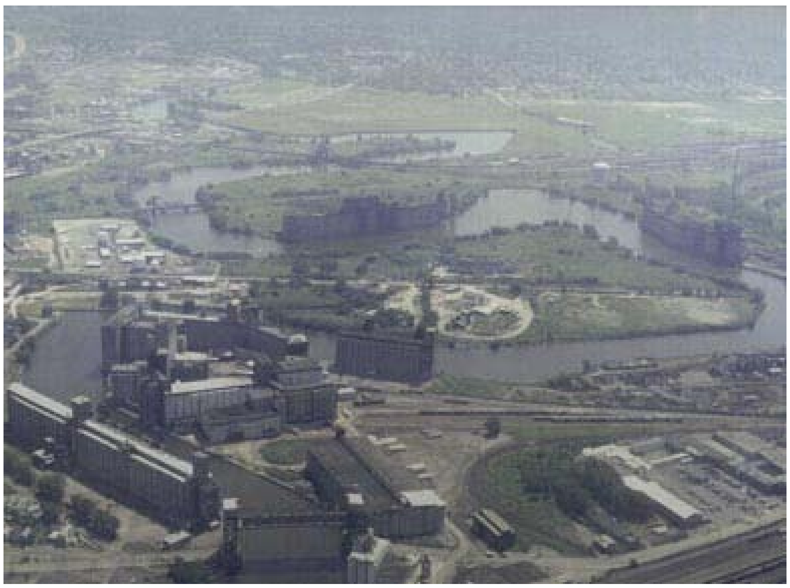
US Army Corps of Engineers®
Buffalo District

FINDING OF NO SIGNIFICANT IMPACT
AND
ENVIRONMENTAL ASSESSMENT



BUFFALO HARBOR DREDGING
GREAT LAKES RESTORATION INITATIVE
ERIE COUNTY, BUFFALO, NEW YORK

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FINDING OF NO SIGNIFICANT IMPACT
GREAT LAKES RESTORATION INITATIVE
DREDGING AND PLACEMENT OF DREDGED MATERIAL
BUFFALO HARBOR
ERIE COUNTY, NEW YORK

The U.S. Army Corps of Engineers (USACE), Buffalo District has assessed the environmental impacts of the dredging activities at Buffalo Harbor in accordance with the National Environmental Policy Act (NEPA) of 1969 and has determined a Finding of No Significant Impact (FONSI). The attached Environmental Assessment (EA) presents the results of the environmental analysis.

The primary purpose of the EA is to update previous environmental documentation prepared for the dredging and dredged material placement activities at Buffalo Harbor.

Buffalo Harbor is located in the city of Buffalo, Erie County, New York. The harbor is located at the mouth of the Buffalo River, which flows from the east and discharges into Lake Erie at the head of the Niagara River (Figure 1). The ship canal, situated south of the river's mouth, is another feature of the harbor. Buffalo Harbor includes a series of authorized Federal navigation channels designed and maintained so that deep-draft commercial vessels can safely navigate the harbor.

The 2010 U.S. Environmental Protection Agency (USEPA) Great Lakes Restoration Initiative (GLRI) provides funding to Federal agencies to perform work that contributes to the ecological restoration of the Great Lakes using existing authorities. Using GLRI funding, the USACE is proposing to dredge authorized Buffalo Harbor Federal navigation channels and properly dispose of contaminated sediments, as it is authorized to dredge these channels at 100 percent Federal expense.

The project would entail dredging the authorized Federal navigation channels in the Buffalo River and ship canal (Figure 2). An estimated 450,000 to 650,000 cubic yards (cy) of sediment would be removed from the Federal navigation channels, with actual quantities dependent upon final funding levels and contract prices. The dredging would be to a depth of 23.5 feet below low water datum (LWD). An additional 6 inches of dredging, known as overdepth, would be allowed to better ensure that the contract depths are obtained. Under existing USACE authorities, this combined depth of up to 24 feet is allowed as advanced maintenance dredging.

Dredging 450,000 cy would occur in areas A through P (except areas L, K and O), as shown in Figure 2 and Figure 3. Contingent on the availability of funds, an additional area of the Buffalo River and ship canal between lines A and B (as shown in Figure 2) may also be dredged as part of routine Operations and Maintenance (O&M) dredging; approximately 200,000 cy of sediment may be removed. It is anticipated that dredging will begin in June 2011 in accordance with previously determined environmental windows. Current environmental windows in which in water activity is permissible are June 15 through December 30 for the Buffalo River, and July 1 through December 30 for the ship canal. Additionally, the placement of dredged material into confined disposal facility (CDF) number 4 is restricted during the period that gulls are nesting within the CDF or along the perimeter wall, which encompasses March 1 until July 15. Between June 15 and July 15, there may be dredged material placed into the CDF, although any of the areas where gulls may still be nesting will be avoided.

The sediment to be dredged has been thoroughly tested and evaluated, and are comparable to or somewhat more contaminated than those routinely dredged from the Buffalo Harbor Federal navigation channels. All dredged sediments would be placed in the existing USACE CDF 4 located in the Outer Buffalo Harbor adjacent to the Buffalo Harbor South Entrance Channel (Figure 1). Planned repairs to the perimeter of this CDF would be completed prior to implementation of the dredging and attendant disposal operations. The CDF can safely and adequately accommodate this dredged material.

The dredging operation would be performed by a contractor of the Federal government. The dredging operations are expected to be similar to the routine maintenance dredging operations that are regularly performed in the river and harbor biennial, with a few additional measures to reduce the potential for contaminant releases to the water column. It is anticipated that mechanical dredging equipment would be used, which would include the use of a barge-mounted crane with an enclosed clamshell bucket. The clamshell bucket would excavate the sediments and place it aboard scows; the scows would be used to transport the dredged material to the CDF. At the CDF, the dredged sediments would be hydraulically pumped from the scows into the facility.

This proposed dredging is intended to restore the Federal navigation channels to their design depths, and safely remove and dispose of the contaminated sediments. Measures being implemented to minimize the release of contaminants associated with the dredging include not allowing the normal practice of scow overflow of turbid water, and avoidance of dredging in select areas within the river and ship canal that contain high levels of contamination. Additional controls designed to decrease releases of contaminants will be implemented.

Analysis has shown that this project is not a major Federal action which would result in significant adverse impacts on the quality of the human or natural environment. The attached EA presents the results of the environmental analysis. Those who have information which might alter this assessment and lead to a reversal of this decision should notify me within 30 days.

Date:

Stephen H. Bales
Lieutenant Colonel, Corps of Engineers
District Commander

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1.0 INTRODUCTION

1.1 PURPOSE AND NEED

The purpose of this Environmental Assessment (EA) is to provide information on the potential environmental effects of the proposed action by the U.S. Army Corps of Engineers (USACE), Buffalo District. Analysis of the potential effects of the proposed project will determine if the project is a major Federal action significantly affecting the quality of the human environment. This EA facilitates compliance with the National Environmental Policy Act (NEPA) of 1969 and includes discussion of the need for the action, a description of the proposed action and alternatives, existing conditions, the environmental impacts of the action, environmental compliance, and a list of agencies, interested groups and individuals consulted.

The scope of this EA will include the limits of the Federal project, which include dredging to a deeper depth than typically maintained and include areas where there are new data on sediment contamination in Buffalo Harbor Federal navigation channels. Based on recent project condition surveys of these channels, shoaling (the deposition of sediment) has reduced navigable depths at several locations. In addition, the quality of much of the sediment is similar to or slightly more contaminated than the material recently dredged by the USACE. Accordingly, the availability of Great Lakes Restoration Initiative (GLRI) funding provides an opportunity to restore authorized depths in these channels while removing a large volume of contaminated sediments from the aquatic environment.

1.2 PROJECT BACKGROUND

Buffalo Harbor is located in the city of Buffalo, Erie County, New York. The harbor is located at the mouth of the Buffalo River, which flows from the east and discharges into Lake Erie at the head of the Niagara River (Figure 1). The ship canal, situated south of the river's mouth, is another feature of the harbor. Buffalo Harbor includes a series of authorized Federal navigation channels designed and maintained so that deep-draft commercial vessels can safely navigate the harbor. The International Joint Commission (IJC), a binational commission advising governments on issues involving the boundary waters between Canada and the United States since 1973, has identified 43 Areas of Concern (AOCs) on the Great Lakes where poor water quality impairs use, or local environmental standards are not being met. A portion of the Buffalo River has been identified as an AOC. The Buffalo River AOC extends from the mouth of the Buffalo River to the farthest point upstream at which backwater conditions exist during Lake Erie's highest monthly average lake level. Federal navigation channels within the Buffalo River and ship canal are situated within the designated AOC. The USACE, Buffalo District maintains Buffalo Harbor navigation channels and conducts annual surveys to determine which areas require dredging. However, due to funding limitations, only portions of the harbor are dredged about every other year where shoals (deposited sediments) substantially impede commercial navigation.

A typical dredging goal in Buffalo Harbor is to maintain the Federal navigation channels in Buffalo River and ship canal to an authorized depth of 22 feet below low water datum (LWD)[1].

[1] Low Water Datum (LWD) for Lake Erie is at elevation 569.2 feet above the reference zero point at Rimouski, Quebec, Canada (International Great Lakes Datum 1985)

On average, this had resulted in the dredging of approximately 140,000 cubic yards (cy) of sediment every two years. Almost one million cy of sediment have been removed from the harbor over the past 18 years. Nevertheless, reduced funding levels over the past several years have resulted in the accumulation of an estimated 750,000 cy of undredged (i.e., “backlog”) material in the harbor’s Federal navigation channels.

The location for the disposal of material dredged from Buffalo Harbor is the existing confined disposal facility (CDF) number 4 (Figure 1). This facility is a nearshore CDF located adjacent to the south Entrance Channel. The perimeter dike of this facility is composed of a sand and gravel filter core rising to an elevation about 2.5 feet below mean lake elevation in water depths of up to 30 feet. The core is covered with layers of rock of increasing size to stabilize the stone perimeter dike. The stone perimeters rise to a height about 15 feet above the mean lake level with side slopes of 1H.5V. A steel sheet pile wall was driven vertically downward 24 feet into the stone perimeter along the centerline of the entire length of the stone perimeter. The CDF has two weir structures with each base at an elevation about 10 feet above the mean lake level. The Buffalo Harbor CDF has been in use since 1972. Dredged material has consistently been placed along the northeasterly side of the CDF (along the breakwater and land), which has effectively created a terrestrial habitat inside along the breakwater side of the CDF. The *Contaminant Monitoring Assessment for CDF 4 (*USACE 2008) concluded that terrestrial and aquatic bioaccumulation of PAHs and metals from Buffalo Harbor CDF No. 4 dredged material are not occurring to any greater extent than bioaccumulation of these constituents from unimpacted reference areas. Therefore, it is concluded that the dredged material within the CDF is not posing a risk to human health or environmental receptors outside the facility.

In 1997, the CDF contained approximately 1.7 million cy of storage capacity below mean lake level. By analyzing the bottom slope and the change in surface area, the CDF is estimated to presently have about 1.1 million cy of storage capacity below mean lake level. All of the dredged material disposed in this proposed project will be placed below the mean lake level within this CDF.

Grouting repairs to this steel pile wall are planned for 2010 in order to restore complete functionality to the CDF as originally designed, which is to be permeable but to constrict water flows only through the sand and gravel filter core. The CDF functions as a storage cell and settling basin. The CDF is presently about 25 to 30 feet deep, while the sheet piles are exposed to water from the top six feet of the CDF. Presently, water from the dredged material disposal is discharged both through gaps in the sheet piles and seepage through the filter core. Due to the remaining capacity in the CDF, the residence time for water within the CDF has generally been about 50 days. This allowed enough time for most particulates associated with the dredged material to settle out prior to the water moving through the dike walls. In addition, wave action from the lake water would dilute CDF discharge water as it moved through the dike walls, resulting in no detectable impact to lake water quality from CDF material.

1.3 PROJECT AUTHORITY

This proposed USACE dredging project is being funded via the U. S. Environmental Protection Agency (USEPA) GLRI. The 2010 GLRI provides funding to Federal agencies to perform work that contributes to the ecological restoration of the Great Lakes using existing authorities.

Buffalo Harbor was initially adopted by the River and Harbor Act of 1826 with subsequent authorizations in 1866, 1874, 1896, 1899, 1900, 1902, 1907, 1909, 1910, 1912, 1919, 1927, 1930, 1935, 1945, 1960, 1962, 1986, and the 1986, 1988, and 2007 Water Resources Development Acts. Buffalo Harbor CDF 4 was authorized by Section 123 of the Rivers and Harbor Act of 1970 under Public Law {PL} 91-611 in 1977.

The USEPA Great Lakes National Program Office (GLNPO) is currently leading another Buffalo River dredging effort under the Great Lakes Legacy Act (GLLA). This project involves planning for the remediation of contaminated sediments located outside the authorized Federal navigation channels in Buffalo River and ship canal. The proposed USACE dredging funded under GLRI would serve to compliment the planned GLLA dredging by removing a substantial amount of contaminated sediment from within the Federal navigation channels. The removal of contaminated sediment would improve the long-term environmental quality of this AOC and provide increased protection to public health. A brief history of USACE involvement in environmental studies in the Buffalo River and additional environmental studies conducted under the GLLA is provided below.

From 1998 through 2005 the USACE conducted a reconnaissance study effort on the river, as part of a Section 312 Environmental Dredging Project, for the purposes of environmental planning, remediation, and ecological restoration within the Buffalo River AOC. This project included the consideration of impacts to the navigation channel from environmental contamination which may come from outside of the navigation channel. The USACE, Buffalo District and the Buffalo Niagara RIVERKEEPER (RIVERKEEPER) signed a Feasibility Cost-Sharing Agreement on April 8, 2005 to conduct a Section 312 Feasibility Study at 50 percent Federal and 50 percent non-Federal costs; the report was completed by Ecology and Environment in 2008. In support of the Section 312 feasibility study, New York State Department of Environmental Conservation (NYSDEC) conducted a field sampling and analysis study with field assistance from GLNPO and USACE on the upper Buffalo River, from Hamburg Street upstream to the new Bailey Avenue bridge.

The GLLA was signed into law in 2002. This Act provides funding to take the necessary steps to clean up contaminated sediment in "Areas of Concern located wholly or partially in the United States," including specific funding designated for public outreach and research components. The USEPA-GLNPO was designated to implement the GLLA. Partners on the GLLA project for the Buffalo River AOC include NYSDEC, RIVERKEEPER, USACE, and Honeywell Corporation. Over the past several years, these entities have coordinated sampling and analysis of sediment within the AOC.

In 2005, USEPA-GLNPO, in coordination with local stakeholders, initiated a Remedial Investigation/Feasibility Study (RI/FS) for the upper Buffalo River, focusing on those areas outside of the Federal navigation channel.

In March 2007, GLNPO and RIVERKEEPER signed a GLLA Project Agreement for a RI/FS of the lower Buffalo River. In June 2007, the NYSDEC conducted a field sampling and analysis study from Hamburg Street downstream to the Buffalo Harbor, including the City ship canal to satisfy the non-Federal cost share requirement; field assistance was provided by GLNPO and USACE.

In September 2008, GLNPO and RIVERKEEPER amended the Project Agreement to merge the 2005 and 2007 GLNPO feasibility studies to ensure the study funded under the Legacy Act would apply to the entire Buffalo River AOC. Honeywell was also added on as a non-Federal sponsor, the total project cost was increased, the project tasks were modified, and the partner responsibilities were redistributed. Subsequent to this, an additional sampling event occurred between August and November 2008. The purpose of the latest round of sampling was to further characterize the nature and extent of potential constituents of interest in the sediment, and further characterize surface water hydrology and ecological conditions in the geographic area of the Buffalo River AOC.

1.4 SCOPE OF THE EA

This EA has been prepared by the Buffalo District pursuant to NEPA and the regulations for implementing NEPA promulgated by the Council of Environmental Quality (40 CFR 1500-1508) and USACE (33 CFR 230). To assess the impacts of the proposed USACE action, this EA evaluates the potential environmental and socioeconomic impacts from implementation of the proposed Buffalo Harbor dredging, including cumulative impacts. This EA supplements previous environmental documents pertaining to the operations and maintenance (O&M) of Buffalo Harbor due to our increased understanding of sediment contamination in the river and ship canal. The following table is a list of the existing environmental documentation concerning Buffalo Harbor.

Table 1. Existing Buffalo Harbor Environmental Documentation

PROJECT COMPLIANCE		
Harbor Reach & Disposal Site(s)	Document	Date
Buffalo Harbor, Maintenance	Final Environmental Impact Statement	May 1972
Buffalo Outer Harbor Diked Disposal Site 2	Final Environmental Impact Statement	August 1972
Buffalo Harbor Diked Disposal Area	Final Environmental Impact Statement	February 1973
Buffalo Harbor Drift and Debris Removal Study	Environmental Assessment and FONSI	October 1982
Buffalo Harbor Diked Disposal Site 4	Supplemental Information Report and Section 404(b)(1) Evaluation	November 1982
Buffalo Harbor Operations and Maintenance	Environmental Assessment and 404(b)(1) Evaluation	March 1983
Buffalo River Demonstration Dredging Project	Environmental Assessment and FONSI	May 1992
Buffalo Harbor, Black Rock Channel and Tonawanda Harbor	Environmental Assessment and Section 404(b)(1) Evaluation	March 1993
Buffalo River and City Ship Canal	Section 312 Existing Conditions Report	November 2008

1.5 PUBLIC INVOLVEMENT

A Scoping Information packet for this project was prepared and made available for public and agency comment on April 9, 2010. Copies of this document and comments received are included in Appendix A. Additionally, in accordance with the Clean Water Act, a Section 404(a) Public Notice pertaining to the discharges associated with this dredging project was released on May 19, 2010.

With the circulation of this draft EA and Finding of No Significant Impact (FONSI) for a 30 day public comment period, the proposed project is in partial compliance with the NEPA. Full compliance will be attained once the public review period has concluded, no significant adverse impacts are identified, any public comments are appropriately addressed, and the FONSI is signed by the District Commander.

2.0 PROPOSED ACTION

The project would entail dredging in the authorized Federal navigation channels in the Buffalo River and ship canal (Figure 2). An estimated 450,000 to 650,000 cy of sediment would be removed from these Federal navigation channels, with actual quantities dependent upon final funding levels and contract prices. The dredging would be to a depth of 23.5 feet below LWD. An additional 6 inches of dredging ("overdepth") would be allowed to better ensure that the contract depths are obtained. Under existing USACE authorities, this combined depth of up to 24 feet is allowed as advanced maintenance dredging.

Dredging (approximately 450,000 cy) would occur in areas A through P as shown in Figure 2, with the exception of areas L, K and O (Section 3.2 and Figure 3). Contingent on the availability of funds, an additional area of the Buffalo River and ship canal between lines A and B may also be dredged as part of routine operations and maintenance (O&M) dredging (Figure 2); approximately 200,000 cy of sediment may be removed. It is anticipated that dredging will begin in June 2011 in accordance with previously determined environmental windows. Current environmental windows in which in water activity is permissible are June 15 through December 30 for the Buffalo River, and July 1 through December 30 for the ship canal. Additionally, the placement of dredged material into confined disposal facility (CDF) number 4 is restricted during the period that gulls are nesting within the CDF or along the perimeter wall, which encompasses March 1 until July 15. Between June 15 and July 15, there may be dredged material placed into the CDF, although any of the areas where gulls may still be nesting will be avoided.

The sediments to be dredged have been thoroughly tested and evaluated, and are comparable to or somewhat more contaminated than those routinely dredged from the Buffalo Harbor Federal navigation channels. All dredged sediment would be placed in the existing USACE CDF 4 located in the Outer Buffalo Harbor adjacent to the Buffalo Harbor South Entrance Channel (Figure 1). The CDF overflow weirs, which are designed to discharge effluent from the facility, would not be used during this dredging operation. Planned repairs to the perimeter of this CDF would be completed prior to implementation of the dredging and attendant disposal operations (See Section 1.2). The CDF can safely and adequately accommodate this dredged material.

The dredging operation would be performed by a contractor of the Federal government. The dredging operations are expected to be similar to the routine maintenance dredging operations that are regularly performed in the river and harbor biennial, with a few additional measures to reduce the potential for contaminant releases to the water column (Section 2.1). It is anticipated that mechanical dredging equipment would be used, which would include the use of a barge-mounted crane with an enclosed clamshell bucket. The clamshell bucket would excavate the sediment and place it aboard scows; the scows would be used to transport the dredged material to the CDF. Turbid water in the scows associated with the dredged material (supernatant) would not be allowed to overflow. At the CDF, the dredged sediment would be hydraulically pumped from the scows into the facility.

This proposed dredging operation is intended to restore the navigation channels to their design depths and safely remove the contaminated sediments. The overall goal of this project is to complete the dredging while minimizing the release of any contaminants associated with dredging-related turbidity in the river and ship canal.

2.1 General Environmental Considerations

This proposed GLRI dredging project has been designed to complement on-going maintenance dredging operations by removing a mass of existing contaminated sediments within portions of the Buffalo River and ship canal Federal navigation channels. Based on a risk characterization completed for this project by the U.S. Army Engineer Research and Development Center (ERDC) (USAERDC 2010b), several dredging controls will be implemented in an effort to protect adjacent and downstream aquatic habitats. Mechanical dredge equipment such as a closed clamshell bucket will be used to reduce sediment resuspension and turbidity in the water column. Except for *de minimus* discharges, the overflow of supernatant in scows containing the dredged material will be prohibited. Production rates will be controlled during dredging to reduce the release of contaminants in the water column. In addition, select areas in the river that contain higher levels of contamination just below the authorized advanced maintenance dredging depth (DA-K, DA-L, and DA-O) will be avoided (see Section 3.2). Oil booms will be deployed should any oil sheen be observed during dredging operations. During storm events or adverse conditions, dredging operations will be suspended.

3.0 ALTERNATIVES TO THE PROPOSED ACTION

This section describes the alternatives that have been considered to the proposed dredging project as defined in Section 2.0 of this EA. In accordance with NEPA regulations, as amended, reasonable alternatives were developed and considered, to the extent practicable, that might also meet the objectives of the proposed action. The No Action Alternative was also considered pursuant to NEPA requirements.

3.1 ALTERNATIVE 1 (NO ACTION ALTERNATIVE)

Under this plan, no Federal action would be taken under GLRI to address the commercial navigational dredging needs in the Buffalo River and ship canal areas A through P. This alternative assumes that the previously authorized O&M dredging will still occur (up to 200,000 cy). Evaluation of the "No Action" alternative is required under NEPA and provides a baseline for comparison to other alternative plans. As this plan does not meet the needs of removing additional contaminated sediments found within the navigation channel from the aquatic environment, it was eliminated as a viable alternative.

3.2 ALTERNATIVE 2 (INCLUDES AREAS DA-K, DA-L AND DA-O)

This plan is identical to the proposed plan, except that it includes also dredging Dredge Area L (DA-L), Dredge Area K (DA-K) and Dredge Area O (DA-O) (Figure 3). Areas DA-K, DA-L, DA-O have the potential to expose after dredging higher concentrations of mercury, lead and PCBs which exhibit the greatest risk to aquatic life. These areas are predicted to exceed the probable effect concentration (PEC) screening value six months after dredging and Area DA-L is expected to exceed the PEC value for mercury after 12 months. These areas were removed from the proposed action based on calculated short-term risks that might result from the newly exposed sediment bed and dredge residuals within the Federal navigational channel (USAERDC 2010a, Appendix C). Such risks were estimated to be at levels which may be acutely toxic to fish or other aquatic life for 6-12 months after dredging. Accordingly, because Alternative 2 does not avoid these areas but rather allows this contamination to be exposed after advanced maintenance dredging, this alternative was eliminated from further consideration.

3.3 ALTERNATIVE 3 (23 FEET DREDGE DEPTH)

Areas A through P (except K, L, and O) would be dredged to 23 feet below LWD, instead of the preferred 24 feet (as described in Section 2.0). Although reducing costs, this alternative would greatly reduce the mass of contaminants removed from the navigation channel. This alternative would also increase the chance of disturbing *in situ* contaminants during future O&M dredging operations. Restricting dredging to only 23 feet below LWD would also compromise the future potential for subsequent sediment to be used in beneficial use purposes. For these reasons, this alternative was eliminated from further consideration.

4.0 EXISTING CONDITIONS

4.1 INTRODUCTION

This section describes the existing conditions of the natural and socioeconomic resources applicable to the area affected by this dredging project.

The Buffalo River has undergone many changes over the past 180 years with regard to water and sediment quality. These changes have had, and continue to have, a great impact on the biota, water and sediment quality, and shoreline of the river. Current impairments of the Buffalo River include degradation of benthos, fish tumors and other deformities, loss of fish and wildlife habitat, degradation of fish and wildlife populations, tainting of fish and wildlife flavor, fish consumption advisories, and bird and animal deformities, and reproductive problems. Some of these impairments are related to sediment quality. The IJC is a binational commission advising governments on issues involving the boundary waters between Canada and the United States. Since 1973, the IJC Water Quality Board has identified 43 AOCs on the Great Lakes where the poor water quality impairs use or local environmental standards are not being met. A portion of the Buffalo River has been identified as one of these AOCs. The Buffalo River AOC extends from the mouth of the Buffalo River to the farthest point upstream at which backwater conditions exist during Lake Erie's highest monthly average lake level.

Degradation of the Buffalo River began with the growth of the city of Buffalo and use of the river for municipal waste disposal in the early 1800s. Degradation continued with pollution loadings from the grain milling and manufacturing industries that were constructed and operated along the river. Pollution problems were compounded by the deepening and widening of the river for navigation, which increased hydraulic residence time and sedimentation in the river. By the 1920s, the Buffalo River was described as a septic basin with little or no dissolved oxygen, and no fish were found in the river at that time. In the late 1960s, water quality, benthos, and fish communities in the Buffalo River began to recover as a result of flow augmentation and a decrease in industrial waste loading resulting from pollution abatement programs. This recovery continued through the 1970s, 1980s, and into the 1990s. Despite these improvements, the Buffalo River AOC remains impaired and degraded. Historic sediment contamination and poor habitat quality persist as major obstacles to full recovery, and combined sewer overflows and upstream pollutant inputs remain issues of concern.

The GLLA was signed into law in 2002. This Act provides funding to take the necessary steps to clean up contaminated sediment in "Areas of Concern located wholly or partially in the United States," including specific funding designated for public outreach and research components. The USEPA-GLNPO was designated to implement the GLLA. Partners on the GLLA project for the Buffalo River AOC include NYSDEC, RIVERKEEPER, USACE, and Honeywell Corporation. Over the past several years, these entities have formed the Buffalo River Project Coordination Team (PCT) and coordinated sampling and analysis of sediment within the AOC.

4.2 PHYSICAL/NATURAL ENVIRONMENT

4.2.1 AIR QUALITY

The Clean Air Act designates six pollutants as "criteria pollutants" for which National Ambient Air Quality Standards (NAAQS) have been promulgated to protect public health and welfare. The six criteria pollutants are particulate matter, (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Areas that do not meet NAAQSs are designated as being in "nonattainment" for that criteria pollutant. Air quality data for New York State are collected and published annually by NYSDEC, Division of Air Resources, to ensure that established air quality standards are being met. Air emissions in the vicinity of the Buffalo River are primarily related to industry, manufacturing, and vehicular travel. The four ambient air quality monitoring stations in Erie County are located in Tonawanda, Buffalo, Amherst, and Lackawanna. Ozone is measured in Amherst, and the region has been in nonattainment for the 8-hour ozone standard since it was promulgated in 2004. Erie County is, therefore, reported as being in nonattainment for ozone (NYSDEC 2008, EPA 2008). Ozone is typically more prevalent during the summer months, as it is formed when volatile organic compounds (VOCs) and nitrogen oxides in the air react with sunlight.

4.2.2 SEDIMENT QUALITY

The soils in the Buffalo River drainage basin are generally composed of a silty or clayey matrix with embedded sand and gravel. Because the clay-size fraction of these soils was derived from glacial action on larger particles and various types of rock, this fraction has no predominant clay mineralogy. These drainage basin soil properties cause Buffalo River sediments to be relatively fine and also contain a large fraction of silt.

A river's history is reflected in its sediment. For the industries along the Buffalo River, the river was not only a transportation link between suppliers and markets, but was also a source of necessary fresh water, as well as a receiver of industrial waste by-products. Portions of the Buffalo River sediment have been contaminated by these industrial discharges, as well as municipal and agricultural discharges, and waste disposal.

The extent of sediment contamination has been the subject of intense sampling, analysis, and evaluation for many years by various agencies including Erie County, NYSDEC, USEPA, and USACE. These efforts have shown that the river's sediments contain elevated levels of metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and numerous other chemicals.

NYSDEC collected sediment and surface water samples from the entire Buffalo River AOC, including the City ship canal, during 2005 and 2007 sampling events, in the upper and lower river respectively. The samples were analyzed for PCBs, semi-volatile organic compounds (SVOCs) which include PAHs, organochlorine pesticides, total organic carbon (TOC), and select metals. Several samples were also analyzed for volatile organic compounds (VOCs). These data are summarized in separate reports for the Upper Buffalo River (NYSDEC 2006) and the Lower

Buffalo River and City ship canal (NYSDEC 2008a). Sample locations were chosen in collaboration with USEPA-GLNPO, RIVERKEEPER, and USACE. In addition, several locations were targeted to assess contamination near main combined sewer outfalls (CSOs), near areas targeted for habitat restoration, and at upstream potential background areas. In 2008 as part of the GLLA, additional sampling was conducted using the Vibrocore sample collection system on the USEPA's research vessel *Mudpuppy*. Sediments were collected from 120 locations along the Buffalo River and City ship canal.

