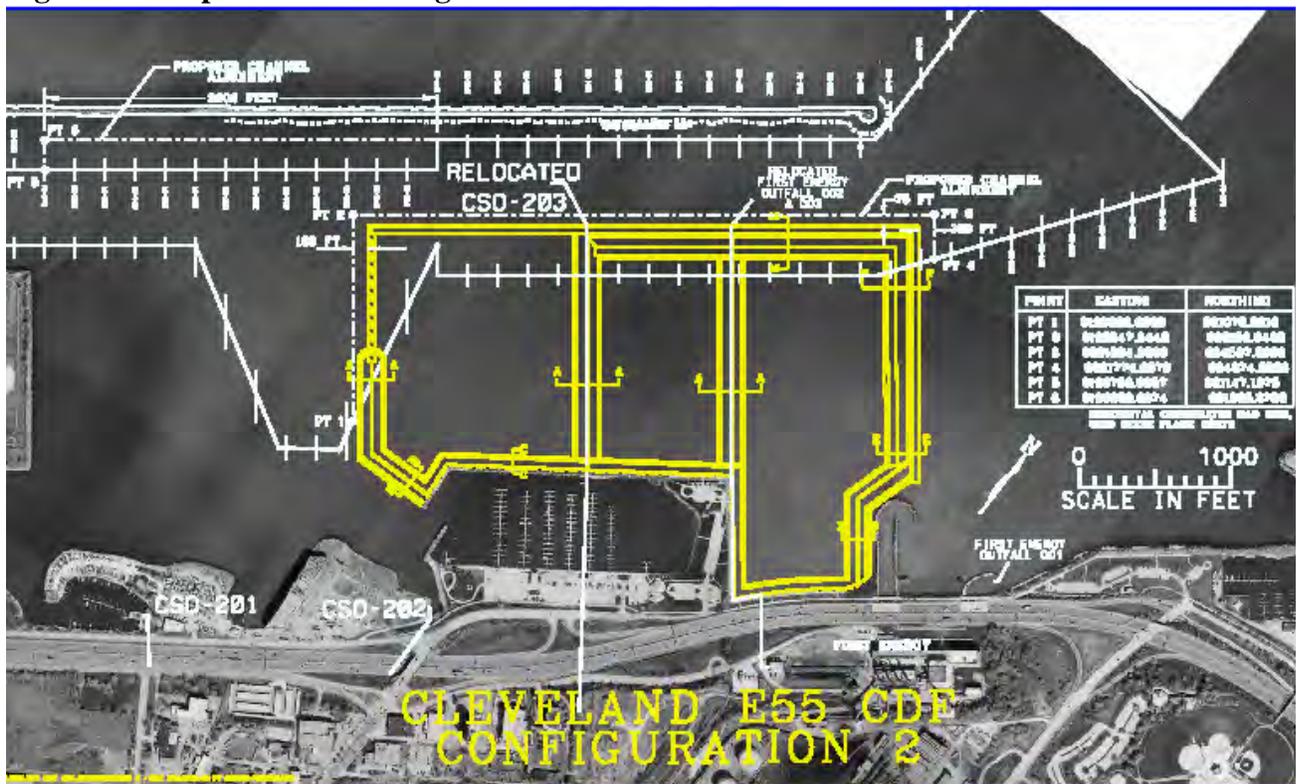
Based on a search of the Buffalo District's annual dredging reports, it appears that only small areas in those channels were subject to maintenance dredging in the 1960's and 1970's. Since that time no further maintenance dredging has been accomplished due to reductions in use of the east channel and very low rates of shoaling. The Nicholson Cleveland Terminal Company (the primary user of the East Basin and Dock Channel at that time) is no longer in business and the land and facility was recently converted to residential lofts.

To accommodate the footprint of the Tentatively Selected Plan (Alternative 4a) the east approach channel would have to be realigned while maintaining its depth and stand-off distances from harbor structures (Figure 2.7). The width would be reduced to 500 feet consistent with the channel width throughout the remainder of the east basin. The distance between the toe of the east breakwater at the

eastern end (the widest point) and the face of the CDF would be approximately 575 feet. The plan does incorporate realignment of a small portion of the northern channel line in order to eliminate channel constriction at the northwest corner of the CDF. Throughout the collaborative planning process, the Buffalo District solicited input from shipping stakeholders on the proposed channel realignments and received no objections. The 500-foot channel is consistent with the remainder of the East Basin, does not interfere with the toe of the existing east breakwater, provides a 75-foot offset from the northern face of the proposed CDF, and is suitably sized for safe two-way traffic of existing and anticipated future ship traffic. Existing commercial ships calling at the current port terminal facilities consist of Seaway-type vessels. Ship lengths are 600-700 feet, beams are approximately 75 feet, and draft is up to 27 feet. Ship traffic is not expected to increase to the point that there will be a need to queue ships.

Prior to implementing any future development on the CDF, additional study may be needed to assess navigation safety and operations if such development would impact commercial shipping traffic in the vicinity of the CDF. Any additional project modification necessary to successfully implement any future development plans are outside the scope of the DMMP/EIS. It is important to note that future CDF development plans are in the early conceptual stages of development, and detailed final plans have not been completed.

Figure 2.7 Proposed channel alignment for East 55th Street site



The project modification necessary to implement Alternative Plans 2a, 3a, 4, and 4a could be achieved either by specific Congressional legislation or possibly through the discretionary Approval Authority

Delegated to Division Commanders as detailed in Appendix G of ER 1105-2-100. The proposed modification affects less than five percent of the project authorized by Congress, does not affect cost, causes insignificant impacts compared to the impacts assessed for the authorized navigation project, and does not add or delete a project purpose. Therefore, the change meets the all the criteria listed in Paragraph G-13a, ER1105-2-100; it is the opinion of Buffalo District counsel that the delegated authority to implement the change resides with the Division Commander.

2.12 SCREENING AND EVALUATION OF ALTERNATIVE PLANS

2.12.1 Step 5 Comparing Alternative Plans – The purpose of this section is to describe the screening and evaluation of the seven alternative plans carried to detailed planning. Consistent with the Principles and Guidelines this screening and evaluation has considered the completeness, effectiveness, efficiency, and acceptability of the alternative plans. This screening and evaluation will lead to the identification of the Base Plan (the most cost effective plan); the National Economic Development (NED) Plan (the plan with the greatest return for every dollar spent); and, the Tentatively Selected Plan (the plan that appears to best meet the study objectives and screening and evaluation criteria).

In general, the USACE is required by the Principles and Guidelines to recommend the NED Plan as the plan favored by the Federal Government. The Base Plan which is used to determine Federal and non-Federal cost-sharing may or may not be the NED Plan. If non-Federal interests have determined that they would like to pursue a plan that sacrifices some NED benefits, and costs more than the Base Plan, that plan is identified as the Locally Preferred Plan (LPP).

2.12.2 Base Plan Alternative (Definition) - In accordance with ER 1105-2-100, 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 meet all Federal environmental standards including the environmental standards established by Section 404 of the CWA of 1972, as amended. This constitutes the base disposal plan for the navigation purpose. The Base Plan may or may not be ultimately selected for implementation but is important in terms of helping to define project impacts and cost-sharing requirements. Considerably more discussion of the Base Plan can be found in Appendices A and G, Base Plan and Economic Analysis, respectively.

2.12.3 NED Plan Defined – The NED Plan is the alternative that maximizes net NED benefits (generally computed on an average annual basis).

2.12.4 System of Accounts – Table 2.4 presents a summary comparison of the seven alternative plans. These plans are further compared in a format consistent with the four accounts described in the Principles and Guidelines and other factors relevant to the plan selection process (Tables 2.5 through 2.7). The four Principles and Guidelines accounts are NED, Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE).

Table 2.4 Summary of Alternative Plans

	No Action (A)	Inner Harbor CDF (south of the breakwater)	Outer Harbor CDF (north of the breakwater)	FMP at Existing CDFs
Plan 1 No Action	X			
Plan 2 CDF 2			X	X
Plan 2a CDF 2a		X	X	X
Plan 3 CDF 3			X	X
Plan 3a CDF 3a		X	X	X
Plan 4 East 55 th Street		X		X
Plan 4a Modified East 55 th Street		X		X

Table 2.5 Economic Evaluations of Alternative Plans

Investment Cost	Plan 1 No Action	Plan 2 CDF 2	Plan 2a CDF 2a	Plan 3 CDF 3	Plan 3a CDF 3a	Plan 4 East 55 th	Plan 4a East 55 th (Port)
Project Cost (Current Value)	\$0.0	\$324.9	\$340.6	\$279.3	\$422.3	\$312.7	\$355.3
Average Annual Cost	\$0.0	\$21.0	\$19.1	\$17.9	\$24.8	\$17.1	\$19.5
Average Annual Benefits	\$0.0	\$23.4 to \$27.1	\$23.4 to \$27.1				
Average Annual Net Benefits	\$0.0	\$2.5 to \$6.1	\$4.4 to \$8.0	\$5.5 to \$9.2	-\$1.3 to \$2.3	\$6.4 to \$10.0	\$4.0 to \$7.7
Benefit to Cost Ratio	\$0.0	1.1 to 1.29	1.23 to 1.42	1.31 to 1.51	0.95 to 1.09	1.37 to 1.59	1.21 to 1.39
Rank	7 th	5 th	3 rd	2 nd	6 th	1 st	4 th

2.12.4.1 Economic Rank Justification – The economic rank was determined by the highest benefit to cost ratio and least expensive current value of the project cost. The current value of the project cost reflects the total project implementation costs over 20 years in current dollars.

Table 2.6 Environmental Quality

Discipline	Plan 1 No Action	Plan 2 CDF 2	Plan 2a CDF 2a	Plan 3 CDF 3	Plan 3a CDF 3a	Plan 4 East 55 th	Plan 4a East 55 th (Port)
Air/Noise	No effect.	DNST effects from construction emissions and sound	DNST effects from construction emissions and sound	DNST effects from construction emissions and sound			
Cultural Resources Historic Properties	No effect.	INST minor effects from construction to W. pierhead light	INST minor effects from construction to W. pierhead light	INST minor effects from construction to W. pierhead light	INST minor effects from construction to E. pierhead light	No effects anticipated.	No effects anticipated.

Discipline	Plan 1 No Action	Plan 2 CDF 2	Plan 2a CDF 2a	Plan 3 CDF 3	Plan 3a CDF 3a	Plan 4 East 55th	Plan 4a East 55th (Port)
Water Quality	INLT effect. Without dredging, contaminated sediment would remain.	DNST effects due to turbidity during construction and dredging. DPLT effect of removing contaminated sediment. DNST effect of filling lake bottom. CP effect to navigation.	DNST effects of filling lake bottom for CDF and due to turbidity during construction and dredging. DPLT effect of removing contaminated sediment. CP effect to navigation, but requires channel deauthorization	DNST effects due to turbidity during construction and dredging. DPLT effect of removing contaminated sediment. DNST effect of filling lake bottom. CP effect to navigation.	DNST effects of filling lake bottom for CDF and due to turbidity during construction and dredging. DPLT effect of removing contaminated sediment. CP effect to navigation, but requires channel deauthorization	DNST effects of filling lake bottom for CDF and due to turbidity during construction and dredging. DPLT effect of removing contaminated sediment. CP effect to navigation, but requires channel deauthorization	DNST effects of filling lake bottom for CDF and due to turbidity during construction and dredging. DPLT effect of removing contaminated sediment. CP effect to navigation, but requires channel deauthorization CN effect; increased potential future development may cause pollution.
Aquatic Habitat	INLT effect. W/o dredging silt would eliminate aquatic habitat and food.	DNLT effect on aquatic habitat during construction. IPLT; spawning shelves installed on CDF	DNLT effect on aquatic habitat during construction. IPLT effect; spawning shelves installed on CDF	DNLT effect on aquatic habitat during construction. IPLT effect; spawning shelves installed on CDF	DNLT effect on aquatic habitat during construction. IPLT effect; spawning shelves installed on CDF	DNLT effect on aquatic habitat during construction. IPLT effect; spawning shelves installed on CDF	DNLT effect on aquatic habitat during construction. CN effect; increased Possible development could restrict habitat values. Vertical walls do not support spawning shelves.
Birds, Wildlife, T&E Species	No effect.	INLT effect at BKL from DC effect of increase in plants and wildlife at CDF	INLT effect at BKL from DC effect of increase in plants and wildlife at CDF	INLT effect at BKL from DC effect of increase in plants and wildlife at CDF	INLT effect at BKL from DC effect of increase in plants and wildlife at CDF	INLT effect at BKL from DC effect of increase in plants and wildlife at CDF	INLT effect at BKL from DC effect of increase in plants and wildlife at CDF
Rank	7th	1st	4th	2nd	5th	3rd	6th

KEY:

D-Direct
I-Indirect

N-Negative
P-Positive

LT-Long Term
ST-Short Term

C-Cumulative

2.12.4.2 Environmental Quality Rank Justification – In general, the environmental ranking was assessed by which plan has the least negative impacts. The summary below briefly describes the minor differences between each plan, not the similarities. A detailed assessment of environmental effects is in Chapter 4.

- **1st – Alternative Plan 2:** CDF 2 is in deep water, therefore will negatively effect significantly less aquatic habitat than a nearshore site that would likely provide greater habitat due to shallower water. As compared to CDF 3, it is further from BKL airport and therefore would likely create less of an impact to aviation safety from the avifauna a CDF is likely to attract.
- **2nd – Alternative Plan 3:** CDF 3 is in deep water and therefore will negatively effect significantly less aquatic habitat than a nearshore site that would likely provide greater habitat due to shallower water. This site is slightly closer to BKL as compared to CDF 2 and would likely create more impact to aviation safety.
- **3rd – Alternative Plan 4:** East 55th Street CDF has the largest acreage of the alternative plans and therefore will negatively impact more lake bottom, thus eliminating the greatest acreage of aquatic habitat. However, there would be more lineal feet to support fish spawning shelves on the lakeward perimeter stone as compared to other plans and is not located adjacent to any historic properties.
- **4th – Alternative Plan 2a:** CDF 2a is an offshore and nearshore facility. It ranks below Alternative Plan 4 because there is a chance of damage to the West Pierhead Light during construction and/or annual disposal operations. As compared to CDF 3a, it is further from BKL airport and therefore would likely create less of an impact to aviation safety.
- **5th – Alternative Plan 3a:** CDF 3a is an offshore and nearshore facility. However, there is a chance of damage to the East Pierhead Light during construction and/or annual disposal operations. CDF 3a is slightly closer to BKL as compared to CDF 2a and therefore would likely create more impact to aviation safety.
- **6th – Alternative Plan 4a:** East 55th Street CDF is the largest of the alternative plans and will negatively impact more lake bottom, thus eliminating the greatest acreage of aquatic habitat. In order to accommodate possible future development of the CDF, the perimeter wall would be constructed of steel sheet pile with little or no toe stone to support fish spawning shelves and therefore eliminates a means of directly offsetting impacts (if/as necessary) to aquatic habitat in the immediate vicinity of the CDF.
- **7th – Alternative Plan 1:** The No Action plan would allow contaminated sediments to remain in the Federal channel, which is likely to cause long term negative impacts to water quality and aquatic habitat. This in turn would likely result in contamination uptake through the food chain via waterfowl, specifically diving birds.

Table 2.7 Other Social Effects

Discipline	Plan 1 No Action	Plan 2 CDF 2	Plan 2a CDF 2a	Plan 3 CDF 3	Plan 3a CDF 3a	Plan 4 East 55th	Plan 4a East 55th (Port)
Aesthetics	No effect.	DNST effects due to construction equipment. CP effects on future development by the sponsor.	DNST effects due to construction equipment. CP effects on future development by the sponsor.	DNST effects due to construction equipment. CP effects on future development by the sponsor.	DNST effects due to construction equipment. CP effects on future development by the sponsor.	DNST effects from construction equipment. CP effects by developing filled CDF. DNLTeffects to views by waterfront properties for duration of disposal operation.	DNST effects from construction equipment. CP effects by possibly developing filled CDF. DNLTeffects to views by waterfront properties for duration of disposal operation. DNC effects to views by waterfront properties due to potential development.
Community Cohesion	DNS< effects to businesses related to shipping.	DPS< effects during construction and dredging.	DPS< effects during construction. DNS< effects to facilities near E55 th	DPS< effects during construction. DNS< effects to facilities near E55 th			
Recreation and Parks	INLT effects for boating access in harbor.	INST effects on boating during construction. IPC effect on recreation development at filled CDF.	INST effects on boating during construction. IPC effect on recreation development at filled CDF.	INST effects on boating during construction. IPC effect on recreation development at filled CDF.	INST effects on boating during construction. IPC effect on recreation development at filled CDF.	INST effects on boating during construction. DNLTeffects to existing recreation. IPC effect future development for recreation.	INST effects on boating during construction. DNLTeffects to existing recreation. DNC effect future development.
Rank	5th	2nd	1st	4th	3rd	6th	7th

KEY:

D-Direct **N-Negative** **LT-Long Term** **C-Cumulative**
I-Indirect **P-Positive** **ST-Short Term**

2.12.4.3 Social Effects Rank Justification – In general, the social ranking was assessed by which plan has the most positive impacts on the respective disciplines. The summary below briefly describes the minor differences between each plan, not the similarities. A detailed assessment of environmental effects is in Chapter 4.

- **1st – Alternative Plan 2a:** CDF 2a is located along the west breakwater and likely easier to provide vehicular access than compared to CDF 3 or 3a. CDF 2a has the highest acreage of the two west breakwater CDFs therefore greater opportunity for future development and recreation to support community growth.
- **2nd – Alternative Plan 2:** CDF 2 is located along the west breakwater and likely easier to provide vehicular access than compared to CDF 3 or 3a. It ranks second simply because there is less acreage than CDF 2a and therefore less recreational development could be provided in the future to support community growth.
- **3rd – Alternative Plan 3a:** CDF 3a is located along the east breakwater and provides the second largest acreage of the outer harbor sites and therefore has great opportunity for future development and recreation to support community growth. However, it would be more difficult and costly for the City to provide vehicular access to the site as compared to CDFs 2 and 2a.
- **4th – Alternative Plan 3:** CDF 3 is located along the east breakwater. It ranks below Plan 3a simply because there is less acreage and therefore has less opportunity for future development and recreation to support community growth. It would be more difficult and costly for the City to provide vehicular access to the site as compared to CDFs 2 and 2a.
- **5th – Alternative Plan 1:** Although the No Action Plan would result in no CDF construction, it would have less negative impacts to the social disciplines cited compared to constructing the East 55th Street CDF. Existing recreation opportunities would remain the same, specifically at current marinas and shoreline parks. Sustenance fishing would remain on the east shore of the harbor in the vicinity of the First Energy intake. Recreation and community cohesion would remain the same but have the potential to grow pending implementation of the Waterfront District Plan.
- **6th – Alternative Plan 4:** East 55th Street CDF would detract from the aesthetic views of Quay 55 residents during construction and disposal operations estimated to last 20 years. It is possible that the City would create an aesthetically pleasing park and recreation facility once the CDF is transferred but that would not occur for at least 20 years. Existing recreation facilities and amenities, including the marina may be negatively impacted (lose customers, revenue, etc.) for the 20 year construction and operation period.
- **7th – Alternative Plan 4a:** East 55th Street CDF (to support possible future development) would detract from the aesthetic views of Quay 55 residents during construction and disposal operations estimated to last 20 years. However, as the facility fills and cells are transferred, the sponsor may begin to develop portions of the CDF that could detract from aesthetics. This visual and auditory impact may negatively affect local residents, visitors to the park, and the local marina (e.g. loss of customers, revenue, and overall business). Although any future development would be required to offset negative impacts by creating equal or greater green space, it may not be as conveniently located for all residents and therefore not a satisfactory sustainable solution as some residents/users would not use these relocated amenities.

2.12.5 Cleveland Harbor Base Plan - For the purpose of this analysis a Base Plan has been determined for the 20 year period 2009 through 2028. The plan assumes that 338,220 cubic yards of dredged material (300,350 Federal and 37,870 non-Federal) will be disposed on an

average annual basis. The Base Plan has two components: From 2009 through 2015, FMPs will be implemented at existing CDFs to increase the design capacity and provide space for dredged material disposal until 2015 when a new CDF would be operational. The new facility would provide capacity for a minimum of 14 years (2015 through 2028).

2.12.6 Base Plan Dredging - The Base Plan assumes that dredging Cleveland Harbor will continue annually from 2009 through 2028. However, due to the current CDF capacity shortage, dredging will be reduced to 250,000 cy per year (225,000 cy Federal and 25,000 cy non-Federal) until 2015 when a new facility or other provisions are available. Dredging quantities would increase in 2015 to remove accumulated sediments (410,400 annually). Backlog dredging is estimated to be complete in 2020 at which time annual dredging quantities would revert back to 330,200 cy. Approximately 6,764,400 cy of sediment will be removed from Cleveland Harbor over the 20 year evaluation period (Table 2.8).

2.12.7 Identification of the Base Plan - Alternative Plan 4 (Construction of a new CDF at East 55th Street) has been identified as the Base Plan. Alternative Plan 4 has a total implementation cost over 20 years of \$313.1 million and has the lowest Average Annual Cost of any of the Alternatives at \$17.1 million.

2.12.8 Identification of the NED Plan - Alternative Plan 4 (Construction of a new CDF at East 55th Street) has been identified as the NED Plan. Alternative 4 has a total implementation cost over 20 years of \$313.1 million and net Average Annual Benefits ranging from \$6.4 million to \$10.0 million depending upon assumed shoaling rates in the Cuyahoga River.

2.12.9 The Locally Preferred Plan (Alternative 4a) – The City of Cleveland and the Cleveland Cuyahoga County Port Authority have both expressed a strong interest in implementation of Alternative Plan 4a, construction of a CDF at the East 55th Street site with certain improvements to the CDF walls. Those wall improvements would best facilitate possible future development of the CDF.

2.13 TENTATIVELY SELECTED PLAN

2.13.1 Step 6 Selecting a Plan - Alternative Plan 4a, construction of a new CDF at the East 55th Street site, with the highest potential for future development once it is filled, has been identified as the Tentatively Selected Plan. The East 55th Street CDF is approximately 157 acres in size (Figure 2.6). The perimeter walls will be comprised of both rubblemound dikes (similar in construction to that of existing Dike 10B) and Combi-wall system design. Since this site may be developed in the future by the local sponsor, the local sponsor would like a vertical surface along the northern, eastern, and a portion of the western outer walls that would support mooring vessels should this become their desire in the future. A detailed discussion of the design can be found in Appendix J.

Table 2.8 Base Plan Timestream of Cubic Yards Removed and Disposal Method

		Federal Sediment Placed In CDF	Non-Federal Sediment Placed In CDF	Total Cubic Yards Placed in CDF	
Calander Year	Project Year				
2008		225,000	25,000	250,000	Dike 10B
2009	1	225,000	25,000	250,000	Dike 12
2010	2	225,000	25,000	250,000	2.0 Years
2011	3	225,000	25,000	250,000	Dike 9
2012	4	225,000	25,000	250,000	2 Years
2013	5	225,000	25,000	250,000	Dike 12
2014	6	362,000	48,400	410,400	2.0 Years
2015	7	362,000	48,400	410,400	New Harbor Sediment Disposal Site
2016	8	362,000	48,400	410,400	
2017	9	362,000	48,400	410,400	
2018	10	362,000	48,400	410,400	
2019	11	362,000	48,400	410,400	
2020	12	362,000	48,400	410,400	
2021	13	293,500	36,700	330,200	
2022	14	293,500	36,700	330,200	
2023	15	293,500	36,700	330,200	
2024	16	293,500	36,700	330,200	
2025	17	293,500	36,700	330,200	14 years Of Dredging Cubi Yards Placed 5,104,000
2026	18	293,500	36,700	330,200	
2027	19	293,500	36,700	330,200	
2028	20	293,500	36,700	330,200	
Evaluation Period Disposal		6,007,000	757,400	6,764,400	
Annual Disposal		300,350	37,870	338,220	

Construction costs for Plan 4a are \$277 million. Cell 1 would be constructed in approximately 25 feet of water, over a three year period (2012, 2013, 2014), and cost \$129.7 million. Cell 2 would be constructed in approximately 28 feet of water, over a three year period (2019, 2020, 2021), and cost \$60.5 million. Cell 3 would be constructed in approximately 28 feet of water, over a three year period (2024, 2025, 2026), and cost \$86.8 million.

2.14 COST SHARING

2.14.1 Implementation Cost Sharing – In general, the costs for implementing DMMPs for existing projects are shared in accordance with navigation O&M cost sharing provisions applicable to the authorized navigation project. Dredged material disposal facility costs, for new CDFs are cost-shared in accordance with Section 201 of the Water Resources Development Act

of 1996 (P.L. 104-303) and United States Code (33 USC 2211). For commercial navigation projects where authorized depths range from greater than 20 feet to 45 feet, non-Federal sponsors are responsible for 25 percent of the initial cost of the facility and 100 percent of the cost of all lands, easements, rights-of-way, relocations, and disposal (LERR). The non-Federal sponsor must also pay an additional ten percent of the total project cost after construction over a maximum 30 year period. The non-Federal costs of LERR (other than utility relocations) needed for the project is credited against the extra ten percent non-Federal cost.

2.14.2 Cost Sharing Beneficial Use Measures or Alternatives – Portions of plans or entire plans that involve beneficial use of dredged material would be cost-shared on a 75 percent Federal and 25 percent non-Federal basis. Non-Federal sponsors are also responsible for the cost of LERR for construction of the project which can be credited toward their 25 percent project share and 100 percent of the cost of operation and maintenance of the beneficial use plan. Implementation of beneficial use plans could be accomplished under Section 204 of WRDA 1992, as amended.

2.14.3 Cost Sharing State Requirements Exceeding the Federal Standard – In cases where a State agency imposes special requirements or alternatives for the disposal of dredged material, over and above that which is considered the Federal standard for that harbor, the additional costs associated with such requirements must be borne 100 percent by the non-Federal sponsor (33 CFR 337.2). The Federal Standard as defined in 33 CFR 335.7 is:

“Federal standard means the dredged material disposal alternative or alternatives identified by the Corps which represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria.”

In accordance with Section 217 of WRDA 96, the USACE, although not required, may enter into agreements to provide additional capacity in a disposal facility for non-Federal dredged or excavated material such as material from berthing areas, non-Federal navigation channels, and marinas. Non-Federal interests must agree to pay all the costs associated with the non-Federal capacity. In these cases, the disposal capacity in the disposal facility will be allocated between the capacity required for the maintenance (or improvement as applicable) of the Federal project and the capacity required for the non-Federal dredged material. Non-Federal interests will pay the non-Federal share of the costs of the capacity attributed to the Federal project(s) plus 100 percent of the cost allocated to the non-Federal dredged material capacity. A similar allocation will be made for the operation and maintenance costs of the disposal facility. The operation and maintenance costs attributable to the Federal project capacity will be shared in accordance with paragraph 7.a.(3) and the operation and maintenance costs associated with the non-Federal capacity will be 100 percent non-Federal. In general, the operation and maintenance of Federal and non-Federal disposal facilities will be accomplished by the USACE with annual payments by non-Federal interests for the non-Federal share of operation and maintenance costs. Payments and fees collected from non-Federal interests will be used for the operation and maintenance of the disposal facility in accordance with Section 217 of WRDA 96. Non-Federal operation and maintenance and annual payments of Federal disposal facilities will be considered on a case-by-

case basis by HQUSACE. Non-Federal interests may recover the costs assigned to the additional capacity through fees assessed on third parties whose dredged material is deposited at the facility and who enter into agreements with the non-Federal interest for use of the facility.

2.14.4 Cost Share Determination - The cost categories in Table 2.9 were used to determine cost share requirements for all cost associated with CDF implementation and construction. The applicable cost sharing percentages were also identified, based on space allocation for Federal and non-Federal disposal needs, and general cost sharing percentages. This procedure identified costs that could be shared up to the cost of the Federal Standard. Costs above the Federal Standard are 100 percent non federal responsibility.

Table 2.9 Cost Sharing Allocations

Construction Components	Plan 4 (Base Plan)	Plan 4a (Tentatively Selected Plan)	Costs above Base Plan
General CDF Construction	\$231,408,700	\$270,466,700	\$39,058,000
Outfall Relocations	\$6,520,300	\$6,520,300	\$0
Environmental Compliance	\$150,000	\$150,000	\$0
Real Estate	\$45,000	\$45,000	\$0
Develop and Execute Project Partnership Agreement (PPA)	\$60,000	\$60,000	\$0
Real Estate Acquisition	\$0	\$0	\$0
Design Analysis	\$7,137,900	\$8,309,600	\$1,171,700
Construction Management (Plans and Specs)	\$14,276,000	\$16,619,200	\$2,343,200
Fish and Wildlife Mgmt.	\$500,000	\$500,000	\$0
Total	\$260,097,900	\$302,670,800	\$42,572,900

Base Plan and Tentatively Selected Plan costs associated with the eight cost categories above are \$260,097,900 and \$302,670,800, respectively. The Base Plan, which may or may not be the ultimate plan selected defines the parameters to be used when determining cost-sharing for all other alternatives which may be developed during the study and which may be eventually put forward as the selected plan. For this DMMP the Base Plan and NED Plan are the same (Alternative 4 East 55th Street CDF Site).

2.14.5 Cost Sharing Tentatively Selected Plan - The costs above the Base Plan are \$42,572,900 and will be required to be funded by the non Federal sponsor. Outfall Relocation Costs (\$6.5 million), and all LERRs (TBD), are also 100 percent non-Federal costs. The remaining project cost of \$253,532,600 will be divided into Federal and non-Federal costs. First this amount is split into the cost of providing sediment disposal space for Federal (88.8 percent) and non-Federal (11.0 percent) over the 20 year project life. Costs associated with providing capacity for non-Federal use (\$28,387,675) is 100 percent non Federal cost. The cost associated with providing capacity for Federal use (\$225,144,925) is cost shared 75 percent Federal, 25

percent non-Federal; the Federal cost is \$168,858,693 and the non-Federal cost is \$56,286,231. Total non-Federal costs are \$133,812,107 and are summarized below. Additional information is provided in Appendix G Part II.

- Costs defined as a 100 percent non federal responsibility – e.g. outfall relocations and LERRs (\$6,565,300).
- CDF disposal capacity for non Federal needs (\$28,387,675).
- Cost share associated with providing CDF capacity for Federal needs (\$56,286,231).
- All other costs above the Federal Standard (\$42,572,900).
- 10 percent of construction costs associated with General Construction and Outfall Relocation(\$23,792,900)

2.15 ITEMS OF LOCAL COOPERATION

2.15.1 Financial Capability (Statement) Assessment - As of June 12, 2007 the sponsor’s financing plan and capability determination are no longer required. Rather, the non-Federal sponsor must sign a “Non-Federal Self-Certification of Financial Capability for Agreements”. Other non-Federal documentation may include a Letter of Intent, any legislation/legal actions that allow the non-Federal sponsor to execute a PPA, and a statement of their acknowledged responsibilities with respect to Operation, Maintenance, Repair, Rehabilitation and Replacement (OMRR&R) costs upon completion of the project.

2.15.2 Real Estate – The USACE Real Estate Division will assess real estate requirements for the selected plan and determine the real estate interests the non-Federal sponsor will need in the land identified for the project. Real Estate Division will prepare a gross appraisal, real estate plan and baseline cost estimate for real estate. A determination of the non-Federal sponsor’s legal and financial capability to perform the work and acquire property in accordance with PL 91-646 “Uniform Relocation Assistance and Real Property Acquisition Policies of 1970” will also be performed. The non-Federal sponsor will be responsible for acquiring all necessary LERRs. After acquisition, local sponsor costs are eligible for credit against the local share of total project costs. Land acquisition begins after the PPA is fully executed and must be in accordance with PL 91-646 and PL 100-17, “Uniform Relocation Act Amendments of 1987”. The process begins with the transmittal of the final project design drawings which will delineate the minimum recommended real estate interests to be acquired. The local sponsor, with the Government’s assistance, will be required to hold a public meeting with affected landowners to fully disclose the project impacts and their rights under PL 86-645. Requirements for the sponsor to obtain property line surveys, gross appraisals, negotiation reports, title evidence, right of entries for construction, and claims for credit will be provided in detail to the sponsor during the next phase of the project. Draft real estate plan is included in Appendix L.

2.15.3 Project Partnership Agreement – On May 18, 2007, a copy of the Model Project Cooperation Agreement (PCA) [now termed a PPA] for ‘Specifically Authorized Commercial Navigation Harbor Projects and Separable Elements Requiring Construction of Dredged or Excavated Material Disposal Facilities’ was transmitted to the Cleveland-Cuyahoga County Port Authority for preliminary review. The model has been approved by Office of the Assistant

Secretary of the Army (OASA). If the project specific agreement does not deviate from the model and the appropriate optional language, the Buffalo District Commander can sign the agreement after obtaining review and approval from CELRD. If there are deviations from the model, then the project specific agreement must be forwarded through CELRB and USACE HQ to the OASA, Civil Works (CW) for review and approval before it can be signed. It is anticipated that the model PPA will be used for the project.

The financial terms of the cost allocation are defined in the PPA. The PPA describes the LPP, NED Plan, and present the estimated cost of each and indicates the non-Federal responsibility for the costs of the LPP above the NED plan. The time between the publication of this document and the execution of the PPA will allow for further definition and refinement of the LPP as well as more detailed design and cost estimation, resulting in a more accurate estimate of costs of the LPP and NED.

CHAPTER 3: AFFECTED ENVIRONMENT

3.1 Introduction - The purpose of this section is to present an overview of the environmental setting in the Cleveland Harbor study area to provide a basis by which to assess impacts and evaluate the various alternative plans.

3.2 Socioeconomics - Cleveland is an important Great Lakes port city. Because of its location and transportation facilities, it has become an important local, state, regional, national, and world center of industry and commerce. This is expected to continue into the future.

3.3 Population – The City of Cleveland is the largest city in Cuyahoga County. Based on the 2000 U.S. Census of Population and Housing, total population of the City was 478,403. In 2000, the population for Cuyahoga County was 1,305,166. Population projections indicate that the City and County populations are expected to moderately increase through the year 2035.

3.4 Employment and Income – The 2006 per capita personal income for Ohio was \$33,338 (29th in the country). This was an increase of 4.6 percent (33rd in the county) from the previous year according to the U.S. Bureau of Economic Analysis. Since 1970, per capita personal income has had annual increases as high as 11.2 percent which occurred during the 1970's and as low as 1.4 percent in 2001. The 2006 total personal income for Ohio was estimated at over \$382.7 billion. In 2003, average annual employment in the private sector was 660,061. Of these, 91,662 pertained to manufacturing, 40,555 in wholesale trade, 77,021 in retail trade, and 105,866 in health care services. Major manufacturing industries in the Cleveland area include: primary metals, fabricated metal products, machinery, transportation equipment industries, and building products.

Employment sectors in the Cleveland-Cuyahoga County area in 2002, employed a total of 980,040 workers, including: services (52.8 %), government (12.2 %), manufacturing (10 %), retail trade (9.6 %), finance and insurance (7.3 %), transportation and warehousing (3.5 %), and other (4.3 %). In 2004, the civilian labor force in Cuyahoga County was 679,600. Unemployed citizens totaled 42,200 (rate of 6.2 percent).

Generally, in the Cleveland-Cuyahoga County area, total employment is expected to moderately increase then decline through the year 2035. Some continued decline in the manufacturing employment sector is expected. Anticipated employment growth sectors include: construction, finance insurance, real estate, and service industries. Continued moderate growth of income is anticipated.

Cleveland Harbor remains important to area business, industry, employment, and economic vitality. Hundreds of employees are directly associated with port operations and facilities, while thousands are indirectly affected.

3.5 Environmental Justice Communities - As outlined in Executive Order 12898, Federal agencies must evaluate environmental justice issues related to any project proposed for implementation. This evaluation includes identification of adverse human health or environmental effects on minority and low-income populations in the study area and identification of any negative project impacts that would disproportionately affect low-income or minority groups. A comparative analysis of 2000 census data for the City of Cleveland indicates a substantial minority community in comparison to County and State percentages. The City and County data indicates a notable percentage of families and individuals below the poverty level (Table 3.1)

**Table 3.1 - General Population Characteristics
(U.S. Census of Population and Housing, 2005)**

	State of Ohio	Cuyahoga County	Cleveland (City)
TOTAL POPULATION	11,155,606	1,305,166	414,534
RACE AND ORIGIN (%)			
One Race	98.5	98.6	98.5
White	84.3	65.5	38.7
Black or African American	11.5	28.9	53.8
American Indian or Alaska Native	0.2	0.2	0.6
Asian	1.5	2.2	1.5
Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0
Some other race	1.0	1.8	4.0
Two or more races	1.5	1.4	1.5
Hispanic or Latino (of any race)	2.3	3.8	7.7
POVERTY STATUS			
Families below poverty level	9.9	13.7	28.6
Individuals below poverty level	13.0	16.9	32.4

3.6 Community Cohesion - Community cohesion, as in most cases, is a result of a number of social and economic factors. Most City of Cleveland residents are long-time residents of varied ethnic backgrounds. Generally, community pride (cohesion) is strong. In the last decade, relative to the harbor area, a general shift from primarily industrial and commercial activity to more mixed activity and developments has affected previous community cohesion factors and interests specifically community structure and development, employment and income, environment, etc.. Community efforts have sought to sustain remaining business and industrial development, where possible, while looking forward to new alternative developmental potentials including: natural, recreational, residential, commercial, and industrial development. The most likely development appears to be one of well-planned mixed usage. Relative to continued harbor operation and maintenance, most interests agree that the harbor should be

maintained to facilitate industry, commerce, and associated community economic well-being, and that dredged material should be appropriately managed. Harbor maintenance activities would result in no adverse effects on predominantly minority or low income populations.

3.7 Transportation - Cleveland Harbor is an important local, state, regional, and national port. The area is served via air, rail, road ways, and water.

3.7.1 Air Transportation - The primary air transportation terminals in Cleveland are Cleveland-Hopkins International Airport located southwest of the City, and BKL Airport located on the shore of Lake Erie, northeast of the City. BKL Airport is used primarily for short, regional flights, while the larger Cleveland-Hopkins terminal is used by major airlines for long-distance air travel.

3.7.2 Railroads - The railroad system in Cleveland Metropolitan Area operates mainly in the downtown area along the lakefront. Rail cars cross the mouth of the Cuyahoga River over a two track drawbridge. The bridge is typically in the down position to accommodate the amount of rail traffic in the area. There are three types of rail operations: freight, intercity passenger, and light rail transit.

3.7.2.1 Freight - Various freight train systems operate in the Cleveland area including tracks owned by Norfolk Southern Corporation (NS) and CSX Transportation Inc. Approximately 7 to 13 freight trains per day utilize the lakefront track system and drawbridge to serve various industries including those on Whiskey Island. These daily carriers do not include the daily freight trains run by CSX or carriers that use the CSX main track which include at least one CSX freight train per day and up to one dozen other carriers that support Cleveland area industry. In addition to local traffic, the CSX main track in Cleveland services approximately 50 daily freight trains traveling to various metropolitan areas including St. Louis, Missouri, Chicago, Illinois, and New York, New York (Prendergast, 2003).

3.7.2.2 Intercity/Light Rail - Intercity passenger rail system is operated by Amtrak; the system operates along Cleveland's lakefront area. Intercity passenger rail services four daily trains between Chicago and the east coast (Prendergast, 2003). The light rail transit system is owned by the Greater Cleveland Regional Transit Authority; the system operates within the immediate downtown Cleveland area. Although the light rail transit system has low user numbers, the system operates 112 daily trains (Prendergast, 2003)

3.7.3 Highway/Roadway - The Cleveland Metropolitan Area is transected by major east/west and north/south highways including Interstate 90, 71, and 80, and Interstate 71, 77, and 271 respectively. In addition to the interstate highway system the City contains an intricate system of local roadways. The City of Cleveland, Division of Traffic Engineering is responsible for operation and maintenance of traffic control devices to ensure the safety of pedestrian and vehicular traffic in the city roadway system. In addition, the Division of Traffic Engineering plans and designs the configuration of

streets, highways, and lands adjacent to City roads (City of Cleveland, Department of Public Service, Division of Traffic and Engineering, 2006)

3.8 River Navigation – Federal navigation channels in Cleveland Harbor and Cuyahoga River Channels were authorized by Congress in various River and Harbor Acts. The project provides an authorized navigation channel depth of 27 feet in the lowermost part of the Cuyahoga River, from the lakeward end of the piers to a point immediately above the Old River junction. Authorized channel depths in the remaining portions of the Cuyahoga River are 23 feet. The Old River navigation channel is maintained to 21 and 23 feet. Maintaining the Federal channels to the authorized channel depths has sustained the commercial navigation industry in the harbor. Cleveland Harbor is ranked 44th in the Nation based on the tonnage of material shipped from, or received at the port and is the fifth largest Great Lakes Port (year 2004 data, USACE-IWR, 2006). Approximately 17 percent of the harbor traffic involves foreign trade or transportation. Historically, the dominant harbor commodities are iron ore and limestone used by the steel industry. The harbor handled a range of 13.4 million to 18.1 million tons per year from 1990 through 2003. The existing Cleveland Harbor Federal navigation project is discussed in detail in Chapter 1 of this report.

3.9 Water Quality/Water Resources – The Great Lakes are the world’s largest source of fresh water and serve as a valuable resource to 33 million people who live and work in the basin. Lake Erie is of particular importance to the State of Ohio. The lake provides drinking water to three million residents and generates approximately \$8.5 billion in annual revenue related to fishing, travel, and tourism. However, two types of pollution threaten the water quality of the Lake Erie Watershed, point source and non-point source pollution. Point source pollution is known sources of discharge such as industrial, residential, and combined sewer overflows. Non-point source pollution is unknown sources and is typically characterized by storm water runoff. The importance of maintaining the water quality of the Great Lakes has resulted in Federal, State, and local authorities taking action to promote pollution prevention and implement measures to protect the water resources.

3.9.1 Federal and State Resources - The Council of Great Lakes Governors (CGLG), which includes representatives from the Provinces of Ontario and Quebec, signed an Agreement in December 2005 stating the need to protect, conserve, restore, and improve the waters in order to maintain sustainable water supplies to people and businesses within the Great Lakes Basin. The Agreement is expected to be passed into law through an interstate compact and will be known as the ‘Great Lakes – St. Lawrence River Basin Water Resources Compact’. In addition to the CGLG, State Agencies and local entities strive to protect the Great Lakes and specifically Lake Erie as a viable water resource. ODNR maintains guidance and procedures in ORC 1521 to coordinate, conserve, develop, protect, use, and manage the water resources of the Lake Erie Drainage Basin. OEPA’s Division of Surface Water is responsible for restoring and maintaining the quality of Ohio’s rivers and streams by managing the water resources in compliance with the Federal Clean Water Act.

3.9.2 Local Resources - On a local level, the City of Cleveland maintains the water resource by implementing preventive measures to manage water quality through various intake, filtration, and sewage treatment plants. The Cleveland Water Authority has four public water supply intakes in Lake Erie. The intakes are located more than two miles offshore, and therefore minimize the potential for contamination from rivers, streams and other nearby sources. The Water Authority uses a multiple barrier process to treat Lake Erie water to meet drinking water quality standards. The Cleveland public water intake system is divided into east and west subsystems by the Cuyahoga River. The area east of the river is served by the Nottingham and Baldwin Filtration Plants. The area west of the river is served by the Division and Crown Filtration Plants. The NEORS D maintains three sewage treatment plants to serve the harbor area: Westerly, Southerly, and Easterly Wastewater Treatment Plants. The Westerly Wastewater Treatment Plant is located near the western extremity of the harbor at the terminus of the Old River and discharges into Lake Erie. The Southerly Wastewater Treatment Plant is located along the Cuyahoga River approximately 6.5 miles upstream from Lake Erie and discharges into the Cuyahoga River. The Easterly Wastewater Treatment Plant is located eight miles northeast of the mouth of the Cuyahoga River and discharges into Lake Erie. Numerous storm sewers collect water and discharge into the lake and river. Through the operation of the treatment plants, the NEORS D minimizes the amount of pollution that enters the Cuyahoga River and Lake Erie. In addition to mechanical treatment, the NEORS D works with local industries to develop and implement Pollution Prevention Plans to reduce point source discharges, and works with local communities to ensure adjoining streams and tributaries are properly maintained.

3.10 Shoreline Discharges – The Cleveland-Cuyahoga County Port Authority’s Advance Report Summary Port Relocation Study cited additional water quality concerns related to shoreline discharges in the vicinity of East 55th Street:

“The Northeast Ohio Regional Sewer District (NEORS D) service area includes 75 square miles served by combined sewers. During excessive rainstorms, Combined Sewer Overflows (CSOs) discharge diluted sanitary wastes to the receiving water bodies. Four of these CSOs discharge to the Cleveland Harbor in the vicinity of the East 55th Street site. Three of these are indirectly impacted by the addition of a new landmass in the harbor; and one, Outfall 203, would be extended as part of the construction project because its current discharge point will be blocked by the new landmass. Related to the specific water quality issues associated with the First Energy circulating water system and CSO discharges, are several secondary issues. The thermal, floating and sedimentary debris and bacterial changes could cause impacts to various ecological systems.”

3.11 Water Modeling - In 2008, the USACE, Engineering Research and Development Center (ERDC) completed various models to assess harbor and river water quality under existing conditions and proposed future conditions to assess potential impacts related to proposed Federal shoreline CDF construction. The ERDC models assessed particulate distribution, currents/water flow, and temperature variations. The model assessed a 30

day period using weather conditions recorded in summer 2002 and included two storm events.

3.11.1 Particle Tracking Model - A Particle Tracking Model (PTM) was used to address the issue of CSO impacts. PTM is an USACE, ERDC-developed model designed specifically to track the fate of point-source constituents (sediment, chemicals, debris, etc) released from local sources (outfalls, dredges, etc) in complex hydrodynamic and wave environments. The study commissioned for this project focused on comparisons between CSO constituent transport during different design phases of CDF construction for portions of the harbor, Cuyahoga River, and Lake Erie that may be influenced by CSO material. The modeled phases consist of the existing Harbor configuration as well as three stages of construction. Included in the analysis are three types of sources: 1) neutrally buoyant particles to represent chemical constituent transport, 2) floatable particles to represent debris, and 3) sediment particles. Additional discussion is included in Appendix K, of this report.

The model represents quiescent conditions on August 16, 2002. After 13 days, chemical constituent particles are dispersed throughout the system, though it begins to be very noticeable that particles are trapped in CSO 200 for both existing conditions and proposed plan. For the existing condition, some particles also remain trapped near CSO 203. However, these particles are no longer trapped under future plan condition. Finally after the 30 day model period, most of the particles have been disbursed through the water and away from the area except those confined particles trapped in CSO 200. Investigation of the hydrodynamics shows that not many particles from CSO 200 disburse from the Harbor because of poor circulation in the adjacent water in the base and all three alternative design conditions. Therefore, the differential impacts to circulation of CSO outflows from CSO 200 are negligible.

Floatable particles are representative of floating debris in the harbor. In the case of floatables, wind effects became a key factor to particle transport. The results of the debris study were drastically different than the chemical transport study. Floatables exited the harbor rapidly. During modeled events, southwesterly winds took the particles eastward. Most of the particles moved away from the harbor within one day. These results remain consistent for all future plan conditions and for both modeled storms.

Generally, the PTM model established that most neutrally buoyant particles were transported out of the system within a 30 day period. Concentration values quickly dissipated as a result of the particle transport, following the same trend. Floatable particles rapidly exited the system due to the additional factor of wind forcing. The model identified two “hot spots” where particles were trapped by the contained flow areas. One hotspot is present under existing conditions and there is no appreciable worsening under future plan conditions. The second identified hot spot is near the Gordon Park marina and is only present when the relocated marina is represented in the model. Relocating the marina is a potential future project by others and this issue should be addressed in the detailed planning and design for that work.

3.11.2 Thermal Model - Thermal changes also affect the water resource, and East 55th Street Site is located in close proximity to the cooling water intake and outfall structures servicing the First Energy Power Plant. In June 2008, USACE completed an extensive Thermal Plume Transport Investigation to address concerns that the proposed CDF would change the circulation pattern in the Harbor area such that water discharge from the power plant would be subsequently drawn into the intake without adequate cooling, adversely affecting operational efficiencies at the plant. For evaluating changes in the thermal plume transport, a two-month simulation period of July and August 2002 was chosen because the relatively weak winds experienced during summer limit mixing of the plume with Lake waters, the worst-case scenario.

Modeling of the thermal plume showed minimal thermal impact, even under quiescent summer conditions. Easterly winds result in some thermal impact along the shoreline in the vicinity of the foot of East 72nd Street (Figure 3.1), while westerly winds result in some thermal rise in the vicinity of CDF 14 (Figure 3.2). The impact of these changes are negligible, as temperature rise is temporary, localized, mild (<5° C), and almost entirely dependent on wind direction.

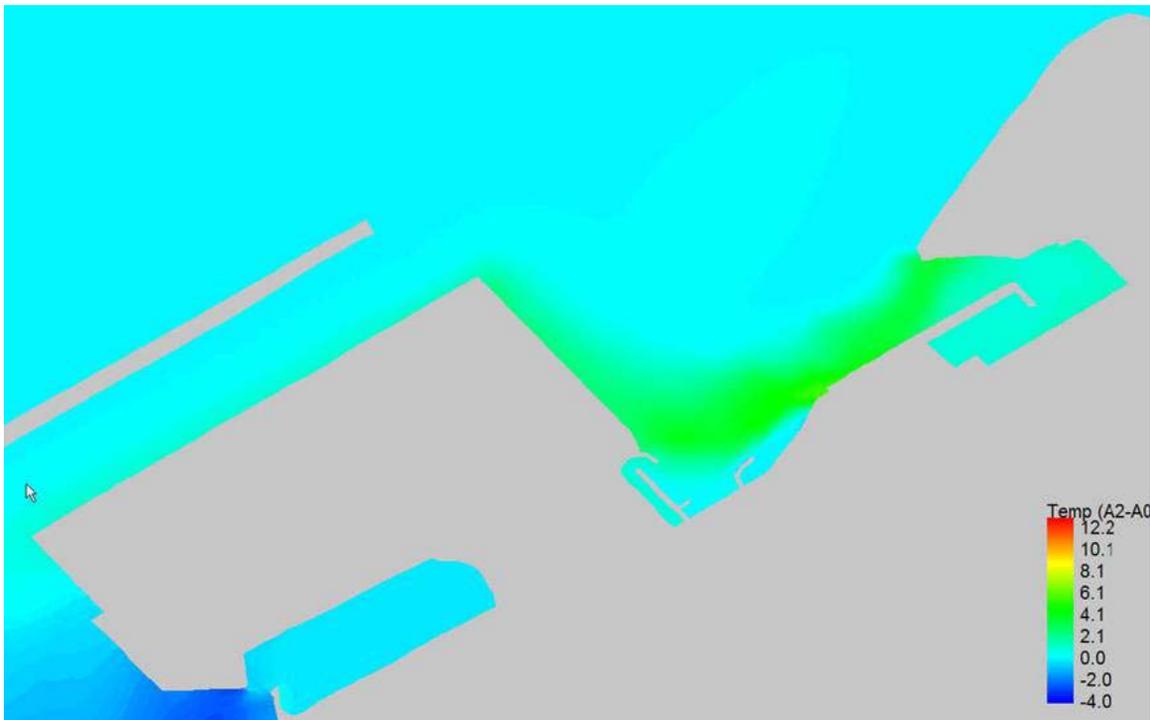


Figure 3.1 AVI snapshot of temperature differences during an easterly wind event with East 55th Street CDF in place

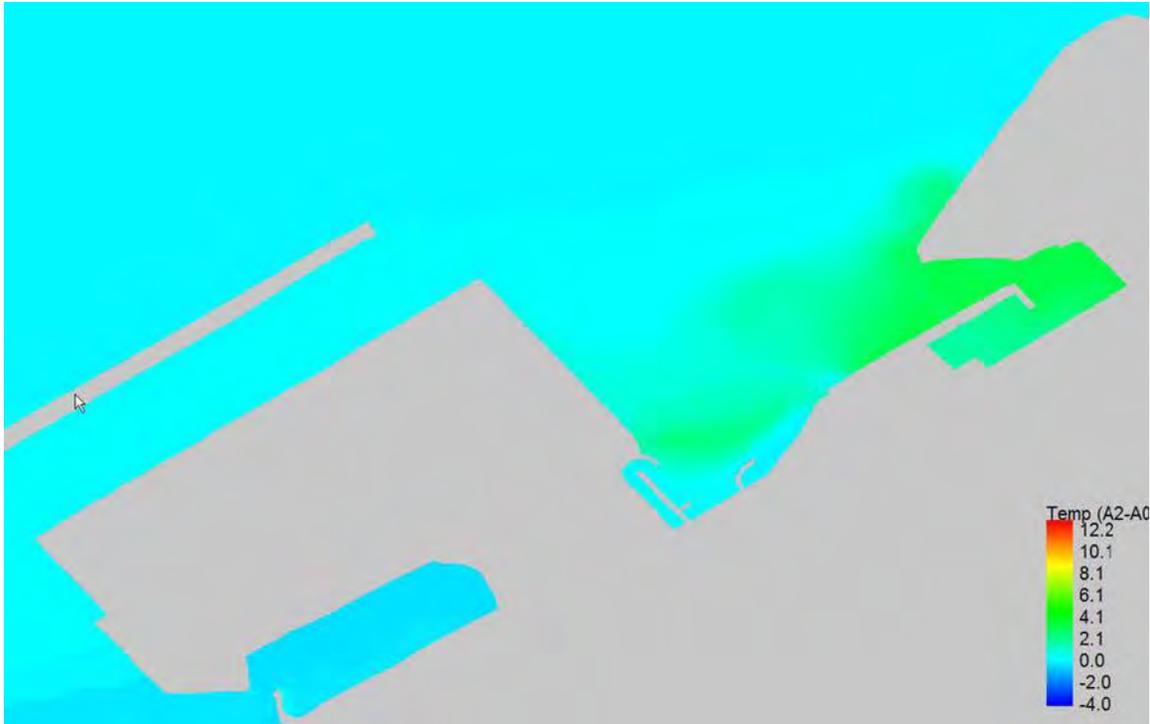


Figure 3.2 Advanced Visual Image (AVI) snapshot of temperature differences during a westerly wind event with East 55th Street CDF in place

The Curvilinear-grid Hydrodynamics three dimensional (CH3D) and thermal transport models were applied to investigate the effect of three CDF alternative configurations on the heated water discharge temperature distribution within Cleveland Harbor. The first configuration represents conditions if the eastern most of the three cells is constructed first. The second condition represents the completed CDF. The third configuration intended to represent effects of others, specifically a potential relocation of Port facilities to the CDF, which includes a breakwater extension, relocation of East 55th Street Marina and lengthening of the First Energy guide wall. For each of the three alternative CDF configurations, the spatial distribution of the thermal plume is shown to be primarily influenced by wind direction and speed, and temperature at the intake can vary significantly depending on the prevailing wind conditions. However, there is minimal temperature change between the base configuration and the three plan configurations and therefore, the impact to the water resource and the industry operations dependant on it are minimal due to thermal plume. Additional discussion is in Appendix K of this report.

3.11.3 Water Current Model - A two-dimensional, depth-averaged, version of the hydrodynamic advanced circulation (ADCIRC) model was applied in this study. Potential adverse impacts due to the proposed CDF were determined by examining changes in model-generated current circulation and thermal transport patterns. ADCIRC modeling efforts concentrated on quantifying the change in circulation patterns with and without the CDF in place for storm and quiescent/non-storm conditions. This model required grid development and calibration/validation of the bathymetric grid to wind forcing. For the model calibration and validation, ADCIRC results were compared with 12 National Ocean Service (NOS) water level gauges throughout Lake Erie and the

Comprehensive Mapping and Engineering Data System (CMEDS). The calculated water levels from the ADCIRC simulation compared well in range and phase with the NOS gauge measurements considering that the locations of the eastern gauges were well outside the area of high resolution in the project area. Under easterly wind conditions, each proposed CDF would increase peak storm-induced westerly currents within the channel from about 0.05 meters per second (m/s) to approximately 0.4 m/s. The stronger currents induced by the planned CDFs are attributed to the reduced cross-sectional area within the channel.

Currents at Gordon Park Marina and East 55th Street marina entrance can be characterized as weak. The planned configurations do not appear to have an appreciable impact on current strength at Gordon Park Marina and the change in current strength at East 55th Street marina is attributed to sheltering caused by the planned configurations. Circulation modeling also indicates minimal impacts to water circulation near the proposed East 55th Street site when compared to Without Project Conditions (Figure 3.3). In fact, the normally channelized flow running lateral to the shoreline and along the deeper Federal channel seems to be accelerated by the in-place project condition. This is to be expected, as the CDF would slightly reduce channel size, which naturally accelerates flow. Additionally, the slight projection of the CDF into the natural channel causes some flow to “catch” on the northwest corner of the CDF and redirect to the south, creating a circular and active flow (Figure 3.4). This phenomenon is best attributed to a cavitation flow condition created by the projection of the proposed CDF and the harbor “cavity” created between the existing CDF 12 and the proposed CDF.

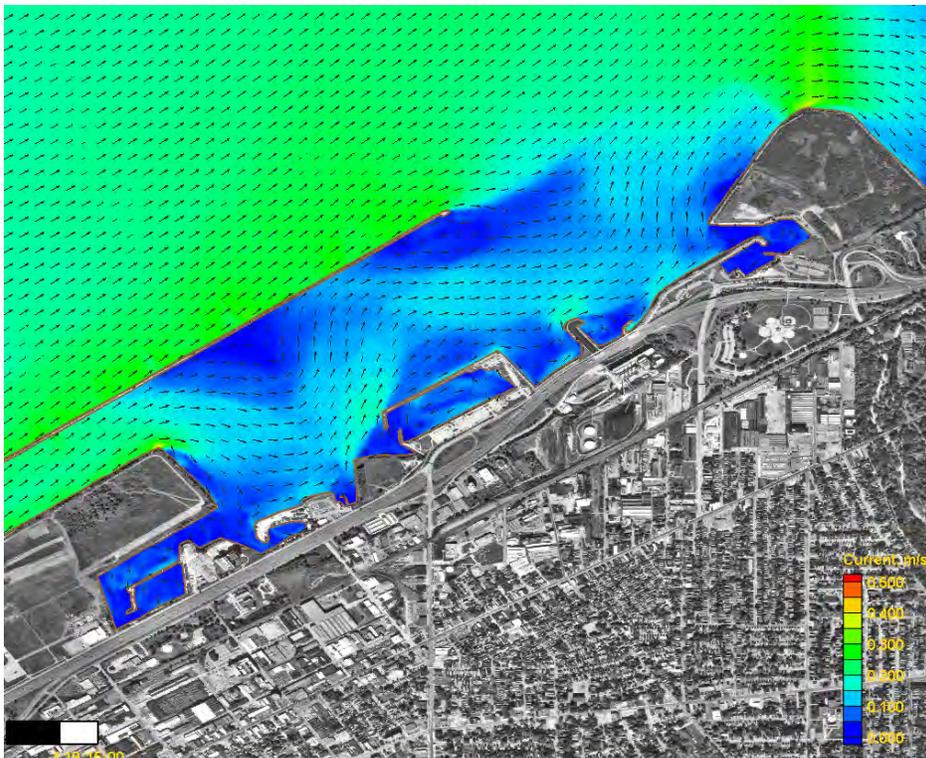


Figure 3.3 Existing Conditions: Peak model-generated current during November 2004 storm.

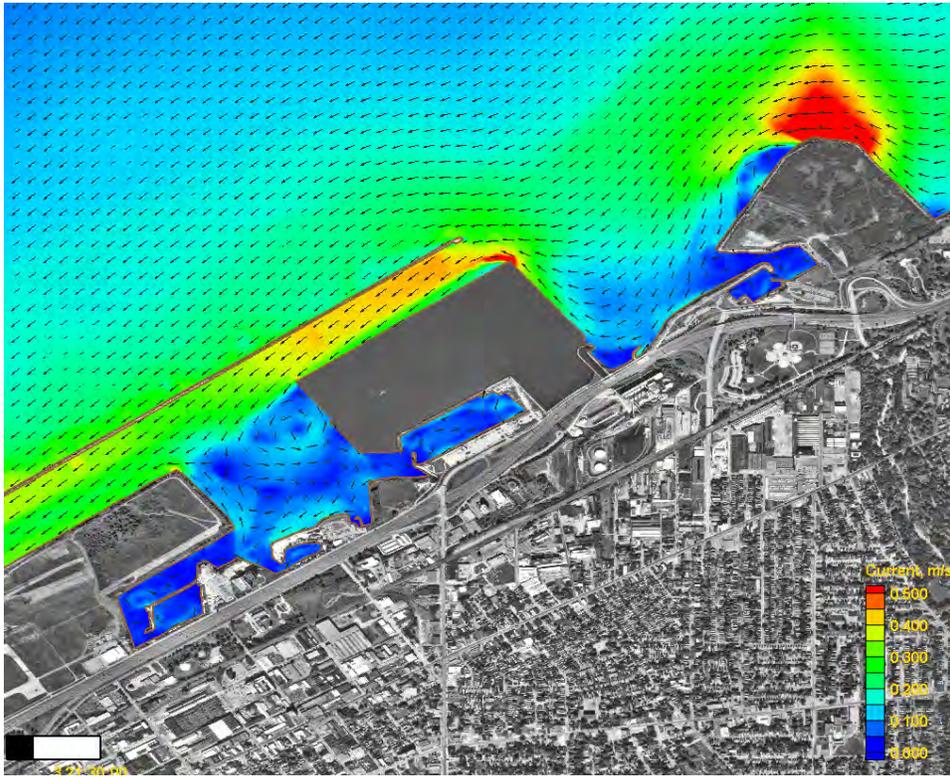


Figure 3.4 East 55th Street CDF: Peak model-generated current during November 2004 storm.

The proposed CDF would have no impact to the CSO discharges; impacts are limited to the effects of changes of the receiving waters, primarily potential circulation and volume changes. Reductions in circulation sometimes result in an excessive build-up of bacteria, thereby impacting human health for users of the water resource. However, the modeling results show that the proposed CDF should not cause eutrophication as there is not an excessive build-up or concentration of neutrally buoyant and negatively buoyant particles.

3.12 Water Quality Criteria and Standards - OEPA and ODNR has developed standards that outline applicable criteria to all waters in the State, as well as specific use designations for Lake Erie coastal zones. It is the policy of the State of Ohio to maintain and improve the quality of the State's coastal waters for the purpose of protecting public health and welfare and to enable the use of such waters for public water supply, industrial and agricultural needs, and propagation of fish, aquatic life and wildlife by assuring compliance with §402 CWA, O.A.C §3745, and O.R.C. §1506.23, §3734, and §6111.

3.13 Cuyahoga River Remedial Action Plan - In addition, and more specifically to Cleveland Harbor, a RAP has been developed to improve water quality conditions in the Cuyahoga River. The Cuyahoga River RAP was organized in 1988 by OEPA. The mission of the Cuyahoga River RAP is to restore the environmental quality of the river through remediation of existing conditions, implement pollution prevention techniques to

minimize further degradation of the water quality. Currently 39 stakeholders are active participants in the Cuyahoga River RAP and include government agencies, businesses, local community groups, and citizens interested in protecting and conserving the waters of the Cuyahoga River. To date several studies and plans have been implemented including the 1992 Cuyahoga River Remedial Action Plan, Stage One Report, 1996 Stage One Update, and 1996 Early Implementation Report.