The following is a brief summary of the samples collected:

Surface Sediments

During the 2005 sampling event, 116 surface sediment samples were collected; during the 2007 sampling event, 86 surface sediment samples were collected. Surface sediment samples were collected to evaluate sediments viewed as being recently deposited at undredged stream banks and down the center of the Buffalo River Federal navigation channel.

Subsurface Samples

During the 2005 sampling event, 150 subsurface sediment samples were collected; during the 2007 sampling event, 120 subsurface sediment samples were collected. Subsurface sediment samples were collected to evaluate historic contamination and potential discharges from past industrial activities. Samples were collected from undredged stream banks and below the dredged depth in the navigational channel.

Toxicity Tests

Toxicity tests (bioassays) were conducted to evaluate the potential toxicity of sediments to freshwater fauna. In 2005, NYSDEC collected 13 toxicity samples, which were provided to the USACE for analysis (NYSDEC, 2006). In 2007, 13 additional toxicity samples were collected by USEPA-GLNPO in areas that were identified as contaminated based on visual and photo-ionization detector readings. NYSDEC collected and performed chemical analyses on samples from the same depth interval (NYSDEC, 2008a). The purpose for the analyses was to evaluate the potential link between chemical concentrations in the sediment and ecological impacts evidenced through the toxicity tests.

Risk Assessments

In 2005, the upper Buffalo River sediment samples were analyzed for SVOCs, PCBs, metals, and pesticides. GLNPO conducted screening level ecological and human health risk assessments on the upper river sediment data, along with existing fish tissue data and existing bioaccumulation data (SulTRAC, October 2007). The risk assessments concluded that contaminants are likely to cause an adverse impact to benthic biota, piscivorous birds, and piscivorous mammals; and for adults, the ingestion of locally-caught fish is the driver for risks and hazards under all scenarios.

Contaminants of Concern

GLNPO conducted a chemical indicator analysis based on these risk assessments and determined that the overall list of indicator chemicals of potential risks to human and ecological receptors are: arsenic, copper, lead, mercury, total PCBs, benzo(a)pyrene, benzo(a)anthracene, and gamma chlordane (SulTRAC October 2007). GLNPO, through further rigorous statistical analysis, determined that total PAHs, lead, mercury, and total PCBs were collocated in the river with all the other indicator chemicals (CSC, November 2007). If remedial activities were targeted at these indicators/risk drivers, then all collocated contamination should be addressed simultaneously.

Geotechnical Samples
During the 2007 sampling event, 25 geotechnical samples were collected by the USEPA-GLNPO from undisturbed core samples at areas that appeared to have acute toxicity. These samples were analyzed for grain-size distribution, Atterburg limits, bulk density, and TOC to determine the physical characteristics of the sediment.

Vibrocore sampling
In 2008, sediment samples were collected at a depth of 0-0.5 feet, 0.5-1 foot, and at 1 foot intervals thereafter to the bottom depth. Sediment samples were collected to assess the potential for chemical bioavailability only to a depth of 3 feet. At locations where Vibracores could not be collected due to impenetrable sediment conditions, surface samples (0-0.5 feet) were collected with a Ponar dredge. Compacted sediments or the presence of gravel prevented the collection of samples from four locations.

4.2.3 WATER QUALITY

Two major sampling events under GLLA occurred in the upper and lower Buffalo River. During the 2005 sampling event conducted by NYSDEC, USEPA, and USACE, Buffalo District, 17 surface water samples were collected; during the 2007 sampling event, 19 surface water samples were collected. Surface water samples were taken to determine the general water quality in the area and the potential for human and ecological exposure to any detected contaminants. These samples, which were collected from the areas with the greatest potential for human contact or habitat restoration, were analyzed for a wide range of parameters, but only low levels of metals and background contaminants were detected.

The major factors that are known to affect water quality in the Buffalo River AOC are low dissolved oxygen, turbidity, heavy metals, and bacterial contamination. The following beneficial use impairments (BUI), or likely impairments as defined by the USEPA, are directly related to the water quality in the AOC:

BUI 3 – Degradation of Fish and Wildlife Populations - Impaired
BUI 10 – Beach Closings – Not Applicable to AOC, but directly related to primary and secondary contact
BUI 11 – Degradation of Aesthetics – Impaired

4.2.4 SOILS

The Buffalo River watershed is situated within the gently rolling dissected glacial plateau of the Erie/Ontario Lake Plain eco-region. During the Pleistocene era varying thicknesses of glacial drift were deposited over Devonian shale. The majority of the watershed is located in ground moraines and end moraines. Sediments deposited by former beach ridges, arranged parallel to sub-parallel to the existing Lake Erie shoreline, are composed of sand, gravel, and cobble. The pre-glacial valleys within the underlying bedrock shale were buried by glacial clays, sands, and gravel to depths of up to 200 feet (USACE 2003).

The city of Buffalo, including the lower reaches of the Buffalo River, is primarily underlain by glacial drifts deposited atop 100 feet of Onondaga Limestone bedrock. The Buffalo River, upstream of its confluence with Cazenovia Creek, is underlain by the Marcellus Formation, a calcareous shale unit. The Marcellus and Onondaga formations are usually underlain by the Akron Dolostone and/or the Bertie Formation, which are a mixed limestone, dolostone, and shale units (occasionally referenced as a water lime). The predominant soil type occurring on lands adjacent to and in the immediate vicinity of the Buffalo River throughout the AOC is urban land. The Natural Resource Conservation Service reports that these soils are nearly level and located in urbanized areas and in areas of well-drained to poorly drained soils and disturbed soils on lowland plains (U.S. Department of Agriculture [USDA] 1986). Other mapped soils within the AOC include Urban Land-Niagara Complex, Urban Land-Teel Complex, and Haplaquolls.

Typically, minimal undisturbed soil remains within the profiles of the various types of urban land due to the development activities that have occurred over the course of time. The Niagara and Teel components are likely minor portions of the urban land series. The Niagara series is comprised of deep, somewhat poorly drained soils on lowland lake plains that were formed in silty lacustrine sediments; the texture is silt loam. The Teel series is comprised of deep, moderately well drained soils on floodplains of major watercourses and on alluvial fans formed in silty alluvium; the texture is silt loam (USDA 1986). Haplaquolls soils are deep, very poorly drained mineral soils that are typically ponded with shallow water most of the year. The uppermost layer is typically composed of organic material and muck. Only one location, near the Buffalo ship canal, is mapped as Haplaquolls ponded.

Overall, the watershed is characterized by 21 different soil series, with the majority of the soils of silt loam texture. The slopes of these soil units range from nearly level to 0.5 percent, while the drainage classification ranges from very poorly drained to excessively drained (Buffalo Niagara Riverkeeper 2008). These soil types are consistent with the underlying glacial sediments common to the AOC and the watershed.

4.2.5 Geology and Topography

The northern and western part of the Buffalo River watershed is within the Erie-Ontario Lake Plain Province, while the southern part of the watershed is within the Alleghany Plateau Province. The Erie-Ontario Province formerly was a glacial lake bed known as Whittlesy and Warren lakes, and therefore has limited relief (Buffalo Niagara Riverkeeper 2008).

The topography in the city of Buffalo is relatively moderate, with ground elevations ranging from 580 feet above mean sea level in the southwest to 700 feet in the northeast portion of the city. The northern half of the city slopes downwards from east to west. The southern half of the city is divided by the Buffalo River and Cazenovia Creek, both sides of which slope towards the river and creek. The area north of the Buffalo River slopes downwards to the southwest; the area south of the Buffalo River is flat and marshy in the western part and slopes mildly to the northwest in the eastern part (Buffalo Niagara Riverkeeper 2008). This topography is derived from both bedrock fractures (i.e., the Onondaga Limestone Escarpment) and glacial till plains dissected by surface water.

4.2.6 CLIMATE

Weather in the Buffalo region is characterized by four distinct seasons, typical of a continental maritime climate. The climate is strongly influenced by its proximity to Lake Erie and Lake Ontario. Buffalo's climate is influenced by the humid air generated by these Great Lakes, which controls overall temperature change, making those changes more even over time (Buffalo Weather and Climate, 2010). Winters in Western New York are generally cloudy, cold, and snowy but may include frequent thaws, and rain as well. Snow covers the ground more often than not from late December into early March, but snow-free periods are not uncommon.

Over half of the annual snowfall comes from the lake-effect process and is consequently localized. Due to the prevailing winds, areas south of Buffalo receive much more lake-effect snow than locations to the north. Lake-effect snows begin as early as mid-November and conclude in mid- to late January when Lake Erie freezes. Average annual snowfall in the region is 92 inches. Historically, the ice pack on Lake Erie has not usually disappeared until mid-April, and the lake remains cool (less than 45 degrees Fahrenheit [ºF]) through most of May. As the prevailing airflow is from the southwest, areas near the lake are often as much as 20 degrees colder than inland locations. Temperatures in April and May typically range from 36 to 66 ºF. The cool air from the lake also retards the growing season, but this also diminishes the threat of damaging late spring frosts. The average date of the last frost is near the end of April in the Buffalo metro area, but in mid-May well inland. Average annual precipitation is 39 inches.

Summer months are generally characterized by significant sunshine, with warm temperatures and moderate humidity levels. High temperatures can peak around 80 °F with an average summer temperature of 71 °F. Rainfall is typically adequate to maintain viable agricultural economies. The stabilizing effect of Lake Erie continues to inhibit thunderstorms and enhance sunshine in the immediate Buffalo area through most of July. August normally provides more precipitation and humidity increases as lake water temperatures become warmer and the stabilizing effect of the lake somewhat declines. Fall is characterized by pleasant weather that also can produce first frosts in late September over interior sections, and mid-October frosts in the Buffalo metro area (NOAA 2010). Temperatures decline dramatically in November, which is the beginning of the lake-effect snow season.

4.2.7 PLANKTON AND BENTHOS

4.2.7.1 PLANKTON

4.2.7.1.1 PHYTOPLANKTON

Irvine, (2007) recently completed a study of the trophic status and phytoplankton community of the Buffalo River AOC. The objectives of the study were to determine the status of BUI 8 (Eutrophication or Undesirable Algae) and BUI 13 (Degradation of Phytoplankton). Specifically, the study determined the trophic state of the AOC; determined if algal toxins (an indicator of undesirable algae) were present; and established the dominant phytoplankton taxa, and examined phytoplankton community composition characteristics to determine if phytoplankton have been negatively impacted by human activity.

Irvine (2007) found that the mean levels of total phosphorus and chlorophyll-a in the Buffalo River were not significantly greater than the threshold levels of 42 micrograms/liter (µg/L) total phosphorus and 8 µg/L chlorophyll-a. These threshold levels can be considered to represent the division between a eutrophic and mesotrophic river. In addition, a literature review found that Buffalo River nutrient and chlorophyll-a levels were similar to those reported for low nutrient, high quality streams (Irvine, 2007). Finally, levels of algal toxins in the Buffalo River were well below guidelines set by the World Health Organization (WHO). Based on the weight of evidence of these results, it was suggested that BUI 8 can be delisted. To keep nutrient levels in check, the report recommends implementation of watershed best management practices and continuation of water quality monitoring in the AOC.

Irvine (2007) also found that phytoplankton community structure in the AOC reflects the suburban/urban environment that surrounds it. There appears to be some anthropogenic impact, as reflected by the balance between pollution-tolerant versus pollution-intolerant species, and the presence of certain indicator species, but these impacts do not seem to indicate extreme stress. It is believed that BUI 13, degradation of phytoplankton, can be delisted but periodic monitoring of the phytoplankton population should be undertaken (Irvine, 2007).

4.2.7.1.2 Zooplankton

Singer et al., (1994) provides information on the zooplankton community in the Buffalo River AOC. The authors sampled zooplankton at four sites in the Buffalo River AOC and a reference site in the outer Buffalo Harbor. The sampling was conducted on three dates in May, June, and July 1992. A total of 21 different zooplankton species were found, which the authors divided into six major taxonomic groups: Copepoda, Daphniidae, Bosminidae, Chydoridae, Dreissenidae (zebra mussel larvae), and other. The zooplankton community at the reference site differed from the river sites in several ways: Copepoda were more abundant and comprised a greater percentage of the total species found at the reference site compared with the river sites; Chydoridae, which typically are found in shallow water habitats, were absent from the reference site; and zebra mussel larvae were abundant at the reference site but were found at much lower densities in the Buffalo River. Singer et al., (1994) suggested that these differences were attributable mainly to differences in water depth between reference and river sites and the high density of attached, adult zebra mussels in the outer Buffalo Harbor. Overall, Singer et al., (1994) concluded that the zooplankton community in the Buffalo River was at least as diverse as the community found at the reference site and did not reflect the impacted nature of the river to the extent that the benthic community surveys have evidenced.

4.2.7.2 BENTHOS

The most recent benthic surveys of the Buffalo River were accomplished in 2008 under the auspices of the GLLA (Environ et. al., 2009). That report included a comparison of recent with older benthic surveys. The draft GLLA FS provides an overview and further summation of those benthic surveys (Environ et. al., 2010). Section 2.4.2 of that document is excerpted below:

> *The March 2009 Buffalo River Sediment Remedial Investigation Report (SRIR) published by Honeywell International, details the most recent analysis of Benthic community in the Buffalo River. The benthic community assessment survey was conducted at eight locations on the Buffalo River (including locations upstream of the AOC), one location on Cazenovia Creek (also upstream of the AOC), three locations on the reference Tonawanda Creek, and three locations on the reference Cattaraugus Creek. Benthic community assessment was conducted on Cazenovia Creek to analyze the benthic community that could repopulate the Buffalo River AOC; therefore, it is not used as a reference location.*
>
> *During the 2008 field investigation both sediment grab samples and Hester-Dendy artificial substrate samplers were analyzed as part of the benthic community assessment survey. Benthic community metrics were calculated separately for sediment grab and Hester-Dendy samples. The SRIR provides a detailed discussion of the results for each sampling method in terms of individual metrics and combined metrics using NYSDEC (2002) and USEPA (1999) community assessment methods, which compare results to an unimpacted reference and urban watershed references, respectively. Overall, the results indicated the benthic community in the Buffalo River showed moderate to severe impairment when sediment grabs were compared to an unimpacted reference condition and slight to moderate impairment when Hester-Dendy samples were compared to an unimpacted reference (NYSDEC 2002). Cattaraugus and Tonawanda reference locations, which were selected to represent urban watershed conditions similar to the Buffalo River (excluding industrial influences) also showed moderate to severe impairment for sediment grab samples compared to the unimpacted reference and some areas of slight impairment for Hester-Dendy samples compared to the unimpacted reference (NYSDEC 2002). The Buffalo River results generally showed unimpacted to slight impairment for sediment grabs compared to the Cattaraugus and Tonawanda urban watershed references, and showed slight impairment to isolated moderate impairment for Hester-Dendy samples compared to these urban watershed references (USEPA 1999a). A comparison of sediment grab metric and Hester-Dendy metric results for species/family richness indicates species richness is significantly higher in the Hester-Dendy samplers than those seen in the sediment grab samples. These findings show that organisms lacking habitat in fine grained sediment (i.e., organisms that are not typically sampled using the sediment grab approach) are present in the river but are not well represented in the sediment grab samples. These results are consistent with previous studies that focused on fine grained sediments and have not identified the presence of these species in the river (Diggins and Snyder 2003; Irvine et al. 2005).*

Sampling with the Hester-Dendy provided insight into the benthic community structure that has not been generally considered in studies of the Buffalo River over time (e.g., Diggins and Snyder 2003; Irvine et al. 2005). The Hester-Dendy sampling results showed greater species and family diversity than measured in the sediment grab samples. Other metrics also showed more favorable community structure in the Hester-Dendy samplers than sediments. Differences between sediment grab and Hester-Dendy metric results are at least in part due to the fact that depositional areas included in sediment grab samples, are composed primarily of fine silts and sands mixed with organic matter. This type of substrate offers little diversity in benthic community habitat. Additional differences also may be due to the differences chemical exposures for the two sampling approaches. On the other hand, Hester-Dendy samplers provide a hard surface for organisms that otherwise preferentially use cobble and woody debris surfaces in the natural environment.

Percent dominance is another metric that is important to compare between sediment grab samples and Hester-Dendy samples, because it provides information about diversity of the benthic community. Past studies relying on sediment grab samples from the Buffalo River have demonstrated the majority of the benthic community is dominated by only a few tolerant species. The 2008 findings in sediment grab samples also show dominance by tolerant species, particularly at RM 4.75 where the highest percent dominance by tolerant species was seen from any grab sample. As to be expected based on the species and family richness results, the percent dominance by tolerant species was lower in many of the Hester- Dendy samplers compared to corresponding sediment grab samples collected in the vicinity of the Hester Dendy samplers.

Results of the chironomid mouthpart deformities analysis showed that all of the locations sampled had deformities within the range of deformities seen at reference locations. Hester-Dendy samplers showed lower chironomid deformities than seen in sediment grab samples. There were no apparent trends in deformities within the 2008 data sets, but it is notable that the overall percentages of mouthpart deformities were lower than the 54 percent deformities reported by Irvine et al. (2005) for samples collected in 2003/2004. Results from the 2008 study show that reference locations, such as Cattaraugus Creek, can have up to 15 percent deformities, and the majority of locations typically fell below that percentage with one exception at RM 2.1, which had 33 percent deformities.

The urban, industrialized, and channelized nature of the river, the high degree of siltation, and the lack of riparian vegetation at many locations, create an altered physical habitat that likely influences the structure, abundance, and diversity of benthic macroinvertebrate communities. The 2008 results indicate that benthic habitat is fairly similar between the Buffalo River and the reference sites. The results of the 2008 sampling and the similarity between the Buffalo River and the reference sites give insight into the extent to which habitat quality contributes to the benthic community structure seen in the sediment grab samples.

4.2.8 Aquatic Vegetation

Macrophytes are an important habitat component in any healthy river system. Macrophytes consume and store nutrients; provide food for waterfowl, mammals, and invertebrates; act as breeding, feeding, and nursery grounds for many species of fish and invertebrates; and provide cover for fish and invertebrates (Janowsky 1998).

Recent information on aquatic macrophyte occurrence in the Buffalo River AOC is from Irvine et al. (2005). The report identified macrophyte species present at 10 potential habitat restoration sites in the AOC: Eurasian watermilfoil (*Myrioplyllum spicatum* [10 sites]), curly-leaf pondweed (*Potamogeton crispus* [3 sites]), fine-leaf pondweed (*P. filiformis* [3 sites]), pondweed (*Potamogeton spp*. [2 sites]), and American eelgrass (*Vallisneria americana* [5 sites]). Submerged macrophyte beds were not extensive at the sites investigated, but were present. American eelgrass and pondweeds tended to be dominant early in the season, while invasive Eurasian watermilfoil increased from August onward.

Additional information on aquatic macrophyte occurrence in the Buffalo River AOC can be found in Janowsky, (1998). The report identified 18 macrophyte beds in the AOC and identified dominant macrophyte species. A total of 12 species of rooted or emergent aquatic macrophytes were collected or observed during the survey, including waterweed (*Anacharis canadensis*), coontail (*Ceratophyllum demersum*), an attached green alga (*Cladoophora spp.*) soft rush (*Juncus effusus*), Eurasian watermilfoil , slender naiad (*Najas flexilis*), brittle naiad (*Najas minor*), knotty pondweed (*P. nodosus*), narrow-leaf pondweed (*P. pusillus*), curly-leaf pondweed, cattail (*Typha latifolia*), and water celery (*Vallisneria americana*). All identified macrophyte beds were associated with shallow depositional shelves that had not been previously or recently dredged. Typically, the macrophyte beds identified by Janowsky were located immediately adjacent to the shoreline and were from 10 to 30 feet wide.

The most recent vegetation surveys of the Buffalo River were accomplished in 2008 under the auspices of the GLLA (Environ et. al., 2009). The draft GLLA FS provides an overview and further summation of those vegetation surveys. Section 2.4.1 of that document is excerpted below:

> *The aquatic vegetation survey conducted in August 2008 identified 29 Submerged Aquatic Vegetation (SAV) beds (23 in shallow water areas outside the navigation channel and 6 within the navigational channel). All SAV beds were represented by narrow linear fringing beds along shorelines within the AOC. The most upstream SAV bed was located 0.7 miles downstream of the confluence with the Cazenovia Creek. Eight species of SAV were identified: coontail (Ceratophyllum dermersum), Canadian waterweed (Elodea canadensis), American waterwillow (Justicia americana), Eurasian watermilfoil (Myriophyllum spicatum), curlyleaf pondweed (Potamogeton crispus), American pondweed (Potamogeton nodosus), sago pondweed (Potamogeton pectinatus), and wild celery (Vallisneria americana). Sago pondweed, wild celery, and coontail were the most common species found within the SAV beds. Substrate type within the identified beds was typically silt with clay.*

The aquatic vegetation survey conducted in August 2008 resulted in the identification of 15 Emergent Vegetation (EV) stands (10 within the AOC, 4 within the navigational channel, and 1 outside the AOC). The most upstream EV stand was located 0.8 miles downstream of the confluence with the Cazenovia Creek. Only one EV stand was located within the Buffalo River, upstream of the AOC. This EV stand was located approximately 0.7 miles upstream from the confluence with Cazenovia Creek. Seven species of EV were identified: purple loosestrife (Lythrum salicaria), common reed (Phragmites australis), Japanese knotweed (Polygonum cuspidatum), broadleaf arrowhead (Sagittaria latifolia), softstem bulrush (Scirpus validus), broadleaf cattail (Typha latifolia), and pickerelweed (Pontederia cordata). Purple loosestrife, Japanese knotweed, and common reed were the most common species found in the EV stands.

4.2.9 Fisheries

Data available on the composition and health of the fish community in the Buffalo River AOC is from Irvine et al. (2005). The researchers surveyed larval, juvenile, and adult fishes in June and August 2003 and 2004 at 10 potential habitat restoration sites, and examined juvenile and adult fishes for deformities, eroded fins, lesions, and tumors (DELTs).

The frequencies of occurrence of DELT anomalies are considered to be indicators of the health and condition of the fish community. These abnormalities occur infrequently or are absent from minimally impacted sites but occur frequently in areas where toxic chemicals are concentrated (Rafferty and Grazio 2006). It should be noted that many fish species are transient, spending a portion of the year in the open lake and a portion in the river. Consequently, the presence or absence of DELTs in fish may not be the result of conditions solely within the Buffalo River. A total of 10 species of larval fishes were collected across all study sites, including the alewife (*Alosa pseudoharengus*), bluntnose minnow (*Pimephales notatus*), carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), gizzard shad (*Dorosoma cepedianum*), sunfish (*Lepomis spp.*), logperch (*Percina caprodes*), crappie (*Pomoxis spp.*), round goby (*Neogobius melanostomus)*, and yellow perch (*Perca flavescens*). No site-specific trends were observed. The authors indicated that larval fish diversity in the AOC in 2003 and 2004 was similar to that found in 1993, when nine species were collected.

The diversity and abundance of juvenile and adult species were similar across all sampling locations in 2003 and 2004, ranging from 15 to 20 species per site on each sampling date. The following species were collected: bluegill (*Lepomis macrochirus*), bluntnose minnow, brown bullhead (*Ameuris nebulosus*), carp, common shiner (*Notropis cornutus*), emerald shiner (*Notropis atherinoides*), fathead minnow, freshwater drum (*Aplodinotus grunniens*), gizzard shad, golden shiner (*Notemigonus crysoleucas*), goldfish (*Carassius auratus*), hogsucker (*Hypentelium spp.*), largemouth bass (*Micropterus salmoides*), logperch, northern pike (*Esox lucius*), pumpkinseed (*Lepomis gibbosus*), redhorse (*Moxostoma spp.*), rock bass (*Ambloplites rupestris*), rudd (*Scardinius erythrophthalmus*), smallmouth bass (*Micropterus dolomieu*), spottail shiner (*Notropis hudsonius*), walleye (*Stizostedion vitreum*), white sucker (*Catostomus commersoni*), and yellow perch. The diversity of juvenile and adult fish in 2003 and 2004 was generally similar to that found in 1993 (Irvine et. al., 2005).

Irvine et al. (2005) used the Index of Biotic Integrity (IBI) to rate the health of the fish community at the 10 potential habitat restoration sites they investigated. The IBI uses attributes of the fish community, including species richness, species composition, trophic composition, fish abundance, and fish condition, to index human effects on the drainage. Based on the IBI, the fish community was rated as poor to very poor at the 10 sites sampled in 2003 and 2004.

DELT anomalies varied greatly among species in 2003 and 2004, with a low of 14 percent in pumpkinseed to a high of 87 percent in brown bullhead. For the AOC as a whole, DELT scores averaged 37 percent, which is much higher than one would expect for a moderately impacted (2 percent to 5 percent) river or a river not impacted (less than 2 percent) (Irvine et al. 2005).

The most recent fish surveys of the Buffalo River were accomplished in 2008 under the auspices of the GLLA (Environ et al., 2009). The draft GLLA FS provides an overview and further summation of those vegetation surveys. Sections 2.4.3 and 2.4.4 of that document is excerpted below:

> *Fish community sampling conducted in 2008 provided taxonomic information on the population and community structure of Buffalo River and Cazenovia Creek, as well as information on the preremediation conditions. Fish communities were evaluated within five locations in Buffalo River and one location in Cazenovia Creek, upstream of the AOC. During the 2008 fish community survey, a total of 23 distinct species were collected by electroshocking. Seining was only conducted at one upstream location (RM 7.25) and resulted in the collection of six species. A list of the fish caught at each location is presented in Table 2-10. Eleven species were collected on the Buffalo River at the three locations upstream of the AOC (RM 6.25 to RM 7.5), while 13 species were collected in the Buffalo River at the two locations within the AOC (RM 4.5 and RM 5.5). The one electroshocking location on Cazenovia Creek (CC) resulted in the collection of 12 species.*
>
> *Fish collected during the fish community survey generally exhibited healthy characteristics. However, a small portion did exhibit some abnormalities. Approximately 2% of the fish collected during the fish community assessment showed evidence of external deformities, eroded fins, lesions, and tumors (DELTs), as described by Ohio EPA (1987). Spatially, the locations within the AOC were observed to have a slightly higher incidence of fish with DELTs (4%) compared to the locations upstream of the AOC (1%). The prevalence of liver tumors and external lesions was assessed in brown bullheads collected from the Buffalo River AOC. Results of the histopathological evaluation are provided in Table 2-13. In summary, three of the thirty-seven fish (i.e., 8.1%) collected from the Buffalo River contained hepatic neoplastic lesions. One tumor was found in each of the river reaches evaluated. In 1983-1986 Black and Baumann (1991) reported a 5.5% incidence of hepatocellular neoplasia and an 11.1% incidence of "bileductular" neoplasia (which combined equal 16.6% total liver tumors) and in1988 Baumann et al. (1996) reported a 5% incidence of "malignancies" and a 19% incidence of "neoplasms" (which combined is 24% total liver tumors).*

4.2.10 Wetlands

The project area consists of routinely dredged and maintained Federal navigation channel that is not known to contain Federal or State jurisdictional wetlands. However, aquatic wetland habitat may exist outside the Federal channel adjacent to the shoreline in some locations. The Buffalo River and most of the Buffalo ship canal is currently mapped in the National Wetlands Inventory (NWI) as riverine, lower perennial, unconsolidated bottom, and permanently flooded (R2UBH) aquatic habitat and excavated (R2UBHx) aquatic habitat, respectively.

4.2.11 Terrestrial Vegetation

The most recent information on shoreline plant species in the Buffalo River AOC is from Irvine et al. (2005). The report identified woody and herbaceous plant species at 10 habitat restoration sites in the AOC. Forty-five plant species (10 woody and 35 herbaceous) were identified at the sites, suggesting the potential for vigorous, productive plant communities to become established at these sites.

Native black willow (*Salix nigra*) was often the dominant woody over story species along the immediate shoreline, providing shade, habitat, and underwater structure where tree limbs have fallen into the river over time. Other native tree species, including the eastern cottonwood (*Populus deltoidies*), green ash (*Fraxinus pensylvanica*), and silver maple (*Acer saccharinum*), were found at the sites. The aggressive and invasive tree-of-heaven (*Ailanthus altissima*) was also observed to be a common species within the river corridor.

Herbaceous vegetation was found to be well developed at all sites, even where much of the shoreline was composed of stone rip-rap. However, two invasive species, purple loosestrife (*Lythrum salicaria*) and Japanese knotweed (*Polygonium cuspidatum*), were found to be abundant at most sites. Japanese knotweed had established dense mono-specific stands at several sites.

4.2.12 WILDLIFE

Table 2: Bird, Mammal, Amphibian, and Reptiles Species Observed in the Buffalo River AOC and Upstream Tributaries by NYSDEC April 1991 through June 1991.