3.14 Sediment Quality - USACE, Buffalo District conducts sediment sampling in the Cuyahoga River Channels and Cleveland Outer Harbor every five years. Cleveland Harbor sediments (including Cuyahoga River Channels) were last sampled and analyzed by the Buffalo District in 2007 under contract to Environment and Engineering Incorporated (EEI). Sampling sites CH-1 through CH-22 represent the River Channels, CH-23 through CH-30 represents the Outer Harbor, and CL-1 through CL-4 represents the open-lake reference sediments (Figures 3.5 through 3.10 in Appendix F). The sediment testing included analyses for inorganic parameters (metals, nutrients, total organic carbon [TOC], etc.), organic contaminants (Polychlorinated Biphenyls [PCBs], Pesticides, Polynuclear Aromatic Hydrocarbons [PAHs]) and elutriate analyses. The following is a summary of the test results:

3.14.1 Particle Size Analysis - Table 3.2 presents the results of the sieve analyses performed on the sediment samples (Appendix F). The River Channel material was comprised of between 35.7% (Site CH-1) and 98.3 % (Site CH-13) silts and clays, with the remainder sands. The Upper End material within the River Channel was comprised of between 49.8% (Site CH-4) and 64.3% (Site CH-1) sands, with the remainder silts and clays. The Old River Channel material was composed of between 39.8% (Site CH-22) and 63.4% (Site CH-21) sands, with the remainder silts and clays. With respect to the Outer Harbor Channel material, it was comprised of between 90.9% (Site CH-30) and 99.1% (Site CH-27) silts and clays, with the remainder sands. Sediments at the open-lake reference area were comprised predominantly of silts and clays (98.3% [Site CL-4] to 98.9% [Site CL-2]), with a very small fraction of sands.

3.14.2 Inorganic Analyses - Tables 3.3 and 3.4 presents the results of inorganic analyses on the sediment samples (Appendix F). Relative to open-lake reference area levels, heavy metal concentrations in the Federal navigation channel sediments were generally comparable. Some sediment samples showed significantly elevated heavy metals concentrations when compared to those at the open-lake reference area. Arsenic concentrations at Sites CH-9, CH-12, CH-13, CH-14, CH-25 and CH-29, which range from 17.4 mg/kg to 20.3 mg/kg, may be of toxicological concern. At Site CH-6, the mercury concentration of 2.88 mg/kg could be acutely toxic. The lead concentration of 127 mg/kg at Site CH-22 would appear to be acutely toxic. Zinc concentrations at Sites CH-9, CH-13 and CH-17, which ranged from 379 mg/kg to 428 mg/kg, may be of toxicological concern. Based on these data, the following heavy metal COCs were identified: mercury at Site CH-6; arsenic and zinc at Site Ch-9 and CH-13; arsenic at Site CH-12, CH-14, CH-25, and CH-29; zinc at Site CH-17; and lead at Site CH-22.

3.14.3 TOC, Ammonia, and Cyanide - Tables 3.3 and 3.4 contain results of the TOC analyses. TOC levels in the Federal navigation channel sediment samples ranged from 6,780 ppm (Site CH-22) to 40,000 ppm (Site CH-30). At the open-lake reference area, TOC concentrations ranged from 27,000 ppm (Site CL-4) to 30,600 ppm (Site CL-2). TOC levels at all sites, except for Sites CH-6, CH-7, CH-9, CH-10, CH-13, CH-23 and CH-30, were significantly below the lowest open-lake reference area TOC level of 27,000 ppm. However, the sediment TOC in Cleveland Harbor exceeds the TOC limit of 5,000 ppm identified in the ODNR and OEPA guidelines for sediment placement in the littoral system. With respect to other inorganic contaminants, ammonia levels at Sites CH-3, CH-10 and CH-25 (range 190 mg/kg to 201 mg/kg) may be toxicologically significant. With respect to cyanide, concentrations at Sites CH-21 and CH-22 (range 2.62 mg/kg to 3.63 mg/kg) could be of toxicological concern. Based on these data, ammonia and cyanide were identified as a COC at the respective sites.

3.14.4 Organic Analyses PAHs – Tables 3.5 and 3.6 presents the results of these analyses (Appendix F). Total PAH concentrations in the Federal navigation channel sediments ranged from 1.13 mg/kg (Site CH-11) to 7.18 mg/kg (Site CH-6). Total PAH levels at the open-lake reference area were quite low, ranging from 0.03 mg/kg (Site CL-1) to 0.69 mg/kg (Site CL-4). While total PAH concentrations at all of the Federal navigation channel sites exceeded those at the open-lake reference area, many may not be of significant toxicological concern. Nevertheless, given the TOC level throughout the Federal navigation channel sediments, and an assumed low fraction of black carbon, some PAH compounds may be more bioavailable and therefore capable of exerting acute toxicity.

3.14.5 PCBs - Table 3.7 presents the results of these analyses (Appendix F). PCBs were measured at all of the Federal navigation channel sites; Aroclors 1242, 1254 and 1260 were predominantly detected. Quality Control (QC) checks were completed. Individual Aroclor mixtures that were detected ranged from 22.2 µg/kg of Aroclor 1254 at Site CH-8 to 260 µg/kg of Aroclor 1254 at Site CH-27_{QC}. “Total PCB” concentrations (the sum of the three predominant Aroclors, valuing non-detectable concentrations at the laboratory reporting limit [LRL]) in the Federal navigation channel sediments ranged from 96.6 µg/kg to 504 µg/kg at Sites CH-14 to CH-27_{QC}, respectively. Aroclor 1254 was the only PCB mixture detected in the open-lake reference area sediments, ranging in concentration from 35.4 µg/kg (Site CL-3) to 42.8 µg/kg (Site CL-2). Since Aroclor 1254 was the only detected PCB mixture, the measured level was assumed to represent the “total PCB” concentration. Total PCB concentrations at all of the Federal navigation channel sites exceeded those at the open-lake reference area sediments.

3.14.6 Pesticides – Tables 3.8 and 3.9 present the results of these analyses (Appendix F). Most pesticides in the Federal navigation channel sediment samples were non-detectable at LRLs ranging from 1.02 µg/kg to 623 µg/kg. With the exception of dieldrin at Site CH-10 (11.6 µg/kg), 4,4'-dichlorodiphenyltrichloroethane (DDT) and its metabolites/breakdown products 4,4'-dichlorodiphenyldichloroethylene (DDE) and 4,4'-dichlorodiphenyldichloroethane (DDD) were detected at most of the Federal navigation channel sites. DDD was the only pesticide detected in the open-lake reference area

sediments and ranged in concentration from 7.89 µg/kg to 8.95 µg/kg at Sites CL-1 and CL-2, respectively.

3.14.7 Elutriate Testing - Tables 3.10 through 3.13 present the results of these analyses (Appendix F). The results showed releases of some heavy metals, ammonia and cyanide from the sediments (Table 3.10). Evidenced heavy metal releases from the harbor sediments were low, and maximum releases (dissolved) generally occurred from MUs CH-URMU and CH-LRMU sediments. The highest releases of copper and mercury (dissolved) were 1.5 µg/L and 0.0024 µg/L from MU CH-URMU sediments, respectively. Releases of PAH compounds (dissolved) were indicated at several of the Federal navigation channels sites (Table 3.11). Maximum benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, chrysene, fluoranthene and pyrene releases (dissolved) were 0.156 µg/L, 0.181 µg/L, 0.405 µg/L, 0.143 µg/L, 0.172 µg/L, 0.254 µg/L and 0.386 µg/L at MU CH-LRMU in the Lower River channel reach, respectively. With respect to PCBs, no releases (dissolved) were shown at LRLs ranging from 0.0102 µg/L to 0.104 µg/L (Table 3.12). Pesticide releases (dissolved) from the sediments were non-detectable at LRLs ranging from 0.0222 µg/L to 2.78 µg/L (Table 3.13).

3.14.8 Dredged Material - The overall data results indicate that sediment within the Federal Channels fails to meet Federal Guidelines (specifically PAHs and heavy metals), and in accordance with joint USEPA/USACE protocols contained in the Great Lakes Dredged Material Testing and Evaluation Manual (1998), is unsuitable for open lake and nearshore placement. Therefore, all dredge material is currently disposed in a CDF.

3.15 Hazardous, Toxic, and Radioactive Waste (HTRW) - There are no known hazardous, toxic, and radioactive waste sites in the general vicinity of the proposed project sites. However, three proposed CDF sites are immediately adjacent to BKL Airport which is built on a former landfill and Nike Administrative Site. A Draft 1992 Risk Assessment for BKL Airport reveals significant levels of contaminants of concern in sediment samples including metals, PAHs, and PCBs (Metcalf and Eddy, 2002). The exposure risk of employees, and adult, teenage, and child spectators of annual events was evaluated with respect to USEPA approved toxicity factors of the contaminants of concern and did not exceed criteria values, except for long term exposure to outdoor maintenance and lawn care employees. However, the cancer risk associated with all groups exceeded acceptable risk and may be associated with the development of cancer in those who visit the site.

3.16 Cultural Resources Definition – Cultural resources are the material remains of past human activities. They can consist of objects, buildings, structures, sites or districts (a group of closely associated sites).

3.16.1 Cultural Resources Significance – Federal agencies' cultural resources responsibilities are defined in a series of laws and regulations that have been promulgated over the years. The most comprehensive and far reaching of these is the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470). The NHPA,

together with its implementing regulations (36 Code of Federal Regulations, Part 800), lays out a process for agencies to follow to accommodate historic preservation concerns with the needs of Federal undertakings. Under Section 106 of the NHPA, it states that a Federal agency shall take into account the effect of its undertakings on historic properties included in or eligible for inclusion in the National Register of Historic Places (NRHP). As part of its required Section 106 consultation process, the Corps also routinely works with appropriate State Historic Preservation Offices (SHPO), Native American Indian Tribes, and other interested parties in managing historic properties found in the Area of Potential Effect (APE) (Appendix D)

An historic property is any prehistoric or historic district, site, building, structure or object included in or eligible for inclusion on the NRHP. Such properties may be significant for their historic, architectural, engineering, archeological, scientific or other cultural values, and may be of national, regional, state, or local significance. The term includes artifacts, records, and other material remains related to such a property or resource. It may also include sites, locations, or areas valued by Native Americans, Native Hawaiians and Alaska Natives because of their association with traditional religious or ceremonial beliefs or activities.

Significance is a term attributable to properties listed in or determined to be eligible for listing in the NRHP (36 CFR Part 60.4). According to these criteria for evaluation, "(t)he quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

- (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
- (b) that are associated with the lives of persons significant in our past; or
- (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- (d) that have yielded, or may be likely to yield, information important in prehistory or history”.

3.16.2 Existing Cultural Resources Environment - General Moses Cleaveland founded the City of Cleveland in 1796. The name changed to its current spelling in 1831 when the "a" was dropped in order to fit the city's name on a newspaper masthead. Originally a frontier village, Cleveland grew into a manufacturing and business center for northern Ohio. Today, the City is headquarters for the manufacturing and service industries, as well as a growing tourism and convention destination.

Approximately 216 properties in the City of Cleveland are listed on the NRHP. Many of the City's National Register sites are located in or immediately east of the central business district. A number of bridges, structures, and districts in the lower Cuyahoga River vicinity have been identified as cultural resources of significance. Of the cultural resources listed, the Cleveland East and West Pierhead Lights are located immediately

adjacent to proposed CDFs 2, 2a, 3, and 3a. No additional significant or recognized cultural resources are affected by the alternative plans.

3.17 Aesthetics - The view of Lake Erie is aesthetically pleasing to visitors in the vicinity of the waterfront (Figure 3.11). Enjoyable views can be found at Edgewater Park, River Park, Harborfront Park, Island Park, Kirtland Park, Voinovich Park and Gordon Park, and at local marinas including Edgewater Marina, Forest City Yacht Club, Northeast Yacht Club, Old River Yacht Club, Commodore's Club Marina, Channel Park Marina, and Wildwood Yacht Club. Commercial businesses such as restaurants, nightclubs and some shops are also located along the waterfront. Cleveland's harbor front boasts a world-class collection of museums, attractions and public events. Some views that might not be as pleasing include industrial and some commercial developments, transportation facilities (highways, roads, rail, airport), and upland developments. Improvements in aesthetic characteristics are increasingly evident on the waterfront.

Figure 3.11 Cleveland Harbor Waterfront



3.18 Visual Resources - The Waterfront District Plan, adopted by the Cleveland City Planning Commission in December 2004, includes many aesthetic features including a continuous 'green ribbon' that will connect the parks and open space along the lakefront (<http://planning.city.cleveland.oh.us/lakefront/cpc.html>). The green ribbon will include a connected lakefront greenway network, renovated and expanded existing parks, a balance of passive and active recreation opportunities, and expanded, year-round programming for all ages. The future plans for the Cleveland waterfront include water taxis, excursion

boats, and an international ferry service that will assure the views of the lake and lakefront will be fully enjoyed. The vision of the committees, stakeholders, elected officials, property owners, design engineers, and residents is “to shape the lakefront as the most vital element in the transformation of Cleveland as a place to live, work, and play” (Cleveland Planning Commission Waterfront District Plan 2004).

3.19 Recreation Facilities and Activities – The comprehensive plan, “Connecting Cleveland: The Waterfront District Plan”, began in April 2002 by Mayor Jane Campbell and the Cleveland Lakefront Partners to develop a community consensus for the future of eight miles of Lake Erie shoreline between Edgewater Park and Gordon Park. The goals of this endeavor are best summarized in the vision statement as an effort to create a lakefront environment where people can live, work, and play. Along with other future plans for the waterfront, recreational boating, fishing, park trails, and tourist areas are all a vision of the Waterfront District Plan.

Recreational boating is the most visible form of recreation in the Cleveland Harbor area. Major marinas are located along the lakefront harbor, immediately west of the West Breakwater, and at the upper end of the Old River. These facilities accommodate thousands of recreational vessels. Considerable recreational boating activities in the Harbor and River Channels include cruising, waterskiing, and fishing.

The closest public swimming beach is Edgewater Park, located approximately 0.3 miles west of the base of the West Breakwater. Numerous other beaches are located along Lake Erie in Cuyahoga County, although most are privately owned and open only to members of lakeshore property associations. Two additional parks in the waterfront area are Gordon and Voinovich Parks.

Court games, field games, and picnicking are available at several municipal parks, playgrounds, and private beach clubs in the Cleveland Lakeshore area. The Cleveland Metroparks System, comprising more than 18,000 acres of park land, contains eleven parks which interface the general Cleveland area. The system contains interpretive centers, hiking trails, riding trails, bicycle trails, swimming and fishing areas, picnic areas, shelter houses, play fields, and golf courses.

Cleveland is home of the Cleveland Indians baseball team and the Cleveland Browns football team. Sport facilities are located on the waterfront. BKL Airport is the site of the annual Grand Prix Auto Race and Cleveland National Air Show; both of which are significant spectator events that have gained National media coverage.

3.20 Aquatic Resources - Fishing is popular along the harbor shoreline and lakefront, and in vicinity of the breakwaters and other harbor structures. A variety of fish species inhabit the harbor area.

3.20.1 Fish – Cleveland Harbor provides habitat for a variety of forage and game fish, and population assessments are routinely completed by ODNR. The central basin of Lake Erie is known for its excellent year-round sport fishing. In the winter and spring,

Cleveland Harbor area is known for smallmouth bass (*Micropterus dolomieu*) and steelhead trout (*Oncorhynchus mykiss*). In the summer and fall, the area is abundant with walleye (*Stizostedion vitreum*), yellow perch (*Perca flavescens*), smallmouth bass, and steelhead trout.

A Fish and Wildlife Coordination Act Report was completed in April 2007 (Appendix I). Species identified were alewife (*Alosa pseudoharengus*), gizzard shad (*Dorosoma cepedianum*), brown bullhead (*Ictalurus nebulosus*), white perch (*Morone americana*), yellow perch (*Perca flavescens*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*M. salmoides*), pumpkinseed (*Lepomis gibbosus*) and black crappie (*Pomoxis nigromaculatus*). Other fish that may be found near the project vicinity may be northern pike (*Esox lucius*), walleye (*Stizostedion vitreum*), white bass (*Morone chrysops*), and various sunfish (*Lepomis sp.*). A revised section to the Fish and Wildlife Coordination Act report regarding the East 55th Street site was submitted to the Buffalo District on May 30, 2008. USF&WS reported observations of fishing access for shoreline anglers. The report concluded that fishing is good in this area and that there are good populations of supporting fish and invertebrate species, such as minnows and shiners, aquatic insects, and benthic organisms, such as crayfish, snails, and mussels. A list of recommendations was provided by the USF&WS. The recommendations have been included in Chapter 4, Section 4.16 and 4.17.

A dive was conducted by a USACE biologist in July of 2008 at the proposed East 55th Street site to determine the general habitat characteristics of the area. Five transects were traversed by the diver through the area in both the open water and nearshore portions of the site. The diver observed that the sediment layer throughout the project site consisted of a homogeneous layer of sandy loam mixed with crushed zebra (*Dreissena polymorpha*) and quagga mussel (*Dreissena rostriformis bugensis*) shells. Due to the homogenous and flat nature of the bottom substrate, it is not expected that any significant fish spawning nest or beds occur in the project area, and none were observed by the diver. Freshwater drum (*Aplodinotus grunniens*) and numerous exotic invasive round goby (*Neogobius melanostomus*) were observed during the dive throughout the proposed project area. A few small largemouth bass and yellow perch were observed by the diver around some of the nearshore areas containing riprap stone. In general, the dive indicated that no outstanding aquatic habitat is present in the proposed project area. The most recent surveys (1994 and 2002) conducted by the OEPA, Division of Surface Water Ecological Assessment Unit in the vicinity of the proposed project area indicated the primary species found, in terms of numbers, were pumpkinseed sunfish, rock bass, and largemouth bass (2008).

Per ER 1105-2-100, paragraph C-3(d)(5), the habitat functions that would be adversely affected through implementation of the final array of alternatives should be characterized using a habitat-based methodology. The significance of the resources in question should also be characterized (ER 1105-2-100, paragraph C-3(d)(4)). This analysis is needed in order to fully assess the potential habitat losses and benefits associated with implementing a proposed plan.

Many methods are available to measure current ecosystem resource conditions and to predict future conditions of those resources. Habitat assessment methods developed for individual species may have limitations when used to assess ecosystem-level problems and objectives, and they do not consider communities of organisms. The assessment methodology chosen for this study is community based and governed by how well the technique meets the needs of the study goals, objectives, and level of detail. The assessment methodology uses species richness (r), which is the number of native fish species found in Cleveland Harbor at each of the potential CDF locations. This method was used to assess the ecological value of the existing aquatic habitat that would be lost with construction of a CDF. The normalized species richness value multiplied by the acres of habitat provides habitat units (HUs) necessary for alternative evaluation. There was no weighting per species type since every fish species within the site is viewed as just as important as the other.

Data collected by OEPA (2008) show species richness for sampling sites in the vicinity of each of the potential CDF locations (Table 3.14). For each potential CDF site, the OEPA sampling site closest to that CDF location was used as a proxy for the species expected to be present at the CDF. A total of 28 species occur throughout the harbor and in an open lake site adjacent to the harbor. Thus the total native species richness achievable is 28, which would equate to normalized $r = 1.0$ ($28/28=1.0$). Therefore, species richness at site 2 or 2a for example, would equate to a normalized $r = 0.43$ ($12/28=0.43$).

As indicated in Table 3.14, the species richness for each of the potential CDF sites is relatively low. This is indicative of the relatively poor fish habitat found throughout Cleveland Harbor. As stated above, a July 2008 dive indicated that habitat in the East 55th Street (Alternatives 4 and 4a) is poor, with sediments consisting of a homogenous layer of sandy loam mixed with crushed zebra and quagga mussels. As a result, it is not expected that any significant fish spawning nests or beds occur in this area. In addition to the invasive zebra and quagga mussels observed, a number of exotic invasive round goby were seen in the project site. These three invasive species have long been considered a significant threat to the Lake Erie ecosystem. As a result, removing invasive mussel and goby habitat by building a CDF may actually provide ecosystem benefits not captured in this analysis. The normalized species richness scores (r) were then multiplied by the number of acres lost at each site to provide the total habitat units lost with construction of a CDF (Table 3.15).

Table 3.14. – Native fish species collected in Cleveland Harbor (ODNR 2006).

Species	Common name	2/2a	3/3a	4/4a	Open Lake
<i>Dorosoma cepedianum</i>	Gizzard shad	x	x	x	x
<i>Ictalurus natalis</i>	Yellow bullhead	x		x	
<i>Morone chrysops</i>	White bass	x	x		x
<i>Pomoxis nigromaculatus</i>	Black crappie	x		x	
<i>Ambloplites rupestris</i>	Rock bass	x		x	x
<i>Micropterus salmoides</i>	Largemouth bass	x	x	x	
<i>Lepomis gibbosus</i>	Pumkinseed	x	x	x	x
<i>Stizostedion vitreum</i>	Walleye	x	x		x
<i>Perca flavescens</i>	Yellow perch	x	x	x	x
<i>Percina caprodes</i>	Log perch	x	x		x
<i>Aplodinotus grunniens</i>	Freshwater drum	x	x		x
<i>Lepisosteus osseus</i>	Longnose gar				x
<i>Carpionodes cyprinus</i>	Quillback				x
<i>Moxostoma duquesnei</i>	Black redhorse				x
<i>Moxostoma erythrurum</i>	Golden redhorse				x
<i>Moxostoma macrolepidotum</i>	Shorthead redhorse		x		x
<i>Catostomus commersonii</i>	White sucker				x
<i>Ictalurus nebulosus</i>	Brown bullhead		x	x	x
<i>Noturus flavus</i>	Stonecat				x
<i>Micropterus dolomieu</i>	Smallmouth bass				x
<i>Cottus bairdii</i>	Mottled sculpin				x
<i>Lepomis macrochirus</i>	Bluegill			x	x
<i>Ictalurus punctatus</i>	Channel catfish				x
<i>Notropis volucellus</i>	Mimic shiner				x
<i>Notropis atherinoides</i>	Emerald shiner	x	x	x	x
<i>Notemigonus crysoleucas</i>	Golden shiner		x	x	
<i>Lepomis cyanellus</i>	Green sunfish			x	
<i>Notropis hudsonius</i>	Spottail shiner		x		x
TOTAL SPECIES		12	13	12	23

Table 3.15 Habitat Units Lost With Construction of CDF

Site	2	2a	3a	3a	4	4a
Number of Species	12	12	13	13	12	12
Normalized r	0.43	0.43	0.46	0.46	0.43	0.43
Acres	108	130	117	129	157	157
Habitat Units	46.44	55.9	53.82	59.34	67.51	67.51

While a number of options exist for providing habitat, the presence of invasive species in Cleveland Harbor suggests that efforts should focus on vegetative rather than rocky habitat. Rocky habitat is more likely to attract zebra mussels, which will then attract round gobies (*Neogobius melanostomus*), which eat zebra mussels. Instead, “fish hotels” and/or habitat baskets which focus on providing vegetative cover and food would be a more appropriate measure as they would provide habitat for native fish species rather than exotics such as the goby. These fish hotels have been constructed along the Chicago River in Illinois and have provided good results. A typical fish hotel would consist of:

- A floating structure with native aquatic plants on the surface to attract insects for fish to eat.
- A submerged level with more wetland plants for shelter.
- Several deeper fish cribs, where bigger fish can linger and hide.
- Typical dimensions may be 10 feet by 50 feet with depths around 9 feet. A

Habitat baskets have been implemented along the lower 5.5 miles of the Cuyahoga River to provide viable habitat that supports larval fish and adults as they migrate through the river to and from Lake Erie. A habitat basket is designed to fit in the recesses of corrugated steel sheet pile. Each basket holds a plant pillow that can hold a variety of wetland plants. The mesh plant pillow prevents carp and geese from eating the plant seeds and roots.

A number of these structures could be placed throughout the harbor. Although the exact design and placement of the hotels and/or baskets will be developed in conjunction with ODNR, USFWS, and the City of Cleveland during the design phase of the study, it is anticipated that they will attract all of the native species currently found in the harbor, and would also attract those fish species found at the site just outside of the harbor. These increases will occur due to fish being attracted to the new spawning/resting areas and predator fish that would be attracted to feed on these fish. As a result, it is hoped that the richness values (*r*) for those areas of the harbor which contain the hotels/baskets would be at least 1 (28/28), if not greater. Although the actual size of the fish hotels is relatively small (~500 square feet each), they would be expected to increase the richness factor not only within the hotel, but within all harbor areas surrounding the hotels. Habitat baskets provide 1.5 cubic feet of habitat and should also increase the richness value of the area. As a result, it is anticipated that construction of several (less than 10) fish hotels and installing multiple habitat baskets will provide enough high quality habitat to provide sufficient habitat units to offset the loss of currently poor to moderate habitat due to CDF construction. Based on the hotels used in the Chicago River Project, estimated cost for the hotels is approximately \$50,000 each. Therefore, each alternative plan has a \$500,000 mitigation component included in the cost estimates and economic analysis. Habitat baskets cost approximately \$300 each, including installation.

3.20.2 Zooplankton and Benthic Organisms - A study that analyzed the changes in the benthic macroinvertebrate community of the Cleveland Harbor area from 1978 to 1989 indicated that the most abundant macroinvertebrates were oligochaete worms, sphaeriid clams, and chironomid larvae (Krieger and Ross 1993). Of the 75 taxa identified, 22

were oligochaetes, 16 were chironomids, and 11 were mollusks. This community composition was suggestive of highly organically enriched sediments. Improvement in the habitat quality of the area, including the harbor, since the late 1970s was evident from a dramatic increase in the number of taxa at all sites, a reduction in the proportion of oligochaete worms, a large increase in the abundance of sphaeriid clams and midge larvae, and the widespread distribution (though low abundance) in open water of caddisfly larvae (*Oecetis* spp.) which were absent in the late 1970s. Midges of the genus *Chironomus* remained largely absent from the harbor, and the abundance of the genus *Procladius* remained low around the mouth of the Cuyahoga River. The abundance of oligochaete worms has increased substantially around the river mouth over the decade. It is important to note, however, that this study took place before and during the introduction of the exotic invasive zebra mussel in Lake Erie. The zebra mussel, and more recently quagga mussel, set the stage for long-term changes in the structure of pelagic and benthic communities in the Great Lakes (Edsall and Charlton 1997). In the late 1980's and early 1990s, the zebra mussel became widespread in nearly all nearshore regions of the Great Lakes, particularly in areas with hard substrates. The mussels, which feed by filtering particles from the water, may cause substantial changes in the food chain by removing large amounts of the phytoplankton and smaller zooplankton, along with suspended materials, from the water and depositing them on the bottom. This process greatly reduces the plankton community and the amount of food available to planktivorous fish that feed in the water column above the bottom, and greatly increases the food supply for benthic communities and bottom feeding fish.

3.20.3 Phytoplankton - Phytoplankton composition in the vicinity of Cleveland Harbor consisted of the following dominant algal groups: diatoms (*Baccillariophyta*), green algae (*Chlorophyta*), chrysophytes (*Chrysophyta*), and blue green algae (*Cyanophyta*).

3.21 Terrestrial Resources - The history of shoreline disturbance and development has significantly contributed toward a reduction of the amount of suitable shoreline habitat available for use by wildlife. Diminishment of the natural vegetative communities has fragmented habitat, limited food, cover, and nesting areas for terrestrial and avian wildlife.

3.21.1 Vegetation - Most of the existing CDF sites are heavily vegetated with common reed (*Phragmites australis*) which is mowed annually when conditions are dry enough to allow entry by equipment. Trees that occur naturally near the waterfront include black willow (*salix nigra*), staghorn sumac (*Rhus typhina*), eastern cottonwood (*Populus deltoides*), black locust (*Robinia pseudoacacia*) and green ash (*Fraxinus pennsylvanica*).

3.21.2 Wildlife - Avifauna typically found in the CDF areas include American robin (*Turdus migratorius*), common grackle (*Quiscalus quiscula*), American (common) crow (*Corvus brachyrhynchos*), killdeer (*Charadrius vociferous*), bluejay (*Cyanocitta cristata*), Northern cardinal (*Cardinalis cardinalis*), yellow warbler (*Dendroica petechia*), American goldfinch (*Carduelis tristis*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), tree swallow (*Iridoprocne bicolor*), mourning dove (*Zenaida macroura*), and rock dove (*Columba*

livia). Waterfowl and shorebirds utilizing the harbor and shoreline likely include mallards (*Anas Platyrhnhos*), Canada goose (*Branta Canadensis*), American black duck (*Anas rubripes*), species of gulls, terns, and shore and wading birds such as sandpipers, plovers, yellowlegs (*Tringa spp.*), rail (*Rallus spp.*), great blue heron (*Ardea Herodias*) and similar species. In addition, other predatory birds such as owls and hawks likely pass through the area.

Additional fauna found in the vicinity of Cleveland Harbor include the leopard and green frogs (*Rana pipiens* and *R. clamitans*, respectively), water snake (*Natrix sipedon*), and snapping turtle (*Chelidra serpendina*). Mammalian species that may occur near the project area include the eastern chipmunk (*Tamias striatus*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), muskrat (*Ondrata zibethica*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginiana*), hairy-tailed vole (*Parascalops breweri*), star-nosed vole (*Condylura cristata*), cottontail rabbit (*Sylvilagus floridanus*), and prairie vole (*Microtus Pennsylvanicus*).

Wildlife control is a significant issue in the area of the Cleveland CDFs due to the proximity of BKL Airport. The Airport currently employs a wildlife biologist with the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) to control wildlife at BKL. The major problem/hazard species that utilize this area include: Bonaparte's Gull (*Larus philadelphia*), Herring Gull (*Larus argentatus*), Ring-billed Gull (*Larus delawarensis*), Canada Goose, Greater Scaup (*Aythya marila*), Lesser Scaup (*Aythya affinis*), Red-breasted Merganser (*Mergus serrator*), Mallard, Mute Swan (*Cygnus olor*), Double-crested Cormorant (*Phalacrocorax auritus*), Caspian Tern (*Sterna caspia*), Great Blue Heron, Killdeer (*Charadrius vociferous*), Red-winged Blackbird (*Agelaius phoeniceus*), American Kestrel (*Falco sparverius*), Coyote (*Canis latrans*), Eastern Meadowlark (*Alliaria petiolata*), European Starling, Mourning Dove (*Zenaida macroura*), and Red-tailed Hawk (*Buteo jamaicensis*). Birds are the dominant concern at BKL and bird strikes caused approximately \$4 million in aircraft damage in 2002.

3.21.3 Endangered Species Act - It is the USACE policy to operate and maintain existing projects in accordance with the project authorization and in a manner that fosters the existence and encourages the propagation of threatened and endangered species, and that protects critical habitat. The proposed project lies within the range of Federally listed endangered and candidate species including the Indiana bat (*Myotis solalis*), eastern massasauga (*Sistrurus catenatus*), and piping plover (*Charadrius melodus*).

3.21.4 Species of Concern - The ODNR advised that old State species records indicate the following species could lie within the proposed project area: Muskellunge (*Esox masquinongy*) (1970 species of concern); Upland sandpiper (*Bartramia longicauda*) (1978-threatened); and Richardson's pondweed (*Potamogeton richardsonii*) (1982-potentially threatened).

3.22 Floodplain Areas - Proposed CDF sites 4 and 5 are located within Federal Emergency Management Agency (FEMA) flood plain areas. The south eastern portion of proposed CDF site 1 is also located within a FEMA designated flood plain however the north western portion of the site is outside the flood plain boundary. The southeast quadrant of proposed East 55th CDF, from the south landward boundary to the northern limit of the adjacent marina, is a designated flood plain. The remainder of the site is outside the flood plain boundary. Proposed CDF sites 2, 3, 6, 7, and 8 are not within designated flood plains (FEMA, 2006).

3.23 Wetlands - Wetlands that once existed have since been eradicated as the result of urbanization and industrial development. The National Wetlands Inventory indicates there are no known jurisdictional wetlands in the general vicinity of the proposed project sites. However, CDFs often produce non-jurisdictional, intermittent wetlands during the filling process. As the CDF is gradually filled with dredged material, the ponded water is replaced with sediment creating small wetlands. The wetlands are temporary and as the CDF is filled, the temporary wetland within the CDF changes to upland.

3.24 Geology and Soils - Cleveland, Ohio is located within the Lake Plains subprovince of the Central Lowland physiographic province. The Northeastern Ohio section of the subprovince is a five to ten mile wide strip of relatively flat land along the south shore of Lake Erie. Terrain throughout the Cleveland area is generally flat, sloping towards Lake Erie with an elevation change from about 580 feet at the lake to 1,000 feet 10 to 15 miles inland. However, lake level fluctuations alter the shoreline topography of the subprovince and surrounding shoreline; decreases in lake levels expose more of the natural or undisturbed land surface, thus forming bluffs ranging 20 to 40 feet high at or near the Lake Erie shoreline. The major tributary in the Cleveland area is the Cuyahoga River which drains into Lake Erie. The Cuyahoga River and its tributaries comprise the Cuyahoga River Watershed which drains 813 square miles including 26 subwatersheds in six counties (Cuyahoga River Community Planning Organization, 2007).

Northern Ohio is a thick sequence of sedimentary strata of Paleozoic Age, mantled by Pleistocene glaciolacustrine and glacial till deposits. The underlying layer of the Paleozoic strata is Precambrian crystalline gneiss and granite basement rocks. Precambrian rock outcrops are absent throughout Ohio because these outcrops lie approximately 5,000 feet below sea level. Unconsolidated surface deposits in the region surrounding Cleveland, Ohio, are derived from materials associated with Pleistocene glaciation including low-relief fossil beaches, striations marking periods in the development of Lake Erie, and weathering of exposed bedrock. Members of the Ohio Shale Formation of Devonian age underlie the unconsolidated surface along a five to seven mile wide belt that parallels the south shore of the lake. Total thickness of this formation can be as much as 500 to 600 feet. Southward from this sequence is younger belts of Mississippian and Pennsylvanian shale, sandstone, and limestone. The materials that make up these formations erode and are transported through tributaries and the Cuyahoga River. Sediment and material either settle to the tributary's bottom or eventually reach Cleveland Harbor or Lake Erie.

3.25 Climate - Within the study area, the climate is generally temperate and cool. Spring and fall are mild and cool, summer is warm, and winter is typically cold and snowy (Government of Canada and USEPA, 2002). The average temperature ranges between 20 and 35 degrees Fahrenheit in winter and 60 to 75 degrees Fahrenheit in summer (Midwest Regional Climate Center, 2001). The average annual precipitation ranges from 31 to 33 inches (1931-1980) (ODNR, 1992).

Lake-effect snows is a common occurrence throughout the Great Lakes region. Lake effect snow occurs when cold air masses pass over warm water of the Great Lakes; this is a common phenomenon because the depth and surface area of the Great Lakes sustains warmer water temperatures well into winter, thus preventing the lakes from freezing (American Geophysical Union, 2007). The warm water and surface area of the lakes provides a long fetch for cold air masses to produce squalls of intense snow. The intensity of lake effect storms is dependent upon the temperature variance between the air and water, the distance the front has traversed over the lake, and the regional weather conditions. In addition, lake effect snow occurrences become more intense in locations where the local terrain on the lee shores includes small hills or mountains (Burnett, 2003).

Lake effect snowfall totals range greatly across the City. Cleveland Hopkins Airport has measured over 100 inches (254 cm) of snowfall in a given season only three times since 1968, whereas areas further south of the City receive less than 20 inches. The average annual snowfall for the City of Cleveland, from 1968 through 2006, recorded at Cleveland Hopkins Airport is 64.5 inches (NOAA, 2007)

3.26 Air Quality - In 2005, Cuyahoga County was designated a nonattainment area for ozone (eight-hour) and PM 2.5 (USEPA AirData – County Air Quality Report, 2006). The potential project area lies within the Ohio Air Quality Control Region (AQCR) referred to as Cleveland number 174. Boundaries for each region were set by consideration of air pollution levels, population density, geography, and common meteorological conditions. As indicated in the 2005 OEPA Ohio Air Quality Report, the following criteria pollutants were monitored: particulate matter smaller than or equal to 10 micrometers (μm)(PM₁₀), particulate matter smaller than or equal to 2.5 (μm) (PM_{2.5}), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), and lead (Pb). Since 1987, total suspended particles (TSP) data collection has been gradually replaced by PM₁₀ data. There were over 200 TSP monitors in 1987 and in 2003 there were only 12 TSP monitors reporting data, all are used for lead or other metals monitoring.

Intermittent ambient air quality monitoring was conducted at 75 sites throughout the City of Cleveland. PM₁₀ was monitored at 15 sites with a high annual 24-hour mean concentration of 42.8 $\mu\text{g}/\text{m}^3$. This concentration is below the Federal and State EPA primary annual arithmetic mean (50 $\mu\text{g}/\text{m}^3$) and the primary 24-hour standard (150 $\mu\text{g}/\text{m}^3$). Continuous ambient air quality monitoring was conducted for SO₂, nitrogen oxides, CO, and O₃ at Government-operated sites. SO₂ was monitored at 12 sites

throughout the City with a high annual mean 24-hour concentration of 0.0073 parts per million (ppm), which is below the Federal and State EPA primary standard of 0.03 ppm. NO₂ was monitored at two sites in the City and recorded a high annual mean concentration of 0.018 ppm; this measurement is below the primary standard of 0.053 ppm. The highest quarterly mean concentration reading for Pb at seven recording sites was 0.36ppm which is below the primary standard of 1.5 ppm. The fourth highest 8-hour average concentration for O₃ between 14 monitoring sites was 0.076 ppm, just below the primary standard of 0.081 ppm set by the Federal and State EPA. The OEPA report indicates that the second highest 8-hour concentration of CO recorded between the eight monitoring sites was 3.5 ppm, which is below the primary ambient air quality standard of 9.0 ppm for this time period. USACE contactors will be required to comply with emission standards cited in Sections 176 and 309 of the Clean Air Act during construction activities.

3.27 Noise - Ambient noise levels throughout the study area are a function of land use within the harbor area including: navigation facilities, industrial and commercial developments, transportation facilities (highways, roads, rail), recreational facilities (parks, marinas), and nearby residential developments. Daytime background noise levels vary at locations but are generally expected to range from 50 to 80 dBA. Average noise levels in close proximity to automobile and truck traffic can range from 60 to 90 dBA and are affected primarily by traffic volumes and speed. Noise levels in the vicinity of the airport range significantly due to aircraft taking off and landing; noise levels range between 80 and 130 dBA. BKL Airport hosts Grand Prix auto racing in June each year. Concerts and events are held in conjunction with the races. The airport also hosts the Cleveland National Air Show near Labor Day weekend each year. All of these events contribute to the noise level in the area. However, the events are short-term and will not cause significant noise problems as compared to regular air traffic.

CHAPTER 4: ENVIRONMENTAL EFFECTS AND EVALUATION

4.1 Introduction - This section presents the anticipated environmental effects of seven alternative plans: No Action, East 55th Street, CDFs 2, 3, 2a, 3a, and FMPs. In Chapter 2 East 55th Street alternative is assessed as two separate plans for economic evaluation because engineering components of the steel sheet pile, to support possible future commercial development, would be more robust (i.e. strength, thickness, and durability) and therefore more costly. However, in this Chapter, East 55th Street is evaluated as one plan because the type of steel sheet pile used does not alter the footprint and design capacity and therefore the environmental effects are the same. Consistent with the Council on Environmental Quality's regulations implementing NEPA, environmental effects can be described as:

- Direct effects, which are caused by an action and occur at the same time and place;
- Indirect effects, which are caused by an action, but are later in time or removed in distance from the action (40 CFR 1508.8);
- Cumulative effects resulting from the incremental impact of an action when considered in combination with past, present, and reasonably foreseeable future actions, regardless of the agency or individual that undertakes such other actions.

Cumulative impacts can result from actions that are, of themselves, minor, but when considered collectively over time, can be significant (40 CFR 1508.7). Cumulative impacts are defined as the incremental impact of a proposed action when added to those of other past, present, and reasonable foreseeable future actions, regardless of the entity carrying out such actions. Geographical boundaries for this discussion of cumulative impacts are the Federal limits of the Cuyahoga River Channels and Cleveland Outer Harbor, the harbor's proposed alternative placement sites, and the City of Cleveland and Cuyahoga County. Temporal boundaries established for this analysis span from the 1960's to 2028 (the life cycle of this DMMP).

- Past: 1967 when CDF 13 was constructed as a demonstration project in Cleveland Harbor to contain sediment dredged from the Federal navigation channels. 2003, initiation of the DMMP studies.
- Present: 2008, ongoing DMMP studies.
- Future: 2015 through 2028, when a new disposal alternative will be operational

Projecting the reasonable foreseeable future actions is difficult at best. Not all the actions by others that may affect the same resources as the proposal are clear. Projections of those actions must rely on judgment as to what is reasonable based on existing trends and where available, projections from qualified sources. Reasonably foreseeable does not include unfounded or speculative projections. In this case, present and reasonably foreseeable future actions within the temporal and spatial boundaries may include:

- Continued commercial navigation
- Continued economic growth related to industrial revenue
- Continued commercial development
- Change in navigation traffic patterns due to deauthorization of a portion of the Federal navigation channel in the Outer Harbor
- Continued development and construction commensurate with the City of Cleveland's 50 Year Waterfront District Plan, as amended.
- Change in existing land use patterns at existing CDFs 10B and 12
- Proposed passive recreation amenities
- Infrastructure/utilities development
- Continued application of environmental requirements such as those under the Clean Water Act
- Impacts on wildlife including aquatic species and habitat
- Continue to assess feasibility of beneficial use alternatives
- Development of the CDF once it is transferred to the local sponsor
- Costs incurred by the City of Cleveland to extend several CSOs and other discharges
- Transportation extensions (e.g. roads, rail) to support future development

Table 4.1 presents a summary of the anticipated environmental effects of the plan alternatives/measures considered in this DMMP/EIS.

Discipline	No Action (No Change)	New CDF Construction (Proposed 55th CDF)	New CDF Construction (Proposed CDF 2)	New CDF Construction (Proposed CDF 3)	New CDF Construction (Proposed CDF 2A)	New CDF Construction (Proposed CDF 3A)	Existing CDF Management
Socio-Economics (Community/Regional Growth and Employment/Income)	Direct negative short and long-term effects to businesses related to shipping	Direct positive short and long-term effects during dredging and construction. Direct, negative short and long term effects to nearby communities.	Direct positive short and long-term effects during dredging and construction.	Direct positive short and long-term effects during dredging and construction.	Direct positive short and long-term effects during dredging and construction.	Direct positive short and long-term effects during dredging and construction.	Direct, positive short and long-term effect; CDF maintenance creates jobs.
Transportation	Direct, negative short and long-term effects to commercial & recreational navigation.	Direct, negative short-term effects to commercial and recreational activities during construction. Direct positive short term effects of maintaining authorized depth. Cumulative positive effect to navigation.	Direct, negative short-term effects to recreational activities during construction. Direct positive short term effects of maintaining authorized depth.	Direct, negative short-term effects to commercial and recreational activities during construction. Direct positive short term effects of maintaining authorized depth.	Direct positive short term effects of maintaining channel depths. Direct, negative short-term effect to navigation during construction. Cumulative positive effect to navigation, but requires channel deauthorization	Direct positive short term effects of maintaining channel depths. Direct, negative short-term effect to navigation during construction. Cumulative positive effect to navigation, but requires channel deauthorization	Indirect, negative short-term effects to BKL Airport operations; cumulative impact of implementing Wildlife Management Plan.
Aesthetics	No effects anticipated.	Direct, negative short-term effects from construction equipment. Cumulative positive effects on future development by the sponsor. Direct, negative, long term effects to views by waterfront properties.	Direct, negative short-term effects due to construction equipment. Cumulative positive effects on future development by the sponsor.	Direct, negative short-term effects due to construction equipment. Cumulative positive effects on future development by the sponsor.	Direct, negative short-term effects due to construction equipment. Cumulative positive effects on future development by the sponsor.	Direct, negative short-term effects due to construction and disposal equipment; long-term minor impacts from increased CDF height.	Direct, negative short-term effects due to construction and disposal equipment; long-term minor impacts from increased CDF height.

Discipline	No Action (No Change)	New CDF Construction (Proposed East 55th CDF)	New CDF Construction (Proposed CDF 2)	New CDF Construction (Proposed CDF 3)	New CDF Construction (Proposed CDF 2A)	New CDF Construction (Proposed CDF 3A)	Existing CDF Management
HTRW	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.
Water Quality/Water Resources	Indirect, negative long-term effect w/o dredging contaminated sediment would remain.	Direct, negative, short-term effects due to turbidity during construction and dredging. Direct, positive long term effect of removing contaminated sediment. Direct negative short-term effect of filling lake bottom. Cumulative positive effect to navigation, but requires channel deauthorization.	Direct, negative, short-term effects due to turbidity during construction and dredging. Direct, positive long term effect of removing contaminated sediment. Direct negative short term effect of filling lake bottom. Cumulative positive effect to navigation, but requires channel deauthorization.	Direct, negative, short-term effects due to turbidity during construction and dredging. Direct, positive long term effect of removing contaminated sediment. Direct negative short term effect of filling lake bottom. Cumulative positive effect to navigation, but requires channel deauthorization.	Direct, negative, short-term effects of filling lake bottom for CDF and due to turbidity during construction and dredging. Direct, positive long term effect of removing contaminated sediment. Cumulative positive effect to navigation, but requires channel deauthorization.	Direct, negative, short-term effects of filling lake bottom for CDF and due to turbidity during construction and dredging. Direct, positive long term effect of removing contaminated sediment. Cumulative positive effect to navigation, but requires channel deauthorization.	Direct, positive short-term effects by creating capacity for dredged sediment and maintaining authorized channel depths.
Cultural Resources	No effects anticipated.	No effects anticipated.	Indirect, negative minor short-term effects from construction to W. pierhead light	Indirect, negative minor short-term effects from construction to E. pierhead light	Indirect, negative minor short-term effects from construction to W. pierhead light	Indirect, negative minor short-term effects from construction to E. pierhead light	No effects anticipated.

Discipline	No Action (No Change)	New CDF Construction (Proposed East 55th CDF)	New CDF Construction (Proposed CDF 2)	New CDF Construction (Proposed CDF 3)	New CDF Construction (Proposed CDF 2A)	New CDF Construction (Proposed CDF 3A)	Existing CDF Management
Aquatic Resources (including benthos and plankton)	Indirect, negative long-term effect. W/o dredging silt would eliminate aquatic habitat and food.	Direct, negative long-term effect. Aquatic habitat eliminated during construction. Indirect positive long term effect; spawning shelves installed on CDF perimeter.	Direct, negative long-term effect on aquatic habitat during construction. Indirect positive long term effect; spawning shelves installed on CDF	Direct, negative long-term effect on aquatic habitat during construction. Indirect positive long term effect; spawning shelves installed on CDF	Direct, negative long-term effect on aquatic habitat during construction. Indirect positive long term effect; spawning shelves installed on CDF	Direct, negative long-term effect on aquatic habitat during construction. Indirect positive long term effect; spawning shelves installed on CDF	Indirect, negative long-term effect. Filling a CDF eliminates aquatic habitat within the facility.
Recreation	Indirect, negative long-term effects for boating access in harbor.	Indirect, negative short-term effects on boating during construction. Indirect, positive cumulative effect for CDF development. Direct, negative, long-term effects to existing rec	Indirect, negative short-term effects on boating during construction. Indirect, positive cumulative effect for CDF development.	Indirect, negative short-term effects on boating during construction. Indirect, positive cumulative effect for CDF development.	Indirect, negative short-term effects on boating during construction. Indirect, positive cumulative effect for CDF development.	Indirect, negative short-term effects on boating during construction. Indirect, positive cumulative effect for CDF development.	No effects anticipated.
Terrestrial Resources (vegetation and wildlife)	No effects anticipated.	Indirect negative long term effect at BKL from direct cumulative effect of increase in plants and wildlife at CDF	Indirect negative long term effect at BKL from direct cumulative effect of increase in plants and wildlife at CDF	Indirect negative long term effect at BKL from direct cumulative effect of increase in plants and wildlife at CDF	Indirect negative long term effect at BKL from direct cumulative effect of increase in plants and wildlife at CDF	Indirect negative long term effect at BKL from direct cumulative effect of increase in plants and wildlife at CDF	Indirect, negative short-term effect of terrestrial resources when implementing the FMP.
Endangered Species	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.	No effects anticipated.

Discipline	No Action (No Change)	New CDF Construction (Proposed East 55th CDF)	New CDF Construction (Proposed CDF 2)	New CDF Construction (Proposed CDF 3)	New CDF Construction (Proposed CDF 2A)	New CDF Construction (Proposed CDF 3A)	Existing CDF Management
Geology and Soils	No effects anticipated.	Direct, negative long term effect; stone perimeter CDF requires extensive quarry excavation.	Direct, negative long term effect; stone perimeter CDF requires extensive quarry excavation.	Direct, negative long term effect; stone perimeter CDFs require extensive quarry excavation.	Direct, negative long term effect; stone perimeter CDFs require extensive quarry excavation.	Direct, negative long term effect; stone perimeter CDFs require extensive quarry excavation.	No effects anticipated.
Air Quality	No effects anticipated.	Direct, negative short-term effects from construction equipment emissions.	Direct, negative short-term effects from equip. emissions.	Direct, negative short-term effects from equip. emissions.	Direct, negative short-term effects from equip. emissions.	Direct, negative short-term effects from equip. emissions.	Direct, negative short-term effects from equip. emissions.
Noise	No effects anticipated.	Direct, negative short term effects during construction.	Direct, negative short term effects of construction.	Direct, negative short term effects of construction.	Direct, negative short term effects of construction.	Direct, negative short term effects of construction.	Direct, negative short-term effect of construction.

4.2 Socioeconomics – Cleveland is an important Great Lakes city. Because of its’ location and transportation facilities, it has become an important local, State, regional, national and world center of industry and commerce. For evaluation purposes, socioeconomics impacts are assessed by ‘Community and Regional Growth/Environmental Justice’, and ‘Employment and Income’.

4.2.1 Community and Regional Growth/Environmental Justice

a. No Action (No Change): This alternative involves no construction or filling operations and there would be no plan for future long-term placement of dredged material. Federal dredging and disposal operations in Cleveland Harbor would cease and the navigation channels would progressively shoal in. As a result, commercial and recreational navigation and associated businesses would be adversely affected, hindering community economic and social well-being, and preventing continued community and regional growth. Consequently, individuals and businesses dependent on this mode of transportation for their livelihood would suffer economic losses and possibly close. Associated long-term land use changes and community and regional development changes would occur.

b. New CDF Construction (East 55th Street site): Development of a new CDF would provide for continued harbor and channel maintenance dredging and disposal of dredged material into a CDF and associated benefits for approximately 20 years. About 157 acres of harbor area adjacent to the shoreline would be converted to a CDF, filled, and transferred to the local sponsor for future use. Overall community interests and concerns could include: associated non-Federal project costs, containment of contaminated dredged material, continued harbor maintenance, and changes to waterfront land use.

Due to the CDF’s connection to shore, waterfront land use is affected. Impacted community assets include 2,200 linear feet of shoreline fishing comprised of 1,900 linear feet of sheet steel pile bulkhead and 300 feet of large-stone rubblemound dike that forms the guidewall for the First Energy water circulation system intake structure. This loss of shoreline access may adversely affect property values and diminish community cohesion that results from recreational and social activities on the waterfront. It is also believed that much of the fishing conducted from the First Energy intake platform is for sustenance. However, East 55th Street would enable future actions to be carried out at the CDF and yield the intended socio-economic benefits. There could be a positive long-term effect on community and regional growth since the site would be available for future use by the City.

An analysis of census tract data (see map of U.S. Census tracts, Figure 4.1 below) in the vicinity of the proposed site of the East 55th Street CDF indicate that this alternative plan does not disproportionately impact low-income or minority populations. Cuyahoga County Census tracts 1111 and 1113 have poverty rates of 21.9 percent and 27.2 percent, respectively (U.S. Census Bureau, 2000). By comparison, the City of Cleveland has a poverty rate of 32.4 percent (U.S. Census of Population and Housing,

2006. African American and Hispanic population proportions also indicate that these populations are not disproportionately affected when compared to the City of Cleveland populations (see Table 4.2 below).

Table 4.2 General population characteristics adjacent to East 55 th Street CDF			
	Cuyahoga County Census Tract 1111	Cuyahoga County Census Tract 1113	City of Cleveland
Poverty rate	21.9%	27.2%	32.4%
Race			
White	54.4%	27.8%	38.7%
African American	32.2%	69.6%	53.8%
Hispanic	6.8%	5.6%	7.7%

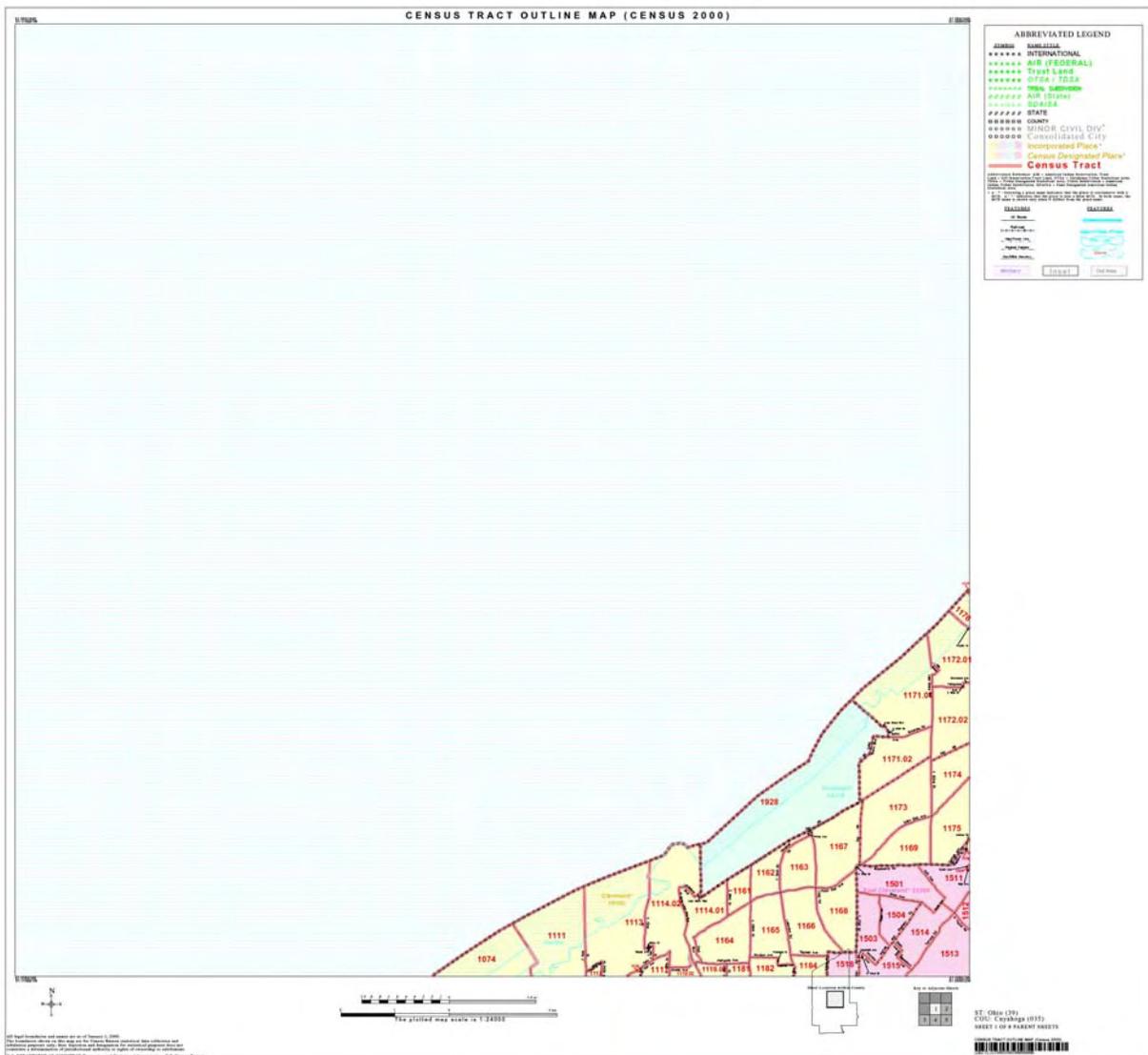


Figure 4.1: U.S. Census tracts in the vicinity of the proposed site of the East 55th Street CDF.

The City of Cleveland Planning Department monitors and maps land use in Cleveland. According to the most recent 1999 mapping, the land use in the areas surrounding the East 55th Street site are predominately transportation/utilities, office, retail, and light industrial.

c. New CDF Construction (Site 2): Development of a new CDF would provide for continued harbor and channel maintenance dredging and disposal of dredged material into a CDF and associated benefits for approximately 20 years. About 108 acres of outer harbor area would be converted to a CDF, filled, and transferred to the local sponsor for future use. Overall community interests and concerns could include: associated non-Federal construction costs, containment of contaminated dredged material, continued harbor maintenance, and eventual additional waterfront land use. There could be a positive long-term effect on community and regional growth since the site would be available for future use by the City. Due to its off-shore location, specific populations are not disproportionately affected.

d. New CDF Construction (Site 3): Development of CDF 3 would provide for continued harbor and channel maintenance dredging and disposal of dredged material into a CDF and associated benefits for approximately 20 years. About 117 acres of outer harbor area would be converted to a CDF, filled, and transferred to the local sponsor for future use. The overall community interests and concerns for this proposed site would be the same as for CDF 2. Due to its off-shore location, specific populations are not disproportionately affected.

e. New CDF Construction (Site 2a): Impacts would be similar to those described for proposed CDF 2. About 130 acres of outer harbor area would be converted to a CDF, filled, and transferred to the local sponsor for future use.

f. New CDF Construction (Site 3a): Impacts would be similar to those described for proposed CDF 3. About 129 acres of outer harbor area would be converted to a CDF, filled, and transferred to the local sponsor for future use.

g. Existing CDF Management: Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. When the existing CDFs are filled to capacity, the facility would be transferred to the local sponsor for future use, thus possibly having a positive effect on regional growth.

h. Environmental Impacts Summary: In general, positive community and regional growth effects are expected to result from the continued Federal maintenance of Cleveland Harbor that all action alternatives provide. None of the alternatives have social justice impacts of concern. Any impacts to community cohesion/growth as a result of potential development of the CDF in the future are the responsibility of the local sponsor to appropriately address if and when such detailed plans are finalized. Therefore,

it is anticipated that any such impacts would be addressed in a separate EIS action separately by others, and would be mitigated in a manner acceptable to the community.

4.2.2 Employment and Income

a. No Action (No Change): If Federal harbor navigation facilities were not maintained, both commercial and recreational navigation and associated businesses would be adversely affected. Associated business, industry, employment, and income could be reduced.

b. New CDF Construction (East 55th Street site): Harbor operation and maintenance provides business, employment, and income to material supply, construction and dredging interests. Continued operation and maintenance of harbor Federal navigation facilities would facilitate both commercial and recreational navigation and associated businesses (limestone, iron ore, cement, sand, gravel, salt, oil, grain, and general cargo). CDF sites are also used by non-Federal local interests for the disposal of dredged material. Project construction would provide business, industry, employment, and income to construction, supply and service industries during the construction period. Development of this alternative would provide for continued harbor channel maintenance, and dredging and disposal operations for approximately 20 years. Business and industry dependent on commercial shipping and local marinas which rely on the channels for navigation would be expected to continue operations similar to existing conditions or possibly expanded levels. Eventually the CDF would be filled and transferred to the local sponsor for future use.

The East 55th Street Marina would incur some impact due to the construction of the CDF along the breakwaters sheltering the marina. The resulting loss of navigable water adjacent to the marina and deteriorated views may adversely impact revenues generated from slip rental, restaurant/concession operations, and fuel sales at the marina.

c. New CDF Construction (Site 2): Harbor operation and maintenance provides business, employment, and income to material supply, construction and dredging interests. Continued operation and maintenance of harbor Federal navigation facilities would facilitate both commercial and recreational navigation and associated businesses (limestone, iron ore, cement, sand, gravel, salt, oil, grain, and general cargo). CDF sites are also used by non-Federal local interests for the disposal of dredged material. Project construction would provide business, industry, employment, and income to construction, supply and service industries during the construction period. Development of this alternative would provide for continued harbor channel maintenance, and dredging and disposal operations for approximately 20 years. Business and industry dependent on commercial shipping and local marinas which rely on the channels for navigation would be expected to continue operations similar to existing conditions or possibly expanded levels. Eventually the CDF would be filled and transferred to the local sponsor for future use.

d. New CDF Construction (Site 3): The effects to employment and income for proposed CDF 3 would be similar to the above proposed CDF 2 effects.

e. New CDF Construction (Site 2a): The effects to employment and income for proposed CDF 2a would be similar to the above proposed CDF 2 effects.

f. New CDF Construction (Site 3a): The effects to employment and income for proposed CDF 3a would be similar to the above proposed CDF 2 effects.

g. Existing CDF Management: Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. Employment opportunities would be provided during dredging and disposal operations, and construction periods associated with raising the existing CDF perimeter. When the existing CDFs are at full capacity, the land can be used by the City for future use, thus possibly having a positive effect on employment, income, and land development.

h. Environmental Impacts Summary: Positive future changes to employment and income, passive recreation amenities, and public facilities are anticipated to result from the DMMP alternatives.

4.3 Transportation – Cleveland Harbor is an important local, state, regional, and national port. The area is served via air, rail, roadways, and water.

a. No Action (No Change): This alternative involves no construction or filling operations and there would be no plan for future long-term placement of dredged material. Federal dredging and disposal operations in Cleveland Harbor would cease and the navigation channels would progressively shoal in. Recreation and commercial navigation, and associated enterprises, would be adversely affected. Consequently, individuals and enterprises dependent on this mode of transportation would suffer economic losses. Railroad transportation would be a secondary transportation mode that would most likely suffer economic losses as riverfront businesses close down and no longer rely on rail transport for goods and materials. There would be no anticipated change in air traffic transportation.

b. New CDF Construction (East 55th Street site): This alternative would have a long-term beneficial impact on river navigation by ensuring adequate depths in the navigation channels. It would also benefit railroad transportation economically because existing river front industry would continue to utilize rail cars for commodity distribution. Construction of a new CDF would have minimal effect on local traffic patterns since construction equipment would remain at the project location for the duration of construction. During construction, a minor effect to recreational boating transportation as vessels would be prohibited from using the waters immediately adjacent to the construction area. In the long term the CDF would likely attract wildlife,

specifically waterfowl, and result in aviation safety concerns regarding bird strikes with aircraft. However, the proposed location for the new CDF is approximately one mile from the airport and if wildlife became a concern for aviation safety, controls for wildlife management would be implemented.

c. New CDF Construction (Site 2): This alternative would have a long-term beneficial impact on river navigation by ensuring adequate depths in the navigation channels. It would also benefit railroad transportation economically because existing river front industry would continue to utilize rail cars for commodity distribution. Construction of a new CDF would have minimal effect on local traffic patterns since construction equipment would remain at the project location for the duration of construction. During construction, a minor effect to recreational boating transportation as vessels would be prohibited from using the waters immediately adjacent to the construction area. In the long term the CDF would likely attract wildlife, specifically waterfowl, and may result in aviation safety concerns regarding bird strikes with aircraft. However, the proposed location for the new CDF is approximately one mile from the airport and if wildlife became a concern for aviation safety, controls for wildlife management would be implemented.

d. New CDF Construction (Site 3): The effects to transportation for proposed CDF 3 would be similar to the above proposed CDF 2 effects.

e. New CDF Construction (Site 2a): The effects to transportation for proposed CDF 2a would be similar to the above proposed CDF 2 effects. In addition, Cell 1 would occupy 65 acres of the existing Federal navigation channel in the West Basin currently designated for commercial and recreation use, and Federal operations and maintenance activities. This would require Congressional deauthorization of the Federal navigation channel.

f. New CDF Construction (Site 3a): The effects to transportation for proposed CDF 3a would be similar to the above proposed CDF 2 effects. In addition, Cell 1 would occupy 50 acres of the existing Federal navigation channel in the West Basin currently designated for commercial and recreation use, and Federal operations and maintenance activities. This would require Congressional deauthorization of the Federal navigation channel.

g. Existing CDF Management: Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. Since on-site material would be used to construct the berms, no material would need to be trucked in, thereby eliminating the possible impact to traffic on local streets. Close coordination with the FAA and BKL would be necessary to avoid impacts to air traffic during maintenance activities. There would be no effect on water traffic, other than the secondary positive effect of allowing

continued dredging of Cleveland Harbor, thereby maintaining appropriate navigational channel depths.

h. Environmental Impacts Summary: Each of the action alternatives would result in continued commercial navigation at Cleveland Harbor. Alternative Plans 2a, 3a, and East 55th Street CDF would require deauthorization of little-used portions of the Federal navigation channel in the Outer Harbor. All action alternatives would likely attract wildlife, specifically waterfowl, and may result in aviation safety concerns regarding bird strikes with aircraft. Alternative Plans 2, 2a, 3, 3a would require road and bridge construction, and East 55th may require transportation amenities, to provide access for potential future industrial and recreation development.