Common Name	Scientific Name
Gray catbird	*Dumetella carolinensis*
American robin	*Turdus migratorius*
European starling	*Sturnus vulgaris*
Yellow warbler	*Dendroica petechia*
Yellow-rumped warbler	*Dendroica coronate*
Common yellowthroat	*Geothlypis trichas*
Red-winged blackbird	*Agelaius phoeniceus*
Northern oriole	*Icterus galbula*
Common grackle	*Quiscalus quiscula*
Brown-headed cowbird	*Molothrus ater*
Scarlet tanager	*Piranga olivacea*
Northern cardinal	*Cardinalis cardinalis*
Brown creeper	*Certhia Americana*
Purple finch	*Carpodacus purpureus*
House finch	*Carpodacus mexicanus*
American goldfinch	*Carduelis tristis*
Dark-eyed junco	*Junco hyemalis*
Chipping sparrow	*Spizella passerine*
Song sparrow	*Melospiza melodia*
Mammals	
Red Fox	*Vulpes vulpes*
Raccoon	*Procyon lotor*
Mink	*Mustela vison*
Striped skunk	*Mephitis mephitis*
White-tailed deer	*Odocoileus virginianus*
Eastern chipmunk	*Tamias striatus*
Woodchuck	*Marmota monax*
Gray squirrel	*Sciurus carolinensis*
Red squirrel	*Tamiasciurus hudsonicus*
Beaver	*Castor Canadensis*
Muskrat	*Ondatra zibethicus*
Eastern cottontail	*Sylvilagus floridanus*
Reptiles and Amphibians	
Leopard frog	*Rana pipiens*
Spring peeper	*Hyla crucifer*
Painted turtle	*Chrysemys picta*
Common garter snake	*Thamnphis sirtalis*

Source: NYSDEC 1993.

4.2.12.1 BIRDS

Between April and June 1991, NYSDEC identified bird species in the Buffalo River AOC and upstream areas. In total, 53 bird species were observed within 30 meters (approximately 100 feet) of the bank (see Table 3). Twenty species were observed along the river downstream from

Bailey Avenue (the upstream boundary of the AOC), and an additional 33 species were observed in the upper tributaries. Greater bird diversity in the upper tributaries was attributed to the presence of more continuous natural cover and floodplain forests. Lower bird diversity in the AOC was attributed to a lack of suitable habitat.

A more recent avian survey was completed by Morris et al. (2006), in which a baseline of existing avian species diversity and species richness in three areas in the watershed (Cazenovia Creek, Buffalo Creek, and Buffalo River), differing in the degree of existing development, habitat, and habitat degradation. When compared to the other locations, species richness was highest at the Buffalo River site during September and January and had the lowest species richness in May. The Buffalo River site had the lowest species diversity during May 2006, but the Buffalo River had the highest species diversity during September and January. Overall the survey data shows patterns of avian diversity that might be expected for the varying levels of degradation in these three waterways, with Buffalo River the most degraded.

4.2.12.2 Amphibians and Reptiles

At the time of writing this EA, the most recent amphibian and reptile survey data available for the Buffalo River AOC were from NYSDEC (1993). Only three amphibians and one reptile species were observed suggesting that diversity and abundance of amphibians and reptiles in the AOC are low (Table 3).

4.2.12.3 Mammals

NYSDEC (1993) provides mammal survey data available for the Buffalo River AOC; a total of twelve species were observed (Table 3). In general, the species observed are those that have adapted to living in developed areas. Upland areas along the Buffalo River AOC provide little high-quality habitat for mammals. Several habitat restoration sites have been established but most of the area within the AOC is without suitable habitat (Irving et. al., 2005).

4.2.12.4 Invasive/Exotic Species

During the past two centuries, invasive species have significantly changed the Great Lakes ecosystem. In turn, the changes have had broad economic and social effects on people that rely on the system for food, water, and recreation. An "invasive species" is a plant or animal that is non-native (or alien) to an ecosystem, and whose introduction is likely to cause economic, human health, or environmental damage in that ecosystem. Once established, it is extremely difficult to control their spread (USEPA, 2009). Table 3 lists invasive/exotic species that may be found in the Buffalo River AOC.

Table 3: Invasive/Exotic Species in the Great Lakes ecosystem

Aquatic Invasive Species of Concern	
Eurasian Watermilfoil	(*Myriophyllum spicatum*)
Water chestnut	(*Trapa natans*)
Curly-Leafed Pondweed	(*Potamogeton crispus*)
Brittle Naiad	(*Najas minor*)
European Frog-Bit	(*Hydrocharis morsus-ranae*)
Variable Watermilfoil	(*Myriophyllum heterophyllum*)
Terrestrial and Wetland Invasive Plants	
Japanese knotweed	(*Fallopia japonica*)
Garlic mustard	(*Alliaria petiolata*)
Tree of heaven	(*Alianthus altisima*)
Mugwort	(*Artemisia vulgaris*)
Lesser celandine	(*Ranunculus vicaria*)
Common reed	(*Phragmites austaralis*)
Multiflora rose	(*Rosa multiflora*)
Exotic Bush Honeysuckles	
Amur	(*Lonicera maackii*)
Bell's	(*L.* x *bella*)
Dwarf	(*L. xylosteum*)
Fragrant	(*L. fragrantissima*)
Morrow's	(*L. morrowii*)
Standish's	(*L. standishii*)
Tartarian	(*L. tatarica)*
Invasive Animal Species	
Round Goby	*(Neogobius melanostomus)*
Sea lamprey	*(Petromyzon marinus)*
Eurasian Ruffle	*(Gymnocephalus cernuus)*
Alewife	*(Alosa pseudoharengus)*
Spiny Water flea	*(Cercopagis pengoi)*

4.2.13 THREATENED AND ENDANGERED SPECIES

In reviewing the reports and investigations that have been completed within the Buffalo River AOC, no statements, or observations of threatened or endangered species were found. A review of the U.S. Fish and Wildlife Service (USF&WS) website for Federally listed endangered and threatened species, and candidate species indicated that no species on either list are known to occur in Erie County. NYSDEC indicated that there are 13 historic locations of state-listed plant species and two locations of state-listed insect species within the Buffalo River AOC study area these are likely historic locations only since the species may no longer occur in the study area (NYSDEC, 2008a).

4.2.14 WILD AND SCENIC RIVERS

The Nationwide Rivers Inventory (NRI) is a list of more than 3,400 free-flowing river segments that are believed to possess one or more "outstanding remarkable" natural or cultural value features judged to be of more than local or regional importance. There are no National Wild and Scenic River segments within the AOC or in the Buffalo River watershed.

4.3 SOCIO-ECONOMIC ENVIRONMENT

4.3.1 DEMOGRAPHICS (POPULATION)

The city of Buffalo is the most urban community in Western New York, with the surrounding region containing numerous suburban and rural communities. Both the city of Buffalo and Erie County have experienced a decline in population and an increase in the unemployment rate from 2000-2008. Table 4 provides some demographic (population) information for the Buffalo and Erie County region.

Table 4: Buffalo/Erie County New York Demographic Statistics

Buffalo/Erie County New York Demographic Statistics (Last 10 Fiscal Years)						
	Population		**Buffalo/Niagara Region**			**New York State**
	Buffalo[2]	**Erie County[2]**	**Per Capita Income[3]**	**Labor Force[1]**	**Unemployment Rate[1]**	**Unemployment Rate[1]**
2000	292,648	949,398	$27,208	583,563	4.1%	4.3%
2001	289,732	945,540	$27,751	578,970	4.5%	4.4%
2002	287,389	941,707	$28,408	587,056	5.4%	6.0%
2003	285,123	938,847	$29,515	589,317	6.0%	6.5%
2004	282,403	934,653	$30,912	589,389	5.7%	5.9%
2005	279,138	928,215	$31,825	589,832	5.2%	4.8%
2006	276,059	921,390	$33,803	591,139	4.8%	4.4%
2007	272,632	913,338	$35,669	581,162	4.5%	4.5%
2008	270,919	909,845	$36,408	589,339	5.7%	5.2%
2009	n/a	n/a	n/a	597,000	8.4%	9.0%

Sources: [1] U.S. Department of Labor – Bureau of Labor Statistics, at June of year shown
[2] U.S. Bureau of the Census
[3] U.S. Bureau of Economic Analysis

4.3.2 ASSOCIATED LAND USE AND DEVELOPMENTS

Land-use information for 2006 and 2008 was obtained from the city of Buffalo in order to present a clear and site specific description of land use conditions within the study corridor. A geographic information system (GIS) was used to compare land use designations and parcel information on all parcels within a 1,000-foot buffer zone from the river bank line. The analysis of the two data sets indicated that land use has not changed between 2006 and 2008. Consequently, the data set described here is from the 2008 mapping. There is an approximate area of 1,693 acres and 2.7 square miles within the entire subject area (including surface water and other non-parcel areas (roads). Nine land-use categories and 831 parcels are located within the measured AOC corridor (1,000-foot buffer zone along each river bank line), comprising approximately 1,230 acres and 1.9 square miles (note that the difference in acreage and area compared to what is presented above is equal to the area encompassed by the river, roads, and any other areas not included in the land use categories). There are 264 parcels of vacant land accounting for the greatest acreage (310.5 acres) and highest relative percentage (25.25 percent) within this corridor, followed by commercial, industrial, and "no code" (see Table 5). (Ecology and Environment, 2008)

Table 5: Land Uses within the Buffalo River AOC Corridor (2008 Data)

Land Use Categories	Acres Per Category	Relative Percentage of Each Category within 1,000-foot Buffer Zone
Vacant Land	310.5	25.25
Commercial	231.54	18.83
Industrial	213.44	17.36
No Code*	172.01	13.99
Public Services	103.36	8.41
Recreation and Entertainment	94.36	7.67
Community Services	51.61	4.2
Residential	30.16	2.45
Wild, Forested, Conservation Lands and Public Parks	22.44	1.82
None	0.15	0.01

* No information specified in the data set.

The top four land use categories comprise approximately 75.4 percent of the parceled land within the buffered area. The category encompassing park lands accounts for a relatively small percentage within the buffer zone, primarily due to the long history of industrial, commercial, and residential development within the corridor. A number of parks and natural areas within or just outside the boundaries of the AOC have been developed since the mid-1990s. These areas provide outdoor recreation along the Buffalo River. As envisioned in the original Buffalo River AOC Remedial Action Plan, the implementation of the Buffalo River Greenway was an element of the remedial strategy.

4.3.3 Business and Industry and Employment and Income

In 2000, the median value of owner-occupied units in the city of Buffalo ($59,300) was much less than the median value in Erie County ($90,800). Both of these median values are considerably lower than the median value for New York State as a whole, which was $148,700 in 2000 (U.S. Census Bureau 2008).

The majority of employment in Erie County is associated with education, health, social services, and manufacturing, followed by retail trade. In the city of Buffalo, 28.4 percent of the workforce is employed in education, health, or social services; 13.1 percent is employed in manufacturing; and 10.7 percent is employed in retail trades. The median household income for Erie County was estimated at $38,567. For the city of Buffalo, the median household income was $24,536 (U.S. Census Bureau 2008). As of 2009, some of the major employers in the Erie County region include the State of New York, University at Buffalo, United States Government, Kaleida Health, HSBC Bank, Buffalo City School District, and Catholic Health System (Business First 2008).

4.3.4 PUBLIC FACILITIES AND SERVICES

Within the Buffalo area, the project vicinity is serviced with water, sewer, gas, electric, telephone, police, fire, emergency (rescue) medical, transportation, and sanitation developments. All of the various utility agencies and companies that serve the city of Buffalo have facilities in, provide service to, or are tied to the harbor in some way. Beyond parkland and recreational opportunities, the only major public facility/service adjacent to the Buffalo River AOC is the Bird Island wastewater treatment plant which is permitted to discharge combined sewer overflows (CSOs) to the Buffalo River. Any planned activities within the Buffalo River AOC will not increase flow or exacerbate poor water quality conditions caused by CSOs.

4.3.5 WATER AND SEWER FACILITIES

Lake Erie is the primary source of drinking water for the city of Buffalo and surrounding communities in Erie County. Lake Erie is the shallowest of the Great Lakes, with an average depth of only 62 feet. It also has the shortest detention time of the Great Lakes. Water remains in the lake for only 2.6 years before it is replaced by incoming fresh water (as compared with 191 years in Lake Superior or 22.6 years in Lake Huron). It is also the siltiest of the Great Lakes. Its bottom consists of fine grain sediment easily upset during turbulent storms. When Lake Erie becomes turbulent, fine particles of sand and silt become agitated and suspended throughout the lake. Organic contaminants tend to tightly cling to these particles. Therefore, water treatment begins as a natural process due to the structure and makeup of Lake Erie (Buffalo Water Authority 2010).

The city of Buffalo draws its drinking water from Emerald Channel water intake in Lake Erie (located at the head of the Niagara River) while Erie County draws water at the Sturgeon Point Treatment Plant in Evans, NY to supply the southern part of Erie County, and communities in Cattaraugus County. The Van de Water Treatment Plant in Tonawanda draws water for northern Erie County and parts of Genesee County from the Niagara River. Each day at these production facilities, millions of gallons of water are cleaned, purified, and tested to meet stringent standards before being distributed to residents and business of the region.

Since 1938 the Buffalo Sewer Authority (BSA) has treated all wastewater from the city of Buffalo at its Bird Island treatment facility located on the Niagara River. The BSA also treats wastewater from all or parts of 11 municipalities in Western New York including Alden, Cheektowaga, Depew, Elma, Lancaster, Sloan, Tonawanda, and West Seneca. The BSA maintains a combined sewer system of approximately 850 miles in length with 10 outlying pump stations, including a 17 million gallon capacity storm retention basin. The Bird Island Wastewater Treatment Plant is the second largest wastewater treatment plant in New York State, and treats and disposes an average sewer flow of nearly 150 million gallons per day (MGD), including current contracts from outside districts which bring in more than 30 million gallons per day (Buffalo Sewer Authority 2010).

As with many older cities across the country, Buffalo is served by combined sewers. During dry weather, all wastewater collected in the combined sewer system is transmitted to the Bird Island wastewater treatment plant, treated, and discharged to the Niagara River. However, during heavy rainfall events, the combination of stormwater and sanitary sewage overwhelms the sewers, and untreated or minimally treated sewage discharges to nearby waterways through CSOs.

There are 27 CSOs in the Buffalo River watershed (52 total in all of Buffalo). The BSA is currently updating a CSO Long Term Control Plan that will identify its plans to address these overflows. In the interim, the BSA is undertaking several CSO control projects, some of which will reduce overflows to the Buffalo River watershed (NYSDEC 2010).

Table 6 displays the number of gallons of wastewater treated by the Buffalo Sewer Authority from 2000 to 2009. In 2009 the BSA treated 48.5 billion gallons of wastewater which is 6.2 billion gallons less than in 2000. This reduction in flow is due to sewer system improvements, improved flow monitoring, and loss of population and industry. The system has undergone a number of improvements over the years that enhanced treatment and/or reduced sewage discharges.

Table 6: BSA wastewater treated (millions of gallons) from 2000-2009

Buffalo Sewer Authority Wastewater Treated in the Last Ten Fiscal Years	
Fiscal Year	**Gallons of Wastewater Treated[1]**
2000	54,714
2001	54,933
2002	56,101
2003	50,845
2004	53,509
2005	49,823
2006	48,144
2007	52,195
2008	49,604
2009	48,509

Note: [1] In millions

Source: Buffalo Sewer Authority, Comprehensive Annual Financial Report for the year ended June 30, 2009

4.3.6 TRANSPORTATION/NAVIGATION

In the 1950's many industrial, manufacturing, and petrochemical plants left the northeastern United States. In addition, transportation patterns changed with the advent of the St. Lawrence Seaway system, which links the Great Lakes to the Atlantic Ocean. These and other factors altered or eliminated much of the industrial and commercial activity along the Buffalo River. Amid open spaces, inactive hazardous waste sites, and unused industrial structures, Buffalo Harbor is still home to some viable industrial activity. Remaining industries bordering the river are involved in flour milling, cereal and grain processing, grain transportation and distribution, cement distribution, recycling facilities, and several other businesses. Major stakeholders for the Buffalo Harbor include the Port of Buffalo, U.S. Coast Guard, General Mills, Exxon-Mobil, Lafarge Cement, and Founders Supplies, Incorporated (USACE 2010; NYSDEC 1989). Nine commercial piers are located along the Buffalo River to facilitate the waterborne transport of commodities.

As a result of its continued importance as a Federal navigation project, the USACE, Buffalo District maintains O&M, including dredging, Buffalo River and ship canal. Buffalo Harbor is a deep- draft commercial harbor ranked 29th among the Great Lakes Ports based on tonnage. The Buffalo Harbor is the 127th leading U.S. port with 1.6 million tons of material shipped or received in 2007. Federal navigation channels in the harbor are typically maintained at an authorized depth of 23 to 30 feet below LWD in the outer harbor and 22 feet below LWD in the Buffalo River and ship canal. These approximately six miles of channels are used by commercial vessels as well as recreational boat traffic. Federal navigation channel widths at the bottom are generally 150 feet in Buffalo River and 125 feet in the ship canal. Natural side slopes are maintained at 1 vertical unit on 3 horizontal units. In recent years, Buffalo Harbor has been dredged every other year during which 100,000 to 150,000 cy of material have been removed.

4.3.7 RECREATION (WATER-RELATED)

Water-related recreational development and activities in the vicinity of Buffalo Harbor include those associated with parks, fishing, and general boating. Small powerboats travel the river for recreational boating purposes, primarily near the mouth of the river. Several Marinas near the mouth of the river provide seasonal dockage and storage, launch ramps, transient docking, hull and engine repair and services, fuel, ice and water, electricity, sewage pump-out, marine supplies, and associated upland facilities (parking, restrooms, restaurants, fish cleaning stations, etc.). Some limited unsupervised swimming has also been observed in the river.
Limited recreational game fishing occurs on the Buffalo River, both from the shoreline and boats. Although fishing occurs, there is a State Health Department consumption advisory. In addition, fishing use has been restrained due to limited land access points, the river's pollution history, and the availability of alternative fishing sites (NYSDEC, 1989).

Parks and restoration project areas within or near the AOC include the Ohio Street boat launch, the Smith Street habitat restoration site, the Bailey Avenue Peninsula, Seneca Bluffs, and the Tift Nature Preserve (Buffalo Niagara Riverkeeper, 2008). These areas provide people with access to the river as well as passive recreational, environmental education, and habitat values.

Playground and other recreational parks include the Chicago-Perry playground along Perry Street; Father Conway Park along Ohio Street; Redmond playground along South Park Avenue; and Leddy Streets and "Old Bailey Woods. The Buffalo and Erie County Naval and Military Park near the mouth of the river contain two decommissioned U.S. Navy warships and one submarine. The vessels are permanently moored in the Buffalo River and serve as a popular tourist attraction.

4.3.8 PROPERTY VALUE AND TAX REVENUE

In 2000, the median value of owner-occupied units in the city of Buffalo ($59,300) was much less than the median value in Erie County ($90,800). Both of these median values are considerably lower than the median value for New York State as a whole, which was $148,700 in 2000 (U.S. Census Bureau, 2008).

4.3.9 NOISE

Many of the activities associated with dredging have the potential to produce noise, which is defined as any unwanted sound at undesirable levels. The environmental setting can affect how noise is perceived by a receptor. For instance, the noise level perceived can be affected by a person's distance from the noise, the additive effects of multiple noise sources, time of year, wind, humidity, and nearby land forms and structures. In general, NYSDEC Noise Policy indicates that a 6 decibel or higher sound pressure level increase over baseline noise levels can cause a potential impact on persons in the area (NYSDEC, 2001). The USACE will assess potential noise impacts that could result when projects are proposed and will ensure compliance with State and Federal noise standards and criteria. Existing noise conditions within the project area are typical for a mixed use urbanized area (e.g., moderate levels of vehicle traffic, industrial/commercial activities).

4.3.10 Aesthetics

The degradation of the Buffalo River has adversely affected the aesthetic quality of the river and the overall riparian corridor. The "aesthetic degradation" BUI for the Buffalo River AOC is listed as impaired by the USEPA. The primary causes of aesthetic degradation have been identified as floatables and debris from CSOs, upstream watershed sources, and foul odors from CSOs in the AOC.

4.3.11 Community Cohesion

Community cohesion is a result of a number of social and economic factors. Many Buffalo area residents and entities have resided in the area for a long time. General community pride and cohesion is relatively strong, and the harbor and river has played an important part in this development. While harbor facilities and associated businesses remain active, as in most areas, pursuit of environmental and recreational developments has received increased emphasis. Community efforts have sought to sustain business and industry, while pursuing these and alternative developments (including environmental and recreational). Relative to continued harbor O&M, most interests agree that Buffalo Harbor Federal navigation channels should be maintained to facilitate industry and commerce, and associated community economic and social well being.

4.3.12 Cultural Resources

According to the New York State Historic Preservation Office (NYSHPO) Public Access GIS Application, five areas listed in the National Register of Historic Places are located adjacent to or in the immediate vicinity of the Buffalo River AOC. Also, according to this GIS application, the majority of the waterfront and AOC are considered by NYSHPO to be archaeologically sensitive.

4.3.13 Environmental Justice

According to NYSDEC Commissioner Policy 29 on Environmental Justice and Permitting, a potential environmental justice area is defined as a minority or low-income community that bears a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies (NYSDEC 2003). The policy expands upon Executive Order 12898, issued by former President Clinton on February 11, 1994, which requires that impacts on minority or low-income populations be accounted for when preparing environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by Federal agencies.

The policy defines a minority population as a group of individuals that are identified or recognized as African American, Asian American/Pacific Islander, American Indian, or Hispanic. Hispanic refers to ethnicity and language, not race. A minority community exists where a census block group, or multiple census block groups, has a minority population equal to or greater than 51.1 percent in urban areas or 33.8 percent in rural areas.

The Buffalo River AOC is considered an urban area. General racial/ethnic statistics for the city of Buffalo include 42.1 percent minority and 8.9 percent Hispanic (U.S. Census Bureau, 2008). The city's minority population is just below the NYSDEC urban threshold; however, the specific demographics of individuals living in the AOC are not accounted for in this calculation.

A low-income population is defined as a group of individuals having an annual income that is less than the poverty threshold established by the U.S. Census Bureau. A low-income community is a census block group, or an area with multiple census block groups, having a low-income population equal to or greater than 23.6 percent of the total population. The city of Buffalo has an overall poverty rate of 26.6 percent, which is above the threshold that designates a low-income population (U.S. Census Bureau 2008); however, poverty statistics specific to the Buffalo River AOC project area were not readily available.

5.0 ENVIRONMENTAL EFFECTS

5.1 DETERMINATION OF ENVIRONMENTAL EFFECTS

This section presents an assessment of the proposed alternative and the no action alternative. The alternatives that were eliminated in Section 3.0 were not evaluated in this section. The proposed project is evaluated for engineering and economic feasibility, environmental and social acceptability, and for best meeting the project planning objectives. Environmental assessment of the proposed action was based on an evaluation of the impacts from construction and operation of the proposed project. Anticipated environmental effects of the proposed project were determined from previous project documentation, agency coordination, and analysis of construction activities necessary to implement the project.

Since the preferred alternative addresses sediment quality, this medium is discussed prior to discussion of other media (such as water and biota) that are indirectly affected by sediment quality impacts via movement of contamination from sediments to these other media.

5.2 PHYSICAL/NATURAL ENVIRONMENT

5.2.1 AIR QUALITY

No Action (without project conditions) - Since this alternative involves no dredging or dredged material management, air quality in the vicinity of the harbor would continue to be similar to existing conditions. There would be no project related dust or exhaust emissions from construction equipment that could contribute to the degradation of air quality.

Selected Plan - The operation of dredging equipment would result in an increased output of air emissions (suspended particulates, nitrogen dioxide, carbon monoxide, lead, etc.) into the local atmosphere. However, such air quality impacts from the dredging operations would be minor, adverse, and short-term. This increased output is not expected to result in any violations to any Federal or State air quality standards.

5.2.2 SEDIMENT QUALITY

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no change to the existing sediment quality in the Buffalo River and ship canal other than by the addition of new sediment over time.

Selected Plan – The concentration of sediment contaminants residing at the surface before dredging (i.e., current conditions), expected to be present in the sediment removed by dredging, and remaining at the new sediment surface after dredging is estimated and summarized (Tables 7, 8, and 9). The sediment concentrations presented in Table 7 (Mean Concentrations of contaminants on the surface prior to dredging) were developed using the results of sediment samples taken between 2003 and 2008 within the top 12 inches of the surface. The sediment concentrations presented in Table 8 (Mean Concentrations of contaminants expected to be dredged) were developed using the results of sediment samples taken between 2005 and 2008 within each segment of the dredge prism, as presented in Figure 2. The dredge prism was defined as those sediments within the lateral extent of the Federally authorized navigation channel, down to a depth of 24 feet below LWD and within a 3:1 side slope. The sediment concentrations presented in Table 9 (Mean Concentrations of contaminants on the surface after dredging) were developed using any sediment sample result taken between 2005 and 2008 that occurred within two feet of the dredge surface. An interval of two feet around the dredge surface was used because of the low number of sediment samples collected precisely at the specified final depth of dredging. Samples that were composited over a depth interval that overlapped with the final dredge surface were also used to estimate the concentration of contaminants at the final depth of dredging.

Following the completion of dredging, the potential for exposed sediments and dredge residuals to remain contaminated and therefore impact water quality and to be toxic to aquatic life was predicted based on the average in situ contaminant concentrations in the exposed sediment bed and the expected average contaminant concentrations in the dredge residuals for each dredge area as presented in Tables 7, 8, and 9 (USAERDC 2010a; Appendix C). Dredging of the Federal navigation channels may, in some areas, temporarily (with first 12 months after dredging) expose sediments that are acutely toxic to aquatic life. Based on the sediment characteristics and expected dredging operation and equipment, it is estimated that 5 to 10 percent of the dredged material will remain in the Buffalo River and ship canal as residuals, resulting in approximately 2 inches of residual sediment. Across the project area, the average concentration of surface contamination is not expected to substantially increase following dredging, thus a significant increase in risk to aquatic life is not expected. This is because the change in the contaminant concentrations in surface sediments is, on a river-wide average, very small.

Although there is only a small change in the average concentration of contaminants in the sediment surface, the removal of an estimated 120,000 pounds of heavy metals and other organic contaminants including PCBs and PAHs from the project area (calculated based on total volumes removed and average concentrations of constituents within these volumes) will contribute to a positive, long-term positive impact to sediment quality in the harbor.

Sediment resuspended during dredging which may migrate outside of the dredging project limits is not expected to have any significant impact on sediment quality in areas outside the planned dredging areas. Measures taken to address this include the following dredging controls. Mechanical dredge equipment such as a closed clamshell bucket will be used to reduce sediment resuspension and turbidity in the water column. Except for *de minimus* discharges, the overflow of supernatant in scows containing the dredged material will be prohibited. Production rates will be controlled during dredging to reduce the release of contaminants in the water column.

Surface sediments following dredging will consist of the residual sediment resulting from dredging operations and the sediment expected to slump along the channel side slope that creates the final sediment surface that is expected to have a 2:1 to 3:1 side slope. The sediment which slumps to form the new side slopes will consist of both cleaner sediments near the existing sediment surface and more contaminated sediment located deeper in the sediment profile. Bathymetric survey data has demonstrated that accumulation of new sediment on the surface of the navigation channel includes accretion of new sediment on these side slopes in addition to the bottom of the navigation channel. Deposition of clean sediment from upstream sources is expected to rapidly occur following GLRI dredging which will cover the contaminated residuals located on both the bottom and sides of the navigation channel, however, the rate of deposition will be variable depending on the distance from head of channel and localized flow velocities within the channel. Previous model estimates of the average sediment deposition indicate that approximately ten cm (about four inches) of sediment enters the channel each year. The rate and spatial variability in the deposition of less contaminated sediment from upstream sources is expected to follow historical patterns with the highest rates of deposition initially occurring at the upstream terminus of the River Channel, with shoaling moving downstream as sediment accumulates at the river bends.

At several locations, the exposed sediment bed and dredge residuals within the Federal navigation channels are predicted to be acutely toxic to fish or other aquatic life immediately following dredging. However, the surface concentration of contaminants in these locations is expected to decrease over several months as the natural deposition of sediment begins to refill the Federal navigation channel. Following six months of natural sediment deposition, the potential for short-term toxicity is limited to four dredge area subunits. Following 12 months of natural sediment deposition, all of the dredge areas subunits would have contaminant concentrations below Probable Effects Concentration (PEC) toxicity screening values (USAERDC 2010a; Appendix C).

Several areas will uncover and leave exposed greater concentrations of residual contamination by dredging to the authorized advanced maintenance dredging depth. These areas are expected to temporarily increase the potential for contamination exposure and toxicity to aquatic organisms. This potential for exposure and toxicity will rapidly decline as clean sediments from upstream sources begin to cover and bury the contaminants. Areas DA-K, DA-L, DA-O have the highest concentrations of mercury, lead and PCBs which exhibit the greatest risk to aquatic life. These areas are predicted to exceed the probable effect concentration (PEC) screening value six months after dredging and Area DA-L is expected to exceed the PEC value for mercury after 12 months. Although areas DA-P5 and DA-E4 show elevated levels of the PAH compound, benz(a)anthracene, the concentration of Total PAHs in these locations are either below (8.5 mg/kg) or nearly the same (17 mg/kg) as the GLLA remedial action goal (PRG) of 16 mg/kg. The preferred alternative is chosen as it represents the best balance between short term risks (avoiding areas with greater potential to leave contamination exposed) and long term improvement in overall sediment quality.

Areas DA-K, DA-L and DA-O may be addressed by GLLA dredging that may occur at a later date. All three of these areas were identified as "resample" areas in the GLLA draft FS. (DA-L corresponds to Resample Area 5, DA-K corresponds to Resample Area 6, and DA-O corresponds to Resample Area 4.) The GLLA dredging can remove sediments to a greater depth further below the navigation channel, thus eliminating exposure to deeper sediment contamination in this area.

Completing advanced maintenance at this point should support the third GLLA Remedial Action Objective to "Reduce or otherwise address legacy sediment COC concentrations to improve the likelihood that future dredged sediments (for routine navigational, commercial, and recreational purposes) will not require confined disposal" (Environ et. al., 2010). The goal after both GLRI and GLLA dredging is completed is that future navigation dredged sediment would be clean enough to preclude the need for confined disposal, i.e., it could be placed beneficially instead. This will reduce long term needs for the existing CDF and provide restoration benefits to the entire Buffalo River ecosystem.