4.4 Water Quality and Water Resources

a. No Action (No Change): This alternative involves no construction or filling operations and there would be no plan for future long-term placement of dredged material. Federal dredging and disposal operations in Cleveland Harbor would cease and the navigation channels would progressively shoal in. The harbor would no longer be used for recreation and commercial navigation and would cause economic losses to local business. Annual revenue related to fishing, travel, and tourism would slowly decline and eventually halt. The loss of the valuable water resource would cause negative regional impacts. State and Federal laws may remain in place to prevent further pollution and contamination within the river and harbor; however failure to remove existing contaminated sediments would negatively impact the water resource.

b. New CDF Construction (East 55th Street site): This alternative includes the construction of a minimum 20 year CDF. The proposed East 55th Street site would allow for continued annual operations and maintenance dredging of the river and harbor channels. Continued dredging would benefit the water resources in many ways, including: continued removal of contaminated sediments, support commercial navigation that supplies materials necessary for continued operation of many waterfront industries, and promote fish spawning via a cleaner river and with manmade habitat structures expected to be incorporated on the exterior perimeter of the new 157 acre facility. Although there would be increased turbidity and noise in and around the construction area that would cause fish and other aquatic species to avoid the project area, they would be expected to quickly return to the area once construction is complete. Commercial and recreational vessels would have limited use of the waterway immediately adjacent to the construction site in an effort to protect mariners. The negative impacts to the area would be minimal and limited to the construction period. Current water circulation and thermal plume dissipation conditions are not expected to worsen. Overall, impacts to the waterway as a local and regional resource would be beneficial and long term.

c. New CDF Construction (Site 2): The effects on the water quality and water resources for constructing proposed CDF 2 would be similar to those mentioned above for proposed East 55th Street, except that 108 acres would be affected.

d. New CDF Construction (Site 3): The effects on the water quality and water resources for constructing proposed CDF 3 would be similar to those mentioned above for proposed East 55th Street, except that 117 acres would be affected.

e. New CDF Construction (Site 2a): The effects on the water quality for constructing proposed CDF 2a would be similar to those mentioned above for proposed East 55th Street, except that 130 acres would be affected. The effect on the water resource would vary because Cell 1 would occupy 65 acres of the existing Federal navigation channel in the West Basin currently designated for commercial and recreation use, and Federal operations and maintenance activities. This would require Congressional deauthorization of the Federal navigation channel.

f. New CDF Construction (Site 3a): The effects on the water quality for constructing proposed CDF 3a would be similar to those mentioned above for proposed East 55th Street, except that 129 acres would be affected. The effect on the water resource would vary because Cell 1 would occupy 50 acres of the existing Federal navigation channel in the West Basin currently designated for commercial and recreation use, and Federal operations and maintenance activities. This would require Congressional deauthorization of the Federal navigation channel.

g. Existing CDF Management: Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. This alternative would allow for continued removal of contaminated sediments from the river and harbor channels, support commercial navigation that supplies materials necessary for continued operations of many waterfront industries, and promote the potential for fish spawning activities via a cleaner river.

h. Environmental Impacts Summary: All action alternatives allow for continued dredging, which would benefit the water quality through continued removal of contaminated sediments. This would complement long term efforts to control point and non-point source pollution, which adversely effect water and sediment quality. Continued dredging would benefit the water resource by supporting commercial navigation that supplies materials necessary for continued operation of many waterfront industries, promote fish spawning via a cleaner river, and potentially provide manmade habitat structures on the exterior perimeter of the new CDFs. Although there would be increased turbidity and noise during construction that would cause fish and other aquatic species to avoid the project area, they would quickly return once construction is complete. Commercial and recreational vessels would have limited use of the waterway immediately adjacent to the construction site in an effort to protect mariners. The negative impacts to the area would be minimal and limited to the construction period; overall impacts to the waterway as a local and regional resource would be beneficial and long term.

4.5 Hazardous, Toxic, and Radioactive Waste (HTRW)

a. No Action (No Change): This alternative involves no construction or filling operations and there would be no plan for future long-term placement of dredged material. Federal dredging and disposal operations in Cleveland Harbor would cease and the navigation channels would progressively shoal in. Since there are no known HTRW sites in the vicinity of the harbor area, there is likely to be no effects in this regard.

b. New CDF Construction (East 55th Street site): This alternative includes the construction of a minimum 20 year CDF. There are no known HTRW sites in the vicinity of proposed East 55th Street site. The CDF would not be used for containment of HTRW materials and therefore there is no anticipated effect.

c. New CDF Construction (Site 2): The effects on HTRW materials and/or facilities for constructing proposed CDF 2 would be similar to those mentioned above for proposed East 55th Street.

d. New CDF Construction (Site 3): The effects on HTRW materials and/or facilities for constructing proposed CDF 3 would be similar to those mentioned above for proposed East 55th Street.

e. New CDF Construction (Site 2a): The effects on HTRW materials and/or facilities for constructing proposed CDF 2a would be similar to those mentioned above for proposed East 55th Street.

f. New CDF Construction (Site 3a): The effects on HTRW materials and/or facilities for constructing proposed CDF 3a would be similar to those mentioned above for proposed East 55th Street.

g. Existing CDF Management: Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. The existing CDFs are not used for containment of HTRW materials, and therefore there is no anticipated effect on HTRW materials and/or facilities for this alternative.

h. Environmental Impacts Summary: There are no known HTRW sites in the vicinity of any of the proposed CDF locations. In addition, CDFs would not be used for containment of HTRW materials and therefore there is no anticipated effect.

4.6 Cultural Resources – Of the 216 cultural resources listed, the Cleveland East and West Pierhead Lights are the only significant or recognized cultural resources potentially affected by the alternative plans.

a. No Action (No Change): If harbor Federal navigation facilities were not maintained, both commercial and recreational navigation and associated enterprises would be adversely affected, and possibly displaced. The no action alternative would have no adverse impact on the existing Cleveland West and East Pierhead Lights.

b. New CDF Construction (East 55th Street site): Proposed CDF 2 would be built directly along the shoreline at the foot of East 55th Street in Cleveland Harbor and along the breakwater that forms the East 55th Street Marina in Cleveland Harbor. Construction of the CDF would create turbidity due to heavy equipment and construction materials. This alternative has no impact on identified cultural resources.

c. New CDF Construction (Site 2): Proposed CDF 2 would be built directly along the West Breakwater at Cleveland Harbor. Construction of the CDF would create turbidity due to heavy equipment and construction materials. While the new CDF would not be constructed immediately adjacent to the West Pierhead, care and concern must be taken during construction to avoid damage to the historic lighthouse. The West Pierhead has recently been repaired and rehabilitated with sheetpile and armor stone to enhance the structural integrity and stability of the facility.

d. New CDF Construction (Site 3): Proposed CDF 3 would be built directly along the East Breakwater at Cleveland Harbor. Construction of the CDF would create turbidity due to heavy equipment and construction materials. While the new CDF would not be constructed immediately adjacent to the East Pierhead, care and concern must be taken during construction to avoid damage to the historic lighthouse. The East Pierhead has recently been repaired and rehabilitated with sheetpile and armor stone to enhance the structural integrity and stability of the facility.

e. New CDF Construction (Site 2a): Impacts would be similar to those described for proposed CDF 2, except that CDF 2a would be constructed both north and south of the existing breakwater. The northern boundary of the proposed CDF is further south of the West Pierhead Lighthouse as compared to CDF 2.

f. New CDF Construction (Site 3a): Impacts would be similar to those described for proposed CDF 3, except that CDF 3a would be constructed both north and south of the existing breakwater. The northern boundary of the proposed CDF is further south of the East Pierhead Lighthouse as compared to CDF 3.

g. Existing CDF Management: Managing the existing CDFs for additional dredged material will have no effect on the East and West Pierhead Lights.

h. Environmental Impacts Summary: The only significant cultural and historic resources potentially impacted by any of the alternative plans are the Cleveland East and West Pierhead Lights (both listed on the NRHP). Although Sites 2, 3, 2a, and 3a all have construction activities in the vicinity of these structures, none is anticipated to have any adverse impacts.

4.7 Aesthetics – The view of Lake Erie is aesthetically pleasing to visitors in the vicinity of the waterfront.

a. No Action (No Change): If the Federal harbor navigation facilities were not maintained, overtime businesses would close and/or relocate to more viable harbors. The abandoned buildings and infrastructure would likely be neglected and fall into disrepair. This would result in an indirect, long term, negative effect on the waterfront aesthetics.

b. New CDF Construction (East 55th Street site): Construction of a new CDF at this site would alter views to and from the lake in the project vicinity. About 157 acres of lakefront area would be utilized to accommodate development of this facility which would be lost to recreational boating use. The permanent presence of the CDF site, especially during construction and filling operations, would detract from the views of the surrounding properties. Quay 55, a luxury multi-unit residential lakefront development immediately to the west of the proposed site, is most notably impacted. It is assumed that Quay 55 residences derive substantial value from the water views the facility provides. Also impacted are the view sheds of the East 55th Marina and related facilities. Although the CDF would not physically encroach on the property (connection with the marina and nearby shoreline would be made at water's edge) the loss of water views would likely detract from the perceived value of the marina, the surrounding 7.2 acres of land, and associated recreation and concession facilities. The presence of construction equipment would also temporarily detract from the aesthetic quality of the area. It is possible that once the proposed CDF is filled, the land area would be utilized by the City of Cleveland and may become prime waterfront property.

c. New CDF Construction (Site 2): Construction of a new CDF at this site would primarily affect view sheds in the western end of the harbor. Views from Whiskey Island and Edgewater park would be primarily affected, as the landward edge of the CDFs would be as close as 1,500 ft from the shore. About 108 acres of lakefront area would be utilized to accommodate development of this facility which would be lost to recreational boating use. The presence of construction equipment would temporarily detract from the aesthetic quality of the area. It is possible that once the proposed CDF is filled, the land area would be utilized by the City of Cleveland and may become prime waterfront property that is aesthetically pleasing.

d. New CDF Construction (Site 3): Aesthetic impacts at proposed CDF 3 would be similar to the above proposed CDF 2 effects except this site would primarily affect views from the recently redeveloped recreation areas around Cleveland Browns Stadium, Pier 32, and the Rock and Roll Hall of Fame.

e. New CDF Construction (Site 2a): Aesthetic impacts at proposed CDF 2a would be similar to the above proposed CDF 2 effects.

f. New CDF Construction (Site 3a): Aesthetic impacts at proposed CDF 3a would be similar to the above proposed CDF 3 effects.

g. Existing CDF Management: Management of the existing CDFs would allow for the presence of construction equipment which would temporarily detract from the aesthetic quality of the area. Raising the overall elevation of the existing CDFs is not anticipated to block the view of Lake Erie nor have a negative effect on site aesthetics.

h. Environmental Impacts Summary: Implementation of FMPs at existing CDFs and construction of a new CDF would allow for continued development commensurate with the City of Cleveland's 50 Year Waterfront District Plan to include passive recreation amenities, naturally vegetated areas, and future shoreline development. All action plans that result in construction of a new CDF would alter views of the lake during construction and filling operations for a minimum of 20 years.

4.8 Recreation – The City of Cleveland Planning Commission adopted “Connecting Cleveland: The Waterfront District Plan”. Along with other future plans for the waterfront, recreational boating, fishing, park trails, and tourist areas are all a vision of the Waterfront District Plan.

a. No Action (No Change): If harbor Federal navigation facilities were not maintained, recreational navigation and associated enterprises would be adversely affected. Breakwater-protected harbor areas could be lost, and harbor channel depths could eventually silt in to problem elevations, particularly for deep-draft commercial navigation. This alternative indicates that no CDF or alternate measures could be developed to accommodate the disposal of dredged material. If no facility or measure were available to facilitate the disposal of this material, it is likely that maintenance dredging of harbor channels would have to be severely limited or terminated. Consequently, individuals and enterprises dependent on this mode of transportation for their livelihood would suffer economically. A number of primary and secondary businesses would likely close. Shoaling of the channel is not expected to adversely impact shallow draft recreational boating needs. However, future Federal funding for operational and maintenance of recreation based navigation needs are unlikely.

b. New CDF Construction (East 55th Street site): Development of a new CDF would provide for continued harbor channel maintenance dredging and disposal of dredged materials for approximately 20 years. A new Federal CDF would likely be used for non-Federal disposal operations by local recreational (marina) interests, and industry and businesses (including restaurants) located adjacent to the Federal Channel. Implementation of this alternative would result in the loss of 157 acres of water area for boaters and water sports including recreational fishing. The eventual filling of the new CDF would create upland that could be developed by the non-Federal sponsors for recreational purposes, including but not limited to park, wildlife refuge, bicycle and walking trails, picnic areas, golf course and many other alternatives.

The proposed CDF would abut the East 55th Street Marina on its northern and eastern sides. According to an inventory conducted by the City of Cleveland Planning Commission, the East 55th Street marina provides the following recreational assets:

- 1,900 lineal feet of continuous shoreline fishing platform
- 300 lineal feet fishing pier (west side of First Energy intake channel)
- 7.2 acres of land surrounded on three sides by water and having:
 - Surface parking (200 spaces)
 - Public restrooms
 - Picnic tables
 - Overhead lighting
- Floating docks with 362 slips
- Surface parking (+ 350 spaces)
- Gas dock for boat fueling
- One-story building with restaurant/concession area serving marina and adjacent public park area with shoreline fishing
- Two-story building with public restrooms (ground floor) and harbormaster office (second floor)
- Children's outdoor play area with equipment
- Off-road, two-lane multipurpose path between East 55th Street and Lakeshore Boulevard on north side of North Marginal Road and I-90 that intersects Rockefeller Park's Harrison Dillard Bikeway at Martin Luther King, Jr. Drive and North Marginal Road

Although the proposed CDF does not encroach upon the footprint of these facilities, the public value of these amenities would likely decrease due to their adjacency to the CDF. Additionally, some construction easements may be needed for vehicle marshalling and material laydown areas during construction and may temporarily disrupt these assets. There is no plan to replace these assets in-kind under this plan.

Any impacts to recreation as a result of potential development of the CDF in the future are the responsibility of the local sponsor to appropriately address if and when such detailed plans are finalized. Therefore, it is anticipated that any such impacts would be addressed separately by others, and would be mitigated in a manner acceptable to the community.

c. New CDF Construction (Site 2): Development of a new CDF would provide for continued harbor channel maintenance dredging and disposal of dredged materials for approximately 20 years. A new Federal CDF would likely be used for non-Federal disposal operations by local recreational (marina) interests, and industry and businesses (including restaurants) located adjacent to the Federal Channel. Implementation of this alternative would result in the loss of 108 acres of water area for boaters and water sports including recreational fishing. The eventual filling of the new CDF would create upland that could be developed by the non-Federal sponsors for recreational purposes, including but not limited to park, wildlife refuge, bicycle and walking trails, picnic areas, golf course and many other alternatives.

d. New CDF Construction (Site 3): Impacts to recreation would be similar to those described for proposed CDF 2, except that 117 acres of water area would be lost for boaters and recreational fishing.

e. New CDF Construction (Site 2a): Impacts to recreation would be similar to those described for proposed CDF 2, except that approximately 130 acres of water area would be lost for boaters and recreational fishing.

f. New CDF Construction (Site 3a): Impacts to recreation would be similar to those described for proposed CDF 2, except that approximately 129 acres of water area would be lost for boaters and recreational fishing.

g. Existing CDF Management: It is expected that there would be no adverse impacts to recreation with the management of the existing CDFs. Eventual filling and use of the CDF areas to expand and/or relocate BKL facilities may eventually make other areas available for completion of planned water-related recreational developments.

h. Environmental Impacts Summary: Under all action plans, transfer of existing and future CDFs to the local sponsor would allow for continued development to include, but not limited to park, wildlife refuge, bicycle and walking trails, picnic areas, golf course, and many other alternatives. Construction of an outer harbor CDF would eliminate a portion of water resources currently used for boating and fishing. Construction of the inner harbor CDF would likely reduce subsistence fishing from existing piers as well as cause adverse impacts to the East 55th Street Marina (e.g. reduced usage, loss of revenue) because of the aesthetic impact of the adjacent CDF.

4.9 Aquatic Resources – Cleveland Harbor and adjacent waters provide habitat for a variety of fish. The Fish and Wildlife Coordination Act Report and benthic macroinvertebrate study concluded that aquatic species populations in Cleveland Harbor and Cuyahoga River continue to grow and prosper (see Section 3.20.1).

a. No Action (No Change): This alternative involves no construction or filling operations and there would be no plan for future long-term placement of dredged material. Federal dredging and disposal activities would cease, the navigation channels would progressively shoal in making the waterways shallower and eventually create a steady-state in the river and lake bed that would not support current aquatic life. Some shoaling habitat may develop for fish utilization as sediments deposit in the harbor area. Over time, as sources of contamination were rectified, cleaner sediment may deposit over existing harbor sediments and improve fish habitat to some degree.

b. New CDF Construction (East 55th Street site): East 55th Street CDF is unique in that it is the only alternative that connects to shore and thus impacts existing sheltered portions of the Cleveland Harbor aquatic habitat. The affected shoreline is entirely comprised of sheet steel pile bulkheads that are completely encrusted with zebra and quagga mussels and therefore provide minimal fish habitat or foraging areas. This site is approximately -22 feet LWD. Construction of the CDF would result in the eventual loss of approximately 157 acres of deep water fish habitat along the Lake Erie coastal zone by covering the substrate and filling the water column with dredged material inside the containment facility. Although perimeter stone would fill in some additional water

column area, the submerged irregular quarry stone and interstices among stones along the perimeter slope facing the harbor would provide new, long-term stable habitat that would likely attract warmwater fish species and invertebrate populations. Man-made fish habitats along the CDF perimeter that would further provide and encourage shelter for fish through all life cycles would be fully explored with ODNR Division of Wildlife staff. Disruption to the area would occur during construction of the CDF and during dredging which would cause fish to temporarily avoid the area of disturbance. No significant adverse impact is anticipated on aquatic vegetation since the project site is located in moderately deep and turbid water. In addition, a dive was conducted within the project design footprint which did not reveal the presence of any unique habitat features (Section 3.20.1).

Many of the transient and foraging fish species attracted by the warm waters created by the existing First Energy Plant circulating water discharge would continue to thrive after construction, as the thermal plume would remain relatively unaffected and in the vicinity of the shoreline, much as it does under current conditions.

c. New CDF Construction (Site 2): Proposed CDF 2 is located north of the West Breakwater at Cleveland Harbor. This site is -20 to -26 feet LWD. Construction of the CDF would result in the eventual loss of approximately 108 acres of deep water fish habitat along the Lake Erie coastal zone, by covering the substrate and filling the water column with dredged material inside the containment facility. Although perimeter stone would fill in some additional water column area, the submerged irregular quarry stone and interstices among stones along the perimeter slope facing the lake, would provide new, long-term stable habitat that would likely attract warmwater fish species. During the construction of the new CDF, man-made fish habitats would be placed along various portions of the perimeter. This would enable and encourage shelter for fish through all life cycles. Disruption to the area would occur during construction of the CDF and during dredging which would cause fish to temporarily avoid the area of disturbance. No significant adverse impact is anticipated on aquatic vegetation, since the project site is located in deep, turbid water.

d. New CDF Construction (Site 3): Proposed CDF 3 is located north of the East Breakwater at Cleveland Harbor. This site is -16 to -22 feet LWD. Construction of the CDF would result in the eventual loss of approximately 117 acres. The impacts on fish habitat and associated fish species are anticipated to be similar to those described above for proposed CDF 2.

e. New CDF Construction (Site 2a): Proposed CDF 2a is an iteration of proposed CDF 2 and would be both north and south of the West Breakwater. This site is -18 to -24 LWD. The CDF would be transected by the breakwater thus creating two cells; Cell 1 and 2 are approximately 65 acres each and would be located south and north of the breakwater, respectively. The impacts on fish habitat and associated fish species are anticipated to be similar to those described above for proposed CDF 2. In addition, there would be impacts to other warm water fish species who spawn in the shallower water located south of the breakwater.

f. New CDF Construction (Site 3a): Proposed CDF 3a is an iteration of proposed CDF 3 and would be both north and south of the East Breakwater. This site is -17 to -22 LWD. The CDF would be transected by the breakwater thus creating two cells; Cell 1 is approximately 50 acres and would be located south of the breakwater and Cell 2 is approximately 79 acres and would be north of the breakwater. The impacts on fish habitat and associated fish species are anticipated to be similar to those described above for proposed CDF 2. In addition, there would be impacts to other warm water fish species who spawn in the shallower water located south of the breakwater.

g. Existing CDF Management: This measure would be combined with the final selected alternative for the DMMP at Cleveland. Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. Construction equipment used to grade sediment typically works on upland areas within the CDF and along the exterior perimeter land. Eventually, the CDF would fill eliminating all aquatic habitats.

h. Environmental Impacts Summary: All alternative plans involve construction of an in-water CDF. Fish would temporarily avoid the project area during construction. While construction of a CDF at any of the potential sites will result in the loss of marginal aquatic habitat in Cleveland Harbor, CDF construction will provide some important environmental benefits. First, construction of a CDF will allow for the continued maintenance dredging of the lower Cuyahoga River, a Great Lakes AOC. Second, perimeter CDF stone will provide important habitat diversity (as measured by bottom relief) in an area that consists of predominantly flat, unvegetated bottom. However, man-made fish habitats would likely be installed along the CDF to provide shelter. Based on this analysis, the chief variable among the impacts of the various CDF plans is acreage of protected open-water habitat for aquatic life lost. The East 55th Street CDF, with the greatest surface area, impacts approximately 157 acres of open water habitat. Sites 2, 2a, 3, and 3a impact 108, 130, 117, 129 acres, respectively.

In addition to maintaining the channel for navigation, this dredging will also result in the continued removal of contaminated sediments from the Cuyahoga River, which would support Cuyahoga River RAP restoration objectives. While these environmental benefits are not quantified in this effort, they are important and warrant consideration when discussing the aquatic resource impacts associated with construction of a new CDF.

4.10 Benthos/Plankton: Several species of invertebrates use the nearby lake bottom around the project site for foraging and breeding. According to the Fish and Wildlife Coordination Act Report, phytoplankton composition in the vicinity of Cleveland Harbor consists of Baccillariophyta (diatoms), Chlorophyta (green algae), Chrysophyta (Chrysophytes), and Cyanophyta (blue green algae).

a. No Action (No Change): This alternative involves no construction or filling operations and there would be no plan for future long-term placement of dredged material. Federal dredging and disposal operations in Cleveland Harbor would cease and the navigation channels would progressively shoal in. This would provide substrate in shallower water upon which benthic invertebrates could colonize. However, filling of the navigation channels would reduce the amount of water column available for use as habitat by plankton.

b. New CDF Construction (East 55th Street site): CDF construction activities would result in excavation, smothering, and mortality of benthic macroinvertebrates, and temporary avoidance of work areas. Following construction of the CDF, benthic communities would likely recolonize around and within the CDF. Construction of a new CDF would allow for continued maintenance dredging and disposal operations in the harbor and river channels. The area is quite industrialized, so benthic use of the water resource is limited (see Section 3.20.1); therefore, impacts in this regard would be minor. Following dredging and disposal activities, benthic communities are expected to recolonize the impacted areas. However, annual discharge of dredged material into the CDF would progressively decrease the amount of water column available for use by plankton each year within the 157-acre CDF. Eventually, the entire water column in the CDF would be displaced by dredged material and change the habitat from aquatic to terrestrial, thereby rendering the site as no longer available for utilization by plankton or benthic organisms. Although substrate for benthic organisms and water column for phytoplankton and zooplankton would be temporarily available within the CDF, until dredged material filled the facility above the water line, there would be disruption to such organisms within the CDF during annual discharge of dredged material. Submerged stone along the lakeside slope would provide new irregular hard bottom substrate surface area for long term benthic invertebrate colonization.

c. New CDF Construction (Site 2): Impacts to benthos and plankton are anticipated to be similar to those described for proposed East 55th Street CDF, except that this CDF would affect about 108 acres.

d. New CDF Construction (Site 3): Impacts on benthos and plankton are anticipated to be similar to those described for proposed East 55th Street CDF, except that this CDF would affect about 117 acres.

e. New CDF Construction (Site 2a): Impacts on benthos and plankton are anticipated to be similar to those described for proposed East 55th Street CDF; CDF 2a would affect approximately 130 acres.

f. New CDF Construction (Site 3a): Impacts on benthos and plankton are anticipated to be similar to those described for proposed East 55th Street CDF, except that this CDF would affect about 129 acres.

g. Existing CDF Management: Managing the existing CDFs at Cleveland Harbor would entail vertical expansion within the original design footprint. A Contractor would

grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. Eventually the CDF will fill eliminating all benthic habitats.

h. Environmental Impacts Summary: All action alternative plans involve construction of an in-water CDF. Benthos and phytoplankton would be destroyed during construction of a new CDF and would likely recolonize after construction is complete. While construction of a CDF at any of the potential sites will result in the loss of marginal aquatic habitat in Cleveland Harbor, CDF construction will provide some important environmental benefits. First, construction of a CDF will allow for the continued maintenance dredging of the lower Cuyahoga River, a Great Lakes AOC. Second, perimeter CDF stone will provide important habitat diversity (as measured by bottom relief) in an area that consists of predominantly flat, unvegetated bottom. The East 55th Street CDF, with the greatest surface area, impacts approximately 157 acres of open water habitat. Sites 2, 2a, 3, and 3a impact 108, 130, 117, 129 acres, respectively

In addition to maintaining the channel for navigation, this dredging will also result in the continued removal of contaminated sediments from the Cuyahoga River, which would support Cuyahoga River RAP restoration objectives. While these environmental benefits are not quantified in this effort, they are important and warrant consideration when discussing the aquatic resource impacts associated with construction of a new CDF.

4.11 Terrestrial Resources – This section analyzes impacts to vegetation, wildlife, and threatened and endangered species.

4.11.1 Vegetation

a. No Action (No Change): With this alternative, no Federal action would occur and therefore, no disturbance of vegetation would be anticipated.

b. New CDF Construction (East 55th Street site): Some existing scattered shrubs, wild grasses, and turf grasses may be disrupted or destroyed along the shoreline at the foot of East 55th Street and along the breakwater that forms the East 55th Street Marina by construction and filling of the CDF. However, as the CDF is gradually filled with dredged material, the aquatic area inside the site would gradually convert from open-water, to saturated mudflat, to upland. As water becomes shallower in the CDF, some species of submerged aquatic plants may establish. As the CDF fills with dredged material and mudflat areas become exposed above the waterline, cattails, rushes, and sedges would invade the area. As the dredged material deposits and creates upland areas, cottonwood, elm, box elder, willow trees, and a mixture of terrestrial shrubs and grasses would establish. Eventually, if left undeveloped, the entire CDF would convert to about 157 acres of terrestrial herbaceous and woody vegetation

c. New CDF Construction (Site 2): Some existing scattered shrubs and grasses may be disrupted or destroyed along the West Breakwater by construction and filling of

the CDF. However, as the CDF is gradually filled with dredged material, the aquatic area inside the site would convert from open-water, to saturated mudflat, to upland. As water becomes shallower in the CDF, some species of submerged aquatic plants may establish. As the CDF fills with dredged material and mudflat areas become exposed above the waterline, cattails, rushes, and sedges would invade the area. As the dredged material deposits and creates upland areas, cottonwood, elm, box elder, willow trees, and a mixture of terrestrial shrubs and grasses would establish. Eventually, the entire CDF could convert to about 108 acres of terrestrial herbaceous and woody vegetation.

d. New CDF Construction (Site 3): Impacts on vegetation are anticipated to be similar to those described for proposed CDF 2, except that some existing scattered shrubs and grasses may be disrupted or destroyed along the East Breakwater by construction and filling of the CDF. Eventually, the entire CDF would convert to about 117 acres of terrestrial herbaceous and woody vegetation.

e. New CDF Construction (Site 2a): Impacts on vegetation are anticipated to be similar to those described for proposed CDF 2; CDF 2a would affect approximately 130 acres.

f. New CDF Construction (Site 3a): Impacts on vegetation are anticipated to be similar to those described for proposed CDF 3; CDF 3a would affect approximately 129 acres.

g. Existing CDF Management: Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Managing the CDFs through implementation of a FMP would increase the capacity and useful life of the facilities would be extended. Since the existing CDFs are still utilized, there is minimal to moderate existing vegetation and therefore impacts to vegetation on the existing CDFs would be minor. When the existing CDFs are at full capacity, herbaceous and woody vegetation would spread rapidly.

h. Environmental Impacts Summary: The terrestrial resources impacts of all actions plans are equal and minimal. Under all action plans, transfer of existing and future CDFs to the local sponsor may provide an opportunity for these sites to become naturally vegetated. Colonization of upland plants would provide food, nesting, and cover that would attract terrestrial wildlife. These may result in uptake of contaminants through the food chain.