5.2.3 Water Quality

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no potential for any adverse impacts to water quality other than that associated with contaminated sediments being left within the aquatic environment.

Selected Plan - Short-term risks that may occur during the dredging operation were evaluated by predicting the resuspension of contaminated sediments and their potential to impact surface water quality and toxicity to aquatic life (USAERDC 2010a). Following removal of sediments from the Federal navigation channels, the short-term risk associated with the water quality impacts from the newly exposed sediment surface was evaluated. A summary of the risk evaluation is presented in Appendix C.

Model predictions indicate that dredging operations may result in sediment resuspension and water quality exceedances of National Recommended Water Quality Criteria for short-term exposures to dissolved copper, lead, and mercury. The concentration of these metals that becomes dissolved in the water column depends on the amount of sediment resuspension occurring during dredging and distance away from the dredge. Dredging equipment and operational controls have been proposed that will help minimize this potential risk (Section 2.1). Sediment resuspended during dredging may migrate outside the Federal navigation channels but not expected to have any significant impact on sediment quality in the Buffalo River or ship canal, nor have any long-term impacts on water quality.

Water quality impacts associated with placement of the dredged material in the CDF have been assessed in the Section 404(b)(1) Evaluation included in Appendix B. In summary, water quality impacts associated with effluent discharges from the CDF into Lake Erie are not expected. More specifically, no exceedances above New York State water quality standards are expected to occur.

Although short-term, minor, adverse water quality impacts are anticipated with this project, they are expected to be within the limits of those typical of such maintenance dredging projects of this scale. The dredging operations are expected to be similar to the biennial maintenance dredging operations in the river and harbor, with a few additional measures to reduce the potential for contaminant releases to the water column (Section 2.1). It is anticipated that mechanical dredging equipment would be used, which would include the use of a barge-mounted crane with an enclosed clamshell bucket. The clamshell bucket would excavate the sediments and place it aboard scows; the scows would be used to transport the dredged material to the CDF.

In conclusion, the preferred alternative is recommended; it represents the best balance between short term risks and long term improvement in overall water quality by removing a greater mass of contaminated sediments from the Buffalo River and ship canal.

5.2.4 SOILS

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no change to the existing soils in the vicinity of Buffalo Harbor.

Selected Plan – The selected plan is not anticipated to have any impact to existing soils in the Buffalo River Watershed.

5.2.5 GEOLOGY AND TOPOGRAPHY

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no change to the existing geology and topography in the vicinity of Buffalo Harbor.

Selected Plan - The selected plan is not anticipated to have any impact to the existing geology in the vicinity of the Buffalo Harbor. The dredging will be completed to 24 feet below LWD in the areas shown on Figure 2. This will restore the existing bathymetry of Buffalo Harbor to the Federally authorized depths in the areas that are going to be dredged.

5.2.6 CLIMATE

No Action (without project conditions) –There would be no change expected to the existing climate conditions in the Buffalo area.

Selected Plan – There are no anticipated impacts to climate as part of this project. The dredging operations will result in minor increased air emissions (Section 5.2.1).

5.2.7 Plankton and Benthos

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, no significant change in the existing planktonic and benthic community would occur in the short-term. In the long-term, sediments would continue to fill the Federal navigation channels, which would eventually provide shallower substrate upon which macroinvertebrates could colonize. Over time, this would potentially change the benthic and planktonic community structure in these areas.

Selected Plan - The excavation of bottom sediments would remove most benthic organisms from the area that is dredged. Resettling of re-suspended sediments could also smother some benthic organisms in the area just downdrift of the dredging area. Re-colonization of these areas by benthos from the surrounding bottom substrate would be expected to occur rapidly following dredging activities. Such impacts would be minor, adverse, and short-term. Ultimately, this plan would improve habitat for benthos in these areas over the long-term, mainly through the formation of shoals and greater establishment of submergent aquatic vegetation. The removal of an estimated 120,000 pounds of heavy metals, and other organic contaminants including PCBs and PAHs, from the project area will also contribute to a positive, long-term benefit to the benthos in the area.

5.2.8 Aquatic Vegetation

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, no disturbance of existing vegetation would be anticipated. Water depth, turbidity, and vessel traffic would likely continue as contributing factors to limiting habitat quality in the harbor area for establishment and growth of submergent aquatic plants. In the long-term, sediments would fill the deeper Federal navigation channels, which would in turn provide shallower water substrate in which submergent aquatic vegetation could potentially become established. This would change, and potentially improve, the aquatic habitat in these areas over the long-term.

Selected Plan – Any aquatic vegetation located in the dredged areas of the Federal navigation channels would be destroyed during the dredging operations, but would likely become reestablished to various degrees during non-dredging intervals. Temporary increases in turbidity and suspended solids generated during dredging and dredged material placement activities may cause localized minor decreases in primary production and photosynthesis through reduced light penetration into the water column. It is expected that turbidity levels would return to ambient levels rapidly following completion of dredging operations.

5.2.9 FISHERIES

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, no significant change in the existing fisheries community would occur in the short-term. The contaminated sediments located in the Federal Navigation channel would remain in place and would potentially continue to contribute to the existing impairment of fisheries in the harbor. Continued shoaling of the Federal channels may, over time, create more suitable habitat for some species as cover (via potential increased submerged aquatic vegetation), foraging habitat, and reproduction. As of July 2010, the Buffalo River is listed in the New York State Department of Health (NYSDOH) Advisories Report which recommends no consumption of carp due to PCB contamination.

Selected Plan – Dredging of the Federal navigation channels would be performed in a manner that minimizes any potential significant, adverse impacts to fish spawning activities. This includes no dredging between December 30 and June 15 in the Buffalo River, and December 30 through June 30 in the ship canal. Dredging would temporarily interfere with fish activities and result in minor, adverse, short-term impacts. More motile fish would avoid the dredging area primarily due to physical disturbances of movement and noise, and generation of localized turbidity. However, some fish may be attracted to forage near the dredging site as a result of the potential suspension of benthic macroinvertebrates in the water column. Dredging would ultimately improve habitat for fish in these areas over the long-term, mainly through the formation of shoals and greater establishment of submergent aquatic vegetation. One of the goals of removing the contaminated sediments is to be able to remove fish consumption advisories for the Buffalo River AOC. However, further monitoring after dredging and determination by NYSDOH would be required. The removal of an estimated 120,000 pounds of heavy metals, and other organic contaminants including PCBs and PAHs, from the project area will also contribute to a positive, long-term benefit to the fisheries in the area.

Based on modeling, PCB and mercury concentrations in fish may temporarily increase, and then decrease, in proportion to the localized changes in water quality and exposure to contaminated sediments during and immediately following dredging operations (USAERDC, 2010a, see Appendix C). The increase in PCB fish tissue concentrations may approach site-specific fish tissue criteria for the protection of mink, six months following dredging operations. However, this increase is expected to be short-lived; fish tissue concentrations in the Buffalo River and Ship Canal are predicted to decrease within 24 months to levels below the current PCB concentrations measured in fish within the river (USAERDC 2010a, see Appendix C). The concentration of mercury in fish will follow a similar pattern to PCBs. However, the transient nature of many fish species, spending a portion of the year in the open lake and in different portions of the river, may also help mitigate any adverse effects of contaminants on fish tissues. Overall, the removal of contaminated sediments in the Buffalo River and ship canal would result in long-term, beneficial impacts to the fish community.

5.2.10 WETLANDS

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, associated impacts to wetlands would not occur. Continued shoaling of the Federal navigation channels may, over time, create waters shallow enough for the establishment of more vegetated aquatic habitat.

Selected Plan – No impact since no wetlands have been found to be within the proposed project area.

5.2.11 TERRESTRIAL VEGETATION (INCLUDING INVASIVE SPECIES)

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, associated impacts to terrestrial vegetation would not occur.

Selected Plan – This project will not impact any terrestrial vegetation in the area of the project.

5.2.12 WILDLIFE

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, no immediate affects to existing wildlife or wildlife habitat would occur. Without dredging, the Federal navigation channels would continue filling in with fine grain sediment, thus making the water shallower. This would ultimately improve habitat for benthos and fish in these areas over the long-term, mainly through the formation of shoals and greater establishment of submergent aquatic vegetation. This would result in more wildlife using the area as resting, foraging, and breeding habitat.

On the other hand, the continued presence of contaminated sediments in the Buffalo River and ship canal would be expected to contribute to the impairment of wildlife in the area.

Selected Plan - Short-term avoidance of the project area by some bird species would likely during dredging operations. However, some bird species, such as gulls, may be attracted to dredging and dredged material placement activities as foraging opportunities. Wildlife impacts in this regard would be minor, adverse, and short-term. The removal of an estimated 120,000 pounds of heavy metals, and other organic contaminants including PCBs and PAHs, from the project area will also contribute to a positive, long-term benefit to the wildlife in the area.

5.2.13 THREATENED AND ENDANGERED SPECIES

No Action (without project conditions) – No threatened or endangered species, or their designated critical habitats, are known to occur within the project areas.

Selected Plan – The project would not affect any threatened or endangered species, or their critical habitat.

5.2.14 WILD AND SCENIC RIVERS

No Action (without project conditions) – Not applicable.

Selected Plan – Not applicable.

5.3 SOCIO-ECONOMIC ENVIRONMENT

5.3.1 DEMOGRAPHICS (POPULATION)

No Action (without project conditions) – This alternative involves no dredging or dredged material management, so there would be no changes to the current demographics of the project area.

Selected Plan – The proposed project would not impact the demographics of the area.

5.3.2 ASSOCIATED LAND USE AND DEVELOPMENTS

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no direct impact to existing land use and developments. It is expected that continued shoaling of the Federal navigation channels would eventually impede commercial, and even recreational, navigation which may indirectly have an adverse impact to adjacent land uses and developments.

Selected Plan - No adverse impacts from the project to the associated land uses in the area are anticipated. Completing advanced maintenance at this point should support the third GLLA Remedial Action Objective to "Reduce or otherwise address legacy sediment COC concentrations to improve the likelihood that future dredged sediments (for routine navigational, commercial, and recreational purposes) will not require confined disposal" (Environ et. al., 2010). The goal after both GLRI and GLLA dredging is completed is that future navigation dredged sediment would be clean enough to preclude the need for confined disposal, i.e., it could be placed beneficially instead. This will reduce long term needs for the existing CDF and provide restoration benefits to the entire Buffalo River ecosystem. Potential beneficial uses of dredged material include use as fill in Brownfield or other construction projects, ecosystem restoration, and landfill cover. These types of beneficial use projects provide restoration benefits to the entire Buffalo River ecosystem and surrounding areas.

5.3.3 BUSINESS AND INDUSTRY AND EMPLOYMENT AND INCOME

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no direct impact to existing business and industry, or employment and income in the project area. It is expected that continued shoaling of the Federal navigation channels would eventually impede commercial, and even recreational navigation which may indirectly have an adverse impact on local businesses and employment.

Selected Plan – No adverse impacts from the project on local business or employment is anticipated. Disruption to navigation during the dredging operations will be minimized as much as possible.

5.3.4 PUBLIC FACILITIES AND SERVICES

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no direct impact to existing public facilities and services. It is expected that continued shoaling of the Federal navigation channels would eventually impede commercial, and even recreational navigation which may indirectly have an adverse impact (e.g. reduced need) on public facilities and services in the vicinity of the project.

Selected Plan - No adverse impacts from the project on public facilities and services is anticipated.

5.3.5 WATER AND SEWER FACILITIES

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no impact to existing water or sewer facilities.

Selected Plan – No adverse impacts from the project on water and sewer facilities is anticipated, and the dredging should not have any adverse impact on drinking water. The closest drinking water intake to the proposed project is at the head of the Niagara River, which is outside the Buffalo River AOC. There are also water supply intakes for Tonawanda (NY1404556), DuPont (NY1403740), ECWA (NY1400443), and Grand Island (NY1400451), which are located further north in the Niagara River.
Any localized, short-term negative impacts on water quality within the AOC would be diluted during transport downstream and likely be unmeasureable in lake water at the water intake. Furthermore, upon reaching the mouth of the river in the Buffalo Outer Harbor, the majority of Buffalo River flow immediately moves in a north/north-westerly direction toward the Niagara River and not due west toward the water intake. This is due to the predominant direction of combined Lake Erie and Niagara River currents, as well as the barriers posed by the existing breakwaters encompassing the Buffalo Outer Harbor. In addition, intake water is treated and tested for quality prior to distribution to the public. More information regarding the Erie County Water Authority drinking water collection, treatment, and testing may be found at http://www.ecwa.org/web/waterquality.jsp?o=Water%20Quality. Notice of the proposed project has been sent to the Erie County Water Authority. In addition, all dredging operations will be conducted with a closed clamshell bucket to minimize turbidity in the water column. Oil booms will be deployed should any oil be observed during dredging operations.

5.3.6 TRANSPORTATION/NAVIGATION

No Action (without project conditions) – No direct impacts to transport or navigation would be expected with this alternative. However, failure to dredge sediment from the Federal navigation channels would result in continued shoaling, ultimately limiting commercial and perhaps recreational navigation.

Selected Plan - The dredging operations are expected to be similar to the biennial maintenance dredging operations that are regularly performed in the harbor. Mechanical dredging equipment will be used, which willinclude the use of a barge-mounted crane with an enclosed clamshell bucket. The clamshell bucket would excavate the sediments and place it aboard scows; the scows would be used to transport the dredged material to the CDF. At the CDF, the dredged sediments would be hydraulically pumped from the scows into the facility. The proposed project has been coordinated with the U.S. Coast Guard (USCG). The contractor will be required to follow all rules and regulations prescribed by the USCG, including the rules of navigation and navigational lighting/marking.

Nine commercial piers are located along the Buffalo River to facilitate the waterborne transport of commodities in addition to the area being used extensively by recreational watercraft. This proposed dredging operation is intended to restore the navigation channels to authorized depths and safely remove the contaminated sediments contained within the channels. The proposed dredging activities are not expected to have any effect on existing transportation infrastructure (e.g. existing roads, bridges) since dredging activities are confined to the existing, previously dredged, Federal navigation channels.

5.3.7 Recreation (Water-Related)

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, the Federal navigation channels would be expected to shoal in over time. Recreational navigation and associated enterprises would not be significantly, adversely affected until such time that natural shoaling reduces navigable depths for recreational vessels.

Selected Plan - Maintenance of Federal navigation channels would facilitate continued harbor operations for recreational watercraft and associated facilities. All dredging for the GLRI project will be performed within the horizontal limits of the Federal navigation channels, so fixed features within the channel or adjacent areas should not be impacted. No fixed features such as docks or other structures are permitted within the Federal navigation channels, except where specifically authorized by the USACE.

Local boaters and commercial shippers will be able to navigate the channel throughout the dredging process, although they should avoid the immediate vicinity of the dredging process. Every effort is being made to coordinate dredging operations with surrounding businesses to minimize any disruption in business operations. Typical dredging methods result in the dredger working within about a 50 feet wide area of the channel at any one time. As such, small, recreational boats will be able to navigate around the dredging activities. The contractor will be required to move equipment that impacts the passage of large commercial vessels. Boat operators will need to operate within normal navigational rules and regulations, and will need to proceed slowly and cautiously when operating around the dredging equipment.

Dredging and dredged material management activities may temporarily disrupt some commercial and recreational vessel traffic due to restrictions within the vicinity of the dredging machinery and operation. All dredging equipment would be adequately marked and lighted to avoid any potential navigation hazards with recreational boating. Adverse impacts to water-based recreation would be minor and short-term, and only during the actual dredging operations.

5.3.8 PROPERTY VALUE AND TAX REVENUE

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, the Federal navigation channels would be expected to shoal in over time, thereby significantly limiting deep-draft commercial navigation in the harbor. Commercial navigation and associated enterprises would be adversely affected, ultimately impacting tax revenues and land values associated with these activities.

Selected Plan - Maintenance of the Federal navigation channels would facilitate the continued economic viability of the harbor and associated facilities and activities, thus helping to sustain property values. The removal of contaminated sediments from the harbor may have a beneficial effect on the property values of the area.

5.3.9 NOISE

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, noise associated with dredging operations would not occur.

Selected Plan - Dredging equipment would be observed in the project area and activities would result in a short-term increase in local noise levels via the operation of dredging equipment. Noise generated by the dredging operation would not exceed ambient noise levels in the harbor area nor would it be expected to affect any sensitive noise receptors (e.g. schools, hospitals).

5.3.10 AESTHETICS

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, no associated change in aesthetics in the project area would occur.

Selected Plan - Water color and clarity in the vicinity of the dredging operations may be altered for several hundred feet downstream due to the generation of turbidity for a relatively short period of time. The turbidity plumes are expected to dissipate rapidly in a downstream direction. Occasional organic matter contained in the dredged material could result in the liberation of short term, localized malodors. Such impacts would be minor, adverse, and short-term.

A long-term positive impact to aesthetics would be gained by the removal of contaminated sediments in the Buffalo Harbor, which may enhance future opportunities for future re-development, use, and general improvements along the waterfront.

5.3.11 COMMUNITY COHESION

No Action (without project conditions) – Since this alternative involves no dredging or dredge material management, there may be negative impacts to community cohesion if the project does not occur resulting from reduced commercial, and ultimately recreational navigation in the area.

Selected Plan – Dredging and maintenance of Federal navigation channels would likely help to preserve the area's potential for desirable community and regional growth, and cohesion since Buffalo Harbor is integrally related with the identity of the Western New York community. The removal of contaminated sediment from the Federal navigation channels is something that the community supports and is part of the larger goal of restoring the area.

5.3.12 CULTURAL RESOURCES

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there is no potential for project related impacts to occur to cultural resources in the harbor vicinity.

Selected Plan - Maintenance of the Federal navigation channels may facilitate preservation of cultural resources by helping to maintain facilities and developments and the economic viability of the region. The cultural sensitivity of, and within the Federal navigation channels was addressed in previous environmental documentation (USACE, 1972 -1993, See Table 1). No historic properties or archaeological sites listed in or eligible for listing in the National Register of Historic Places would be affected by the proposed action.

5.3.13 HEALTH AND SAFETY

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, no immediate effects to human health and safety would occur.

Selected Plan - Maintenance of Federal navigation channels would facilitate safe commercial and recreational navigation. The concentration of heavy equipment in the project area during dredging operations could potentially pose a navigation hazard. However, standard USACE contract specifications require the maintenance of a safe, unrestricted work area during these periods. The contractor is required to prepare a detailed job hazard analysis of each major phase of work, including all anticipated hazards and specific actions which would be taken to prevent personal injury. The contractor is required to comply with Occupational Safety and Health Administration Standards. The human health impacts associated with this alternative would be indiscernible. The proposed project has been coordinated with the USCG. The contractor will be required to follow all rules and regulations prescribed by the USCG, including the rules of navigation and navigational lighting/marking. Recreational watercraft (including canoes and kayaks) should maintain a reasonable distance from dredging activities and exercise caution if putting in or taking out just downstream from active dredging operations, due to the risk of capsizing during these activities, .

There is minor risk to river users coming in direct contact with any dredged sediments. Risks to the public during dredging activities include ingestion of suspended sediment immediately adjacent to dredging operations, consumption of fish from the Buffalo River (as per current restrictions), and vessel congestion within the proximity of barge traffic and dredge machinery. The concentration of contaminants in surface water is very low and there would be very little absorption of contaminants through the skin. However, drinking water from an AOC (either deliberately or inadvertently while swimming) is currently not advised due to the poor water quality and bacteriologic hazards that result from municipal CSOs and stormwater sewer outfalls. The USEPA risk assessment presented in the soon to be released GLLA Buffalo River Feasibility Study considered dermal exposure related to sediment contamination, and found that it posed a negligible human health risk (Environ et. al., 2010).

Dredging operations are expected to have localized and short-term adverse impacts on water quality; these impacts will be eliminated once dredging is complete and the natural deposition of cleaner sediment resumes. Sediment and water quality in the AOC will improve following the removal of contaminated sediments. Similar impacts are expected on contaminant concentrations in fish tissue, where there may be a short-term increase in contaminant concentrations in fish tissue. Such levels would be expected to decline below current levels in the first two years after the completion of GLRI and GLLA dredging projects. A risk characterization included an assessment of water-borne pathways and predicted this effect based on the anticipated temporary increases in water column turbidity. There is a significant risk to human health related to water safety in the vicinity of the dredging operations and equipment (e.g., boat traffic/construction accidents). For this reason, swimming and boating in the work zone near the dredging operations will be restricted. Because the impacts to water quality and surface sediments from dredging operations are short-term and localized, the long term health risk to recreational users of the AOC is negligible. Furthermore, the impacts to water quality are likely beneficial due to the net removal of contaminated sediments.

5.3.14 Environmental Justice

No Action (without project conditions) – Since this alternative involves no dredging or dredged material management, there would be no issues associated with environmental justice.

Selected Plan - The proposed project would not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations.

5.4 Cumulative Impacts

A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future action regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR Part 1508.7). Such impacts can result from individually minor, but collectively significant actions taking place over a period of time. Evaluations of cumulative impacts include consideration of the proposed action with known past and present actions, as well as reasonably foreseeable future actions. In assessing cumulative effects, the key determinant of importance or significance is whether the incremental effect of the proposed action will alter the sustainability of resources when added to other present and reasonably foreseeable future actions.

Cumulative environmental effects for the proposed dredging project were assessed in accordance with guidance provided by the President's Council on Environmental Quality (CEQ) (USEPA 1999). This guidance provides an eleven-step process for identifying and evaluating cumulative effects in NEPA analyses. The overall cumulative impact of the proposed dredging project is considered to be environmentally, socially, and economically beneficial. The most significant cumulative effects from this proposed project are the removal of contaminated sediments from the aquatic environment, and the preservation of commercial and recreational navigation opportunities.

The geographic boundaries for this cumulative impact assessment include the horizontal and vertical profiles of the proposed dredge areas of the Buffalo River and ship canal shown in Figure 2 (including the contingency area between lines A and B), CDF 4, and the Buffalo Outer Harbor which would be used for transiting the dredged material in scows to the CDF. The temporal scale for this assessment includes the USACE's history in dredging these areas to the present efforts to maintain these channels at authorized depths, including the separate but parallel effort on-going by the USEPA under the GLLA. Reasonably foreseeable impacts are highly variable, but are generally within five (5) years post USACE dredging.

There are other social, environmental, and economic benefits associated with river remediation. Significant resources would be dedicated to the effort which would also benefit the local economy through multiplier effects. As a result of the removal of contaminated sediments from the Federal navigation channels (including by the reasonably foreseeable GLLA dredging), improved public access, restored habitat, and minimized human and ecological health risk would ideally benefit current and future waterfront revitalization efforts. Also, improved habitat diversity and aesthetic qualities along the river would make adjacent vacant land areas more amenable and desirable to be used for future development. Economic development along the river can generate wages for construction workers, revenues for material suppliers, and long-term employment for area residents. Recreational development would particularly benefit low-income and minority communities which routinely use the area, but generally have limited access to high-quality natural areas for both recreational and educational opportunities.

Projecting the reasonably foreseeable future actions is difficult at best. Clearly, the proposed action (Federal dredging) is reasonably foreseeable; however, actions by others that may affect the same resources are not as clear. Projections of those actions must rely on judgment as to what are reasonable based on existing trends and where available, projections from qualified sources. Reasonably foreseeable does not include unfounded or speculative projections. In this case, reasonably foreseeable future actions include:

- Long term improvement to sediment quality within the Federal navigation channels
- Improved water quality for aquatic life and recreational use
- Continued use of the Buffalo River for commercial navigation.
- Improved public desirability of the Buffalo River and canal for recreation and general re-development opportunities
- Beneficial impact on tourism along the Buffalo River and waterfront
- Continued application of environmental requirements such as those under the Clean Water Act

- Improved usage of the Buffalo River for recreation and education
- Dredging of the Buffalo River by USEPA in areas outside the Federal navigation channels

The final point would be accomplished under the auspices of the GLLA. The GLLA PCT developed a Feasibility Study which should be published later this year (Environ et al., 2010). In it, remedial action objectives are established which would be protective of human health and the environment. These remedial action objectives and corresponding remedial goals for each of the four indicator COCs described in Section 4.2.3 (total PAHs, lead, mercury, and total PCBs) should ultimately contribute to the overall objective of delisting the AOC by lifting the beneficial use impairments from the Buffalo River and ship canal. The areas A through P within the navigation channel which will be dredged under the GLRI were chosen based on identification of areas of the river and ship canal that were the most contaminated according to studies conducted under the GLLA. Following GLRI dredging, further dredging under GLLA should commence and would be targeted at areas outside and under the navigation channel that remain contaminated. The timeline under which the Buffalo River site-specific remedial goals are expected to be achieved is dependent on the remedial technology that is selected. Long-term monitoring of surface sediment (0–1 feet) chemical concentrations would likely be conducted at two and five years following the completion of the GLLA remedy. The target is to achieve the site-specific total PAH remedial goal and the surface weighted average concentration remedial goals for lead, mercury, and total PCBs at the five year review. A Residual Management Plan will also be developed for the GLLA, and would include re-sampling, potential re-dredge strategies, and recovery tracking to evaluate what is left behind following the initial GLLA dredging in both the near and long term time-frames. Buffalo River and ship canal recovery rates would be monitored to document progress towards delisting of beneficial use impairments. The GLLA work also contains an ecosystem restoration component, which is further explained in the FS and associated appendix.

Taken together, GLRI and GLLA project efforts will result in long term improved health and restoration of the Buffalo River and ship canal sediments and ecosystem. These efforts should contribute to the delisting of the Buffalo River as one of the 43 Great Lakes AOCs, and restore beneficial use impairments that have occurred due to the presence of contaminated sediments, and also affected habitat in and near the river.

5.5 SUMMARY

Along with direct and indirect effects, cumulative effects of the proposed dredging project were assessed following the guidance provided by the President's CEQ Council. There have been numerous effects to the resources of the Buffalo River and ship canal from past and on-going actions, and reasonably foreseeable future actions can also be expected to produce both beneficial and adverse effects. In this context, the increments of effects from the proposed dredging project are relatively minor and beneficial over the long-term. Based on this expectation of continued sustainability of all resources, adverse cumulative effects are not considered to be significant.

5.5.1 Compliance

Compliance with Federal and State environmental statutes and executive orders is summarized as follows:

- *Archaeological and Historical Preservation Act, as Amended; National Historic Preservation Act, as Amended; Executive Order 11593 (Protection and Enhancement of the Cultural Environment).* The project's impact on cultural resources has been evaluated in accordance with Engineer Regulation (ER) 1105-2-50 and 36 CFR 800. The impact assessments for dredging the Federal navigation channels were addressed in previous planning and environmental documentation. USACE consulted with the National Park Service, New York State Department of Parks, Recreation and Historic Preservation, and Great Lakes Historical Society with a Scoping Information Packet issued on April 9, 2010. No comments were received in this regard. This EA has been submitted to the same agencies for final review and comment on this determination.

- *Clean Air Act, as Amended.* Copies of this EA have been sent to the Regional Administrator of the USEPA requesting comments in compliance with the Clean Air Act.

- *Clean Water Act, as amended.* USACE, Buffalo District has prepared a Section 404(a) Public Notice and Section 404(b)(1) Evaluation for the discharges associated with this project, pursuant to the Clean Water Act (Appendix B). Water quality and related information in this evaluation will provide documentation to demonstrate that the recommended plan is in compliance with this Act. Section 401 State Water Quality Certification for the discharge was requested from NYSDEC on May 19, 2010. The Section 401 Water Quality Certification was issued by NYSDEC for this project on July 20, 2010.

- *Coastal Zone Management Act, as amended.* This project was analyzed with respect to the 44 management policies presented in Part II, Section 6 of the August 1982 State of New York Coastal Management Program and Final Environmental Impact Statement (FEIS), and USACE, Buffalo District determined that the project is consistent with these policies. A request for concurrence was submitted to New York State, Department of State, Coastal Programs Administrator on May 19, 2010. Concurrence with our Coastal Zone Consistency Determination was received from New York State Department of State on July 19, 2010.

- *Endangered Species Act, as amended.* Consultation with the USF&WS relative to the possible presence of threatened or endangered species, or their critical habitat within the affected areas was initiated on April 9, 2010. Response from USF&WS is as follows: "…except for occasional transient individuals, no Federally-listed or proposed endangered or threatened species, or candidate species under our jurisdiction are known to exist in this county".

- *Fish and Wildlife Coordination Act*. USACE, Buffalo District is coordinating this project with the USF&WS and NYSDEC. USACE, Buffalo District will collaborate with these agencies to identify fish and wildlife concerns, relevant information on the study area, obtain the respective agency views concerning the significance of fish and wildlife resources and anticipated project impacts, and identify those resources which need to be evaluated in the study. Full consideration will be given to the comments and recommendations resulting from this coordination.

- *National Environmental Policy Act (NEPA).* With the circulation of this EA and FONSI, the proposed project is in partial compliance with the Act. Full compliance will be attained once the public review period has been concluded, no significant adverse impacts are identified, and the FONSI is signed.

- *River and Harbor Act of 1970.* USACE planning actions have fulfilled the requirements of the Act. All 17 points identified in Section 122 of the Act (P.L. 91-611) have been evaluated in this EA.

- *Wild and Scenic Rivers Act.* The Buffalo River and ship canal where the project area is located is not designated as a wild, scenic, or recreational river.