4.11.2 Wildlife

a. No Action (No Change): Since no Federal action would occur with this alternative, there would be no project-related impacts on wildlife or wildlife habitat. No significant changes relative to wildlife and habitat would be expected in the near future. The open water surface of the harbor area would continue to be available for use by waterfowl and other bird species as resting and feeding habitat. The East and West

Breakwaters would continue to provide resting/loafing habitat for some species of waterfowl. The submerged portion of the proposed site would continue to provide some degree of feeding habitat for diving birds.

b. New CDF Construction (East 55th Street site): There would be temporary disruption of open water habitat in the harbor for aquatic wildlife, such as gulls, terns and waterfowl during construction of the CDF. Some disruption to wildlife would also occur during annual dredging and disposal operations, and stone dike maintenance. The CDF would provide approximately 11,100 lineal feet of loafing and nesting habitat for some waterfowl, gulls, and terns. The confines of the CDF would provide an area of water protected by the winds and wave action of Lake Erie. The protected, calm water within the CDF would also be utilized by waterfowl. However, water depth and aquatic area available for such uses would progressively diminish each time dredged sediment was placed into the facility. Filling the CDF with dredged material would eventually result in the loss of 157 acres of protected open-water habitat for aquatic wildlife. Resultant colonization of the CDF by a variety of upland plants would provide food, nesting and brood cover that would attract terrestrial wildlife, such as various species of birds and mammals, unless development occurs on the CDF. Since the CDF would be constructed for the purpose of containing contaminated dredged material, unavoidably some contaminants may be ingested through the food chain. CDF construction operations would not significantly disturb or disrupt behavior of migratory birds that rely on the nearby CDF 14 as seasonal habitat. CDF construction activities would not encroach upon bird flight patterns.

c. New CDF Construction (Site 2): There would be temporary disruption of open water habitat in the harbor for aquatic wildlife, such as gulls, terns and waterfowl during construction of the CDF. Some disruption to wildlife would also occur during annual dredging and disposal operations, and stone dike maintenance. The CDF would provide approximately 9,135 lineal feet of loafing and nesting habitat for some waterfowl. The confines of the CDF would provide an area of water protected by the winds and wave action of Lake Erie. The protected, calm water within the CDF would also be utilized by waterfowl. However, water depth and aquatic area available for such uses would progressively diminish each time dredged sediment was placed into the facility. Filling the CDF with dredged material would eventually result in the loss of 108 acres of protected open-water habitat for aquatic wildlife. Resultant colonization of the CDF by a variety of upland plants would provide food, nesting and brood cover that would attract terrestrial wildlife such as birds and mammals, unless development occurs on the CDF. Since the CDF would be installed for the purpose of containing contaminated dredged material, unavoidably some contaminants may be ingested through the food chain.

d. New CDF Construction (Site 3): Impacts on wildlife are anticipated to be similar to those described for proposed CDF 2. CDF 3 would provide approximately 9,430 lineal feet of loafing and nesting habitat for a variety of waterfowl, gulls, and terns. Filling the CDF with dredged material would result in the eventual loss of 117 acres of protected open-water habitat for aquatic wildlife.

e. New CDF Construction (Site 2a): Impacts on wildlife are anticipated to be similar to those described for proposed CDF 2. CDF 2a would provide approximately 8,300 and 8,540 lineal feet at Cell 1 and Cell 2, respectively of loafing and nesting habitat for a variety of waterfowl, gulls, and terns (this excludes existing stone breakwater currently used by waterfowl). Filling the CDF with dredged material would result in the eventual loss of 130 acres of protected open-water habitat for aquatic wildlife.

f. New CDF Construction (Site 3a): Impacts on wildlife are anticipated to be similar to those described for proposed CDF 3. CDF 3a would provide approximately 8,300 and 10,680 lineal feet at Cell 1 and Cell 2, respectively of loafing and nesting habitat for a variety of waterfowl, gulls, and terns (this excludes existing stone breakwater currently used by waterfowl). Filling the CDF with dredged material would result in the eventual loss of 129 acres of protected open-water habitat for aquatic wildlife.

g. Existing CDF Management: CDF 10B and 12 provides an abundant source of wildlife habitat specifically for waterfowl. The increased bird populations have created aviation safety hazards at BKL. Wildlife at the existing CDF and adjacent airport property is currently managed by a USDA wildlife biologist on staff at BKL. Avian management techniques are necessary to address existing and potential avian problems and hazards. Management techniques at BKL include pyrotechnics, effigies, and a Federal depredation permit. The depredation permit allows for the lethal removal of specific numbers of ring-billed gulls, herring gulls, Canada geese, and mallards. The permit also allows for the removal of a limited number of ring-billed or herring gull nests.

h. Environmental Impacts Summary: Temporary and minor adverse impacts are expected during CDF construction as a result of species avoiding the area due to disturbance. However, any displaced populations or individuals would be expected to return following construction. The construction of a CDF could provide loafing and nesting habitat for some waterfowl, gulls and tern species. However, this may result in uptake of contaminants through the food chain.

4.11.3 Threatened and Endangered Species

a. No Action (No Change): Since no Federal action to construct a project would occur with this alternative, there would be no adverse impacts on Federally listed threatened or endangered species.

b. New CDF Construction (East 55th Street site): The proposed project lies within the range of the Indiana bat (*Myotis sodalis*) and piping plover (*Charadrius melodus*), both Federally-listed endangered species. The proposed East 55th site should have no effect on these species since the habitat within the project area and adjacent shoreline is currently unsuitable for these two species. The proposed project is also within the range of Richardson's Pondweed (*Potamogeton richardsonii*), a potentially threatened species and the Upland Sandpiper (*Bartramia longicauda*), a threatened

species. It is not expected that the project would have any effect on these species due to the existing condition of the shoreline and the depth of water.

c. New CDF Construction (Site 2): Impacts to threatened or endangered species would be similar to those described for proposed East 55th Street CDF. It is not expected that the project would have any effect on these species.

d. New CDF Construction (Site 3): Impacts to threatened or endangered species would be similar to those described for proposed East 55th Street CDF. It is not expected that the project would have any effect on these species.

e. New CDF Construction (Site 2a): Impacts to threatened or endangered species would be similar to those described for proposed East 55th Street CDF. It is not expected that the project would have any effect on these species.

f. New CDF Construction (Site 3a): Impacts to threatened or endangered species would be similar to those described for proposed East 55th Street CDF. It is not expected that the project would have any effect on these species.

g. Existing CDF Management: Although the existing CDFs are within the range of the Indiana bat, piping plover, Richardson's pondweed, and upland sandpiper, management of the existing CDFs is not expected to have an effect on these species.

h. Environmental Impacts Summary: All CDF sites lie within the range of the Indiana bat (*Myotis sodalis*) and piping plover (*Charadrius melodus*), both Federally-listed endangered species. The proposed project is also within the range of Richardson's Pondweed (*Potamogeton richardsonii*), a potentially threatened species and the Upland Sandpiper (*Bartramia longicauda*), a threatened species. It is not expected that the project would have any effect on these species.

4.12 Geology and Soils – Cleveland is located within the Lake Plains subprovince of the Central Lowland physiographic province.

a. No Action (No Change): If Federal harbor navigation facilities were not maintained, there would be no change in the soils and geology in the Cleveland Harbor area.

b. New CDF Construction (East 55th Street site): This alternative is not anticipated to affect the geology and soil in the Cleveland Harbor area. However, a direct negative long term effect would occur if the preferred construction alternative is a stone perimeter CDF since the amount of stone needed for construction could exhaust local quarry supplies. At this time, quarry locations have not been determined.

c. New CDF Construction (Site 2): The effects to geology and soil for proposed CDF 2 would be similar to the above proposed East 55th Street CDF.

d. New CDF Construction (Site 3): The effects to geology and soil for proposed CDF 3 would be similar to the above proposed East 55th Street CDF.

e. New CDF Construction (Site 2a): The effects to geology and soil for proposed CDF 2a would be similar to the above proposed East 55th Street CDF.

f. New CDF Construction (Site 3a): The effects to geology and soil for proposed CDF 3a would be similar to the above proposed East 55th Street CDF.

g. Existing CDF Management: Managing the existing CDFs at Cleveland would entail vertical expansion within the original design footprint. A Contractor would grade the sediments in the CDFs to raise the elevation of the perimeter to increase capacity. Minor short-term effects to soils and topography, resulting from some earthmoving and construction activities are expected during construction of the FMP. The use of construction BMPs would reduce the erosion that could occur as a result of the CDF management techniques.

h. Environmental Impacts Summary: All action plans involving construction of a new CDF could exhaust local quarry supplies. Therefore, the geology and soils impacts of all actions plans are equivalent except to the degree they differ in amount needed.

4.13 Air Quality – The operation of the construction equipment would result in short-term increased emissions of pollutants (suspended particulates, nitrogen dioxide, carbon monoxide) into the local atmosphere. The release of these pollutants is not expected to result in any long or short-term exceedance of Federal or State air quality standards or to change the status of the nonattainment zone.

a. No Action (No Change): No Federal action would be taken to construct a project, therefore, there would be no project related dust or exhaust emissions from construction equipment that could temporarily contribute to localized degradation of air quality.

b. New CDF Construction (East 55th Street site): Heavy equipment activity in the general vicinity of the project site would cause some localized, temporary air quality degradation during construction of the CDF as well as during dredging and disposal operations. Particulate emissions as well as smoke and combustion odors associated with the use of oil and fuel needed to operate construction equipment would be anticipated. The release of these pollutants is not expected to result in any long or short-term exceedance of Federal or State air quality standards.

c. New CDF Construction (Site 2): Impacts to air quality at proposed CDF 2 would be similar to proposed East 55th Street CDF.

d. New CDF Construction (Site 3): Impacts to air quality at proposed CDF 3 would be similar to proposed East 55th Street CDF.

e. New CDF Construction (Site 2a): Impacts to air quality at proposed CDF 2a would be similar to proposed East 55th Street CDF.

f. New CDF Construction (Site 3a): Impacts to air quality at proposed CDF 3a would be similar to proposed East 55th Street CDF.

g. Existing CDF Management: Management of the existing CDFs would require some use of heavy machinery during management techniques and during dredging operations. The use of machinery would have some minor impact on air quality, but in terms of time, would be of short-term duration.

h. Environmental Impacts Summary: All action plans involve construction and filling activities that will cause intermittent emissions for a 20 year period. If any of the CDF locations are developed after they are filled, their use may result in more long term air quality emissions depending on the type of development.

4.14 Noise – Noise in the Cleveland harbor area is associated with the various harbor area developments including: navigation facilities, industrial and commercial developments, transportation facilities (highways, roads, rail, airport), and recreational facilities (parks, marinas, the stadium).

a. No Action (No Change): If Federal harbor navigation facilities were not maintained, both commercial and recreational navigation and associated businesses would be adversely affected. Associated business, industry, employment, and income could be reduced. Noise associated with dredging and disposal operations would cease. Noise associated with alternate means of transportation could increase.

b. New CDF Construction (East 55th Street site): The proposed CDF construction site is located within the harbor waters and would have minimal impacts on local receptors. Noise generated from CDF construction would be limited to normal daylight hours and would be temporary in nature. Noise levels are commensurate with large scale civil construction. The construction contractor would be responsible for noise control and mitigation for construction activities.

c. New CDF Construction (Site 2): Noise impacts at proposed CDF 2 would be similar to the above proposed East 55th Street CDF.

d. New CDF Construction (Site 3): Noise impacts at proposed CDF 3 would be similar to the above proposed East 55th Street CDF.

e. New CDF Construction (Site 2a): Noise impacts at proposed CDF 2a would be similar to the above proposed East 55th Street CDF.

f. New CDF Construction (Site 3a): Noise impacts at proposed CDF 3a would be similar to the above proposed East 55th Street CDF.

g. Existing CDF Management: Management of the existing CDFs would require some use of heavy machinery during management techniques and when dredged material is disposed in CDFs. The use of machinery would have some minor noise impacts, but in terms of time, would be of short-term duration.

h. Environmental Impacts Summary: All action plans involve construction and filling activities that will create intermittent noise conditions for a 20 year period. However, each of the proposed CDFs may ultimately be developed after they have been filled, which may result in a change in noise levels than was experienced during CDF filling operations.

4.15 Cumulative Impacts: Consideration of cumulative effects requires a broader perspective than examining just the direct and indirect effects of a proposed action. It requires that reasonably foreseeable future impacts be assessed in the context of past and present effects to each important resource. One of the most important aspects of cumulative effects assessment is that it requires consideration of how actions by others (including those actions completely unrelated to the proposed action) would affect the same resources (Tables 4.3 through 4.6).

Table 4.3 Description of Effects on Various Resources - No Action Alternative					
Resource	Past Actions	Present Actions	No Action	Future Actions	Cumulative Effect
Socioeconomics	Thriving shipping port *employment *housing *increased population Cultural diversity. Community development.	Increased unemployment. Foreclosures. Population decrease.	Waterfront District Plan	Industrial businesses close. Non-textile businesses move in.	Limited community and regional growth. Population decreases. Economic loss.
Transportation	Thriving shipping port. Recreation navigation. Thriving railway	Thriving shipping port. Recreation navigation. Less rail use	Decreased commercial navigation. Recreation navigation. Increased rail use	Industrial businesses close. Decreased regional distribution. Flux in international steel market.	Navigation ceases. Steel prices increase.
Aesthetics	Thriving shipping port. Industrial view on waterfront.	Industrial riverfront. Limited aesthetically pleasing views.	Waterfront District Plan. CDF development. Intermittent aesthetically pleasing views.	ArcelorMittal steel decrease production. Businesses close. Deteriorated shipping port.	Abandoned buildings. Neglected structures. Buildings in disrepair.

Table 4.3 Description of Effects on Various Resources - No Action Alternative					
Resource	Past Actions	Present Actions	No Action	Future Actions	Cumulative Effect
Recreation	Limited waterfront resources. USACE constructed breakwaters.	Waterfront District Plan. Public beaches. Fishing/boating Greenspace development	Waterfront District Plan. Public beaches. Fishing/boating Greenspace development.	Waterfront District Plan. Develop CDFs . Marinas lose business. Degraded beaches.	Beaches close. Marinas close. Nonviable fishing. Unsafe boating. Health and safety hazards.
Water Quality and Aquatic Resources	Unregulated discharges.	Regulated discharges.	Waterfront District Plan.	Marinas close. ArcelorMittal steel decrease production.	Channels shoal in; decreased recreation Uptake of contaminants through food chain. Business and industry close.
HTRW	1969 river ignited due to waste discharges	Low level PCBs remain in river sediment.	Accumulation of PCBs.	Continued accumulation.	Eliminate viable aquatic habitat. No water related recreation (fishing, boating). Health and safety hazard.
Cultural Resources	216 historic properties in the Cleveland area	Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan	Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan	Federal O&M of pierheads cease. Community activists seek maintenance. Waterfront District Plan	NGO or USCG would be responsible for funding pierhead maintenance.
Terrestrial Resources	Urban development decreased terrestrial habitat	Existing CDFs create upland habitat. Waterfront District Plan	Existing CDFs create habitat Waterfront District Plan	Waterfront District Plan CDF development	CDFs become naturally vegetated. Upland plants provide habitat for wildlife. Uptake of contaminants through the food chain.

Table 4.3 Description of Effects on Various Resources - No Action Alternative					
Resource	Past Actions	Present Actions	No Action	Future Actions	Cumulative Effect
Geology & Soils	Urban development	Brownfield development. FMPs	No Action. Brownfield development. Waterfront District Plan	Brownfield development. Waterfront District Plan.	Soil remediation. Urban and recreation development. Natural wetlands development.
Air Quality	Development of river commerce and industry	Riverfront development Waterfront District Plan	No Action	Waterfront District Plan	Intermittent air emissions from construction.
Noise	Development of river commerce and industry	Riverfront development Waterfront District Plan	No Action.	Waterfront District Plan	Intermittent noise disturbance from construction.

Table 4.4 Description of Effects on Various Resources - CDF Construction (East 55th Street)

Resource	Past Actions	Present Actions	East 55th	Future Actions	Cumulative Effect
Socioeconomics	Thriving shipping port *employment *housing *increased population Cultural diversity. Community development.	Increased unemployment. Foreclosures. Population decrease.	Increased employment. Community development. Regional growth. Eliminated sustenance fishing.	Possible future development at East 55 th reduces shoreline access. Marina and recreation facilities impacted by possible future development. Waterfront District Plan	Foreign trade zone creates more jobs. Waterfront District Plan increase recreation and green space. Reduced shoreline access and sustenance fishing. Recreation opportunities altered by possible future development Decreased property value at Quay 55.
Transportation	Thriving shipping port. Recreation navigation. Thriving railway	Thriving shipping port. Recreation navigation. Less rail use	Waterfront District Plan. Possible phased development of CDF Implement Wildlife Management Plan.	Construct more rails/roads for possible new development. Increased vehicle traffic. Marina usage impacted by possible future development. Waterfront District Plan	Increased traffic due to development by the non-Federal sponsor. Increased waterborne, rail, and/or vehicle traffic.
Aesthetics	Thriving shipping port. Industrial view on waterfront.	Industrial riverfront. Limited aesthetically pleasing views.	Construction detracts from the view at Quay 55, East 55 th Marina, Gordon Park, and shoreline recreation.	Possible future development could result in road construction, additional traffic, commercial and/or recreational activity.	Future development could detract from view. Greenspace development further east and at river mouth aesthetically pleasing.
Recreation	Limited waterfront resources. USACE constructed breakwaters.	Waterfront District Plan. Public beaches. Fishing/boating Greenspace development	Decrease sustenance fishing. Decrease recreational use of waterway and shoreline. Loss of business at marina.	Marina usage adversely impacted by possible CDF development. Waterfront District Plan.	Future recreation development along the shore. Future commercial development along the shore. Sustenance fishing access.

Table 4.4 Description of Effects on Various Resources - CDF Construction (East 55th Street)

Resource	Past Actions	Present Actions	East 55th	Future Actions	Cumulative Effect
Water Quality and Aquatic Resources	Unregulated discharges.	Regulated discharges.	157 acres of aquatic habitat lost. Install fish spawning shelves. Monitor weir discharges.	Monitoring of discharges (NPDES, SPDES, etc.). Possible increased commercial vessel and vehicle traffic.	Fish avoid industrial /commercial area. Eliminate sustenance fishing. Zebra and quagga mussels inhabit CDF rock perimeters. Discharges (NPDES, SPDES, etc) from development decrease water quality.
HTRW	1969 river ignited due to waste discharges	Low level PCBs remain in river sediment.	Brownfield development.	Possible development at East 55 th could result in storage of HTRW.	Landowner/developer would be responsible for compliance with State and Federal regulations.
Cultural Resources	216 historic properties in the Cleveland area	Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan.	2 historic properties in APE Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan	Implement Waterfront District Plan.	Lighthouses remain designated historic structures. Additional historic properties in the area are protected and preserved.
Terrestrial Resources	Urban development decreased terrestrial habitat	Existing CDFs create upland habitat. Waterfront District Plan	CDF construction will destroy vegetation along the shoreline and Marina breakwater. CDF provides waterfowl habitat. Implement Wildlife Management Plan. Waterfront District Plan.	Waterfront District Plan. Possible CDF development.	CDFs become naturally vegetated. Upland plants provide habitat for wildlife. Industrial and/or commercial development eliminates all or part of 157 acres of potential terrestrial greenspace. Greenspace development at mouth of river.
Geology & Soils	Urban development	Brownfield development. FMPs	Quarry excavation. Waterfront District Plan. Brownfield development.	Waterfront District Plan. Brownfield Development.	Quarry excavation to extend Federal breakwater. Natural wetlands development.

Table 4.4 Description of Effects on Various Resources - CDF Construction (East 55th Street)

Resource	Past Actions	Present Actions	East 55th	Future Actions	Cumulative Effect
Air Quality	Development of commerce and industry	Riverfront development Waterfront District Plan	Intermittent air quality disturbance during construction and filling.	Waterfront District Plan Organics material emits odor during disposal operations	Commercial/industrial development would result in increased emissions and decreased air quality in the surrounding area. Commercial/Industrial development required to comply with Federal and State emission standards. Intermittent emissions from construction.
Noise	Development of commerce and industry	Riverfront development Waterfront District Plan	Intermittent noise disturbance during construction and filling.	Noise associated with any development activities on CDF. Waterfront District Plan	Daily operations of any future development would result in increased noise. Intermittent noise disturbance during construction.

**Table 4.5 Description of Effects on Various Resources
New CDF Construction (Sites 2, 2a, 3, 3a)**

Resource	Past Actions	Present Actions	CDFs 2, 2a, 3, 3a	Future Actions	Cumulative Effect
Socioeconomics	Thriving shipping port *employment *housing *increased population Cultural diversity. Community development.	Increased unemployment. Foreclosures. Population decrease.	Increased employment. Waterfront District Plan	Waterfront District Plan	Waterfront District Plan increase recreation and green space.
Transportation	Thriving shipping port. Recreation navigation. Thriving railway	Commercial navigation. Recreation navigation. Less rail use	Waterfront District Plan. Implement Wildlife Management Plan.	Waterfront District Plan Construct pedestrian and/or vehicle access from shore to CDF.	Increased vehicle traffic. Increased small craft and commercial vessel use of outer harbor.
Aesthetics	Thriving shipping port. Industrial view on waterfront.	Industrial riverfront. Limited aesthetically pleasing views.	Construction and filling operations detract from the view at Whiskey Island and Edgewater park (2 and 2a) or Cleveland Browns Stadium, Pier 32, and the Rock and Roll Hall of Fame (3 and 3a).	Waterfront District Plan.	Greenspace development at the CDF once transferred. Pedestrian and/or vehicle access from shore to CDF.
Recreation	Limited waterfront resources. USACE constructed breakwaters.	Waterfront District Plan. Public beaches. Fishing/boating Greenspace development	Waterfront District Plan. Land creation.	Recreation development at CDF. Waterfront District Plan. Fishing tournaments Construct pedestrian and/or vehicle access from shore to CDF	Provides outer harbor recreation activities. Sustenance fishing access. CDF develops into wildlife preserve.
Water Quality and Aquatic Resources	Unregulated discharges.	Regulated discharges.	108 (2), 130 (2a), 117 (3) or 129 (3a) acres of aquatic habitat lost. Install fish spawning shelves. Monitor weir discharges.	Increased recreation craft. Waterfront District Plan.	Continued dredging promotes cleaner waters. Increased fish habitat. Zebra and quagga mussels inhabit CDF rock perimeters.

**Table 4.5 Description of Effects on Various Resources
New CDF Construction (Sites 2, 2a, 3, 3a)**

Resource	Past Actions	Present Actions	CDFs 2, 2a, 3, 3a	Future Actions	Cumulative Effect
HTRW	1969 river ignited due to waste discharges	Low level PCBs remain in river sediment.	Brownfield development.	Brownfield development. Waterfront District Plan.	Brownfield development restores areas throughout the City.
Cultural Resources	216 historic properties in the Cleveland area	Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan	2 historic properties in APE Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan	Waterfront District Plan Community activists seek to develop historic interpretive facility at pierhead	Increased disturbance to structures due to increased operational use at harbor entrance.
Terrestrial Resources	Urban development decreased terrestrial habitat	Existing CDFs create upland habitat. Waterfront District Plan	CDF provides waterfowl habitat. Implement Wildlife Management Plan. Waterfront District Plan.	Waterfront District Plan. Develop existing CDFs.	CDFs become naturally vegetated. Upland plants provide habitat for wildlife.
Geology & Soils	Urban development	Brownfield development. FMPs	Quarry excavation. Waterfront District Plan. Brownfield development.	Waterfront District Plan. Brownfield Development. Creating land	Natural wetlands development.
Air Quality	Development of commerce and industry	Riverfront development Waterfront District Plan	Intermittent air quality disturbance during construction and filling.	Waterfront District Plan. Organics material emits odor during disposal operations.	Intermittent emissions from construction.
Noise	Development of commerce and industry	Riverfront development Waterfront District Plan	Intermittent noise disturbance during construction and filling.	Waterfront District Plan	Intermittent noise disturbance during construction. Pedestrian and/or vehicle access creates additional noise.

**Table 4.6 Description of Effects on Various Resources
Existing CDF Management**

Resource	Past Actions	Present Actions	FMP	Future Actions	Cumulative Effect
Socioeconomics	Thriving shipping port *employment *housing *increased population Cultural diversity. Community development.	Increased unemployment. Foreclosures. Population decrease.	Increased employment. Waterfront District Plan	Waterfront District Plan	Waterfront District Plan increase recreation and green space.
Transportation	Thriving shipping port. Recreation navigation. Thriving railway	Commercial navigation. Recreation navigation. Less rail use	Waterfront District Plan. Implement Wildlife Management Plan.	Waterfront District Plan BKL expansion.	Increased vehicle traffic at new recreation area. Aviation security and safety issues.
Aesthetics	Thriving shipping port. Industrial view on waterfront.	Industrial riverfront. Limited aesthetically pleasing views.	Construction and filling operations detract from the lakefront view.	Waterfront District Plan.	Greenspace development at the CDF once transferred.
Recreation	Limited waterfront resources. USACE constructed breakwaters.	Waterfront District Plan. Public beaches. Fishing/boating Greenspace development	Waterfront District Plan.	Recreation development at CDF. Waterfront District Plan. Fishing tournaments	BKL expands. CDF develops into wildlife preserve. Passive recreation activities develop.
Water Quality and Aquatic Resources	Unregulated discharges.	Regulated discharges.	Monitor weir discharges.	Increased recreation craft. Waterfront District Plan.	Continued dredging promotes cleaner waters. Increased fish habitat. Zebra and quagga mussels inhabit CDF rock perimeters
HTRW	1969 river ignited due to waste discharges	Low level PCBs remain in river sediment.	Brownfield development.	Brownfield development. Waterfront District Plan.	Brownfield development restores areas throughout the City.

**Table 4.6 Description of Effects on Various Resources
Existing CDF Management**

Resource	Past Actions	Present Actions	FMP	Future Actions	Cumulative Effect
Cultural Resources	216 historic properties in the Cleveland area	Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan	2 historic properties in APE Community activists seek protection, restoration, and preservation of properties. Waterfront District Plan	Waterfront District Plan Community activists seek protection, restoration, and preservation of properties.	Potential disturbance to structures due to increased operational use at harbor entrance
Terrestrial Resources	Urban development decreased terrestrial habitat	Existing CDFs create upland habitat. Waterfront District Plan	CDF provides waterfowl habitat. Implement Wildlife Management Plan. Waterfront District Plan.	Waterfront District Plan. Develop existing CDFs.	CDFs become naturally vegetated. Upland plants provide habitat for wildlife.
Geology & Soils	Urban development	Brownfield development. FMPs	Waterfront District Plan. Brownfield development.	Waterfront District Plan. Brownfield Development.	Natural wetlands development.
Air Quality	Development of commerce and industry	Riverfront development Waterfront District Plan	Intermittent air quality disturbance during construction and filling.	Waterfront District Plan. Organics material emits odor during disposal operations.	Intermittent emissions from construction.
Noise	Development of commerce and industry	Riverfront development Waterfront District Plan	Intermittent noise disturbance during construction and filling.	Waterfront District Plan	Intermittent noise disturbance during construction.

4.16 Measures to Minimize Environmental Impacts: Although habitat throughout Cleveland Harbor is generally of low quality, construction of a CDF will result in some habitat losses. As a result, measures to minimize environmental impacts will be included as part of the selected plan. The alternatives presented were developed to support disposal of sediments removed from the Harbor and River Channels during annual O&M dredging activities. The following measures to minimize environmental impacts during dredging and disposal, and CDF construction and management activities include:

- Dredging would not be performed during Lake Erie storm events.
- Coordinate with USFWS to meet seasonal restrictions that may apply to minimize impacts on fish spawning.
- Care would be employed throughout the course of the dredging and disposal operations to avoid the creation of unnecessary turbidity that may degrade water quality or adversely affect aquatic life outside the project area.
- Effluent from CDF weir (when used) would be monitored to achieve discharges of no more than 100 ppm total suspended solids.
- Maximizing the use of existing CDF's.
- Fully implement BMPs during construction of the new CDF to maximize capacity.
- Encourage local landowners and municipalities to implement BMPs to minimize the volume of eroded materials entering Cleveland Harbor.

4.17 Measures to Offset Unavoidable Impacts: Various BMPs would be implemented as mitigation techniques during the design, construction, and operation phases of the selected alternative plan(s). The potential measures include

- Contractors would be required to develop an Environmental Protection Plan to include, but not limited to, noise control, minimize turbidity, develop and implement spill prevention control and countermeasures, and reduce air emissions.
- Providing capacity for dredged material in existing and new CDFs would remove contaminated sediment from the navigation channels.
 - This maintains adequate depths for commercial navigation and sustains the economic vitality of the community and region.
 - Supports Cuyahoga River RAP restoration activities by restoring the environmental quality of lower Cuyahoga River through the remediation of existing conditions.
 - Provides cleaner waters for aquatic habitat.
 - Increases opportunities for recreation boating, fishing, and swimming.
- Include fish spawning habitat (hotels or baskets) along the outside of new and existing CDFs.
- During operation of the proposed CDF, a Wildlife Damage Management Plan would be implemented by the USACE and USDA, Wildlife Services to minimize wildlife habitat on the CDF. The Plan would likely minimize the occurrence of bird strikes during take-off and landing of aircraft at BKL Airport, thereby maintaining FAA safety standards necessary to support aviation safety. A typical plan would include vegetation growth once the

- Alternative Plans 4 and 4a would require a wildlife management plan separate from, but similar to, those in place at our existing CDFs due to the disparate location of the East 55th Street site and additional manpower and resource requirements. USACE, in cooperation with the FAA, Cleveland Airport System, and USDA, will develop the wildlife management plan and implementation protocol during detailed design.
- USACE will also account for airspace restrictions relative to equipment operations during CDF construction.
- Once the new CDF is operational, the existing CDFs, 9, 10B, 12, and 13 would be filled and transferred to the local sponsor prior to opening the new CD; implementation of wildlife management plans will then be the responsibility of the local sponsor to at those sites.
- Once filling operations are complete and the CDF is transferred to the local sponsor, the end land use could support recreation development to support community cohesion and growth while adding to the lakefront aesthetics.
- For the East 55th Street CDF, consider designing dikes to allow for public access for fishing and other passive recreation activities in order to offset the loss of fishing platforms.

CHAPTER 5 – ENVIRONMENTAL COMPLIANCE

5.1 Introduction - Throughout the planning/scoping and NEPA process for the Cleveland Harbor DMMP/DEIS, stakeholders and interested parties have been invited to identify issues and provide comment on the alternatives developed. Numerous Federal, State, local laws, statutes, executive orders, regulations, and guidelines exist and must be considered during the planning, coordination, assessment/evaluation, and ultimate selection of a plan for dredged material management at Cleveland Harbor. In April 2007, actions had been initiated to integrate the requirements of the above mentioned items into the Cleveland DMMP process. Ultimately, the DMMP/EIS will address the potential social, economic, and environmental benefits and adverse impacts that would result from each alternative plan selected for detailed analysis.

5.2 National Environmental Policy Act (NEPA) - The USACE, Buffalo District assessed the potential significant environmental impacts of the alternative plans in accordance with the Council on Environmental Quality's "Regulations for Implementing the Procedural Provisions of the NEPA of 1969" (40 CFR 1500-1508) and Engineer Regulation 200-2-2 (Procedures for Implementing NEPA).

Initial compliance with NEPA has been accomplished by scoping and publication of a "Notice of Intent to Prepare a Draft Environmental Impact Statement for a Proposed Dredged Material Management Plan for Cleveland Harbor, OH" in the Federal Register on March 17, 2006 (Appendix D3). In addition, a "Public Scoping Information Packet" dated March 16, 2006 (Appendix D1) for the Cleveland DMMP/DEIS was given widespread dissemination to agencies and the public listed in Chapter 8. Comment letters received on the Scoping Information Packet and Notice of Intent has been reproduced in Appendix D2.

5.3 Clean Water Act - Under the Clean Water Act, a proposed plan that involves the placement of dredged or fill material below the ordinary high-water mark of Lake Erie or any other waters of the United States, requires the project be evaluated in accordance with the guidelines promulgated by the Administrator of the USEPA in conjunction with the Secretary of the Army under the authority of Section 404(b)(1) of the Act. A Section 404(a) Public Notice would be issued and any party that may be significantly impacted by the project would be afforded the opportunity to request a public hearing. Section 401 of the Act requires certification from OEPA that confirms the proposed project is in compliance with established effluent limitations and state water quality standards. Section 402 of the Act requires a Stormwater Pollution Prevention Plan (SWPPP) for construction activities that will disturb greater than one acre of ground surface. The SWPPP along with a Notice of Intent application to OEPA for coverage under their general permit is required and will be completed by the construction contractor.

The tentatively selected plan requires compliance with Sections 401, 402, 404(a), and 404(b)(1). The Sections 404(a) and 404(b)(1) public notice and evaluations are in Appendix D4.

5.4 Fish and Wildlife Coordination Act and Endangered Species Act. Initial compliance with these acts has been accomplished by initial scoping and subsequent related coordination with USF&WS. USF&WS provided a “Fish and Wildlife Coordination Act Report” on April 6, 2007 for consideration and inclusion with the draft and final EIS (Appendix I). The report includes resource information, assessment/evaluation of impacts of detailed alternatives (specifically proposed CDF sites 1, 2, 2a, 3, and 4), endangered species consultation, and associated comments and recommendations (refer to Chapter 6 – Coordination). A revised section of the Fish and Wildlife Coordination Act Report evaluating the proposed East 55th Street Site was submitted on May 30, 2008. Section 7 Consultation under the Endangered Species Act of 1973, as amended, will be completed, if necessary, for the piping plover and Indiana bat for the tentatively selected plan.

5.5 Coastal Zone Management Act - The tentatively selected DMMP alternative affects Ohio’s designated coastal zone. Therefore, USACE, Buffalo District is preparing a Federal Consistency Determination.

5.6 National Historic Preservation Act - The SHPO (Ohio Historical Society), potentially interested Indian tribes, historic preservation organizations and others likely to have knowledge of, or concern with, historic properties will be consulted during the DMMP/EIS planning, preparation, and coordination. Under Section 106 of this Act, consultation with the National Park Service was initiated by coordination of the Scoping Information Packet. The tentatively selected plan does not affect any historic properties and therefore does not require further Section 106 consultation.