- *Federal Water Project Recreation Act; and Land and Water Conservation Act.* In planning the proposed project, full consideration has been given to opportunities afforded by the project for outdoor recreation and fish and wildlife enhancement. Review copies of this EA have been provided to the U.S. Department of the Interior in regard to recreation, and fish and wildlife activities for conformance with the comprehensive nationwide outdoor recreation plan formulated by the Secretary of the Interior.

- *Watershed Protection and Flood Prevention Act.* Based on evaluation of the project, no significant adverse impacts to watershed protection or flood prevention would be expected.

- *Executive Order 11990, Protection of Wetlands, 24 May 1977.* Not applicable.

- *Executive Order 11988, Flood Plain Management, 24 May 1977.* The USACE has concluded that the recommended action is in compliance with the Order.

- *Executive Order 12898, 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.* The proposed project would not result in disproportionately high or adverse human health, or environmental effects on minority or low-income populations.

- *Analysis of Impacts on Prime and Unique Farmlands, CEQ Memorandum, 30 August 1976.* Since the proposed project would not affect prime or unique farmlands in any manner, the recommended action is in compliance with this memorandum.

5.5.2 Coordination

The Scoping Information Packet (Appendix A), EA/FONSI, Section 404(a) Public Notice, and Section 404(b)1 Evaluation (Appendix B) have been coordinated with the following Federal, State, and local agencies, and other local interests:

Federal
Advisory Council on Historic Preservation
Federal Emergency Management Agency, Region 2
U.S. Environmental Protection Agency, Region 2
U.S. Environmental Protection Agency, Great Lakes National Program Office
U.S. Coast Guard
U.S. Fish and Wildlife Service
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. Department of Agriculture, Farm Service Agency
U.S. Department of Agriculture, Forest Service – Eastern Region
National Center for Environmental Health, Centers for Disease Control and Environmental Health
U.S. Department of State, OES/ENV
U.S. Department of Energy, Office of NEPA Policy and Compliance
U.S. Department of Housing and Urban Development
Federal Highway Administration, New York Division
Department of the Interior, Office of Environmental Policy and Compliance
U.S. Department of Commerce – National Ocean and Atmospheric Administration
National Park Service
Federal Maritime Commission, Office of Energy and Environmental Impact

State
Empire State Development Corp.
New York State Department of Environmental Conservation, Region 9
New York State Department of Health
New York State Department of Transportation
New York State Department of State, Coastal Management Program
New York State Thruway Authority
New York State Office of Parks, Recreation and Historical Preservation
New York State Museum

Local
Erie County Department of Environment and Planning
Erie County Department of Health
Erie County Water Authority
City of Buffalo
Buffalo Urban Development Corporation
Erie County Industrial Development Agency
Erie County Executive
Buffalo Sewer Authority
Greater South Buffalo Chamber of Commerce

City of Buffalo, Office of Strategic Planning
Buffalo Common Council
Buffalo Environmental Management Commission
Erie County Soil and Water
Erie County Clerk's Office
Niagara Frontier Transportation Authority
City of Buffalo Public Works

Organizations/Individuals
Buffalo Niagara Riverkeeper
Canisius College
Bird Studies Canada
University at Buffalo
PVS Chemicals
Buffalo State College, Great Lakes Center
Sierra Club, Niagara Region
M&T Bank
League of Women Voters
Ecology and Environment
WNY Trout Unlimited
Ducks Unlimited
Great Lakes United
Community Foundation for Greater Buffalo
New York Sea Grant
Old First Ward Community Association
WNY Environmental Federation
Lafarge Cement
Henkel Adhesives
Armor Electric
The John R. Oishei Foundation
Buffalo Audubon Society
Honeywell
Exxon Mobil
Niagara Greenway Commission
Great Lakes Sport Fishing Council
Uniland Development Co.
Valley Community Association
Seneca Babcock Community Center
Tift Nature Preserve
Erie County Federation of Sportsmen's Clubs
Citizens Environmental Coalition
Great Lakes Historical Society
International Joint Commission, Great Lakes Regional Office

Tribes
Seneca Nation of Indians, Cattaraugus Reservation

Seneca-Cayuga Tribe of Oklahoma
Tonawanda Seneca Nation

6.0 CONCLUSION

The removal of a large volume of contaminated sediments from the Federal navigation channels in the AOC would have long-term environmental benefits. Contaminated sediments in the AOC currently pose a long-term risk to human health, navigation, and fish and wildlife that use the area; the proposed dredging would remove sediment as a source of contamination. Ultimately, removal of these contaminated sediments through this project and the GLLA would contribute towards the restoration of the AOC and reduce dredging costs by possibly creating opportunities for beneficial uses of future, cleaner sediment.

Benefits that reasonably may be expected to accrue from the proposed project were balanced against its reasonably foreseeable detriments. The preferred alternative represents the best balance between short term risks and long term improvement in overall sediment quality. All natural and social environmental factors that may be relevant to the proposed action, including the cumulative effects thereof, were considered. Based on this evaluation of environmental effects, no significant impacts were identified, and a FONSI has been prepared for the proposed action.

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TABLES

Table 7. Mean Concentrations (mg/kg) of contaminants on the surface prior to dredging

USACE Dredge Areas	Total Volume Inside Nav Channel (yd^3)	Dredge Area Surface Area (square feet)	PCB, Total	PAHs, Total	Lead	Mercury	Copper	Arsenic	Chromium
DA-A	1,700	12889	0.014	5.2	31.2	0.06	41.3	7.7	19.7
DA-B	2,500	16585	0.112	4.1	30.2	0.06	ND	ND	ND
DA-C	2,100	25811	0.161	4.3	78.8	0.19	ND	ND	ND
DA-D1	9,059	114951	0.065	12.4	62.8	0.20	68.3	14.9	57.7
DA-D2	9,942	92353	0.047	5.3	49.7	0.13	49.4	10.6	34.0
DA-E1	11,268	87058	0.023	3.1	26.8	0.05	ND	ND	ND
DA-E2	12,768	99306	0.018	5.5	91.4	0.35	81.4	14.1	55.9
DA-E3	11,359	73765	0.039	2.4	47.5	0.09	23.8	5.5	12.2
DA-E4	11,314	68698	0.016	36.0	29.4	0.05	39.0	8.7	20.0
DA-E5	11,162	75075	0.019	7.1	100.3	0.15	2070.0	417.0	90.6
DA-E6	11,686	68745	0.052	4.4	34.7	0.10	40.2	9.4	21.0
DA-F1	12,376	58813	0.194	9.1	52.8	0.43	37.1	71.9	26.7
DA-F2	13,041	87107	0.069	5.1	45.3	0.12	ND	ND	ND
DA-F3	12,802	98352	0.066	8.9	59.3	0.20	42.3	8.8	24.1
DA-F4	12,674	67685	0.305	13.1	133.5	0.61	38.9	8.8	20.4
DA-F5	11,640	71083	0.166	8.2	83.7	0.37	76.5	7.4	18.3
DA-F6	11,921	71663	0.057	8.2	52.0	0.28	68.3	15.8	47.0
DA-F7	12,484	147682	0.055	5.7	38.4	0.11	38.2	10.5	19.5
DA-F8	11,615	114933	0.059	10.2	78.5	0.22	48.7	9.6	28.6
DA-F9	12,720	101518	0.304	19.5	131.5	0.63	90.7	17.2	62.3
DA-F10	12,661	84085	0.082	9.0	74.0	0.14	51.7	8.8	30.4
DA-F11	12,124	85670	0.905	29.6	184.0	0.46	36.7	6.7	19.1
DA-F12	12,596	78008	0.016	3.4	22.9	0.07	26.6	5.3	13.9
DA-F13	11,599	87151	0.031	4.4	39.7	0.13	37.1	7.3	17.6
DA-F14	11,823	116564	0.029	4.8	45.7	0.08	36.8	6.9	19.9
DA-F15	12,422	171845	0.044	9.8	50.8	0.21	29.4	3.2	21.2
DA-F16	12,039	83275	0.148	3.4	59.8	0.21	46.7	10.9	30.4
DA-F17	11,034	72729	0.073	7.3	45.7	0.10	ND	ND	ND
DA-G1	9,113	148500	0.112	5.5	52.2	0.22	37.2	9.6	22.8
DA-G2	8,825	256164	0.035	8.3	65.7	0.33	36.3	8.8	27.3
DA-G3	8,603	1520	0.013	14.0	51.2	0.17	34.5	6.5	22.5
DA-H1	8,411	109192	0.305	7.5	71.2	0.30	52.9	9.1	22.4
DA-H2	7,974	109192	0.190	5.2	53.9	0.11	55.6	11.0	30.6
DA-I	2,900	28296	0.015	4.8	37.8	0.08	38.0	7.3	33.3
DA-J	1,000	10934	0.135	5.7	45.4	0.18	43.6	8.0	31.0
DA-K	800	11993	0.700	23.0	143.0	0.80	83.9	10.8	59.0
DA-L	100	2827	0.210	9.0	494.0	0.35	53.7	10.8	42.8
DA-M	3,500	36380	0.056	4.1	39.4	0.09	ND	ND	ND
DA-N	21,400	103013	0.259	48.3	403.0	2.44	132.6	10.9	44.2
DA-O	2,400	9163	1.300	28.0	136.0	3.30	116.0	27.6	86.7
DA-P1	13,742	170277	0.091	3.5	31.7	0.12	21.1	5.5	10.9
DA-P2	16,405	173935	0.249	11.4	95.6	0.69	ND	ND	ND
DA-P3	13,935	165703	0.284	31.0	161.5	1.36	ND	ND	ND
DA-P4	8,984	167259	0.141	8.1	78.2	0.53	60.9	9.3	42.6
DA-P5	9,519	140860	0.329	28.2	98.9	1.06	104.1	35.2	97.6

ND – No sampling and analysis for this constituent in this area.

Table 8. Mean Concentrations (mg/kg) of contaminants expected to be dredged

USACE Dredge Areas	Total Volume Inside Nav Channel(yd^3)	Dredge Area Surface Area (square feet)	PCB, Total	PAHs, Total	Lead	Mercury	Copper	Arsenic	Chromium
DA-A	1700	12889	0.014	5.2	31.2	0.06	41.3	7.7	19.7
DA-B	2500	16585	0.122	4.3	32.0	0.10	ND	ND	ND
DA-C	2100	25811	ND	ND	ND	ND	ND	ND	ND
DA-D1	9059	114951	0.074	12.5	68.4	0.24	72.9	14.3	60.3
DA-D2	9942	92353	0.050	5.5	47.3	0.13	54.6	11.5	36.6
DA-E1	11268	87058	0.067	5.7	53.7	0.15	78.2	17.4	60.3
DA-E2	12768	99306	0.017	4.7	35.4	0.07	43.6	9.6	26.3
DA-E3	11359	73765	0.013	2.1	25.5	0.06	29.4	6.6	14.5
DA-E4	11314	68698	0.141	54.5	80.0	0.30	69.5	14.5	46.8
DA-E5	11162	75075	0.041	8.5	97.5	0.21	200.9	38.6	48.7
DA-E6	11686	68745	0.036	4.2	29.9	0.07	38.3	7.9	20.5
DA-F1	12376	58813	0.074	5.3	49.3	0.26	52.5	11.9	47.7
DA-F2	13041	87107	0.102	5.8	65.8	0.15	174.1	20.9	55.0
DA-F3	12802	98352	0.033	4.0	40.3	0.05	42.3	8.7	21.2
DA-F4	12674	67685	0.123	9.8	54.7	0.14	46.8	9.2	28.6
DA-F5	11640	71083	ND	0.1	19.4	0.06	121.0	5.4	12.0
DA-F6	11921	71663	0.263	18.5	102.4	0.87	162.0	32.2	121.1
DA-F7	12484	147682	0.054	5.5	37.9	0.11	38.7	10.0	20.0
DA-F8	11615	114933	0.101	8.3	56.6	0.18	148.0	14.3	112.0
DA-F9	12720	101518	0.286	22.9	146.8	0.80	94.3	23.9	70.1
DA-F10	12661	84085	0.155	15.8	89.7	0.15	75.8	8.0	27.5
DA-F11	12124	85670	0.753	25.5	166.4	0.47	47.7	6.6	29.2
DA-F12	12596	78008	0.016	3.4	22.9	0.07	26.6	5.3	13.9
DA-F13	11599	87151	0.058	17.6	141.1	0.66	76.2	12.4	67.5
DA-F14	11823	116564	0.039	6.3	40.2	0.06	57.0	11.8	37.4
DA-F15	12422	171845	0.117	19.6	91.9	0.44	122.7	40.3	160.7
DA-F16	12039	83275	0.048	4.3	52.9	0.13	48.0	10.6	42.5
DA-F17	11034	72729	0.092	8.4	60.6	0.15	79.6	17.2	88.0
DA-G1	9113	148500	0.058	5.9	40.3	0.11	38.3	10.2	24.0
DA-G2	8825	256164	0.043	9.0	61.2	0.28	36.3	8.8	27.3
DA-G3	8603	1520	0.038	14.2	33.5	0.13	30.1	5.8	17.6
DA-H1	8411	109192	0.226	6.7	59.1	0.16	43.5	8.1	21.9
DA-H2	7974	109192	0.239	6.0	61.8	0.14	54.2	10.7	31.3
DA-I	2900	28296	0.090	21.5	80.2	0.28	58.8	8.7	53.5
DA-J	1000	10934	0.307	20.6	112.2	1.34	91.1	17.1	89.9
DA-K	800	11993	1.349	35.2	245.7	2.76	168.6	29.8	142.5
DA-L	100	2827	0.087	73.0	205.0	3.90	154.0	23.8	166.0
DA-M	3500	36380	0.131	7.4	58.7	0.26	74.8	13.2	60.2
DA-N	21400	103013	0.246	20.2	213.5	0.78	84.1	9.9	33.4
DA-O	2400	9163	1.300	28.0	136.0	3.30	116.0	27.6	86.7
DA-P1	13742	170277	0.188	8.1	94.8	0.30	49.9	10.4	35.9
DA-P2	16405	173935	0.255	15.6	112.8	1.25	93.9	16.0	69.8
DA-P3	13935	165703	0.102	7.3	49.9	0.26	45.7	7.9	31.6
DA-P4	8984	167259	0.157	10.2	88.6	0.64	75.9	14.6	57.0
DA-P5	9519	140860	0.134	16.7	94.2	0.86	58.6	13.6	49.5

ND - No sampling and analysis for this constituent in this area.

Table 9. Mean Concentrations (mg/kg) of contaminants on the surface after dredging

USACE Dredge Areas	Total Vol Inside Nav Channel(yd^3)	Dredge Area Surface Area (square feet)	PCB, Total	PAHs, Total	Lead	Mercury	Arsenic	Chromium	Copper
DA-A	1700	12889	0.140	4.5	21.8	0.19	3.5	14.5	24.5
DA-B	2500	16585	0.374	5.2	40.2	0.17	ND	ND	ND
DA-C	2100	25811	0.161	4.3	78.8	0.19	ND	ND	ND
DA-D1	9059	114951	0.109	10.9	79.9	0.26	14.4	100.2	87.4
DA-D2	9942	92353	0.199	6.9	72.7	0.35	24.1	152.1	132.3
DA-E1	11268	87058	0.132	9.8	88.6	0.39	8.4	23.8	42.8
DA-E2	12768	99306	ND	ND	ND	ND	ND	ND	ND
DA-E3	11359	73765	0.020	2.9	28.1	0.05	6.6	14.5	29.4
DA-E4	11314	68698	0.426	67.1	132.0	0.72	18.8	71.6	92.8
DA-E5	11162	75075	0.094	59.5	314.0	0.72	81.2	57.8	389.5
DA-E6	11686	68745	0.095	6.0	57.6	0.18	11.0	30.1	50.1
DA-F1	12376	58813	0.198	12.6	114.4	0.59	13.8	63.6	77.3
DA-F2	13041	87107	0.373	13.6	134.5	0.42	25.2	79.9	157.4
DA-F3	12802	98352	0.064	4.8	49.0	0.11	8.9	23.6	41.4
DA-F4	12674	67685	ND	ND	ND	ND	ND	ND	ND
DA-F5	11640	71083	ND	ND	ND	ND	ND	ND	ND
DA-F6	11921	71663	ND	ND	ND	ND	ND	ND	ND
DA-F7	12484	147682	0.099	5.0	48.1	0.12	7.5	19.7	35.4
DA-F8	11615	114933	0.245	9.4	93.1	0.41	ND	ND	ND
DA-F9	12720	101518	0.559	34.1	185.0	1.14	29.1	92.1	121.2
DA-F10	12661	84085	1.500	43.0	142.0	0.28	9.3	33.6	144.0
DA-F11	12124	85670	0.829	30.4	181.1	0.52	8.1	31.4	62.4
DA-F12	12596	78008	ND	ND	ND	ND	ND	ND	ND
DA-F13	11599	87151	0.117	31.9	291.0	1.82	16.1	132.1	109.3
DA-F14	11823	116564	0.066	8.5	63.8	0.16	15.0	56.2	68.2
DA-F15	12422	171845	0.166	32.3	136.6	0.72	35.8	103.0	100.5
DA-F16	12039	83275	0.033	1.3	24.5	0.06	8.6	17.0	33.1
DA-F17	11034	72729	0.551	31.7	229.8	1.09	23.2	127.1	117.4
DA-G1	9113	148500	0.036	14.7	98.2	0.72	20.4	27.6	41.1
DA-G2	8825	256164	0.015	6.4	54.8	0.31	12.4	19.1	25.4
DA-G3	8603	1520	0.066	14.2	27.1	0.12	5.5	15.5	28.1
DA-H1	8411	109192	0.105	12.3	86.4	0.50	9.0	26.2	40.7
DA-H2	7974	109192	0.232	5.8	68.7	0.19	11.2	40.2	54.8
DA-I	2900	28296	0.560	96.0	170.0	0.95	10.4	85.8	91.0
DA-J	1000	10934	0.307	20.6	112.2	1.34	17.1	89.9	91.1
DA-K	800	11993	2.600	54.0	422.0	9.50	82.2	344.0	339.0
DA-L	100	2827	0.210	9.0	494.0	0.35	10.8	42.8	53.7
DA-M	3500	36380	0.406	7.8	87.3	0.45	13.2	61.0	76.8
DA-N	21400	103013	0.235	8.5	113.1	0.25	9.1	25.2	53.4
DA-O	2400	9163	ND	ND	ND	ND	ND	ND	ND
DA-P1	13742	170277	0.215	14.5	132.5	0.48	19.8	118.0	118.0
DA-P2	16405	173935	0.316	15.9	119.9	1.61	19.5	87.1	110.3
DA-P3	13935	165703	0.149	14.7	77.5	0.52	13.0	56.6	77.6
DA-P4	8984	167259	0.110	8.1	63.9	0.31	14.6	57.0	75.9
DA-P5	9519	140860	0.076	15.1	85.7	0.78	12.9	50.1	60.7

ND - No sampling and analysis for this constituent in this area.

FIGURES

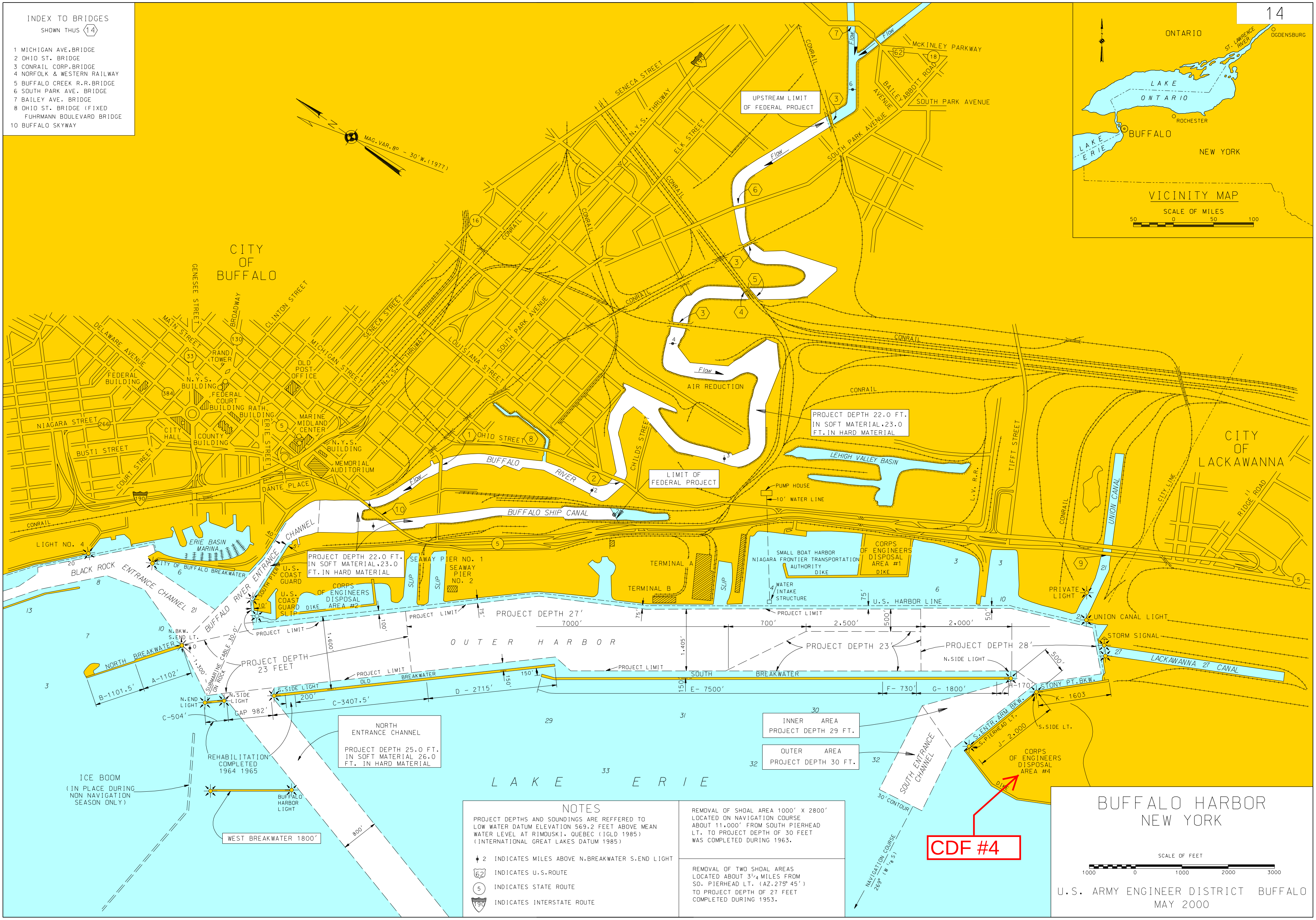

INDEX TO BRIDGES
SHOWN THUS 14
1 MICHIGAN AVE.BRIDGE
2 OHIO ST. BRIDGE
3 CONRAIL CORP.BRIDGE
4 NORFOLK & WESTERN RAILWAY
5 BUFFALO CREEK R.R.BRIDGE
6 SOUTH PARK AVE. BRIDGE
7 BAILEY AVE. BRIDGE
8 OHIO ST. BRIDGE (FIXED
FUHRMANN BOULEVARD BRIDGE
10 BUFFALO SKYWAY
14
MAG.VAR.8° - 30'W.(1977)
ONTARIO
LAKE ONTARIO
ST. LAWRENCE RIVER
OGDENSBURG
ROCHESTER
BUFFALO
LAKE ERIE
NEW YORK
VICINITY MAP
SCALE OF MILES
50 0 50 100
CITY OF BUFFALO
CITY OF LACKAWANNA
UPSTREAM LIMIT OF FEDERAL PROJECT
McKINLEY PARKWAY
SOUTH PARK AVENUE
SENECA STREET
N.Y.S. THRUWAY
ELK STREET
CONRAIL
AIR REDUCTION
PROJECT DEPTH 22.0 FT. IN SOFT MATERIAL,23.0 FT.IN HARD MATERIAL
LEHIGH VALLEY BASIN
LIMIT OF FEDERAL PROJECT
BUFFALO RIVER
BUFFALO SHIP CANAL
PUMP HOUSE
10' WATER LINE
TIFFT STREET
UNION CANAL
NIAGARA STREET
BUSTI STREET
DELAWARE AVENUE
MAIN STREET
GENESEE STREET
BROADWAY
CLINTON STREET
MICHIGAN STREET
LOUISIANA STREET
SOUTH PARK AVENUE
OHIO STREET
CHILDS STREET
FEDERAL BUILDING
N.Y.S. BUILDING
RAND TOWER
OLD POST OFFICE
FEDERAL COURT BUILDING
RATH BUILDING
CITY HALL
COUNTY BUILDING
MARINE MIDLAND CENTER
MEMORIAL AUDITORIUM
DANTE PLACE
ERIE BASIN MARINA
LIGHT NO. 4
BLACK ROCK ENTRANCE CHANNEL
CITY OF BUFFALO BREAKWATER
BUFFALO RIVER ENTRANCE CHANNEL
PROJECT DEPTH 22.0 FT. IN SOFT MATERIAL,23.0 FT.IN HARD MATERIAL
U.S. COAST GUARD
U.S. COAST GUARD SLIP
CORPS OF ENGINEERS DISPOSAL AREA #2
SEAWAY PIER NO. 1
SEAWAY PIER NO. 2
TERMINAL A
TERMINAL B
SMALL BOAT HARBOR
NIAGARA FRONTIER TRANSPORTATION AUTHORITY
CORPS OF ENGINEERS DISPOSAL AREA #1
WATER INTAKE STRUCTURE
U.S. HARBOR LINE
PRIVATE LIGHT
UNION CANAL LIGHT
STORM SIGNAL
LACKAWANNA CANAL
PROJECT DEPTH 27'
PROJECT DEPTH 23'
PROJECT DEPTH 28'
PROJECT DEPTH 23 FEET
OUTER HARBOR
NORTH BREAKWATER
SOUTH BREAKWATER
STONY PT.BKW.
S.SIDE LIGHT
N.SIDE LIGHT
N.END LIGHT
N.BKW. S.END LT.
SUBMARINE CABLE ON ROCK
REHABILITATION COMPLETED 1964 1965
NORTH ENTRANCE CHANNEL
PROJECT DEPTH 25.0 FT. IN SOFT MATERIAL 26.0 FT. IN HARD MATERIAL
INNER AREA PROJECT DEPTH 29 FT.
OUTER AREA PROJECT DEPTH 30 FT.
SOUTH ENTRANCE CHANNEL
CORPS OF ENGINEERS DISPOSAL AREA #4
ICE BOOM (IN PLACE DURING NON NAVIGATION SEASON ONLY)
BUFFALO HARBOR LIGHT
WEST BREAKWATER 1800'
LAKE ERIE
30' CONTOUR
NAVIGATION COURSE 269° (W 1/8 S)
NOTES
PROJECT DEPTHS AND SOUNDINGS ARE REFFERED TO LOW WATER DATUM ELEVATION 569.2 FEET ABOVE MEAN WATER LEVEL AT RIMOUSKI, QUEBEC (IGLD 1985) (INTERNATIONAL GREAT LAKES DATUM 1985)
2 INDICATES MILES ABOVE N.BREAKWATER S.END LIGHT
INDICATES U.S.ROUTE
INDICATES STATE ROUTE
INDICATES INTERSTATE ROUTE
REMOVAL OF SHOAL AREA 1000' X 2800' LOCATED ON NAVIGATION COURSE ABOUT 11,000' FROM SOUTH PIERHEAD LT. TO PROJECT DEPTH OF 30 FEET WAS COMPLETED DURING 1963.
REMOVAL OF TWO SHOAL AREAS LOCATED ABOUT 3 1/4 MILES FROM SO. PIERHEAD LT. (AZ.275° 45') TO PROJECT DEPTH OF 27 FEET COMPLETED DURING 1953.
CDF #4
BUFFALO HARBOR
NEW YORK
SCALE OF FEET
1000 0 1000 2000 3000
U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 2000

Figure 1

Buffalo River USACE GLRI 2010-2011 Dredge Areas (upstream to downstream)

USACE GLRI Dredge Areas	Old Area Name (original GLLA remedy 5 name)	Start	End	Design Volume (cubic yds)	Overdredge Volume (cubic yds)	Total Volume Inside Navigation Channel (cubic yds)
DA-A	Area-17	See Map				1,700
DA-B	Area-16	See Map				2,500
DA-C	Resample-15	See Map				2,100
DA-D	Area-15	727+75	735+75	16,800	2,200	19,000
DA-E	Area-14	711+00	726+00	65,000	4,600	69,600
DA-F	Area 13-10, 18, R14-R12	650+25	703+75	193,200	14,400	207,600
DA-G	Area- 9	628+00	642+00	24,500	2,100	26,600
DA-H	Area- 8	609+25	618+00	14,300	2,100	16,400
DA-I	Resample- 8	See Map				2,900
DA-J	Area- 7	See Map				1,000
DA-M	Area- 5	See Map				3,500
DA-N	Area- 6	See Map				21,400
DA-P	Ship Canal Areas	803+00	841+75	54,100	8,500	62,600
					Total	**437,000**

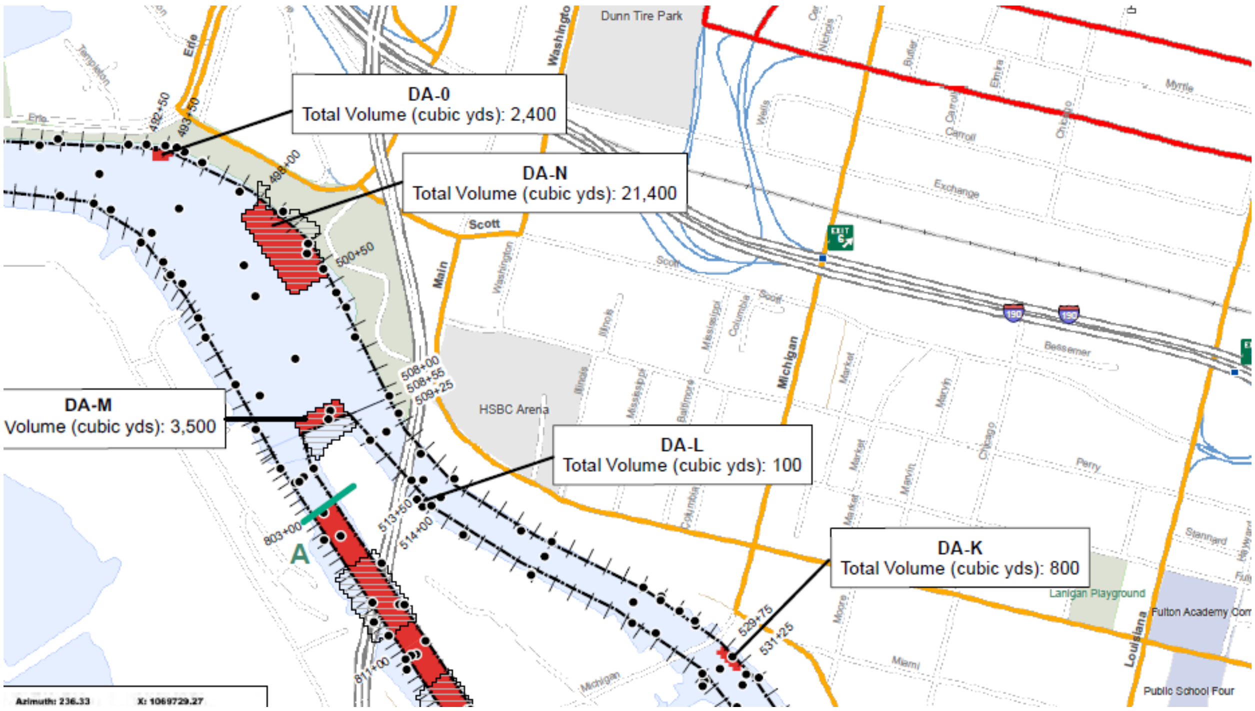
Note 1 - Exact coordinates of dredge areas A, B, C, and I through N to be determined.
Note 2 - Total volumes of dredge areas A, B, C, and I through N are E&E in-channel volume estimates based on Remedy 5a dredging footprint, dated October 22, 2009.
Note 3 - Resample areas R-7, 9, 10, and 11 currently show little to no available sediment at 24 ft. and will not be included in the 2010 USACE dredge plan.
Note 4 - Design depth will be 23.5 ft with an allowable overdepth of 0.5 ft (total depth 24 ft)
Note 5 - Numbers rounded to nearest 100 cubic yards.

- Sample Point
- River Mile
- USACE GLRI 2010-2011 Dredge Boundary
- Dredging Boundary Subdivider
- B Lower Limit of Navigational Dredging
- A Upper Limit of Navigational Dredging
- Stationing Line
- Navigation Channel

Figure 2. **Dredge Boundaries for USACE GLRI 2010-2011 Strategic Navigational Dredging, Buffalo River AOC Version for EA**

FIGURE 3.

Areas DA-O, DA-L and DA-K which were removed from dredging consideration



See Section 3.2 for a discussion regarding these areas.

APPENDIX A

SCOPING INFORMATION PACKET AND COMMENTS RECEIVED

SCOPING INFORMATION PACKET

Buffalo Harbor Dredging
Great Lakes Restoration Initiative
Erie County, Buffalo, New York

April 9, 2010

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

Table of Contents

1.0 INTRODUCTION

The National Environmental Policy Act (NEPA) directs Federal agencies to initiate "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action." This Scoping Information Packet has been prepared by the U.S. Army Corps of Engineers (USACE)-Buffalo District for the proposed dredging project in Buffalo Harbor. Its purpose is to elicit public and agency concerns, clearly define the environmental issues and alternatives that should be examined, and identify Federal, State and local requirements that may need to be addressed.

2.0 PURPOSE AND NEED OF DREDGING

2.1 Overview

Buffalo Harbor is located in the city of Buffalo, Erie County, New York. A major portion of the harbor is located in the lower Buffalo River, which flows from the east and discharges into Lake Erie at the head of the Niagara River (Figure 1). The Ship Canal, situated south of the river's mouth, is another feature of the harbor. Buffalo Harbor includes a series of authorized Federal navigation channels designed and maintained so that deep-draft commercial vessels can safely navigate the harbor. Federal navigation channels within the Buffalo River and Ship Canal are situated within the designated Buffalo River Area of Concern (AOC). The USACE-Buffalo District maintains Buffalo Harbor and conducts an annual survey of the authorized Federal navigation channels to determine which areas require dredging. However, due to funding limitations, only portions of the harbor are dredged about every other year where shoals (deposited sediments) substantially impede commercial navigation.

A typical dredging goal in Buffalo Harbor is to maintain the Federal navigation channels in Buffalo River and Ship Canal to an authorized depth of 22 feet below International Great Lakes Datum (IGLD)[1]. On average, this had resulted in the dredging of approximately 116,000 cubic yards (CY) of sediment every two years. Almost one million CY of sediment have been removed from the harbor over the past 18 years. Nevertheless, reduced funding levels over the past several years have resulted in the accumulation of an estimated 750,000 CY of undredged (i.e., "backlog") material in the harbor's authorized Federal navigation channels.

The primary goal of the project described in this Scoping Information Packet is to dredge portions of Buffalo Harbors authorized Federal navigation channels within the Buffalo River and Ship Canal. This dredging would serve to substantially reduce the current backlog of sediment within these channels. In so doing, it would result in the removal of an estimated 120,000 pounds of heavy metals and other organic contaminants including PCBs and PAHs, from the Buffalo River AOC.

2.2 Project Authority

This proposed USACE dredging project is anticipated being funded via the U. S. Environmental Protection Agency (USEPA) Great Lakes Restoration Initiative (GLRI).

[1] Low Water Datum for Lake Erie is at elevation 569.2 feet above the reference zero point at Rimouski, Quebec, Canada (International Great Lakes Datum 1985).

The USEPA Great Lakes National Program Office (GLNPO) is currently leading another Buffalo River AOC effort under the Great Lakes Legacy Act (GLLA). This involves planning for the remediation of contaminated sediments located outside of the authorized Federal navigation channels in Buffalo River and Ship Canal. If implemented, the proposed USACE dredging funded under GLRI would serve to compliment the planned GLLA dredging by removing a substantial amount of contaminated sediment from the Buffalo River and Ship Canal. The removal of contaminated sediment would improve the long-term environmental quality of the AOC and provide increased protection to public health.

3.0 ALTERNATIVE PROJECT PLANS

Recommended Plan (Alternative 1). The project would entail the dredging in the authorized Federal navigation channels in Buffalo River and Ship Canal (Figure 2). An estimated 450,000 to 650,000 CY of sediment would be removed from these Federal navigation channels, and the actual quantities would depend on final funding levels and contract prices. The dredging would be to a depth of 23.5' below IGLD. An additional 6" of dredging ("overdepth") would be allowed to better ensure that the contract depths are obtained. Under existing USACE authorities, this combined depth of up to 24 feet is allowed as advanced maintenance dredging.

Dredging would occur in Areas A through P as shown in Figure 2. Contingent on the availability of funds, an additional area of the Buffalo River and Ship Canal between lines A and B (as shown in Figure 2) may also be dredged. It is anticipated that this dredging would begin after October 15, 2010, continue until inclement weather, then resume again in 2011 in accordance with previously determined environmental windows, which stretch between June 15 and December 30 in the Buffalo River and July 1 and December 30 in the Ship Canal.

The sediments to be dredged have been thoroughly tested and evaluated, and they are comparable to or somewhat more contaminated than those routinely maintenance dredged from Buffalo Harbor Federal navigation channels. All dredged sediments would be placed in the existing USACE confined disposal facility (CDF) No. 4 (Figure 3) located in the Outer Buffalo Harbor adjacent to the Buffalo Harbor South Entrance Channel. Planned repairs to the outer dike of this CDF would be completed prior to implementation of the dredging. The CDF can safely and adequately accommodate this dredged material.

The dredging operation would be performed by a Contractor of the Federal government. The dredging operations are expected to be similar to the routine maintenance dredging operations that are regularly performed in the river and harbor, with a few additional components to reduce the potential for contaminant releases to the water column. It is anticipated that mechanical dredging equipment would be used, which would include the use of barge-mounted crane with an enclosed clamshell bucket. The clamshell bucket would excavate the sediments and place it aboard scows, and the scows would be used to transport the dredged material to the CDF. At the CDF, dredged sediments would be hydraulically pumped from the scows into the facility. Alternate dredging methods could include the use of a hydraulic cutterhead dredge. Under this scenario, sediments would be removed via suction pipe and cutterhead, then hydraulically pumped via pipeline directly from the dredging site to the CDF. Use of this type of dredging equipment is unlikely due to issues such as a significant pumping distance, piping interference with navigation, and difficulties with handling debris that would be encountered during dredging.

This work is intended to restore the navigation channel to its designed depth and safely remove the contaminated sediments contained in the channel. The overall goal of this project is to minimize the release of contaminants and turbidity in the river and ship canal. In an effort to accomplish this goal, this project will not allow the normal practice of overflow dredging, areas that contain high levels of contamination will be avoided, and other controls designed to decrease releases of contaminants will be implemented.

No Action Plan. Under this plan, no Federal action will be taken to address the commercial navigational dredging needs in the Buffalo River and Ship Canal. Evaluation of the "No Action" alternative is required under NEPA and provides a baseline for comparison to other alternative plans.

4.0 IMPACT ASSESSMENT

The environmental impacts of this project will be compared to those associated with not performing the dredging under the "No Action" Plan. These impacts will be evaluated in relation to several parameters including the following social, economic and environmental categories:

- Fish and Wildlife Resources
- Water Quality
- Dredged Material Management
- Geology and Soils
- Contaminated Materials
- Air Quality
- Noise
- Recreation
- Historic Properties
- Property Values and Tax Revenues
- Employment
- Community Cohesion and Growth
- Transportation
- Public Facilities and Services
- Aesthetics
- Environmental Justice

In conjunction with the impact assessment, there is also a draft risk assessment being completed by USACE that assesses the resuspension of contaminated sediments during dredging operations, the potential impact to surface water quality and an analysis of ecological risks. There is also an assessment of the risk associated with the sediment that is expected to remain in the river channel following GLRI dredging.

Preliminary results indicate that the proposed dredging would result in adverse water quality impacts similar to or slightly greater than those associated with routine maintenance dredging operations, and they would be minor and short-term. Furthermore, it is estimated that the project would result in an overall substantial beneficial impact to the aquatic environment through the removal of an estimated 120,000 pounds of heavy metals and other organic contaminants (PAHs and PCBs) from the AOC. An engineering analysis was conducted to evaluate the environmental safety of placing contaminated dredge material present in the navigation channel into the CDF. The analysis showed that the CDF will prevent the release of contaminants and provide protection to residents using the river and nearshore Lake Erie.

5.0 PUBLIC PARTICIPATION AND INTERAGENCY COORDINATION

Throughout the scoping process, stakeholders and interested parties are invited to provide comment on the alternatives that will be evaluated for this proposed dredging project. Potential social, economic and environmental benefits and adverse impacts that would result from each alternative plan selected for detailed analysis will be documented in an Environmental Assessment (EA) prepared pursuant to NEPA. Interested parties are welcome to contact USACE-Buffalo District to discuss their views and recommendations regarding this project.

6.0 COMPLIANCE WITH ENVIRONMENTAL PROTECTION STATUTES

Numerous environmental laws and executive orders influence and guide water resources planning, development and management within the USACE civil works program. Table 1 presents a comprehensive list of environmental protection statutes, executive orders, etc. that are normally considered. Therefore, an additional goal of this scoping process is to consult with appropriate agencies and other interested parties pertaining to resources protected by these mandates. The dissemination of this scoping information initiates applicable coordination and consultation requirements required under their provisions.

Some important Federal environmental protection statutes that will be addressed include:

- *NEPA*. In accordance with 33 Code of Federal Regulations 203 (Procedures for Implementing NEPA), USACE-Buffalo District will assess the potential environmental effects of the project alternatives on the quality of the human environment. Using a systematic and interdisciplinary approach, an assessment will be made of the potential environmental impacts for each plan as judged by comparing the with- and without-project conditions. The impact assessment process will determine if an Environmental Impact Statement (EIS) is required.

- *Clean Water Act.* If the recommended plan involves the placement of dredged or fill material into the waters of the United States, USACE-Buffalo District will evaluate the discharge in accordance with the Clean Water Act Section 404(b)(1) Guidelines. Water quality and related information used in this evaluation will provide documentation to demonstrate that the recommended plan is in compliance with this Act. A Section 404(a) Public Notice would be circulated and an opportunity to request a public hearing will be afforded to all potentially affected parties. Section 401 Water Quality Certification for the discharge of dredged or fill material would be requested from the New York State Department of Environmental Conservation (NYSDEC)-Region 9.

- *Coastal Zone Management Act*. The Act requires that Federal activities are consistent with the enforceable policies of the New York State Coastal Management Program. A Federal consistency determination would be submitted to the New York Department of State-Division of Coastal Resources for their concurrence.

- *Endangered Species Act*. In accordance with Section 7 of this Act, USACE-Buffalo District is requesting information from the U.S. Fish and Wildlife Service (USFWS) on any listed species or critical habitat, or proposed for listing, that may be present within the project area. If this any such species or critical habitat are found to be present, then USACE-Buffalo District will conduct a biological assessment to determine the proposed project's effect on these species or critical habitat.

- *Fish and Wildlife Coordination Act*. USACE-Buffalo District is coordinating this project with the New York Field Office of the USFWS and NYSDEC Region 9. USACE-Buffalo District will collaborate with these agencies to identify fish and wildlife concerns, identify relevant information on the study area, obtain their views concerning the significance of fish and wildlife resources and anticipated project impacts, and identify those resources which need to be evaluated in the study. Full consideration will be given to their comments and recommendations resulting from this coordination.

- *National Historic Preservation Act*. Under Section 106 of this Act, this scoping process also initiates consultation with the National Park Service, State Historic Preservation Office (New York State Office of Parks and Recreation), potentially interested Indian tribes, local historic preservation organizations and others likely to have knowledge of, or concern with, historic properties that may be present within the study's area of potential effect. The need for cultural resources surveys, testing, evaluation, effects determination, mitigation planning, and coordination will be evaluated as a follow-up to this initial consultation.

7.0 POINT OF CONTACT

Interested parties are encouraged to contact USACE-Buffalo District with their comments and recommendations concerning this proposed dredging project. Questions or requests for additional information may be directed to:

Christine M. Cardus, Biologist
Environmental Analysis Team
Telephone No.: 716-879-4130
Fax No.: 716-879-4396
E-mail: Christine.M.Cardus@usace.army.mil

Please present your comments or recommendations in writing by April 30th, 2010 to Ms. Cardus' attention at the following address:

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

Thank you for your interest and involvement in this project.

Table 1. Federal Environmental Protection Laws, Orders, Policies.

1. PUBLIC LAWS

a. American Folklife Preservation Act, P.L. 94-201; 20 U.S.C. 2101, *et seq.*
b. Anadromous Fish Conservation Act, P.L. 89-304; 16 U.S.C. 757, *et seq.*
c. Antiquities Act of 1906, P.L. 59-209; 16 U.S.C. 431, *et seq.*
d. Archaeological and Historic Preservation Act, P.L. 93-291; 16 U.S.C. 469, *et seq.* (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.)
e. Bald Eagle Protection Act; 16 U.S.C. 668.
f. Clean Air Act, as amended; P.L. 91-604; 42 U.S.C. 1857h-7, *et seq.*
g. Clean Water Act, P.L. 92-500; 33 U.S.C. 1251, *et seq.* (Also known as the Federal Water Pollution Control Act; and P.L. 92-500, as amended.)
h. Coastal Zone Management Act of 1972, as amended, P.L. 92-583; 16 U.S.C. 1451, *et seq.*
i. Endangered Species Act of 1973, as amended, P.L. 93-205; 16 U.S.C. 1531, *et seq.*
j. Estuary Protection Act, P.L. 90-454; 16 U.S.C. 1221, *et seq.*
k. Federal Environmental Pesticide Control Act, P.L. 92-516; 7 U.S.C. 136.
l. Federal Water Project Recreation Act, as amended, P.L. 89-72; 16 U.S.C. 460-1(12), *et seq.*
m. Fish and Wildlife Coordination Act of 1958, as amended, P.L. 85-624; 16 U.S.C. 661, *et seq.*
n. Historic Sites Act of 1935, as amended, P.L. 74-292; 16 U.S.C. 461, *et seq.*
o. Land and Water Conservation Fund Act, P.L. 88-578; 16 U.S.C. 460/-460/-11, *et seq.*
p. Migratory Bird Conservation Act of 1928; 16 U.S.C. 715.
q. Migratory Bird Treaty Act of 1918; 16 U.S.C. 703, *et seq.*
r. National Environmental Policy Act of 1969, as amended, P.L. 91-190; 42 U.S.C. 4321, *et seq.*
s. National Historic Preservation Act of 1966, as amended, P.L. 89-655; 16 U.S.C. 470a, *et seq.*
t. Native American Religious Freedom Act, P.L. 95-341; 42 U.S.C. 1996, *et seq.*
u. Resource Conservation and Recovery Act of 1976, P.L. 94-580; 7 U.S.C. 1010, *et seq.*
v. River and Harbor Act of 1899, 33 U.S.C. 403, *et seq.* (also known as the Refuse Act of 1899)
w. Toxic Substances Control Act, P.L. 94-469; 15 U.S.C. 2601, *et seq.*
x. Watershed Protection and Flood Prevention Act, as amended, P.L. 83-566; 16 U.S.C. 1001, *et seq.*
y. Wild and Scenic Rivers Act, as amended, P.L. 90-542; 16 U.S.C. 1271, *et seq.*

2. EXECUTIVE ORDERS

a. Executive Order 11593, Protection and Enhancement of the Cultural Environment. May 13, 1979 (36 FR 8921; May 15, 1971)
b. Executive Order 11988, Floodplain Management. May 24, 1977 (42 FR 26951; May 25, 1977)
c. Executive Order 11990, Protection of Wetlands. May 24, 1977 (42 FR 26961; May 25, 1977)
d. Executive Order 11514, Protection and Enhancement of Environmental Quality, March 5, 1970, as amended by Executive Order, 11991, May 24, 1977
e. Executive Order 12088, Federal Compliance with Pollution Control Standards, October 13, 1978
f. Executive Order 12372, Intergovernmental Review of Federal Programs, July 14, 1982
g. Executive Order 12856, Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements, August 3, 1993
h. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994
i. Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

3. OTHER FEDERAL POLICIES

a. Council on Environmental Quality Memorandum of August 11, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act
b. Council on Environmental Quality Memorandum of August 10, 1980: Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the National Inventory
c. Migratory Bird Treaties and other international agreements listed in the Endangered Species Act of 1973, as amended, Section 2(a)(4)

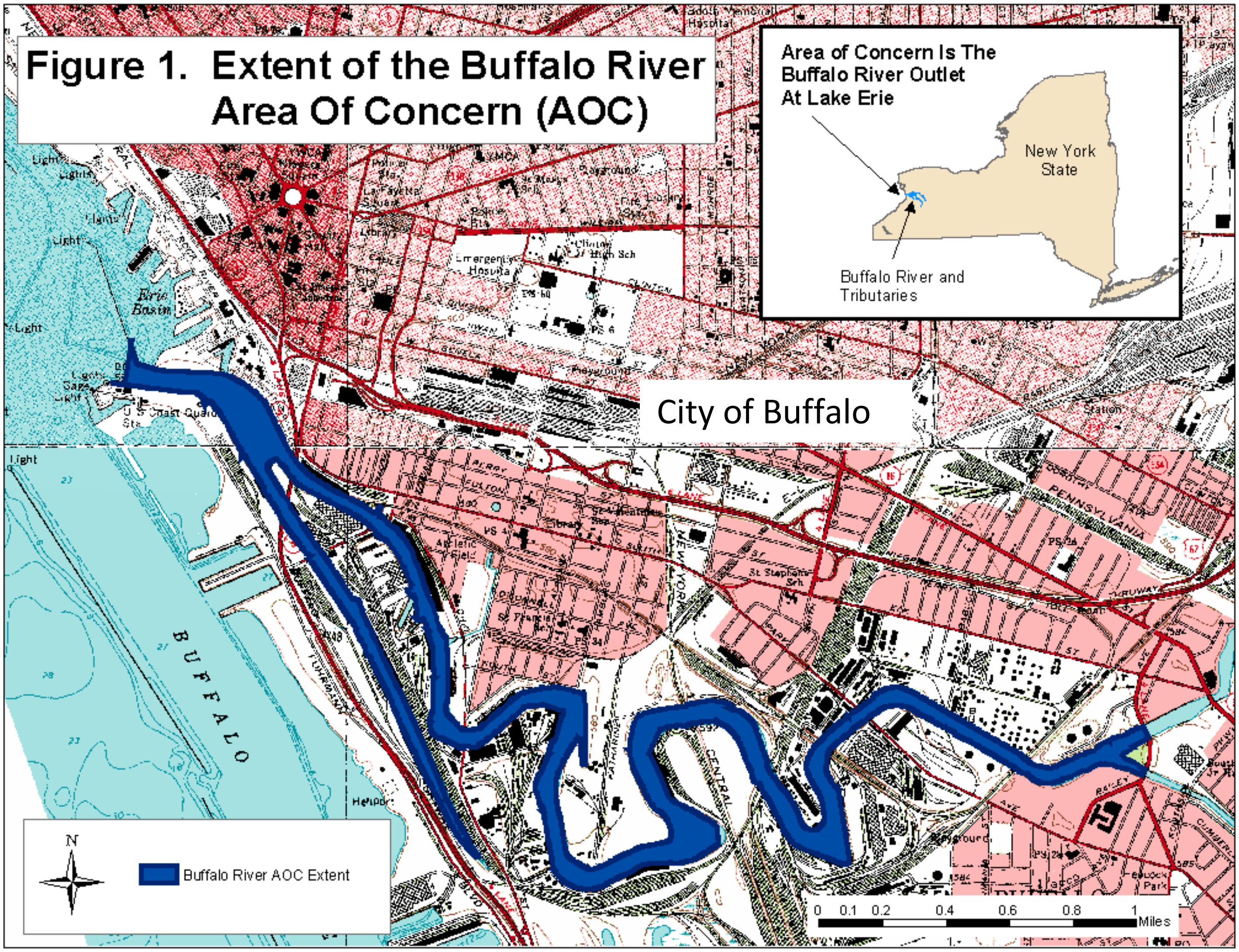


Figure 1. Extent of the Buffalo River Area Of Concern (AOC)

USACE GLRI Dredge Areas	Old Area Name (original GLLA remedy 5 name)	Start	End	Design Volume (cubic yds)	Overdredge Volume (cubic yds)	Total Volume Inside Navigation Channel (cubic yds)
DA-A	Area-17	See Map				1,700
DA-B	Area-16	See Map				2,500
DA-C	Resample-15	See Map				2,100
DA-D	Area-15	727+75	735+75	16,800	2,200	19,000
DA-E	Area-14	711+00	726+00	65,000	4,600	69,600
DA-F	Area 13-10, 18, R14-R12	650+25	703+75	193,200	14,400	207,600
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DA-H	Area- 8	609+25	618+00	14,300	2,100	16,400
DA-I	Resample- 8	See Map				2,900
DA-J	Area- 7	See Map				1,000
DA-K	Resample- 6	See Map				800
DA-L	Resample - 5	See Map				100
DA-M	Area- 5	See Map				3,500
DA-N	Area- 6	See Map				21,400
DA-O	Resample- 4	See Map				2,400
DA-P	Ship Canal Areas	803+00	841+75	54,100	8,500	62,600
					Total	**440,200**

Buffalo River USACE GLRI 2010-2011 Dredge Areas (upstream to downstream)

Note 1 - Exact coordinates of dredge areas A, B, C, and I through O to be determined.
Note 2 - Total volumes of dredge areas A, B, C, and I through O are E&E in-channel volume estimates based on Remedy 5a dredging footprint, dated October 22, 2009.
Note 3 - Resample areas R-7, 9, 10, and 11 currently show little to no available sediment at 24 ft. and will not be included in the 2010 USACE dredge plan.
Note 4 - Design depth will be 23.5 ft with an allowable overdepth of 0.5 ft (total depth 24 ft)
Note 5 - Numbers rounded to nearest 100 cubic yards.

Sample Point
River Mile
Stationing Line
USACE GLRI 2010-2011 Dredge Boundary
B Lower Limit of Navigational Dredging
A Upper Limit of Navigational Dredging
Great Lakes Legacy Act Dredge Area
Great Lakes Legacy Act Potential Cap Area

Figure 2

Dredge Boundaries for USACE GLRI 2010-2011 Strategic Navigational Dredging, Buffalo River AOC

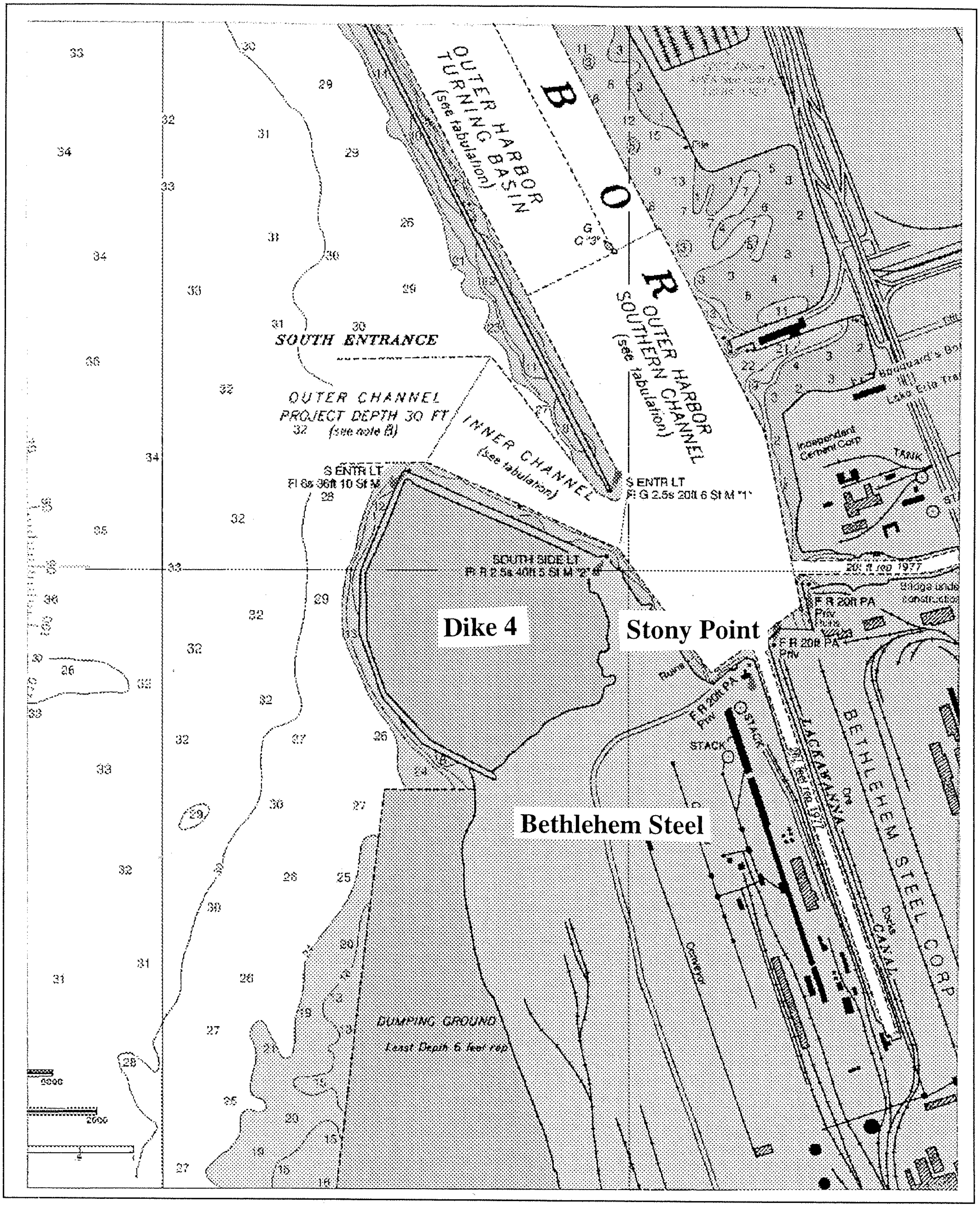


Figure 3. Buffalo CDF 4 Location

From: Balduf, Christopher
To: Cardus, Christine M LRB
Subject: Buffalo Harbor Dredging Project
Date: Thursday, April 29, 2010 6:23:52 PM

Ms. Christine M. Cardus,

As a stakeholder in the Buffalo Harbor Dredging Project I am in Favor of continuation of Buffalo River Dredging.

I currently reside in the once zoned Flood Region that was designated by FEMA. Our local Congressmen at the urgency of their constituents fought hard for FEMA to “re-zone” this entire mapping of the Flood Zone Region.