5.7 Clean Air Act - Project coordination was initiated through the Scoping Information Packet with the USEPA. No significant adverse impacts to air quality would be expected due to project implementation. Copies of this EIS have been sent to the Regional Administrator of the USEPA requesting comments in compliance with the Clean Air Act. Established under the Clean Air Act, Section 176(c)(4), the General Conformity Rule plays an important role in helping states and tribal regions improve air quality in those areas that do not meet the National Ambient Air Quality Standards (NAAQS). Under the General Conformity Rule, Federal agencies must work with State, Tribal and local governments in a nonattainment or maintenance area to ensure that Federal actions conform to the initiatives established in the applicable State or Tribal implementation plan.

5.8 Executive Order 12898 - The proposed dredging and placement operations would not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations. This is in compliance with Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994; Executive Order 12948, Amendment to Executive Order 12898, January, 30, 1995.

5.9 Other Coordination Requirements - In addition to the aforementioned Federal statutes, the proposed project must also comply with other applicable or relevant and

appropriate Federal laws. Table 5.1 presents a comprehensive list of environmental protection statutes, executive orders, *etc.* The level of compliance completed to date is defined as Full Compliance, Non-Compliance, Not Applicable, and To Be Determined. Full compliance is defined as meeting all requirements of the specific act consistent with planning activities conducted to date on the DMMP/EIS. The Scoping Fact Sheet was distributed March 16, 2006, and was the first step to disseminate pertinent project information to meet the applicable coordination and consultation requirements required under the provisions. Further coordination and consultation to achieve compliance with the following laws, orders, and policies will be conducted during the planning, preparation, and coordination of the DMMP/DEIS.

Table 5.1 Federal Environmental Protection Laws, Orders, Policies.

Laws and Policies	Compliance
American Folklife Preservation Act, P.L. 94-201; 20 U.S.C. 2101, <i>et seq.</i>	NA
Anadromous Fish Conservation Act, P.L. 89-304; 16 U.S.C. 757, <i>et seq.</i>	TBD
Antiquities Act of 1906, P.L. 59-209; 16 U.S.C. 431, <i>et seq.</i>	FC
Archaeological and Historic Preservation Act, P.L. 93-291; 16 U.S.C. 469, <i>et seq.</i> (Also known as the Reservoir Salvage Act of 1960, as amended; P.L. 93-291, as amended; the Moss-Bennett Act; and the Preservation of Historic and Archaeological Data Act of 1974.)	FC
Bald and Golden Eagle Protection Act; 16 U.S.C. 668.	FC
Clean Air Act, as amended; P.L. 91-604; 42 U.S.C. 1857h-7, <i>et seq.</i>	FC
Clean Water Act, P.L. 92-500; 33 U.S.C. 1251, <i>et seq.</i> (Also known as the Federal Water Pollution Control Act; and P.L. 92-500, as amended.)	FC
Coastal Barrier Resources Act of 1982, 16 U.S.C. § 3501 <i>et seq.</i> ; 12 U.S.C. § 1441 <i>et seq.</i>	NA
Coastal Zone Management Act of 1972, as amended, P.L. 92-583; 16 U.S.C. 1451, <i>et seq.</i>	FC
Endangered Species Act of 1973, as amended, P.L. 93-205; 16 U.S.C. 1531, <i>et seq.</i>	TBD
Estuary Protection Act, P.L. 90-454; 16 U.S.C. 1221, <i>et seq.</i>	NA
Federal Environmental Pesticide Control Act, P.L. 92-516; 7 U.S.C. 136.	NA
Federal Water Project Recreation Act, as amended, P.L. 89-72; 16 U.S.C. 460-1(12), <i>et seq.</i>	FC
Fish and Wildlife Coordination Act of 1958, as amended, P.L. 85-624; 16 U.S.C. 661, <i>et seq.</i>	FC
Historic Sites Act of 1935, as amended, P.L. 74-292; 16 U.S.C. 461, <i>et seq.</i>	FC
Land and Water Conservation Fund Act, P.L. 88-578; 16 U.S.C. 460/-460/-11, <i>et seq.</i>	NA
Migratory Bird Conservation Act of 1928; 16 U.S.C. 715.	FC
Migratory Bird Treaty Act of 1918; 16 U.S.C. 703, <i>et seq.</i>	FC
National Environmental Policy Act of 1969, as amended, P.L. 91-190; 42 U.S.C. 4321, <i>et seq.</i>	FC
National Historic Preservation Act of 1966, as amended, P.L. 89-655; 16 U.S.C. 470a, <i>et seq.</i>	FC
Native American Religious Freedom Act, P.L. 95-341; 42 U.S.C. 1996, <i>et</i>	FC

<i>seq.</i>	
	Compliance
	Laws and Policies
Resource Conservation and Recovery Act of 1976, P.L. 94-580; 7 U.S.C. 1010, <i>et seq.</i>	NA
River and Harbor Act of 1899, 33 U.S.C. 403, <i>et seq.</i> (Also known as the Refuse Act of 1899.)	FC
Submerged Lands Act of 1953, P.L. 82-3167; 43 U.S.C. 1301, <i>et seq.</i>	FC
Surface Mining and Reclamation Act of 1977, P.L. 95-89; 30 U.S.C. 1201, <i>et seq.</i>	TBD
Toxic Substances Control Act, P.L. 94-469; 15 U.S.C. 2601, <i>et seq.</i>	NA
Watershed Protection and Flood Prevention Act, as amended, P.L. 83-566; 16 U.S.C. 1001, <i>et seq.</i>	NA
Wild and Scenic Rivers Act, as amended, P.L. 90-542; 16 U.S.C. 1271, <i>et seq.</i>	NA
Executive Order 11593, Protection and Enhancement of the Cultural Environment. May 13, 1979 (36 FR 8921; May 15, 1971).	FC
Executive Order 11988, Floodplain Management. May 24, 1977 (42 FR 26951; May 25, 1977).	FC
Executive Order 11990, Protection of Wetlands. May 24, 1977 (42 FR 26961; May 25, 1977).	FC
Executive Order 11514, Protection and Enhancement of Environmental Quality, March 5, 1970, as amended by Executive Order, 11991, May 24, 1977.	FC
Executive Order 12088, Federal Compliance with Pollution Control Standards, October 13, 1978.	FC
Executive Order 12372, Intergovernmental Review of Federal Programs, July 14, 1982.	FC
Executive Order 12856, Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements, August 3, 1993.	NA
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994.	FC
Council on Environmental Quality Memorandum of August 11	FC
Council on Environmental Quality Memorandum of August 10	FC
Migratory Bird Treaties and other international agreements listed in the Endangered Species Act of 1973	FC

NA: *Not Applicable*
 NC: Non Compliance
 FC: Full Compliance
 TBD: To Be Determined

CHAPTER 6 - COORDINATION, CONSULTATION, AND PUBLIC INVOLVEMENT

6.1 Introduction – Since inception of the need to prepare a DMMP for Cleveland Harbor in early 2003 (refer to Appendix B – Preliminary Assessment) numerous public and agency information sessions and meetings have been held with local interests and local, State, and Federal agencies. In particular, close coordination and cooperation has been maintained with representatives of the City of Cleveland and the Cleveland-Cuyahoga County Port Authority regarding the formulation and locations of alternative measures for dredged material disposal at Cleveland. The following paragraphs will discuss the outcomes of several information sessions and meetings held in Cleveland since the decision was made to prepare an environmental impact statement for this study in early 2006. This section will also discuss other coordination and consultation efforts and requirements.

6.2 Phase I (Preliminary Assessment) - Phase I of public and agency involvement in the Dredged Material Management Study for Cleveland occurred from 2003 to 2004. The USACE coordinated frequent meetings at Cleveland City Hall with Federal, State and local stakeholders and interests. From March 2003 through November 2003 meetings were scheduled on a monthly basis. The purpose of those meetings was to discuss USACE DMMP authority, the objectives of Phase I of the study (write a Preliminary Assessment, Scope of Work, and obtain a Letter of Intent (LOI), obtain a non-Federal sponsor, and more importantly identify proposed alternatives for dredged material management (specifically proposed CDF locations) that would be commensurate with the City of Cleveland's 50 Year Waterfront Development Plan. In October 2003, the USACE sponsored and coordinated a DMMP Workshop. The workshop was held at BKL Airport and attended by over 50 persons from Federal, State, and local agencies. Presentations provided information relative to the DMMP and interim dredged material management issues affecting the harbor, and were provided by subject matter experts from USACE ERDC, FAA, USEPA, Great Lakes Commission, OEPA, Cleveland City Planning Commission, BKL Airport, and the Port of Cleveland. Between November 2003 and March 2004, USACE finalized the Preliminary Assessment and Scope of Work, and in March 2004 obtained a joint LOI from the City of Cleveland and Cleveland-Cuyahoga County Port Authority. In the spring of 2004, two additional meetings were held in Cleveland with non-Federal sponsors and other interested parties to complete Phase I coordination and submit the Phase I package (Preliminary Assessment, SOW, and Letter of Intent) to CELRD for approval in May 2004. In November 2004, the Phase I package was approved.

6.3 Phase II (Dredged Material Management Plan) - Phase II of the Cleveland Dredged Material Management Study began in March 2005 with a meeting at Cleveland City Hall. The purpose of this meeting was to discuss the path forward for Phase II efforts and production of a DMMP, and the impacts of recent developments and modifications to the City of Cleveland's 50 Year Waterfront Development Plan.

Meetings during Phase II would not be held as frequently as during Phase I. The USACE explained to stakeholders that the purpose of Phase II is to produce a DMMP/EIS based on information gathered during the scoping and coordination completed during Phase I. Furthermore, additional formal communication, coordination, and scoping among Federal, State, and local entities would be through the NEPA process. Two public information meetings were held at Carnegie West Branch Public Library in September 2006 and April 2007 to date in the Phase II efforts.

Phase I and II meeting minutes were documented and distributed via e-mail. Final reports and documentation were provided to the non-Federal sponsors and posted on the USACE, Buffalo District Cleveland DMMP website. USACE issued Press Releases and published meeting notices in Cleveland area newspapers, particularly The Cleveland Plain Dealer, to notify stakeholders of the public meetings. The USACE also distributed notification of meetings via e-mail and websites (including State and local links) specifically Blue Lake Green City and Cuyahoga River Community Planning Organization.

6.4 National Environmental Policy Act (NEPA) Scoping – The requirements for public and agency scoping and coordination under the NEPA have been directly incorporated into the Phase II efforts of this Dredged Material Management Study. On March 16, 2006, a Public Scoping Information Packet (Appendix D) was mailed to numerous Federal, State, Tribal, and local agencies. The scoping packet discussed alternative measures for dredged material management at Cleveland and gave the recipients opportunity to provide input and recommendations for the study. All comments, concerns, and recommendations received have been considered in the continued formulation of alternative plans and measures for dredged material management at Cleveland Harbor.

The USACE received scoping input that included concerns/issues regarding dredging and dredged material disposal management, environmental concerns, and potential beneficial uses of dredged materials. Some issues identified included in-water work periods for aquatic species, contaminated material, washing the sand, wildlife hazards to aircraft, hydraulic vs. clamshell dredges, relocation, land use, and concerns for endangered species. The Scoping Information Packet and all correspondence received is included in Appendix D. A summary of the comments is furnished below.

6.5 Environmental Impact Statement – During the Preliminary Assessment (Phase I) study it was determined that alternative plans that would be considered in the dredged material management study would be major in scope and have significant public interest. Therefore it was decided to prepare an EIS in accordance with the NEPA. The Notice of Intent to prepare a draft Environmental Impact Statement (DEIS) for the proposed DMMP was published in the Federal Register on March 17, 2006 (Appendix D). No public or agency comments were received as a result of this notice.

**Summary of Comments
to the Public Scoping Information Packet
Dated March 16, 2006**

Agency/Office	Date	Comments	Response (as of April 2007)
National Park Service, Dept. of Interior	March 27, 2006	Project could have impacts to sites funded w/assistance from Land & Water Conservation Fund (L&WCF)	Comment acknowledged. When the final array of preferred plans is selected, we will fully coordinate with the ODNR concerning impacts on L&WCF properties.
U.S. Dept. of HUD	April 5, 2006	Supports project	No response necessary.
USFWS, Dept. of Interior	April 7, 2006	<p>Proposed project lies within range of endangered species: Indiana bat and piping plover. Threatened species: bald eagle.</p> <p>Habitat and surrounding trees should be saved wherever possible.</p> <p>Exfoliating bark, split tree trunks and/or branches can be used as roost areas.</p>	<p>Acknowledged. Appropriate consultations will be made with the USFWS concerning endangered species.</p> <p>Acknowledged.</p> <p>Acknowledged.</p>
Cleveland Airport System	April 13, 2006	<p>Wildlife hazard: CDFs are attractants for birds and wildlife, poses risk to aviation.</p> <p>Land Use: potential for altering land use in Alt. 4, 5, and 14.</p> <p>Health: Should assess the potential for human exposure to contaminants and means to mitigate potential health issues.</p>	<p>Acknowledged. Measures have been successfully implemented at CDF 10b to mitigate such problems and will be considered for any other CDF plans.</p> <p>Alternative CDFs 4, 5, and 14 have all been eliminated from further consideration.</p> <p>In 2004 USACE completed a Risk Assessment on sediments contained within CDF 10B. There is no significant exposure risk associated with the in situ sediment and human contact.</p>

Agency/Office	Date	Comments	Response (as of April 2007)
Cuyahoga County Planning Commission	April 13, 2006	<p>Consider a whole systems approach consistent w/ the goals of the Cuyahoga Valley Initiative.</p> <p>Best management practices and beneficial use should be paramount.</p> <p>Pursue practices that help to prevent increased sedimentation.</p> <p>Suggest the use of hydraulic dredging to limit the negative effects of sediment disturbance.</p> <p>Take a proactive approach for positive impacts on the quality of life for people in Ohio.</p>	<p>We favor a comprehensive systems approach and consider the Cuyahoga Valley Initiative's goals through collaborative planning. This DMMP is a small part of collaboration related primarily to navigation. Federal funds have not been provided for a Comprehensive Watershed Study which would significantly enhance our ability to partner with the Initiative.</p> <p>Beneficial Use particularly the concept of recycling dredged material from existing CDFs and using the material for strip mine reclamation has been seriously considered in this study.</p> <p>Agree that reduced sedimentation in the Cuyahoga River Watershed would probably reduce, but not eliminate the need for dredging Federal channels. Practices to reduce sedimentation are generally local land use practices not directly implementable by USACE.</p> <p>EPA Testing Manual - Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. favors use of clamshell dredge and dump scow to minimize re-suspension of sediments as compared to other equipment and methods.</p> <p>The USACE will, to the extent practicable and within the limits of providing an economically feasible plan for management of dredged material, attempt to provide a plan that provides positive impacts to the quality of life of the people of Cleveland.</p>

Agency/Office	Date	Comments	Response (as of April 2007)
USDOT, FAA, Detroit Airports District Office	April 24, 2006	Existing CDFs are considered wildlife attractants. Bird/aircraft hazards are a huge factor.	USACE fully understands FAA and aircraft concerns for CDFs in Cleveland Harbor. If a new CDF is recommended, appropriate measures will be included in the plan to minimize wildlife hazards to aircraft (see CDF 10b plan)
Ohio Dept. of Natural Resources	April 27, 2006	<p>Cleveland Lakefront State Park indicates potentially threatened species: Richardson's Pondweed, and threatened species: Upland Sandpiper.</p> <p>Recommends no in-water work from March 15 to June 30 to reduce impacts on aquatic species.</p> <p>Proposed CDF 8 may impound sand transported westward by northeast storm waves. Also if sand accumulates shoreward of the proposed CDF 8, provisions should be made for returning sand to littoral system.</p> <p>Explore opportunities for beneficial reuse, consider washing sand to remove contaminants for nearshore disposal.</p>	<p>Acknowledged.</p> <p>USACE will further coordinate with ODNR concerning construction timing.</p> <p>CDF #8 has been eliminated from further consideration.</p> <p>Beneficial use alternatives will be considered in depth in the DMMP/EIS. However, contamination levels of coarse grain material in CDF 10B exceeds Federal and State standards for littoral nourishment. In addition, USACE used the coarse grain material to implement the FMP at CDF 10B to increase the elevation of the south perimeter (discussed in Chapter 2)</p>
Chagrin Valley Engineering	May 9, 2006	Mayor of Bratenahl and Council have concerns with proposed CDF 8, located very close to Bratenahl. This CDF could have a detrimental effect on the quality of life in the Village. Project would have negative impact on noise, odors and views of lake.	CDF #8 has been eliminated from further consideration in the DMMP.

Agency/Office	Date	Comments	Response (as of April 2007)
Ohio Environmental Protection Agency	May 15, 2006	Concerned about insufficient time to address CDF issue.	By using FMPs in existing CDFs we can extend the useful life for a number of years while concurrently planning for a new CDF or method of disposal.
		Explain the discrepancy in the sediment dredging volumes that the Corps has stated.	We double checked and confirmed the average volume of dredged material placed in CDF 10b was 305,000 cy (271,000 cy Federal and 34,000 cy non-Federal). We cannot explain your statement that OEPA issued water quality certifications for 250,000 cy for the same time period. Our certifications indicate OEPA authorized 400,000 cy in 2000 to 2002; 350,000 cy in 2003; 325,000 cy in 2003; 350,000 in 2005.
		Evaluate how many more years contaminated sediments are anticipated in the Cuyahoga Navigation Channel.	Sediment data from 1993, 1998 and 2002 show significant contamination of sediments that warrant CDF placement. Results from the most recent sampling event in 2002 indicate sediment in the Federal Channels fails Federal Guidelines (specifically PAHs and heavy metals) and is therefore unsuitable for open lake and nearshore placement. Although the industrial point sources have been eliminated and water quality is generally good, non-point sources such as CSOs and industrial leaching still contribute sediment load in the river. We conclude sediments will remain contaminated for the 20-year study period.

Agency/Office	Date	Comments	Response (as of April 2007)
Ohio Environmental Protection Agency	May 15, 2006	OEPA would like to see the completed report on the Cuyahoga River Sediment Transport Study.	The “report” is not yet completed. A series of meetings to discuss the model capabilities and to transfer the technology to local and state interests, including the OEPA, is being conducted at the OEPA Twinsburg, OH office by the USACE.
		Request that the Corps sample the sediments more frequently than once every 5 years.	Traditionally, the Buffalo District has conducted sediment sampling in the Cuyahoga River Channels and Cleveland Outer Harbor every five years. The most recent sampling event occurred in 2002. This is consistent with funding provided for the project and the fact that no significant improvements have been seen in the quality of the sediments during recent sampling events. If the 2007 sampling shows some significant improvement in sediment quality, we will attempt to fund sediment sampling on a more frequent basis.
		Requests that the background section of the EIS acknowledge the impact of the channel morphology on water quality and habitat degradation.	USACE acknowledges channel morphology does impact dissolved oxygen (DO) levels and habitat in the lower Cuyahoga River, we would debate that this is the sole or primary reason for such degradations. In 2003 the Cuyahoga River RAP informed USACE of low DO levels in the channel; studies linked the deepened navigation channel to low DO. (Continued below)

Agency/Office	Date	Comments	Response (as of April 2007)
Ohio Environmental Protection Agency	May 15, 2006		<p>However, the RAP also identified organics, toxicity, nutrient, and flow alterations as major causes of water quality problems in the river. Not all of these variables can be attributed to channel morphology. In addition, the RAP has identified restoration options to include elimination of combined sewer overflows (CSOs) and urban runoff controls. Insofar as they relate to dredged material management we will address these issues in the DMMP/EIS.</p>
		<p>OEPA encourages beneficial use of dredged material and more progress on the use of fish bulkhead habitats along the river.</p>	<p>Beneficial use of dredged material has been addressed in the DMMP EIS. The concepts of replacement of privately owned bulkheads along the Cuyahoga River are not being pursued under the DMMP as they are not part of the Federal Navigation Project at Cleveland. However, the USACE has been provided a substantial amount of funding under the Section 594 Environmental Infrastructure Program to further investigate and pursue the idea of creating fish habitats along the river edges (sometimes called "Green Bulkheads") an idea that was originally investigated a couple of years ago under the Section 401 RAP Program.</p>

Agency/Office	Date	Comments	Response (as of April 2007)
Ohio Environmental Protection Agency	May 15, 2006	Provide most recent sediment data	The most recent sediment sampling data has been provided to OEPA by separate correspondence.
		Explain how the Corps considers open lake placement of sediments that exceed the federal standard.	The Corps cannot propose to place dredged material in the open lake that does not meet Federal guidelines.
		OEPA requests a thorough review of CDF best management practices, including soil washing techniques.	Beneficial use alternatives will be considered in depth in the DMMP/EIS and a copy of the report will be furnished to OEPA for review. Soil washing techniques would likely be used on coarse grain sediment. However, contamination levels of coarse grain material in CDF 10B exceeds Federal and State standards for littoral nourishment. In addition, USACE used the coarse grain material to implement the FMP at CDF 10B to increase the elevation of the south perimeter (discussed in Chapter 2).
		Provide a spreadsheet that shows the volumes of material added to CDF 10b and the sources (federal/private).	Table 1.2 in Chapter 1 provides this information.
		Provide a legible detailed map(s) of all the CDFs 1 through 14, including location of cell 10a.	A detailed map is included in Chapter 2 of this report. There were a total of five, not 14 CDFs in Cleveland including 9, 10B, 12, 13, and 14. There is no cell 10A.
		Explain feasibility of daylighting the portion of Doan Brook than runs underneath CDF 14.	Technically we don't see why Doan Brook could not be 'daylighted'. However, without a detailed engineering and cost analysis we cannot state whether or not it would be a reasonable action to undertake. CDF 14 is now owned by the Cleveland-Cuyahoga Port Authority not USACE.

6.6 Issue Resolution Conference Number 1 (June 2006) – This conference/meeting was held on June 14, 2006, at Cleveland City Hall, Cleveland, Ohio. The meeting was held with local stakeholders, Federal, State, and local agencies, and personnel from USACE District, Division and Washington D.C. Headquarters offices. The primary purpose of the meeting was to bring together a forum of open communication with all interested parties to present and discuss alternative measures and plans for the dredged material management study; to discuss the USACE plan formulation process; and, to gather concerns and suggestions from the stakeholders. The USACE explained the primary objective of a DMMP study is to verify that all Federally maintained navigation projects have sufficient capacity for dredged material disposal for a minimum of 20 years. Specific study requirements to meet that objective include: (1) establish a Base Plan for the project; (2) assess the potential for beneficial use of dredged material; (3) establish a Management Plan for the project; and, (4) demonstrate that continued maintenance is economically warranted based on high-priority (non-recreational benefits). The USACE also presented the challenges of managing dredged material at Cleveland Harbor including the following:

- The DMMP study proposes to have a new CDF or disposal method available in Cleveland Harbor in 2014.
- CDF Site 10B will be filled in 2006.
- No further CDF capacity is available without modifications to existing facilities.
- Historical average annual dredging and disposal of 330,000 cubic yards.
- Fill Management Plans will be implemented to manage disposal of dredged material from 2007 to 2011 in existing Cleveland CDFs.
- An additional Fill Management Plan may need to be developed for 2012 and 2013.

After the USACE presented the study process, schedule, and many challenges of the project, the audience exchanged questions, ideas, and discussed the proposed alternative measures and plans. In conclusion, the USACE returned to Buffalo with additional measures to consider and address in the DMMP/EIS including the use of nearby harbor CDFs, development of a regional CDF, sediment traps on the Cuyahoga River, and sediment loading to the Cuyahoga River. Habitat creation was mentioned both in the context of beneficial use and CDF design, and there was significant discussion pertaining to the Sediment Transport Model developed by USACE, Buffalo District. Overall, there was a high degree of stakeholder interest in measures to control and reduce sedimentation in the Cuyahoga River. A detailed record of the Issue Resolution Conference is contained in Appendix H.

6.7 Issue Resolution Conference Number 2 (June 2007) - The second Issue Resolution Conference, also known as the Alternative Formulation Briefing (AFB), was held in September 2007. The AFB is held at a point where most of the project planning has been completed and to confirm that technical and policy concerns regarding the tentatively selected plan have been resolved during project planning. The purpose of the AFB is to confirm the plan formulation and selection process, the tentatively selected plan, and that the definition of Federal and non-Federal responsibilities are consistent with applicable

laws, statutes, Executive Orders, regulations, and current policy guidance. The end product was a HQUSACE issued formal memorandum called the AFB Guidance memorandum. The AFB Guidance Memorandum was used by the Buffalo District to complete all required detailed analysis and make final preparations of the draft DMMP/EIS for release for 45-day agency and public review.

However, shortly after the completion of the September 2007 AFB, the Alternative Plan 4 (East 55th Street site) was re-introduced into the planning process by the non-Federal sponsor. Since then, efforts were devoted to conducting detailed analysis of Alternative Plan 4. A third Issue Resolution Conference was held April 16, 2009 and provided the same output as the AFB.

6.8 NEPA Public Meeting (September 2006) – In accordance with the NEPA, an early stage (scoping) public meeting was held on September 7, 2006 at the Carnegie West Branch, Cleveland Public Library. The purpose of the meeting was to inform the public and all that attended of the USACE plans and alternatives to be discussed in the EIS and to gather further scoping issues. The format, questions and issues, and answers were essentially the same as at the June 2006 IRC (paragraph 6.6).

6.9 Other Meetings, Briefings, etc. (2006 through 2007) - USACE staff presented updates of the status, issues and alternatives being considered for the Cleveland DMMP at a number of meeting and forums during the summer of 2006 through the spring of 2007 as discussed below..

- August 23, 2006 - Cuyahoga River Delisting Workshop, Ohio Environmental Protection Agency Offices, Twinsburg, OH (update on the status of the DMMP).
- October 18, 2006 - Cuyahoga River Watershed Symposium, Cuyahoga Falls, OH (presentation of the Cleveland DMMP study).
- December 20, 2006 – Cuyahoga River RAP Meeting, OEPA Offices, Twinsburg, OH (update on the status of the DMMP).
- March 1, 2007 – Northeast Ohio Committee Meeting, U.S. Coast Guard Station, Cleveland, OH (presentation of alternatives being considered in the Cleveland DMMP study).
- April 19, 2007 – Public Meeting, Carnegie West Branch Library (presentation of alternative plans being considered in the Cleveland DMMP study).
- August 13, 2007 – Meeting with Mayor Frank Jackson, City of Cleveland (coordination meeting and progress update on Cleveland DMMP study).
- February 1, 2008 – Interagency coordination meeting to discuss analysis of Alternative Plan 4

- February 19, 2008 – Joint public meeting with Cleveland Cuyahoga County Port Authority
- June 16, 2008 – Joint public meeting with Cleveland Cuyahoga County Port Authority

6.10 Endangered Species Act Consultation – It is USACE policy to operate and maintain existing projects in accordance with the project authorization and in a manner that fosters the existence and encourages the propagation of threatened and endangered species, and that protects critical habitat. Through the Public Information Scoping Packet that was sent out on March 16, 2006, ODNR and USF&WS were asked to comment on the proposed project and potential impacts on endangered and threatened species. The USACE initiated Section 7 consultation with the USF&WS.

6.11 Tribal Consultation – The USACE recognizes that Tribal governments are sovereign entities. The USACE works to meet trust obligations, protect trust resources, and obtain Tribal views of trust and treaty responsibilities. USACE leaders and Tribal leaders will meet and recognize that, as governments, Tribes have the right to be treated in accordance with principles of self-determination. Tribes will be involved in a collaborative process designed to ensure meaningful communication, consideration of disparate viewpoints before and during decision-making, and utilization of fair and impartial dispute resolution. With the distribution of the Public Scoping Information Packet, the USACE sought to provide meaningful and timely opportunities for tribes to comment on agency policies that may have significant or unique effects on tribal interests.

6.12 Laws and Statutes Relating to Tribal Interests - There are many Federal laws, executive orders, policy directives, and Federal regulations that address responsibilities of the executive branch agencies regarding tribal interests. Collectively, these form the basis of how consultation is conducted and have had a profound impact on Federal-tribal relations. Examples of the statutes specifically discussing tribal interests are the NHPA, Archeological Resources Protection Act, NAGPRA, Executive Order 13007, Indian Sacred Sites, and Executive Order 13175, Consultation and Coordination of Indian Tribal Governments.

6.13 Government-to-Government Consultation Status - The USACE initiated communication with tribal interests through the scoping process on March 16, 2006. The Scoping Packet was sent to 36 tribes. To date, none have indicated an interest in further consultation. A ‘Notice of Availability’ of the draft DMMP/EIS was sent to the tribes in August 2009, for additional consultation.

FUTURE COORDINATION AND CONSULTATION

6.14 NEPA Public Review – In accordance with NEPA, interested parties are hereby given 45-days to provide comments on the draft DMMP/EIS. After this review is complete, all comments received will be addressed in the Final DMMP/Final EIS which will then be made available for public review for a 30-day period. The final NEPA

action, after final selection of a plan and coordination of the FEIS, will be release of a Record of Decision (ROD).

6.15 Clean Water Act - Section 404 of the CWA (1972) developed a program to regulate the discharge of dredged or fill material into waters of the US. In compliance with the CWA, persons who wish to discharge dredged or fill material into waters of the United State, regardless if it is public or private property, must obtain a Section 401 State Water Quality Certification from the respective State whose waters would be impacted by the proposed activity. Under the CWA, every state must adopt water quality standards to protect, maintain and improve the quality of the nation's surface waters. These standards represent a level of water quality that will support the goal of "swimmable/fishable" waters (Clean Water Act, 1972).

USACE has followed Section 404 regulations of the CWA throughout planning and preliminary design of the selected alternative plan. A 404(a) Public Notice and 404(b)(1) Evaluation have been submitted to EPA for review and concurrence (Appendix D).

Changes to ORC section 6111.30 were implemented in September 2005 and directly affect the Section 401 Water Quality Certification requesting and issuance process via OEPA. The requirements specified in ORC 6111.30 (A, B, and E through H) must be met in order to complete the application process and are summarized below.

USACE must submit a complete application form to OEPA. The application must include, if applicable:

- wetland characterization
- use attainability analysis (if the project impacts a stream)
- specific and detailed mitigation
- applicable permit fees (Federal government is exempt)
- Site photographs
- Documents confirming interagency coordination (ODNR, USF&WS)
- Maps, figures, and economic information for the preferred alternative, non-degradation alternatives and minimal degradation alternatives for design and operation of the activity

Furthermore, once the application is received by OEPA, the agency has 15 business days to review and accept the application for completeness. If incomplete, the letter will specify what parts of the application package are missing. If complete, the letter will specify what type of public notice is required for the proposed project. The letter will also provide the name and contact information for the application reviewer assigned to that project. This notification will be a letter that is faxed to the applicant or their designated agent. The applicant, or their agent, will be asked to acknowledge receipt of the 15-day review letter by signature and return fax. Should the application be incomplete, the applicant has 60 days in which to provide the missing information.

OEPA is required to forward all public comments to the applicant within five business days of receiving the comment. This is to ensure that the applicant has sufficient time to

respond to the comment if necessary. The applicant is required to provide a written response to comments within 15 business days of receiving them. This is to ensure that the application review process is completed in a timely fashion.

OEPA is required to act on a complete application within 180 days of receiving that application and is also required to provide the applicant an opportunity to review the action prior to its issuance. These requirements provide the applicant a much shorter permitting time frame and ensure that the applicant will be aware of the pending action.

6.16 Coastal Zone Management Act – Under CZMA of 1972, Federal Consistency is required for certain Federal agency projects, permits, and funding that has reasonably foreseeable effects on State’s designated coastal areas. Actions must be consistent with the State’s enforceable policies. Coastal management programs promote State rather than Federal discretion in coastal resource management. This empowers State and local governments to determine whether Federal actions will or will not help further coastal stewardship efforts. State Consistency, in the State of Ohio, is required under ORC 1506.03.

State Consistency is the requirement that State agency projects and permits directly affecting the coastal area must be determined to be consistent with the Office of Coastal Management Program (OCMP) policies.

Consistency reviews consider comments and concerns of local, State, and Federal agencies, as well as those of the general public. Projects are also reviewed to assure that the proposed activities receive all necessary State permits and authorizations. Applicants must provide ODNR with a copy of a signed Consistency Certification and all necessary information required so that ODNR may conduct its review and issue its final consistency determination for the activity.

ODNR staff will consult with other State agencies networked in the OCMP in its review. When ODNR has completed its review of the activity, ODNR will issue its final determination, either Concurrence or an Objection to the Consistency Certification. In its Objection, ODNR may provide a description of alternatives to consider, if any exist, that would make the proposed activity consistent with the OCMP if adopted by the applicant.

6.17 U.S. Fish and Wildlife Coordination Act - The Fish and Wildlife Coordination Act provides the basic authority for the USF&WS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It also requires Federal agencies that construct, license or permit water resource development projects to first consult with the Service (and the National Marine Fisheries Service in some instances) and State fish and wildlife agency regarding the impacts on fish and wildlife resources and measures to mitigate these impacts (Fish and Wildlife Coordination Act).

USF&WS reviews project proposals and prepares a Fish and Wildlife Coordination Act Report that identifies potential impacts, issues, or concerns, if any, related to fish and wildlife species and habitat in and around the designated project area.

The USF&WS completed a Fish and Wildlife Coordination Act Report pertaining to the proposed Cleveland DMMP on April 10, 2007 (Appendix I). Subsequent to the completion of the initial Fish and Wildlife Coordination Act Report received in April 2007, USACE requested that the Report be expanded to include the newly proposed East 55th Street site. Comments from both reports will be taken into consideration by the Buffalo District and to the maximum extent practicable, addressed in the planning, design, and construction phases of the project. Recommendations from the USF&WS are stated below.

USF&WS Coordination Act Report Summary	
Comments and Recommendations	USACE Consideration of Comments
Recommend fully implementing BMP in the watershed to minimize the volume of eroded materials entering Cleveland Harbor (regardless of alternative plan pursued). This can be accomplished through WRDA, CREP, and/or CRP programs, as well as programs associated with other agencies, such as U.S. Geological Survey and State and Federal EPAs.	Concur, under 516(e) Great Lakes Tributary Sediment Transport Modeling Program, USACE is developing a Cuyahoga River Watershed model that will be complete and transferred to local interests in Fiscal Year 2007. The purpose of the model is to identify and implement measures to reduce sediment loads.
Maximize utilization of existing CDFs to forestall need to construct a new facility.	Concur, USACE will implement a FMP at existing CDFs to maximize the capacity.
Fully explore the possibilities of beneficial use of dredged material in the Cuyahoga River watershed area (regardless of alternative plan pursued). Implement the feasible beneficial uses, either from barged loaded with fresh dredged materials or from consolidated materials on CDFs.	Concur, current beneficial use measures under consideration include FMPs, mine reclamation, and use of geosynthetic containers for construction of new CDFs.
Fully implement BMPs during dredging operations to minimize impacts to water quality in the harbor.	Concur.
Fully implement BMPs during any possible construction activities to increase capacity at an existing CDF, or a new CDF.	Concur, beneficial use measures under consideration include FMPs and harvest dredged material to fill geosynthetic containers for CDF construction.

USF&WS Coordination Act Report Summary	
Comments and Recommendations	USACE Consideration of Comments
Except for CDFs near the airport, recommend that CDFs be managed for wildlife as mitigation during intervals of non-activity, if feasible, and after final filling of the CDF. Management efforts should be coordinated with ODNR Division of Wildlife and the Service.	Dredging and disposal operations occur two times each year and requires routine operation and maintenance of the facilities between disposal events therefore, there is essentially no period of inactivity. End use of the CDF is determined by the local sponsor.
Recommend consultation with the ODNR regarding seasonal restrictions of dredging activities to protect the fishery resource during the spawning period, in particular.	Concur, USACE has consulted ODNR and there is no environmental window established for the area within the limits of the Federal navigation channels.
Recommend that our proposal to construct fish spawning shelves along the outside of newly constructed CDF dikes be fully explored regarding need and feasibility. This feature would serve as partial mitigation for loss of fishery habitat in the Cleveland Harbor area.	Concur.
Recommend fully implementing BMP in the watershed to minimize the volume of eroded materials entering the Cleveland Harbor (regardless of alternative plan pursued).	Concur, under 516(e) Great Lakes Tributary Sediment Transport Modeling Program, USACE is developing a Cuyahoga River Watershed model that will be complete and transferred to local interests in Fiscal Year 2009. The purpose of the model is to identify and implement measures to reduce sediment loads.
Maximize utilization of existing CDFs to forestall the need for construction of a new facility.	Concur; USACE will implement a FMP at existing CDFs to maximize the capacity
Fully explore the possibilities of beneficial use of dredged material in the Cuyahoga River watershed area (regardless of alternative plan pursued). Implement the feasible beneficial uses, either from barged loaded with fresh dredged materials or from consolidated materials on CDFs.	Concur, current beneficial use measures under consideration include FMPs, mine reclamation, and use of geosynthetic containers for construction of new CDFs.
Fully implement BMPs during maintenance dredging operations to minimize impacts to water quality in the harbor.	Concur.

USF&WS Coordination Act Report Summary	
Comments and Recommendations	USACE Consideration of Comments
Fully implement BMPs during any possible construction activities to increase capacity at an existing CDF, or a new CDF.	Concur, current beneficial use measures under consideration to increase capacity at existing CDFs include FMPs and use of harvested dredged material to fill geosynthetic containers for construction of new CDFs.
Except for CDFs near the airport, recommend that CDFs be managed for wildlife as mitigation during intervals of non-activity, if feasible, and after final filling of the CDF. Management efforts should be coordinated with Ohio DNR Division of Wildlife and the Service.	Dredging and disposal operations occur two times each year and requires routine operation and maintenance of the facilities between disposal events therefore, there is essentially no period of inactivity. End use of the CDF is determined by the local sponsor.
Recommend consultation with the Ohio DNR regarding seasonal restrictions of dredging activities to protect the fishery resource during the spawning period, in particular.	Concur, USACE has consulted ODNR and there is no environmental window established for the area within the limits of the Federal navigation channels.
Recommend that our proposal to construct fish spawning shelves along the outside of newly constructed CDF dikes be fully explored regarding need and feasibility. This feature would serve as partial mitigation for loss of fishery habitat in the Cleveland Harbor area.	Concur.
The proposed CDF would destroy more than 200 acres of warm-water aquatic habitat. Not only is this a significant loss of habitat, but we believe the Corps should assess the cumulative impact of this habitat loss. In addition to our recommended fish spawning shelves, we recommend shoreline fish habitat improvements be implemented in conjunction with Ohio DOT's Cleveland Urban Core Projects.	Concur. To the extent feasible, shoreline fish habitat improvements will be implemented in conjunction with Ohio DOT's Cleveland Urban Core Projects.

USF&WS Coordination Act Report Summary	
Comments and Recommendations	USACE Consideration of Comments
<p>We recommend that new marina(s), ramps, fishing access and public green space of similar or better size and quality be constructed nearby to mitigate for the loss of these services and areas to those that frequent the areas for fishing, boating, wildlife watching, and recreating in downtown Cleveland. If this cannot be accommodated by selection and size of this proposed CDF site, then alternate CDF site(s) should be pursued.</p>	<p>Concur. Proposed construction will not directly impact marinas, ramps, public green space, boating, wildlife watching, or recreation in downtown Cleveland; however, the construction of the East 55th Street CDF will impact fishing areas currently along the breakwater that forms the East 55th Street marina. To the extent feasible, fishing platforms will be incorporated into the design and construction of the East 55th Street CDF to mitigate for the loss. The cumulative impact due to actions by others, could affect these services and area and these impacts would be addressed in a separate EIS action by others, and will be mitigated in a manner acceptable to the community.</p>

6.18 Independent External Peer Review - The Cleveland Harbor DMMP meets the applicability standards for review of decision documents as discussed in EC 1105-2-410, paragraph 2. The initial cost of the selected alternative is in excess of \$200 million dollars. As stated in paragraph 6(c) of EC 1105-2-410, one of the factors to consider whether an Independent External Peer Review (IEPR) is appropriate is where the project cost exceeds \$45 million. This \$45 million project cost is also consistent with Congressional direction found in Section 2034 of the Water Resources Development Act of 2007. Therefore, an IEPR of the draft DMMP/EIS document will be conducted simultaneously with the NEPA public review. Disciplines that are anticipated to undergo IEPR are engineering, environmental, and economics. Comments, responses, and required action will be incorporated into the final DMMP/EIS.

6.19 Coordination with Navigation Interests – Throughout this DMMP process the direction and progress of the study has been closely coordinated with the non-Federal sponsor, the Cleveland-Cuyahoga Port Authority; the City of Cleveland; various industries (e.g. ArcelorMittal Steel) that are users of port facilities and channels; the U.S. Coast Guard; and, the Lake Pilot’s Carriers Association. To date, none of those interests have expressed significant concerns related to construction of a new CDF.

Acknowledging that there would be some reconfiguration of the channels in the location of East 55th Street with construction of a CDF, a meeting to discuss navigation safety issues was held in Cleveland on February 19, 2009. That meeting was attended by representatives of the USACE, the Cleveland-Cuyahoga Port Authority, the Lakes Pilots Association and URS Inc (consultants for the Port Authority). The primary purpose of the meeting was to describe the CDF footprint, discuss realignment of the channels in the eastern basin that would be needed for construction, and to gain the Lake Pilots

Association initial assessment of the potential ship navigation difficulties that might be encountered if the CDF was built. According to the representative from the Lake Pilots Association, the eastern entrance to the harbor is used much less frequently than the “main” entrance at the river. However, it is sometimes used as a convenience and particularly if there are northwest winds. The alignment as proposed would provide a satisfactory width for commercial navigation. The USACE agreed that future design and wave modeling efforts will be conducted to identify and develop mitigation for any potential navigation safety issues.

CHAPTER 7 – LIST OF PREPARERS

7.1 The following USACE personnel were involved in the preparation of this DMMP/EIS Documentation.

Philip E. Berkeley is a Biologist in the Planning Branch at the USACE, Buffalo District. He received a B.S. in Biology from Springfield College in Springfield, Massachusetts and M.S. in Biology from the State University of New York (SUNY) at Buffalo. He has over 30 years Federal government experience in Corps of Engineers Planning and Project Evaluation.

Paul Bijhouwer is a Hydraulic Engineer in the Operations Branch at the USACE, Buffalo District. He received a B.S. in Civil Engineering from the University of New Orleans. He has five years Federal government experience, 12 years of private sector experience, and is a Professional Engineer registered by New York State.

Josh Feldmann is the Continuing Authorities Program Manager in the USACE, Buffalo District Planning Branch. He received a B.S. in Civil Engineering from Syracuse University and an M. Eng. from North Carolina State University. He has seven years of experience in civil engineering and project management. He is a registered Professional Engineer in New York State and a certified Project Management Professional.

Lynn M. Greer is an Outreach Program Specialist in the Planning Services Branch at the USACE, Buffalo District. She received a B.S. in Geology, B.A. in Italian, and M.S. in Environmental Science from SUNY, College at Buffalo. She has ten years Federal government experience. Prior to serving as the Outreach Coordinator, Lynn served five years as a Physical Scientist and Technical Manager of the DMMP EIS.

Roger E. Haberly is a Regional Economist in the Planning Branch at the USACE, Buffalo District. He received a B.A. in Economics from Canisius College, Buffalo, New York, and his M.A. in Economics from the SUNY at Buffalo. He has over 25 years Federal government experience in Planning and Project Evaluation.

Michele L. Hope is a former Archeologist and Project Manager in the Planning Branch of the USACE, Buffalo District. She received a B.A. in Anthropology, M.A. in Archeology Museum Studies from George Washington University, and a M.P.A. in Public Administration from the University of Alaska, Anchorage. She has over 29 years Federal government experience in cultural resources management, environmental coordination, planning and policy, public affairs, and project management.

Patti McKenna is a Physical Scientist and Project Manager in the Planning Branch of the USACE, Buffalo District. She received a B.S. in Environmental/Urban Planning from SUNY at Buffalo and is currently pursuing her Master's Degree in Interdisciplinary Studies. She has 25 years Federal government experience.

Jay M. Miller is a biologist in the Environmental Analysis Section at the USACE, Buffalo District. He received a B.S. in Environmental Studies with Biological Applications from SUNY Environmental Science and Forestry, Syracuse, New York. He has over nine years Federal government experience in Environmental Analysis and Project Evaluation.

Michael C. Mohr is the Regional Technical Specialist in Coastal Engineering for the Great Lakes and Ohio River Division and is stationed at the USACE, Buffalo District. He received a B.S. in Civil Engineering from SUNY at Buffalo, New York, and his M.S. in Fluid Mechanics and Hydraulics from the University of Connecticut, Storrs, Connecticut. He has over 31 years federal government experience in hydraulic and coastal engineering design with the USACE, Buffalo District and has also designed or reviewed coastal projects for other USACE Districts.

Frank A. O'Connor is a Project Manager in the Project and Program Management Branch of the USACE, Buffalo District. He received a B.S. in Geology from the State University of New York at Albany and an M.S. in Geology from Oklahoma State University. He is a registered Professional Engineer in New York State and a certified Project Management Professional with over 20 years of experience, gained primarily as a consultant with large A/E firms. He has extensive experience with environmental studies and engineering designs.

Tod Smith is a former Community/Environmental Planner in the Environmental Analysis Section of the Environmental Engineering and Analysis Branch of the USACE, Buffalo District. He received an Associate of Applied Science in Civil Technology and subsequent Bachelor of Arts in Environmental Design from the School of Architecture and Environmental Design from SUNY at Buffalo. He served 30 years of engineering technician, planning, and environmental (NEPA and Community/Social) coordination experience with the USACE, Buffalo District.

Reed Vetovitz is a Geotechnical Engineer in the Design Branch of the USACE, Buffalo District. He received a B.A. in pre-engineering from Baldwin-Wallace College, a B.S. in Civil Engineering from Case Western Reserve University, and a M.S. in Civil Engineering from the University of Cincinnati. He has 11 years of experience as a Civil Engineer.

James R. Wryk is a Civil Engineering Technician in the Cost and Project Engineering Team at the USACE, Buffalo District. He received an A.A.S. in Civil Engineering Technology from Erie Community College in Buffalo. He has 29 years of Federal experience in the Corps of Engineers, the last 25 years in Cost Engineering.

CHAPTER 8 – DISTRIBUTION LIST

8.1 The Public Scoping Information Packet for the proposed Cleveland Harbor DMMP, and the Draft DMMP/DEIS, were sent to the Federal, State, and local agencies listed below. The Final DMMP/EIS is tentatively scheduled for distribution to the same list in 2010.

Federal

Federal Aviation Administration
 Detroit Airports District Office
Federal Emergency Management Administration
Federal Maritime Commission
U.S. Coast Guard, Cleveland
U.S. Department of Agriculture
 Animal and Plant Health Inspection Service
 Farm Service Agency
 Forest Service
 Natural Resource Conservation Service
U.S. Department of Commerce
 National Oceanic and Atmospheric Administration
U.S. Department of Energy
U.S. Environmental Protection Agency
 Ohio Environmental Protection Agency
U.S. Department of Health
 Centers for Environmental Health & Disease Control
U.S. Department of Housing and Urban Development
 Region 5 Field Office
U.S. Department of the Interior
 National Park Service
 Office of Environmental Project Review
 U.S. Fish & Wildlife Service
U.S. Department of State
U.S. Department of Transportation
 Federal Highway Administration
 Federal Highway Administration, Midwest Resource Center
 Federal Railroad Administration, Region 2

State

Ohio Department of Health
Ohio Department of Natural Resources
 Coastal Management Service
 Office of Legislative Services
Ohio Department of Transportation
 Office of Environmental Services
Ohio Historic Preservation Office

Local

Cuyahoga County

- Board of Commissioners
- Board of Health
- Cleveland-Cuyahoga County Port Authority
- County Administrator
- County Engineer
- Cuyahoga River Remedial Action Plan Commission
- Cuyahoga Soil and Water Conservation District
- Parks & Recreation
- Planning Commission
- Public Health and Welfare

City of Cleveland

- City Planning Commission
- Cleveland Airport Systems
- Department of Port Control, Burke Lakefront Airport
- Division of the Environment
- Mayor's Office
- Mayor of Bratenahl
- Water Pollution Control

Tribal Interests

- Bad River Band of the Lake Superior Tribe of Chippewa Indians, Wisconsin
- Bay Mills Indian Community, Michigan
- Burt Lake Band of Ottawa and Chippewa Indians, Inc.
- Chippewa-Cree Tribe of the Rocky Boy's Reservation, Montana
- Citizen Potawatomi Nation, Oklahoma
- Delaware Nation, Oklahoma
- Delaware Tribe of Indians, Oklahoma
- Hannahville Indian Community, Michigan
- Huron Potawatomi, Inc., Michigan
- Keweenaw Bay Indian Community, Michigan
- LacCourte Oreilles Band of Lake Superior Chippewa Indians, Wisconsin
- Little River Band of Ottawa Indians, Michigan
- Little Shell Tribe of Chippewa Indians, Montana
- Little Traverse Bay Bands of Odawa Indians, Michigan
- Match-e-be-nash-she-wish Band of Pottawatomi Indians, Michigan
- Miami Nation of Indians of Indiana
- Miami Tribe of Oklahoma
- Ottawa Tribe of Oklahoma
- Pokagon Band of Potawatomi Indians, Michigan & Indiana
- Prairie Band of Potawatomi Nation, Kansas
- Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
- Red Lake Band of Chippewa Indians, Minnesota
- St. Croix Chippewa Indians of Wisconsin

Seneca Nation of New York
Seneca-Cayuga Tribe of Oklahoma
Sokaogon Chippewa Community, Wisconsin
Tonawanda Band of Seneca Indians, New York
Turtle Mountain Band of Chippewa Indians, North Dakota
Wyandotte Tribe of Oklahoma

Regional/Other Interests

ArcelorMittal Steel Company
Audubon Society
Detroit Columbia Gulf
Ducks Unlimited
Earth Day Coalition
Ecology and Conservation Office
Flats Industry
Ford Motor Company
Forest City Yacht Club
Great Lakes Commission
Great Lakes Shipping
Great Lakes United
Great Lakes Tomorrow
Great Lakes Towing
Green City Blue Lake
Inland Seas Maritime Museum
Interested Citizens
International Joint Commission
International Salt Company
Kurtzman Bros. Inc.
Lake Carriers Association
Lakeside Yacht Basin
Mobile Oil Corporation
Northeast Ohio Regional Sewer District
NY/NJ Clean Ocean and Shore Trust
Oglebay Norton Marine Service
Ohio Sea Grant
Ontario Stone Corporation
St. Clair-Superior Coalition
Samsel Rope & Marine Supply
Sandusky Maritime Museum
Shell Oil Company
Sherwin-Williams Company
Sierra Club
Trout Unlimited
URS

CHAPTER 9 –GLOSSARY AND ACRONYMS

9.1 Glossary - This glossary defines terms found in the draft and final DMMP/EIS:

Advanced Circulation Model (ADCIRC): A two-dimensional, depth averaged, hydrodynamic model used to quantify circulation patterns.

Air Quality Control Region (AQCR): Federally designated area that is required to meet and maintain Federal ambient air quality standards. May include nearby locations in the same state or nearby states that share common air pollution problems.

American Society for Testing and Materials (ASTM): An international standards developing organization that develops and publishes voluntary technical standards for a wide range of materials, products, systems, and services.

Animal and Plant Health Inspection Service (APHIS): A part of the Department of Agriculture established in 1977. This service conducts inspections of animals and plants to prevent pests and disease, or to control and eradicate once discovered. APHIS has the authority to impose quarantines to stop interstate and foreign commerce shipments. The service also licenses and regulates the manufacture and sale of chemical and non chemical products used to prevent or treat animal and plant pests, and diseases.

Archaeological Resource: See cultural resource.

Authorized Project: A project established by the authority of the U.S. Congress for the specific purposes described in the legislation (e.g., flood control, power generation, navigation, irrigation, recreation, fish and wildlife, etc.).

Buffer: Usually a natural area or open space used to divide two developed or developing areas.

Centimeter (cm): A unit of measurement that is 1/100th of a meter or approximately 4/10ths of an inch (0.39 inch).

Chief Financial Officer (CFO): The corporate executive having financial authority to make appropriations and authorize expenditures for a firm.

Clamshell Dredging: Clamshell dredges use a bucket operated from a crane or derrick that is mounted on a barge or operated from shore. Sediment removed by the bucket is usually placed on a barge for disposal to either an upland or in-water site.

Clean Air Act (CAA): A set of laws passed in 1970 to regulate air pollution in the United States. The goal of this act was to improve air quality; it was revised in 1990 to be more detailed about issues such as the hole in the ozone layer and acid rain.

Coastal Zone Management: A Federally funded and approved State program under the Federal Coastal Zone Management Act of 1972. The program reviews federal permitting, licensing, funding, and development activities in the coastal zone for consistency with State policies.

Confined Disposal Facility (CDF): An engineered structure for containment of dredged material.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): The Federal law that guides cleanup of hazardous waste sites.

Contaminants Of Concern (COC): Contaminants in a given media (usually soil or water) above a risk level that may result in harm to the public or the environment.

Council on Environmental Quality (CEQ): An advisory council to the President, established by NEPA in 1966. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Council of Great Lakes Governors (CGLG): A non-partisan partnership of the Governors of the eight Great Lakes States: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. The Council encourages and facilitates environmentally responsible economic growth.

CSX - A Class 1 Railroad Company formed July 1, 1986 as a renaming of the Seaboard System Railroad and Chessie System, Inc. into one entity. It services most of the east coast.

Cubic feet per second (cfs): A unit of measurement (English) that can be used to describe the flow rate or discharge of water. One cfs is equal to 449 gallons per minute.

Cultural Resource: Evidence of human occupation or activity that is important in the history, architecture, or archaeology of a community or region.

Cuyahoga County Planning Organization: The County Planning Commission (CPC) promotes administrative and regulatory measures to implement regional plans. The CPC provides land use zoning, development, and other planning services for the County's cities, villages, and townships, Board of County Commissioners, and other governmental and not-for-profit organizations.

Cuyahoga River Watershed: A 'U' shaped watershed in Ohio that drains 813 square miles of land in Geauga, Portage, Summit, and Cuyahoga Counties into Lake Erie.

Cuyahoga Valley Initiative (CVI): A multi year collaborative process initiated by the Cuyahoga County Planning Commission to regenerate the environment, economy, and community of the Cuyahoga River Valley.

Dredged Material Management Plan (DMMP): The dredging and disposal plan that results from analyses conducted in the Dredged Material Management Study.

Dredged Material Management Study (DMMS): A programmatic study by the Corps Of Engineers to provide disposal alternatives for sediments dredged over a 20 year period. These studies follow guidance provided in ER-1105-2-100.

Department Of Environmental Quality (DEQ): A State department created to ensure clean air, water, and land in the State and protect citizens from the adverse health impacts of pollution.

Easement: An interest or privilege in land created by a provision in a deed or by an agreement that confers a right on the owner to some profit, benefit, dominion, or lawful use of the estate over another.

Ecosystem: Living and nonliving components of the environment that interact or function together.

Endangered Species: Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range. Endangered Species are published in the Federal Register.

Executive Order (EO) 12898: Issued February 11, 1994, this EO Establishes environmental justice as a Federal government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

Fill: The placement, deposition, or stockpiling of sand, sediment, or other earth materials.

Greater Cleveland Regional Transit Authority: The metropolitan transportation agency in Cleveland, Ohio and its surrounding suburbs. It owns and operates the Cleveland Rapid Transit rail system (The Rapid) and bus services.

Habitat: The place or conditions where a plant or animal lives or can live. The plant or animal can be an individual organism, a population, or a taxonomic group. In the present context, habitat refers to an area that provides some portion of the requirements for the life history of a given species.

In-Water Disposal: The placement of dredged material along the riverbed in or adjacent to the navigation channel or in designated in-water sites.

Low Water Datum: An approximation of mean low water used for harbor dredging purposes.

Micron: A metric unit of length equal to 1 millionth of a meter.

Mitigation: An additional action that compensates for loss of resources by providing substitute resources. The use of any or all of the following actions:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

Monitoring: A process of collecting information to evaluate if objectives and anticipated results of a management plan are being realized or if implementation proceeds as planned.

National Ambient Air Quality Standards (NAAQS): Standards set by the Environmental Protection Agency that identify the limit of concentrations of certain air pollutants that endanger public health or welfare.

Native American Graves Protection and Repatriation Act (NAGPRA): The 1990 Act address the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to Native American human remains, funerary objects, sacred objects, and objects of cultural significance. The statute requires Federal agencies and museums to provide information about Native American cultural items to parties with standing and, upon presentation of a valid claim, ensure the item(s) undergo disposition or repatriation.

National Historic Preservation Act: A Federal statute passed in 1966 that established a Federal program to further the efforts of private agencies and individuals in preserving the Nation's historic and cultural foundations. NHPA authorized establishing the National Register of Historic Places, established the Advisory Council on Historic Preservation and a National Trust Fund to administer grants for historic preservation, and authorized development of regulations to require Federal agencies to consider the effects of Federally assisted activities on properties included on or eligible for the National Register of Historic Places.

Obstacle Free Area (OFA): An 800 foot wide area measured from the centerline of the runway in which no objects are permitted in this area above the elevation of the runway except for equipment needed for airport safety. This requirement provides a 400-foot OFA on either side of the centerline of the runway.

Particle Tracking Model (PTM): An USACE, ERDC-developed model designed to track the fate of point-source constituents (sediment, chemicals, debris, etc) released from local sources (outfalls, dredges, etc) in complex hydrodynamic and wave environments.

PM₁₀: An index of particulate matter that can enter the thorax and cause or exacerbate lower respiratory tract diseases.

Project: The broad term covering Federally constructed and maintained channels and structures. A “Project” is a channel or facility constructed for variety of authorized purposes, such as, hydroelectric generation, flood control, navigation, etc.

Reach: A section of river, usually defined by river mile(s).

Riparian: The area immediately adjacent to streams, ponds, lakes, and wetlands that directly contributes to the water quality and habitat components of the water body. This may include areas that have high water tables, soils and vegetation that exhibit characteristics of wetness, and upland areas immediately adjacent to the water body that directly contribute shade, nutrients, cover, debris, or that directly enhance water quality within the water body.

Runway Safety Area (RSA): A 500-foot wide zone, as measured from the runway centerline, which is essentially flat in elevation from the centerline of the runway. The RSA allows for a 250 feet safety zone on either side of the centerline of the runway.

Spawning: Release and fertilization of eggs by fish.

Species: A group of organisms that can interbreed in nature (a common gene pool that is biologically isolated from closely related species) and is designated by an available and valid scientific name.

Threatened Species: Plant or animal species likely to become endangered in the foreseeable future through all or a significant portion of their habitat range. Plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.

Total Organic Carbon (TOC): The amount of carbon bound in an organic compound and is often used as a non-specific indicator of water quality.

Toxic Equivalency Factors: Toxicity potency factors that are used by the World Health Organization (WHO) and by scientists and regulators globally as a consistent method to evaluate the toxicities of highly variable mixtures of dioxin compounds

Upland: Any area that does not qualify as a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands.

Water Quality: The chemical, physical, and biological characteristics of water.

Wetlands: Areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, under normal circumstances, a prevalence of vegetation

typically adapted for life in saturated soil conditions. This does not include riparian areas, rivers, streams, and lakes.

9.2 Acronyms/Abbreviations - The following acronyms are used in the DMMP:

ADCIRC – Advanced Circulation

AFB – Alternative Formulation Briefing

AOC – Area of Concern

APE - Area of Potential Effect

APHIS - Animal and Plant Health Inspection Service

AQCR - Air Quality Control Region

ASTM - American Society for Testing and Materials

AVI – Advanced Visual Image

BA - Biological Assessment

BKL – Burke Lakefront Airport

BMP - Best Management Practice

CAA - Clean Air Act

CADD - Computer Aided Drafting and Design

CDF – Confined Disposal Facility

CERCLA - Comprehensive Environmental Response Compensation Liability Act

CELRD – Corps of Engineers, Great Lakes and Ohio River Division

CEQ – Council on Environmental Quality

CFO - Chief Financial Officer

cfs - cubic feet per second

CGLG - Council of Great Lakes Governors

CH3D - Curvilinear-grid Hydrodynamics 3-Dimensional model

cm - centimeter

CMEDS - Comprehensive Mapping and Engineering Data System

CO- Carbon monoxide

COC- Contaminants of Concern

CSO – Combined Sewer Overflow

CVI - Cuyahoga Valley Initiative

CWA - Clean Water Act

cy – Cubic Yard

CZM - Coastal Zone Management

dba - A-weighted decibels

DEIS - Draft Environmental Impact Statement

DEQ - Department of Environmental Quality

DMMP - Dredged Material Management Plan

DMMP/EIS - Dredged Material Management Plan/ Environmental Impact Statement

DMMS - Dredged Material Management Study

DO - dissolved oxygen

EEI - Environment and Engineering Incorporated

EIS - Environmental Impact Statement

EPA - Environmental Protection Agency

ER - Engineering Regulation

ERDC – Engineering Research and Development Center

ESA - Endangered Species Act

FAA – Federal Aviation Administration

FEMA – Federal Emergency Management Agency

FMP – Fill Management Plan

FSM – Feasibility Scoping Meeting

FY - fiscal year

GPS – Global Positioning System

HQUSACE – Headquarters, U.S. Army Corps of Engineers

HTRW - Hazardous, Toxic, or Radioactive Waste

IGLD – International Great Lakes Datum

IRC – Issue Resolution Conference

ISG- International Steel Group

ITR – Independent Technical Review

km - kilometer

LERRD – Lands, Easements, Rights-of-Way, Relocations, and Disposal

LERR – Lands, Easements, Rights-of-Way, and Relocations

LOI – Letter of Intent

LWD – Low Water Datum

m - meter

mg/L - milligrams per liter

mm - millimeter

m/s – meters per second

NEORS- Northeast Ohio Regional Sewer District

NEPA - National Environmental Policy Act

NHPA - National Historic Preservation Act

NOI – Notice of Intent

NO₂ - Nitrogen Dioxide

NOS – National Ocean Service

NR - National Register

NRHP - National Register of Historic Places

NS – Norfolk Southern Corporation

ODNR – Ohio Department of Natural Resources

ODOT – Ohio Department of Transportation

OEPA – Ohio Environmental Protection Agency

O₃ - Ozone

⁰F - Degrees Fahrenheit

OFA – Obstacle Free Area

O&M – Operations and Maintenance

PA - Preliminary Assessment

PAH- Polynuclear Aromatic Hydrocarbons

Pb- Lead

PCB - Polychlorinated Biphenyls

PCS – Project Condition Survey

PED – Preconstruction, Engineering, and Design

PM - particulate matter

PM₁₀ - Particulate matter of 10 microns in diameter or smaller.

ppb – parts per billion

ppm - parts per million

PTM – Particle Tracking Model

RAP - Remedial Action Plan

RCRA - Resource Conservation and Recovery Act

ROD - Record of Decision

RPCC - recycled portland cement concrete

RSA – Runway Safety Area

SHPO - State Historic Preservation Office

SMSA – Standard Metropolitan Statistical Area

SO₂ – sulfur dioxide

SOW - Scope of Work

SSP - Steel sheet pile

TEF - Toxic Equivalency Factors

TOC - Total organic carbon

TP - total phosphorus

TSP – total suspended particles

TSS - total suspended solids

ug/m³ - Micrograms per cubic meter of air

USACE - U.S. Army Corps of Engineers

IWR - Institute for Water Resources

USDA - United States Department of Agriculture

USDOE - U.S. Department of Energy

USEPA - United States Environmental Protection Agency

USWA - United Steel Works Association

USF&WS – United States Fish and Wildlife Service

USGS – United State Geological Survey

USWRC - United States Water Resources Council

UTM – Universal Transverse Mercator

ug/m³ - Micrograms per cubic meter of air.

VRPNC – Value Recovery Partners North Coast

WRDA – Water Resources Development Act

CHAPTER 10 - REFERENCES

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