I am concerned that if the Buffalo River Dredging does not continue it may impact the residents and businesses that reside in this region. Although the sediment deposits build-up may take years to impact the flow of the river, I am concerned if the Buffalo River Dredging Project ceases due to limited funding it might be too late to obtain funding at a future point in time. If the dredging ceases the sediment deposit build-up would be even more costly to remove in the future and may in turn cause severe impact to the region in creating flooding and causing economic damage.

The Buffalo River is one of the environmental and economical resources of the region and Buffalo River Dredging Project should continue!

Best Regards,

Christopher L. Balduf

Resident and Employed in the South Buffalo/Buffalo River Region

From: Poleto,Don
To: Cardus, Christine M LRB
Subject: Buffalo River Dredging
Date: Tuesday, April 13, 2010 8:36:42 AM

Hi Christine,

Please include me in your pre-construction meeting for this project, as from the map I see you are going to need the lift bridges, what is the start date?

Thanks,

Don Poleto

Sr. Operations Engineer / Harbormaster

City of Buffalo, DPW

716-851-5359

From:	Rick Speth
To:	rdrake@bnriverkeeper.org; Cardus, Christine M LRB
Cc:	stvcrbtt@yahoo.com; richard1597@earthlink.net
Subject:	Dredging Buffalo River
Date:	Saturday, April 10, 2010 5:13:03 PM

Hi Robbyn.

I rec'd in the mail a postcard from the US Corps of Engineers requesting comments.

My comments are that the dredged material is to be dumped into an area adjacent to the south entrance to the outer harbor. There are 2 areas, one referred to as 'Dike 4', and another which is simply called 'Dumping Ground'. These are both on old Bethlehem Steel land. These are referred to in Figure 3, CDF 4 Location of the Buffalo Harbor SI packet.

This area is directly adjacent to Lake Erie and only 3.5 miles upstream of the Buffalo City water intake. I am concerned that sediment that is stored here will leech out into the lake and contaminate the water supply as well as the fishery and spawning grounds for walleye pike and other aquatic species.

I think this needs to be brought up prior to the comment deadlines to Christine Cardus. I believe that this issue must be addressed.

Please talk to Julie about this and let me know what you are thinking.

Regards,

Rick Speth
Riverwatch Captain
Bflo R

From:	Ness
To:	Cardus, Christine M LRB
Subject:	Comments on Buffalo Harbor Dredging Project
Date:	Saturday, April 17, 2010 8:30:49 PM

Hello Christine,

I am a Buffalo-Niagara Riverkeepers Riverwatch Captain. I received your postcard in the mail and have read the Scoping Information Packet on the Buffalo River Dredging Project

I do have a few questions/comments. I understand why the dredging is necessary, but I have my fears that the dredging will stir up toxins in the river and cause side effects to the fish or wildlife, or even to the water quality for humans. How will we be assured this won't happen?

Regarding the CDF (confined disposal facility), as I have kayaked to that location several times in the past, I am particularly interested in this. As a repository for contaminated sediment, how does it keep the toxins from leaching out into the lake? Is there a geotextile on the sides or bottom, or some other way to keep the toxins contained in that area forever? I also think it should be posted from at least the west Lake Erie side that this is a confinement area for toxins. I and many other kayakers have stopped there to rest while on the lake. I think people should be warned to stay away from it.

Thank you for keeping me informed on this matter, and please keep me in the loop for any further information.

Sincerely,

Vanessa Wazny
Riverwatch Captain
5772 West Lane
Lake View, NY 14085

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New York Field Office
3817 Luker Road
Cortland, NY 13045
Phone: (607) 753-9334 Fax: (607) 753-9699
http://www.fws.gov/northeast/nyfo

Project Number: 100362

To: Christine Cardus

Date: May 21, 2010

Regarding: Buffalo Harbor Dredging Project - Scoping Information Packet

Town/County: City of Buffalo / Erie County

We have received your request for information regarding occurrences of Federally-listed threatened and endangered species within the vicinity of the above-referenced project/property. Due to increasing workload and reduction of staff, we are no longer able to reply to endangered species list requests in a timely manner. In an effort to streamline project reviews, we are shifting the majority of species list requests to our website at http://www.fws.gov/northeast/nyfo/es/section7.htm. Please go to our website and print the appropriate portions of our county list of endangered, threatened, proposed, and candidate species, and the official list request response. Step-by-step instructions are found on our website.

As a reminder, Section 9 of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) prohibits unauthorized taking* of listed species and applies to Federal and non-Federal activities. Additionally, endangered species and their habitats are protected by Section 7(a)(2) of the ESA, which requires Federal agencies, in consultation with the U.S. Fish and Wildlife Service (Service), to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. An assessment of the potential direct, indirect, and cumulative impacts is required for all Federal actions that may affect listed species. For projects not authorized, funded, or carried out by a Federal agency, consultation with the Service pursuant to Section 7(a)(2) of the ESA is not required. However, no person is authorized to "take"* any listed species without appropriate authorizations from the Service. Therefore, we provide technical assistance to individuals and agencies to assist with project planning to avoid the potential for "take," or when appropriate, to provide assistance with their application for an incidental take permit pursuant to Section 10(a)(1)(B) of the ESA.

Project construction or implementation should not commence until all requirements of the ESA have been fulfilled. If you have any questions or require further assistance regarding threatened or endangered species, please contact the Endangered Species Program at (607) 753-9334. Please refer to the above document control number in any future correspondence.

Endangered Species Biologist: Sandra Doran *Sandra Doran*

*Under the Act and regulations, it is illegal for any person subject to the jurisdiction of the United States to ***take*** (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these), import or export, ship in interstate or foreign commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any endangered fish or wildlife species and most threatened fish and wildlife species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. "Harm" includes any act which actually kills or injures fish or wildlife, and case law has clarified that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife.

Erie County

Federally Listed Endangered and Threatened Species and Candidate Species

Except for occasional transient individuals, no Federally-listed or proposed endangered or threatened species, or candidate species under our jurisdiction are known to exist in this county.

Information current as of: 5/26/2010

Print Species List

APPENDIX B

SECTION 404 PUBLIC NOTICE AND 404(B)1 EVALUATION

US Army Corps of Engineers

Public Notice

No. 10-6 **Issuing Office:** CELRB-TD-EA **Issue Date:** 19 MAY 2010 **Exp. Date:** 19 JUNE 2010

REPLY TO ATTENTION OF:

Environmental Analysis Section

GREAT LAKES RESTORATION INITIATIVE DREDGING AND DREDGED MATERIAL PLACEMENT

BUFFALO HARBOR (RIVER CHANNEL AND SHIP CANAL)

ERIE COUNTY, NEW YORK

This Public Notice has been prepared in conformance with U.S. Army Corps of Engineers (USACE) regulation, "Practice and Procedure: Final Rule for Operation and Maintenance of Army Corps of Engineers Civil Works Projects involving the Discharge of Dredged Materials into Waters of the United States or Ocean Waters," 33 Code of Federal Regulations (CFR) 337.1. Its purpose is to specify what dredged/fill materials would be discharged into waters of the United States by implementation of the proposed action, and advise all interested parties of the proposed project and to provide an opportunity to submit comments concerning the discharges, or request a public hearing.

USACE-Buffalo District anticipates the need to dredge and discharge material excavated from the Federal navigation channels of Buffalo Harbor. Included in the project are the River Channel and Ship Canal. The attached map (Figure 1) shows the authorized limits and depths of the Federally maintained channels. The dredging would occur to a depth of 23.5 feet below LWD[1] and may include an additional six inches of “overdepth” to ensure that the specified depths are achieved. A combined dredging depth of 24 feet below LWD in these Federal navigation channels is allowed under existing USACE authorities.

[1]Low Water Datum (LWD) for Lake Erie is 573.4 feet above mean sea level at Rimouski, Quebec, Canada (International Great Lake Datum [IGLD] 1985).

This dredging is anticipated to be funded under the U. S. Environmental Protection Agency (USEPA) Great Lakes Restoration Initiative (GLRI). The USEPA Great Lakes National Program Office (GLNPO) is currently leading another separate Buffalo River Area of Concern (AOC) sediment remediation effort under the Great Lakes Legacy Act (GLLA). The proposed GLRI funded dredging in the harbor would serve to compliment the planned GLLA dredging by removing a substantial amount of contaminated sediment from inside the Federal navigation channel limits of the Buffalo River and Ship Canal.

This project would be accomplished by a contractor of the Federal government. The dredging operation is tentatively scheduled to be performed between October 15, 2010 and December 30, 2011. In 2011, the dredging would resume on or after July 1 in the Ship Canal and June 15 in the River Channel and be completed by December 30.

The project would entail dredging Areas A through P in the River Channel and Ship Canal shown in Figure 2. An estimated 450,000 cubic yards (CY) of sediment would be removed from these areas. Contingent on the availability of funds, portions of the Buffalo River between lines A and B may also be dredged in order to maintain the Federal navigation channel. This dredged material consists primarily of silts and clays, with some sands. The sediments have been thoroughly tested and evaluated, and are comparable to or somewhat more contaminated than those routinely maintenance dredged from Buffalo Harbor Federal navigation channels. The dredged material would be placed into the existing USACE confined disposal facility (CDF) No. 4 (see Figure 1) located in the Outer Buffalo Harbor adjacent to the South Entrance Channel. Planned repairs to the confinement dike of this CDF would be completed prior to implementation of the dredging. The CDF can safely and adequately accommodate this dredged material. It is anticipated that mechanical dredging equipment would be used to perform the dredging, which would include the use of a barge-mounted crane with an enclosed clamshell bucket. The clamshell bucket would excavate the sediments and place it aboard scows, and the scows would be used to transport the dredged material to the CDF. Water associated with the dredged material (supernatant) in the scows would not be allowed to overflow into harbor or lake water. At the CDF, dredged material would be hydraulically pumped from the scows into the facility. Overflow weirs in the dike designed to decant water (effluent) from the facility would not be employed during this project. However, when dredged material is pumped into the CDF, water from the operation (effluent) will be discharged into Lake Erie by its gradual passing through the confinement dike. The quality of this effluent is predicted to comply with applicable New York State water quality standards. Alternate dredging methods could include the use of a hydraulic cutterhead dredge. Under this scenario, sediments would be removed via suction pipe and cutterhead, then hydraulically pumped via pipeline directly from the dredging site to the CDF. Use of this type of dredging equipment is unlikely due to issues such as a significant pumping distance, piping interference with navigation, and difficulties with handling debris that would be encountered during dredging.

This work is intended to restore selected areas in the Federal navigation channels within Buffalo River and Ship Canal to design dimensions through the safe removal and disposal of contaminated sediments. The long-term environmental and human health benefits of removing these sediments from the harbor would substantially outweigh the negligible to minor short-term risks associated with the dredging project.

Comments in response to this Public Notice should relate to the discharges of dredged material associated with this project. In this project, the discharges would be limited to effluent released into Lake Erie after being filtered through the CDF confinement dike.

State Water Quality Certification (WQC) from the New York State Department of Environmental Conservation (NYSDEC) is required for discharges associated with this dredging project, pursuant to Section 401 of the Clean Water Act. This includes the discharge of effluent through the CDF's confinement dike. A copy of this Public Notice has been provided to NYSDEC with an accompanying request to modify the existing WQC dated April 29, 2008 (DEC ID No. 9-9909-00039/00003).

The environmental effects of routine dredging operations in Buffalo Harbor are documented in the ***Environmental Assessment (EA) and Section 404(b)(1) Evaluation, O&M, Buffalo Harbor, Black Rock Canal and Tonawanda Harbor, New York (1993).*** This document, and supplemental documentation, have been submitted to USEPA. Copies are available for examination at the USACE-Buffalo District office. USACE is in the process of preparing an EA and Section 404(b)(1) Evaluation for this project, which is anticipated to be released for public review by June 2010.

There are no registered historic properties or properties listed as being eligible for inclusion in the National Register of Historic Places that will be adversely affected by this project. By this notice, the National Park Service is advised that currently unknown archaeological, scientific, prehistorical or historical data may be lost or destroyed by the work to be accomplished.

Based on the review of the available environmental data, we have determined that the proposed work will not affect any species proposed or designated by the U.S. Department of the Interior as threatened or endangered, nor will it affect the designated critical habitat of any such species. Therefore, unless additional information indicates otherwise, no further formal consultation pursuant to Section 7 of the Endangered Species Act Amendments of 1978 will be undertaken with the U.S. Fish and Wildlife Service.

This work will be undertaken in a manner consistent, to the maximum extent practicable, with the State Coastal Management Program.

The decision whether to perform dredging will be based on an evaluation of the probable impact, including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative factors thereof; among these are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.

This activity is being coordinated with the following agencies, as well as other appropriate Federal, State and local agencies, Indian nations and organizations:

NYDSEC
New York State Office of Parks, Recreation and Historic Preservation
U.S. Coast Guard
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Environmental Protection Agency

Any interested parties and/or agencies desiring to express their views concerning the proposed discharges associated with this dredged material may do so by filing their comments, in writing, no later than 30 days from the date of this notice. Any person who has an interest which may be affected by this discharge may request a public hearing. The request must be submitted in writing to the undersigned within 30 days of the date of this Public Notice. The request must clearly set forth the interest which may be affected, and the manner in which the interest may be affected, by this activity.

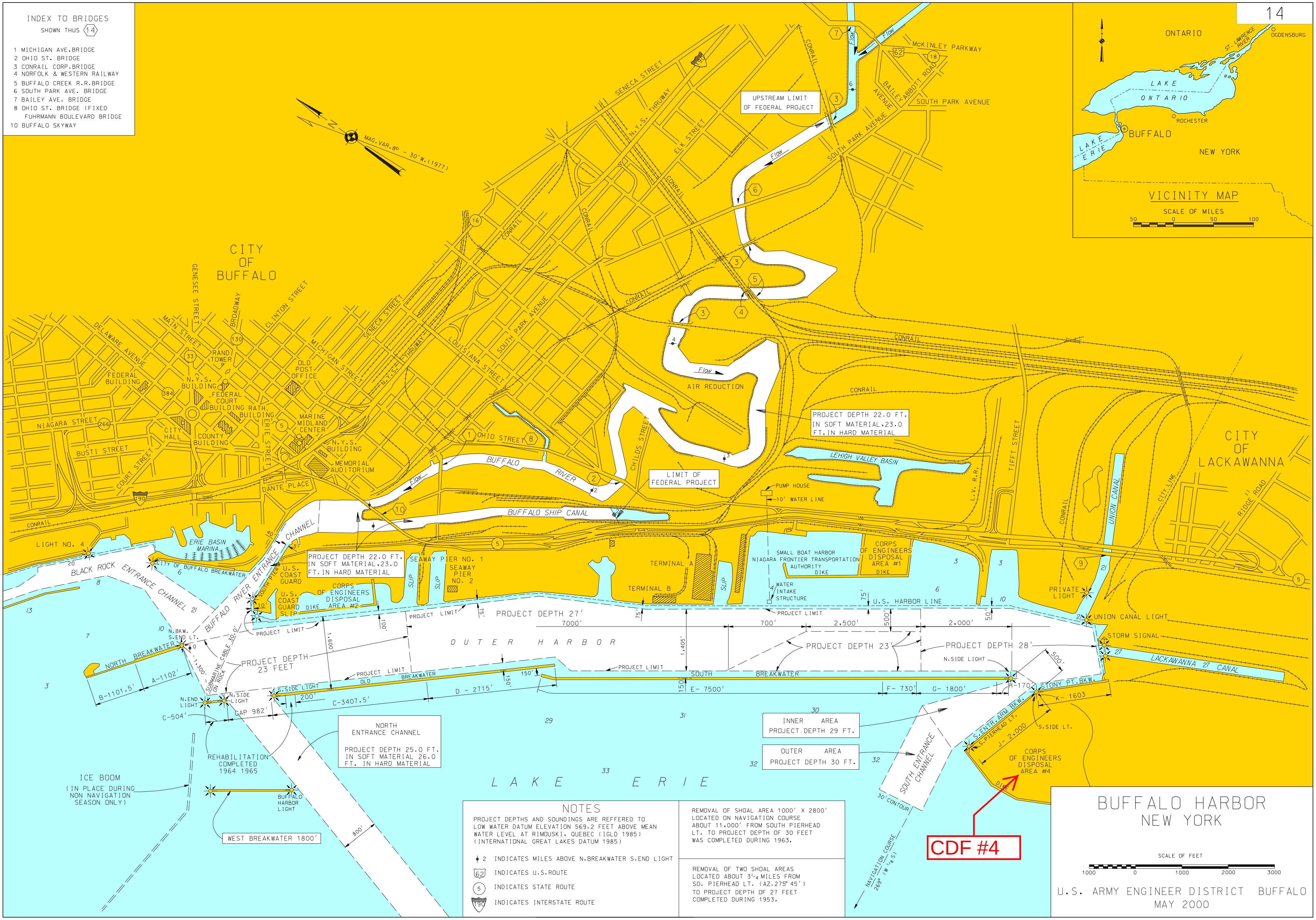
Questions and comments concerning this project should be directed to Mr. Scott W. Pickard or Ms. Christine Cardus of my Environmental Analysis Section, who may be contacted by calling 716-879-4404 or 716-879-4130 (FAX 716-879-4396; e-mail scott.w.pickard@usace.army.mil and christine.m.cardus@usace.army.mil), respectively, or by writing to their attention at the following address:

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

This Public Notice is published in conformance with 33 CFR 337.1. All dredging and dredged material discharge will be performed in conformance with Sections 313 and 404 of the Clean Water Act (33 USC 1323 and 1344, respectively).

Martin P. Wargo, PWS
Supervisory Biologist
Environmental Analysis Section

Attachments



14
INDEX TO BRIDGES
SHOWN THUS 14
1 MICHIGAN AVE. BRIDGE
2 OHIO ST. BRIDGE
3 CONRAIL CORP. BRIDGE
4 NORFOLK & WESTERN RAILWAY
5 BUFFALO CREEK R.R. BRIDGE
6 SOUTH PARK AVE. BRIDGE
7 BAILEY AVE. BRIDGE
8 OHIO ST. BRIDGE (FIXED
FUHRMANN BOULEVARD BRIDGE
10 BUFFALO SKYWAY
MAG. VAR. 8° - 30' W. (1977)
CITY OF BUFFALO
CITY OF LACKAWANNA
UPSTREAM LIMIT OF FEDERAL PROJECT
PROJECT DEPTH 22.0 FT. IN SOFT MATERIAL, 23.0 FT. IN HARD MATERIAL
LIMIT OF FEDERAL PROJECT
BUFFALO RIVER
BUFFALO SHIP CANAL
LEHIGH VALLEY BASIN
AIR REDUCTION
ERIE BASIN MARINA
BLACK ROCK ENTRANCE CHANNEL
BUFFALO RIVER ENTRANCE CHANNEL
U.S. COAST GUARD
CORPS OF ENGINEERS DISPOSAL AREA #2
SEAWAY PIER NO. 1
SEAWAY PIER NO. 2
TERMINAL A
TERMINAL B
SMALL BOAT HARBOR NIAGARA FRONTIER TRANSPORTATION AUTHORITY
CORPS OF ENGINEERS DISPOSAL AREA #1
U.S. HARBOR LINE
UNION CANAL LIGHT
STORM SIGNAL
LACKAWANNA CANAL
PROJECT DEPTH 27'
OUTER HARBOR
PROJECT DEPTH 23'
PROJECT DEPTH 28'
PROJECT DEPTH 23 FEET
SOUTH BREAKWATER
NORTH BREAKWATER
STONY PT. BKW.
S. ENTR. ARM BKW.
CORPS OF ENGINEERS DISPOSAL AREA #4
NORTH ENTRANCE CHANNEL
PROJECT DEPTH 25.0 FT. IN SOFT MATERIAL 26.0 FT. IN HARD MATERIAL
INNER AREA PROJECT DEPTH 29 FT.
OUTER AREA PROJECT DEPTH 30 FT.
SOUTH ENTRANCE CHANNEL
REHABILITATION COMPLETED 1964 1965
ICE BOOM (IN PLACE DURING NON NAVIGATION SEASON ONLY)
WEST BREAKWATER 1800'
BUFFALO HARBOR LIGHT
LAKE ERIE
CDF #4
NOTES
PROJECT DEPTHS AND SOUNDINGS ARE REFFERED TO LOW WATER DATUM ELEVATION 569.2 FEET ABOVE MEAN WATER LEVEL AT RIMOUSKI, QUEBEC (IGLD 1985) (INTERNATIONAL GREAT LAKES DATUM 1985)
INDICATES MILES ABOVE N.BREAKWATER S.END LIGHT
INDICATES U.S.ROUTE
INDICATES STATE ROUTE
INDICATES INTERSTATE ROUTE
REMOVAL OF SHOAL AREA 1000' X 2800' LOCATED ON NAVIGATION COURSE ABOUT 11,000' FROM SOUTH PIERHEAD LT. TO PROJECT DEPTH OF 30 FEET WAS COMPLETED DURING 1963.
REMOVAL OF TWO SHOAL AREAS LOCATED ABOUT 3 1/4 MILES FROM SO. PIERHEAD LT. (AZ.275° 45') TO PROJECT DEPTH OF 27 FEET COMPLETED DURING 1953.
VICINITY MAP
LAKE ONTARIO
LAKE ERIE
BUFFALO
ROCHESTER
NEW YORK
BUFFALO HARBOR
NEW YORK
U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 2000

Figure 1

Buffalo River USACE GLRI 2010-2011 Dredge Areas (upstream to downstream)						
USACE GLRI Dredge Areas	Old Area Name (original GLLA remedy 5 name)	Start	End	Design Volume (cubic yds)	Overdredge Volume (cubic yds)	Total Volume Inside Navigation Channel (cubic yds)
DA-A	Area-17	See Map				1,700
DA-B	Area-16	See Map				2,500
DA-C	Resample-15	See Map				2,100
DA-D	Area-15	727+75	735+75	16,800	2,200	19,000
DA-E	Area-14	711+00	726+00	65,000	4,600	69,600
DA-F	Area 13-10, 18, R14-R12	650+25	703+75	193,200	14,400	207,600
DA-G	Area- 9	628+00	642+00	24,500	2,100	26,600
DA-H	Area- 8	609+25	618+00	14,300	2,100	16,400
DA-I	Resample- 8	See Map				2,900
DA-J	Area- 7	See Map				1,000
DA-K	Resample- 6	See Map				800
DA-M	Area- 5	See Map				3,500
DA-N	Area- 6	See Map				21,400
DA-O	Resample- 4	See Map				2,400
DA-P	Ship Canal Areas	803+00	841+75	54,100	8,500	62,600
					Total	**440,200**

Note 1 - Exact coordinates of dredge areas A, B, C, and I through O to be determined.
Note 2 - Total volumes of dredge areas A, B, C, and I through O are E&E in-channel volume estimates based on Remedy 5a dredging footprint, dated October 22, 2009.
Note 3 - Resample areas R-7, 9, 10, and 11 currently show little to no available sediment at 24 ft. and will not be included in the 2010 USACE dredge plan.
Note 4 - Design depth will be 23.5 ft with an allowable overdepth of 0.5 ft (total depth 24 ft)
Note 5 - Numbers rounded to nearest 100 cubic yards.

- Sample Point
- River Mile
- USACE GLRI 2010-2011 Dredge Boundary
- Dredging Boundary Subdivider
- B Lower Limit of Navigational Dredging
- A Upper Limit of Navigational Dredging
- Stationing Line
- Navigation Channel

Figure 2

Dredge Boundaries for USACE GLRI 2010-2011
Strategic Navigational Dredging, Buffalo River AOC
Version for EA

SECTION 404(b)(1) EVALUATION

OPERATIONS & MAINTENANCE
(DREDGING WITH DISCHARGE OF DREDGED MATERIAL)
BUFFALO HARBOR
ERIE COUNTY, NEW YORK

Section 404(b)(1) of the Clean Water Act (33 USC 1344) requires that placement sites and dredged fill material proposed for placement into waters of the United States be evaluated through the application of guidelines developed by the Administrator of the U.S. Environmental Protection Agency (USEPA) in conjunction with the Secretary of the Army. This Section 404(b)(1) Evaluation is based on the regulations found at 40 CFR 230, “Guidelines for the Specification of Disposal Sites for Dredged and Fill Material.” Its purpose is to assess the effects resulting from the discharge of effluent from the Buffalo Harbor confined disposal facility (CDF) associated with the disposal of material proposed to be dredged from Buffalo Harbor. This material would be dredged under the Great Lakes Restoration Initiative (GLRI) and it is more contaminated in comparison to the material that is routinely dredged and placed in the CDF (U.S. Army Corps of Engineers [USACE] 1993).

1. PROJECT DESCRIPTION

1.1 Location.

Buffalo Harbor is located in Erie County, New York and on the east end of Lake Erie at the mouth of the Buffalo River, approximately 175 miles northeast of Cleveland, Ohio.

1.2 General Description.

1.2.1 *Buffalo Harbor Federal Navigation Project*. The Federal navigation project at Buffalo Harbor is designed to accommodate commercial navigation. Buffalo Harbor includes a series of authorized Federal navigation channels designed and maintained so that deep-draft commercial vessels can safely navigate the harbor (see Figure 1 of the Environmental Assessment [EA]). A major Federal navigation channel is located in the lower Buffalo River, which flows from the east and discharges into Lake Erie at the head of the Niagara River. The Ship Canal, situated south of the river’s mouth, includes another Federal navigation channel. The Federal navigation channels within the Buffalo River and Ship Canal are also situated within the designated Buffalo River Area of Concern (AOC). The USACE-Buffalo District maintains Buffalo Harbor and conducts an annual survey of the Federal navigation channels to determine which areas require dredging. Due to funding limitations, only portions of these channels can be dredged about every other year where shoals substantially impede commercial navigation.

A typical dredging goal in Buffalo Harbor is to maintain the Federal navigation channels in Buffalo River and Ship Canal to an authorized depth of 22 feet below Low Water Datum (LWD)[1]. On average, this had resulted in the dredging of approximately 140,000 cubic yards (CY) of sediment every two years. Almost one million CY of sediment have been removed from the harbor over the past 18 years. Nevertheless, reduced funding levels over the past several years have resulted in the accumulation of an estimated 750,000 CY of undredged (i.e., "backlog") material in the harbor's Federal navigation channels.

Material dredged from Buffalo Harbor Federal navigation channels is typically placed in CDF No. 4 in the Outer Harbor (see Figure 1 of the EA). This facility was constructed in 1972 mainly for the disposal and containment of material dredged from Buffalo Harbor, Black Rock Canal and Tonawanda Harbor Federal navigation channels. Material dredged by non-USACE entities from other areas is periodically placed in the CDF subject to specific USACE approval.

1.2.2 *Proposed Project.* The selected plan would involve maintenance dredging of the Federal navigation channels in Buffalo River and Ship Canal (Figure 1 of the EA) under GLRI. The dredging would occur to a depth of 23.5 feet below LWD and may include an additional six inches of "overdepth" to ensure that the specified depths are achieved. A combined dredging depth of 24 feet below LWD in these Federal navigation channels is allowed under existing USACE authorities. The project would entail dredging Areas A through P in the River Channel and Ship Canal (see Figure 2 of the EA). Contingent on the availability of funds, an additional area of the Buffalo River and Ship Canal between lines A and B may also be dredged. An estimated 450,000 to 650,000 CY of sediment would be removed from these areas. The dredging operation is tentatively scheduled to be performed beginning June 15, 2011 in the River Channel and after July 1 in the Ship Canal. This project would be accomplished by a contractor of the Federal government.

The material to be dredged consists primarily of silts and clays, with some sands. The sediments have been thoroughly tested and evaluated, and are comparable to or somewhat more contaminated than those routinely maintenance dredged from Buffalo Harbor Federal navigation channels. The dredged material would be placed in CDF No. 4 located in the Outer Harbor adjacent to the South Entrance Channel (see Figure 1). Planned repairs to the confinement dike of this CDF would be completed prior to implementation of the dredging. The CDF can safely and adequately accommodate this dredged material. Overflow weirs in the dike designed to decant water (effluent) from the facility would not be employed during this project. Effluent from the placement of

[1]Low Water Datum (LWD) for Lake Erie is 573.4 feet above mean sea level at Rimouski, Quebec, Canada (International Great Lake Datum [IGLD] 1985).

dredged material with carrier water in the CDF would be discharged through the confinement dike into Lake Erie. It is anticipated that mechanical dredging equipment would be used to perform the dredging, which would include the use of a barge-mounted crane with an enclosed clamshell bucket. The clamshell bucket would excavate the sediments and place it aboard scows, and the scows would be used to transport the dredged material to the CDF. Water associated with the dredged material (supernatant) in the scows would not be allowed to overflow into harbor or lake water. At the CDF, dredged material would be hydraulically pumped from the scows into the facility.

1.3 Authority and Purpose.

Buffalo Harbor was initially adopted by the River and Harbor Act of 1826 with subsequent authorizations in 1866, 1874, 1896, 1899, 1900, 1902, 1907, 1909, 1910, 1912, 1919, 1927, 1930, 1935, 1945, 1960, 1962, 1986, as well as the 1986, 1988 and 2007 Water Resources Development Acts (WRDA). CDF No. 4 was authorized by Section 123 of the Rivers and Harbor Act of 1970 under Public Law 91-611 in 1977. The maintenance dredging of Buffalo Harbor Federal navigation channels proposed under this plan would be funded under the GLRI.

This dredging is intended to restore selected areas in these channels within Buffalo River and Ship Canal to design dimensions through the safe removal and disposal of contaminated sediments. This dredging would facilitate safe and efficient commercial navigation and its associated benefits. The long-term environmental and human health benefits of removing these sediments from the harbor would substantially outweigh the negligible to minor short-term risks associated with the dredging project.

The USEPA Great Lakes National Program Office (GLNPO) is currently leading another Buffalo River AOC effort under the Great Lakes Legacy Act (GLLA). This involves planning for the remediation of contaminated sediments located outside of the authorized Federal navigation channels in Buffalo River and Ship Canal. If implemented, the proposed USACE dredging funded under GLRI would serve to compliment the planned GLLA dredging by removing a substantial amount of contaminated sediment from the Buffalo River and Ship Canal.

1.4 General Description of Dredged or Fill Material. The “dredged material” constituting the discharge is effluent from the CDF that would be released into Lake Erie water in the Outer Harbor.

1.4.1 *General Characteristics of the Material*. A description of the effluent to be released from the CDF as a result of this dredging operation is described in USAERDC (2010). The effluent would consist of water with low-level dissolved concentrations of pollutants such as organic contaminants including total polycyclic aromatic hydrocarbons (PAHs), benz(a)anthracene, fluorene, phenanthrene, total polychlorinated biphenyls

(PCBs), and heavy metals including lead, mercury and copper.

1.4.2 *Quantity of Material*. An estimated 2,250,000 cubic yards of effluent would be discharged from the CDF during this dredging operation (USAERDC 2010).

1.4.3 *Source of Material*. The effluent would be generated via the process of placing Buffalo Harbor dredged material in the CDF. This material is being dredged from authorized Federal navigation channels in the Buffalo River and Ship Canal.

1.5 General Description of the Proposed Discharge Site.

1.5.1 *Location*. CDF No. 4 is located in the Buffalo Outer Harbor adjacent to the South Entrance Channel (see Figure 1 of the EA). Effluent from the CDF would be discharged into the surrounding Lake Erie water in the Outer Harbor (Figure 1).

1.5.2 *Size*. CDF No. 4 is 107 acres in area. However, see Paragraph 1.5.3 below.

1.5.3 *Type of Site*. The CDF is confined and it would discharge effluent into Lake Erie waters in the Outer Harbor. Depths in Lake Erie water surrounding the CDF where the effluent would discharge range from approximately 0 to 30 feet.

1.5.4 *Type of Habitat*. The CDF is a nearshore facility that extends the peninsula of land at the South Entrance of Buffalo Harbor, connecting the northwestern corner of the land to the northwest tip of the South Entrance Arm of the Stony Point Breakwater with an arc of dike. The confinement dike contains a sand and gravel filter core rising to an elevation about 2.5 feet below mean lake level (568.6 feet LWD) in water depths of up to 30 feet. The core is covered with layers of rock of increasing size to stabilize the dike. The dikes rise to a height about 15 feet above mean lake level with side slopes (H:V) of 1.5. A steel sheet pile wall is driven 24 feet into the dike along the centerline of its entire length. Grouting repairs to this steel pile wall are planned for 2010 in order to restore complete functionality to the confinement dike as originally designed, which is to be permeable but to constrict water flows to be only through the sand and gravel filter core. Warmwater aquatic habitat in Lake Erie surrounding the CDF in the vicinity of the effluent discharge is a high energy area consisting of downwardly sloped stone of the confinement dike, mud lake-bottom and deeper water column. Depending on proximity to the lakeward slope of the dike, water depths in the vicinity of the effluent discharge range from approximately 0 to 30 feet.

1.5.5 *Timing and Duration of Discharge*. Dredging with dredged material placement would be tentatively scheduled to occur beginning June 15, 2011. During placement of dredged material in the CDF, the effluent is estimated to discharge through the confinement dike at a maximum rate of 7.8 cubic feet per second (cfs).

1.6 Description of Discharge Method. Dredged material with its carrier water would be pumped into the CDF, and effluent from this activity would be discharged through the confinement dike.

2. FACTUAL DETERMINATIONS

2.1 Physical Substrate Determinations.

2.1.1 *Substrate Elevation and Slope*. The discharge of effluent through the confinement dike would not significantly affect substrate elevation and slope.

2.1.2 *Sediment Type*. Bottom sediments outside of the confinement dike are predominantly fine-grain in nature. The discharge in effluent through the confinement dike would not significantly affect this sediment type.

2.1.3 *Dredged Material Movement*. The effluent discharged through the confinement dike would be subject to lake hydrodynamics (currents and wave action) along the exterior of the confinement dike.

2.1.4 *Physical Effects on Benthos*. The effluent discharged through the confinement dike may force some benthos off and/or away from the dike. This effect would be localized, temporary and not significant.

2.1.5 *Other Effects*. No other effects have been identified with respect to physical substrate elevation and slope.

2.1.6 *Actions Taken to Minimize Impacts*:

- The confinement dike is designed to retain sediments (and their associated contaminants) within the CDF.

2.2 Water Circulation, Fluctuation and Salinity Determinations.

2.2.1 *Water*:

a. Salinity—Not applicable.

b. Water Chemistry—No significant effects.

c. Clarity—No significant effects.

d. Color—No significant effects.

e. Odor—No significant effects.

f. Taste—No significant effects.

g. Dissolved Gas Levels—No significant effects.

h. Nutrients—No significant effects.

i. Eutrophication—No significant effects.

2.2.2 *Current Patterns and Circulation*:

a. Current Pattern and Flow—No significant effects.

b. Velocity—No significant effects.

c. Stratification—No significant effects.

d. Hydrologic Regime—No significant effects.

2.2.3 *Normal Water Level Fluctuations*. No significant effects.

2.2.4 *Salinity Gradients*. Not applicable.

2.2.5 *Actions Taken to Minimize Impacts.* No further actions are deemed appropriate.

2.3 Suspended Particulate/Turbidity Determinations.

2.3.1 *Expected Changes in Suspended Particulates and Turbidity in the Vicinity of the Placement Site*. The discharge in effluent through the confinement dike would not result in any significant changes in suspended particulates and turbidity.

2.3.2 *Effects on Chemical and Physical Properties of the Water Column*:

a. Light Penetration—The effluent discharged through the confinement dike would be clear and not significantly influence light penetration into the water column.

b. Dissolved Oxygen—The discharge of effluent through the confinement dike would not significantly influence dissolved oxygen levels in the water column.

c. Toxic Metals and Organics—Metals and organics would be present in the effluent discharged from the CDF and would be released to the water column. A characterization of this effluent is included in USAERDC (2010). The effluent would contain low-level dissolved concentrations heavy metals such as lead, mercury and copper, and organic contaminants such as total PAHs, benz(a)anthracene, fluorene, phenanthrene and total PCBs. Table 1 includes a summary of predicted contaminants of concern (COC) concentrations in the effluent, all of which are below New York State water quality standards (WQSs).

d. Pathogens—The discharge of effluent through the confinement dike would not significantly influence pathogens.

e. Aesthetics—The effluent discharged through the confinement dike would be clear and have no significant effects on aesthetics.

2.3.3 *Effects on Biota*:

a. Primary Production and Photosynthesis—The effluent discharged through the confinement dike would be clear and low in nutrient concentrations. No significant effects to primary production and photosynthesis would occur.

b. Suspension/Filter Feeders—The effluent discharged through the confinement dike may force some suspension and filter feeders off and/or away from the confinement dike. This effect would be localized, temporary and not significant.

c. Sight Feeders—The temporary loss of some suspension and filter feeders off and/or away from the confinement dike may affect some sight feeders. This effect would be localized, temporary and not significant.

2.3.4 *Actions Taken to Minimize Impacts*.

- The contractor would be required to minimize accidental spills of petroleum, oil or lubricants. The contractor would be required to prepare and implement an Environmental Protection Plan and Oil Spill Contingency Plan.
- The contractor would be prohibited from purposely allowing the overflow of water (supernatant) from scows containing the dredged material.

2.4 Contaminant Determinations. This evaluation pertains to the contaminant determination at 40 CFR 230.11(d), and its purpose is to determine the degree to which the CDF effluent material proposed for discharge would introduce, relocate or increase contaminants.

2.4.1 *Potential Sources of Sediment Contamination*. The potential source of effluent contamination would be Buffalo Harbor dredged material placed in the CDF.

2.4.2 *Dredged Material Discharge Evaluation*. The dredged material discharge relates to the release of effluent from the CDF as it is associated with the proposed dredging operation. A comprehensive evaluation of effluent to be generated and released from the CDF is presented in USAERDC (2010).

a. Effluent COCs—The modified elutriate test (MET) is designed or predict the release of contaminants from dredged material placed in CDFs. In order to identify which contaminants in CDF 4 effluent had the potential to exceed New York State WQSs or screening values, MET data on Buffalo Harbor sediments were used to calculate ratios of average MET dissolved concentration to the WQSs or screening values for acute toxicity and chronic toxicity to aquatic organisms. A ratio greater than one indicates the potential of the effluent to exceed the WQS or screening value. These ratios yielded a total of eight COCs for water quality impairment, including copper, lead, mercury, total PCBs, total PAHs and the PAH compounds benz(a)anthracene, fluorene and phenanthrene.

b. CDF pond water quality—MET data were used to conservatively estimate the quality of water (contaminant concentrations) in the CDF pond. Relative to actual measured pore water concentrations, the MET data indicated high dissolved water concentrations, suggesting inordinately low partitioning. Table 1 summarizes the dissolved elutriate, bulk sediment and sediment pore water data, and the corresponding partitioning coefficients. The MET derived partitioning coefficient data for PAHs, PCBs and metals were used to develop a worst-case scenario for CDF pond water quality. Because the volume of dredged material and its carrier water is nearly twice the volume of the existing CDF pond water, a conservative assumption would be that the pond water quality will approach the dissolved concentrations indicated by the average MET result. Partitioning of the COCs from suspended sediment to the CDF pond water was conducted using average partitioning results from the MET to predict the final and worst case CDF water quality. The predicted pond water COC concentrations (included in Table 2) fall between the average MET results and pore water results.

c. Effluent generation—The quantity of effluent discharged from the CDF would be equal to the volume of dredged material placed into the CDF. The volume of dredged material placed is the volume of the material plus up to four times (worst case) carrier water required to pump the material into the CDF. Based on a daily production rate of 5000 cubic yards (CY), this translates into a maximum effluent discharge from the CDF of 25,000 CY/day or 7.8 cfs.

d. Effluent mixing within the confinement dike—Mixing from wave action will serve to dilute the effluent in the confinement dike with the *in-situ* CDF pond water. Effluent passing through toward the outside of the confinement dike is exposed to Lake Erie waves running up the dike and a portion of the wave crest infiltrates into the dikes. This infiltration builds a head above the lake level inside the dike and creates a flow throughout the depth of the dike, which mixes and dilutes the effluent discharge as it passes through the dike. The average infiltration rate resulting from this action was estimated to be 30% of the wave volume, or 880 cfs. Using the conservative CDF effluent discharge rate of 7.8 cfs, the dilution factor in the dike was estimated to be 113.

e. Effluent discharge water quality—Given the dike dilution factor of 113, effluent discharge through the outer face of the confinement dike is predicted to have contaminant concentrations that are less than 1% of those in CDF pond water. This translates to all effluent COCs having concentrations of more than an order of magnitude below the water quality criteria for acute criteria, and about a factor of two below the water quality criteria for chronic toxicity (note that for lead and copper, measured lake water contamination was factored into the predicted effluent concentration) (see Table 4 of USAEREDC 2010). For example, total PAH concentrations in the effluent discharge are predicted to be 0.23 µg/L, which is well below the New York State acute and chronic criteria of 25 µg/L and 6.1µg/L, respectively. Table 2 includes a summary of predicted COC concentrations in the effluent discharge into Lake Erie relative to CDF pond water following dike dilution.

2.4.3 *Determination*. This evaluation indicates that the discharge of effluent from the CDF associated with the GLRI-funded Buffalo Harbor dredging project would comply with applicable New York State WQSs.

2.5 Aquatic Ecosystems and Organisms Determinations.

2.5.1 *Effects on Plankton*. The discharge of effluent through the confinement dike would not significantly affect plankton.

2.5.2 *Effects on Benthos*. The effluent discharged through the confinement dike may force some benthos off and/or away from the dike. This effect would be localized, temporary and not significant.

2.5.3 *Effects on Nekton*. The loss of some benthos from the confinement dike may affect some nekton. This effect would be localized, temporary and not significant.

2.5.4 *Effects on Aquatic Food Web*. Disruption and disturbance by equipment during the dredged material placement operation would result in a short-term avoidance of the project area by local wildlife species, primarily fish and aquatic birds. Only minor, localized temporary effects on the aquatic food web are expected to occur as a result of the discharge of effluent from the confinement dike.

2.5.5 *Effects on Special Aquatic Sites*:

a. Sanctuaries and Refuges—Not applicable.

b. Wetlands—No significant effects are expected.

c. Mud Flats—No significant effects are expected.

d. Vegetated Shallows—No significant effects are expected.

e. Coral Reefs—Not applicable.

f. Riffle and Pool Complexes—Not applicable.

2.5.6 *Threatened and Endangered Species*. Consultation with the USFWS relative to the possible presence of threatened or endangered species or their critical habitat within the affected area was initiated on April 10, 2010 and via Section 404 Public Notice dated May 19, 2010. USFWS indicated that except for occasional transient individuals, no Federally-listed or proposed endangered or threatened species, or candidate species under our jurisdiction are known to exist in Erie County. In a letter dated May 27, 2010, USFWS indicated that no further Endangered Species Act coordination or consultation was required.

2.5.7 *Other Wildlife*. Disruption and disturbance by equipment during the dredged material placement operation would result in a short-term avoidance of the project area by local wildlife species, primarily aquatic birds.

2.5.8 *Actions Taken to Minimize Impacts*.

- Dredging operations would be scheduled to occur such that impacts to fish would be minimized. The dredging operation is tentatively scheduled to begin June 15, 2011 in the River and after July 1 in the Ship Canal.
- The contractor would be prohibited from allowing the discharge of supernatant from scows containing the dredged material.
- The CDF overflow weirs, which are designed to discharge effluent from the facility, would not be employed during this dredging operation.
- The contractor would be required to minimize accidental spills of petroleum, oil or lubricants. The contractor would be required to prepare and implement an Environmental Protection Plan and Oil Spill Contingency Plan.

2.6 <u>Proposed Discharge Site Determinations</u>.

2.6.1 *Mixing Zone Determination*. Since it is predicted that the concentrations of all contaminants in the effluent would be below applicable New York State WQSs, no Mixing Zone determination is necessary.

2.6.2 *Determination of Compliance with Applicable Water Quality Standards*. Under a worst case scenario, concentrations of all effluent COCs were predicted to be more than an order of magnitude below the water quality criteria for acute criteria, and about a factor of two below the water quality criteria for chronic toxicity (Table 1). Consequently, the discharge of effluent from the CDF would appear to comply with applicable New York State WQSs. Pursuant to Section 401 of the Clean Water Act, USACE-Buffalo District has applied to New York State Department of Environmental Conservation (NYSDEC) for a Water Quality Certification.

2.6.3 *Potential Effects on Human Use Characteristics*:

a. Municipal and Private Water Supply—The discharge of effluent through the CDF confinement dike would not adversely affect any public services or facilities.

b. Recreational and Commercial Fisheries—The discharge of effluent through the CDF confinement dike would not adversely affect recreational and commercial fisheries.

c. Water-related Recreation—The discharge of effluent through the CDF confinement dike would not adversely affect water-related recreation.

d. Aesthetics—The discharge of effluent through the CDF confinement dike would not adversely affect aesthetics.

e. Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves—Not applicable.

2.7 <u>Determination of Cumulative Effects on the Aquatic Ecosystem</u>. No significant, adverse cumulative effects on the aquatic ecosystem would be expected to occur as a result of the discharge of effluent from the confinement dike.

2.8 <u>Determination of Secondary Effects on the Aquatic Ecosystem</u>. No significant, adverse secondary effects on the aquatic ecosystem would be expected to occur as a result of the discharge of effluent from the confinement dike.

FINDING OF COMPLIANCE

1. No Significant adaptations of the Section 404(b)(1)Guidelines were made relative to this evaluation.

2. The proposed plan was selected based on its ability to best address the identified community needs and to sufficiently satisfy national goals and planning objectives. It reasonably maximizes National Economic Development (NED) benefits consistent with protecting the Nation's Environmental Quality. The other alternatives considered could not be justified economically or by other accounts. The following alternative plans were considered:

(a) Alternative 1—No Action, under which the Federal Government would not use GLRI funding to conduct this dredging operation. See paragraph 3.1 of the EA regarding why this alternative was eliminated from consideration.

(b) Alternative 2—This plan is identical to the proposed plan, except that it includes dredging Area L (DA-L) (see Figure 3 of the EA), with placement of the associated dredged material and effluent discharge. See paragraph 3.2 the EA regarding why this alternative was eliminated from consideration.

(c) Alternative 3—This plan is similar to the proposed plan, but would involve dredging Areas A through P (except L) to 23 feet below LWD (instead of the preferred 24 feet below LWD), with placement of the associated dredged material and effluent discharge. See the paragraph 3.3 of the EA regarding why this alternative was eliminated from consideration.

3. The discharge of effluent through the CDF confinement dike would not violate applicable State Water Quality Standards, nor will it violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

4. The discharge of effluent through the CDF confinement dike would not jeopardize the continued existence of any Federal-listed threatened or endangered species, or their designated critical habitat.

5. The discharge of effluent through the CDF confinement dike would not contribute to significant degradation of waters of the United States, nor would it result in significant adverse effects on human health and welfare; municipal and private water supplies; recreation and commercial fishing; plankton, fish, shellfish, wildlife, or special aquatic sites; life stages of organisms dependent on the aquatic ecosystem; ecosystem diversity, productivity and stability; or recreational, aesthetic, and economic values.

6. Appropriate and practicable steps would be taken to minimize potential adverse impacts of the discharges associated with this dredging operation on the aquatic ecosystem.

7. On the basis of the guidelines, the discharge of effluent through the CDF confinement dike is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution and adverse effects on the aquatic ecosystem.

REFERENCES

USACE. 1993. *Environmental Assessment and Finding of No Significant Impact (including Section 404[b][1] Evaluation), Operation and Maintenance, Buffalo Harbor, Black Rock Canal and Tonawanda Harbor, New York*.

USAERDC. 2010. Evaluation of Dredged Material Placement in Buffalo Harbor CDF. CEERD-EP-E memorandum dated March 11, 2010.

FIGURE 1. Area of effluent discharge around CDF No. 4.

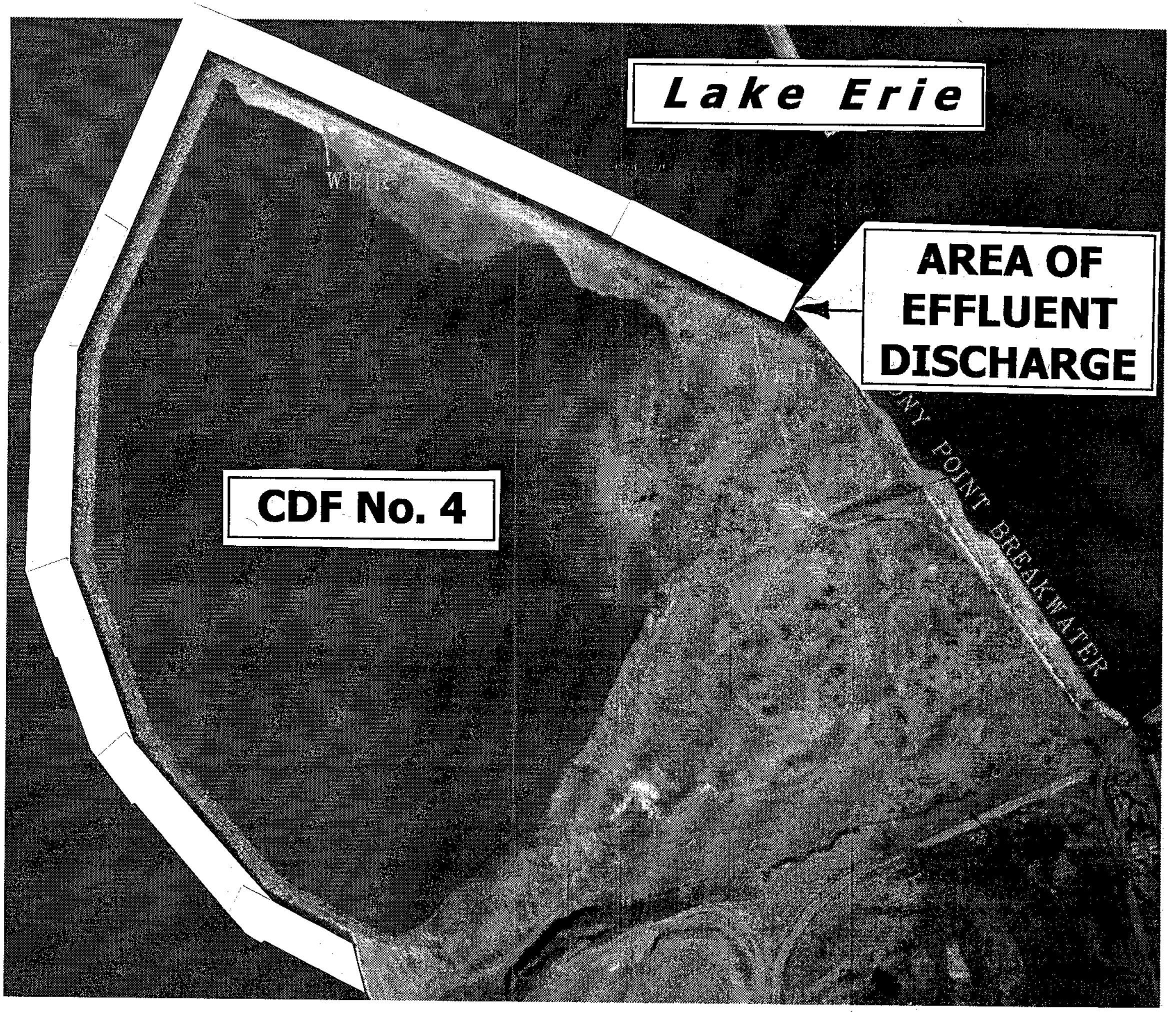


TABLE 1. Dissolved elutriate, bulk sediment and dissolved pore water data, and associated partitioning coefficients, relative to COCs in CDF effluent associated with Buffalo Harbor GLRI dredged material (after USAERDC 2010).

	Sediment elutriate			Sediment pore water		
Contaminant of concern (COC)	**Average dissolved concentration (ug/L)**	**Average bulk sediment concentration (mg/kg)**	**Average bulk partitioning coefficient (L/kg)**	**Average dissolved concentration (ug/L)**	**Average bulk sediment concentration (mg/kg)**	**Average bulk partitioning coefficient (L/kg)**
Total PAHs	201	63.4	**315**	2.07	63.4	**30,637**
Benz(a)anthracene	7.59	2.62	**345**	0.01	2.62	**32,909**
Fluorene	21.3	6.72	**315**	0.27	6.72	**4,287**
Phenanthrene	57.4	18.2	**318**	0.23	18.2	**10,721**
Total PCBs	3.15	0.46	**146**	0.01	0.46	**182,923**
Lead	302	142	**471**	NA	NA	**NA**
Mercury	3.54	1.67	**472**	NA	NA	**NA**
Copper	215	57.6	**268**	NA	NA	**NA**

TABLE 2. Summary of predicted COC concentations in various water media relative to the Buffalo Harbor GLRI dredging project (after USAERDC 2010).

Contaminant of concern (COC)	CDF pond (ug/L)	Effluent discharge rate (cfs)	Dike dilution factor	Lake water (ug/L)	CDF effluent (ug/L)	Water quality standard (ug/L)	
						Acute	Chronic
Total PAHs	25.9	7.8	113	0	**0.23**	**25**	**6.1**
Benz(a)anthracene	2.35	7.8	113	0	**0.02**	**0.23**	**0.03**
Fluorene	0.66	7.8	113	0	**0.006**	**4.8**	**0.54**
Phenanthrene	2.9	7.8	113	0	**0.03**	**45**	**5**
Total PCBs	0.62	7.8	113	0	**0.005**	**2**	**0.014**
Lead	135	7.8	113	1	**2.2**	**60**	**3.7**
Mercury	0.69	7.8	113	0	**0.006**	**1.4**	**0.77**
Copper	185	7.8	113	3	**4.64**	**13**	**8.8**

APPENDIX C

ENGINEER RESEARCH AND DEVELOPMENT CENTER REPORTS

CEERD-EP-E 11 March 2010

MEMORANDUM FOR Mr. Byron Rupp, CELRB-PM-PB

SUBJECT: Evaluation of Dredged Material Placement in Buffalo Harbor Confined Disposal Facility

1. Objective. The objective of this evaluation of dredged material placement in the Buffalo Harbor confined disposal facility (CDF) is to determine the need for controls at the CDF, modifications to the placement operation, or a mixing zone to satisfy water quality criteria for the discharge from the facility. Under Section 404(b)(1) of the Clean Water Act, the effluent quality of a discharge of dredged material carrier water is predicted by running a modified elutriate test to determine site-specific contaminant release characteristics and then applying contaminant fate and transport models and mixing models as appropriate for site conditions. When necessary, additional studies and analysis can be applied to ensure that risk goals will be met. To satisfy the objective of this evaluation, a conservative estimate of the discharge water quality is generated based on total dissolved contaminant concentration, including both the truly dissolved concentration in water and the contaminant concentration associated with organic carbon, which may not be bioavailable nor contribute to toxicity. Information on the truly dissolved contaminant concentrations in pore water is provided to provide a basis for judging how little of the total dissolved contaminant concentration is likely to be truly dissolved and contributing significantly to risk (comparable to the water quality criteria).

2. Dredging Operation. Dredged material from Buffalo River Federal navigation channels within the designated Great Lakes Area of Concern is proposed to be placed in the Buffalo Harbor CDF. The proposed dredging operation consists of mechanically dredging about 440,000 cy of sediment into 1000- to 3000-cy barges. The barges will be transported to the CDF where the dredged material will be hydraulically off-loaded using water from the harbor or, if necessary to achieve discharge water quality standards, from the CDF. The daily dredged material production is estimated to be 5000 cy. Typically, about 2 to 4 parts of water would be added to one part of sediment during the off-loading.

3. Existing CDF Site Conditions. The Buffalo Harbor CDF is a nearshore CDF that extends the peninsula of land at the entrance of the harbor, connecting the northwestern corner of the land to the northwest tip of the South Entrance Arm of the Stony Point Breakwater with an arc of dike. The dike is composed of a sand and gravel filter core rising to an elevation about 2.5 ft below mean lake elevation in water depths of up to 30 feet. The core is covered with layers of rock of increasing size to stabilize the dike. The dikes rise to a height about 15 ft above the mean lake level (568.6' L.W.D.) with side slopes (H:V) of 1.5. A steel sheet pile wall was driven 24 ft into the dike along the centerline of the entire length of the dike. Grouting repairs to the steel pile wall are planned for 2010 to restore the function of the confinement dike as originally designed, restricting the discharge to the sand and gravel filter core. The dike was designed to be permeable, but the CDF has two weir structures with their bases at an elevation about 10 feet above the mean lake level. The Buffalo Harbor CDF has been in use since 1972. Dredged material has consistently been placed along the northeasterly sides of the CDF (along the breakwater and land), which has sealed the breakwater side of the CDF. In 1997 the CDF had about 1.7 million cubic yards of storage capacity below mean lake level. By analyzing the bottom slope and the change in surface area, the CDF is estimated to presently have about 1.2 million cubic yards of storage capacity below mean lake level. All of the dredged material disposed in this proposed project will be placed below the mean lake level.

4. Approaches to Estimate CDF Discharge Water Quality. Effluent water quality is typically predicted by modified elutriate testing; however, this testing does not consider any potential dilution that may occur from discharging into a CDF filled with an abundance of lake water nor does it consider any mixing of the discharge within the dike with wave induced infiltration. The influence of existing water on the effluent quality can be estimated by a partitioning analysis, while the elutriate quality could be used for a worst-case analysis. The effect of wave-induced mixing and dilution in the outer dikes can be estimated by considering the infiltration rate and the discharge rate.

5. Effluent Generation. The quantity of effluent discharged from the CDF will be equal to the volume of dredged material placed into the CDF. The volume placed is the volume of the sediment being dredged plus up to 4 volumes (worst case) of carrier water to pump the dredged material. Since 440,000 cy of sediment is being dredged, the total worst-case volume of effluent is 2,200,000 cy, which is nearly double the existing volume of water in the CDF. At the end of the disposal project, the newly placed and settled dredged material would be expected to occupy about 650,000 cy, all below the mean lake level where the contaminants will remained in an anoxic, geochemically reduced condition. At the end of disposal, about 550,000 cy of water will remain in the CDF below the mean lake elevation. Since up to 5000 cy of sediments will be dredged per day, the maximum discharge rate is 25,000 cy per day or 7.8 cfs. Since the average residence time in the CDF is about 35 days, the average total suspended solids (TSS) concentration in the ponded water will be quite low, probably less than 20 mg/L. However, based on settling test results, about 1% of the daily solids discharge into the CDF will stay in suspension for at least a day. The contaminants on that 1% of the solids will be able to partition with the existing CDF water to create the effluent, composed with only dissolved contaminants. This evaluation assumes that the planned 2010 CDF grouting repairs restore the function of the confinement dike as originally designed, preventing loss of TSS and particulate-associated contaminants from the CDF in the discharge.

6. Elutriate Data (Worst Case). The average elutriate data from the thirteen samples taken throughout the dredging reaches are listed in Table 1 along with the corresponding average partitioning coefficients from the elutriate results. The concentrations of dissolved PAHs are more than an order of magnitude greater than the pore water data given below in Table 2, indicating the presence of a dissolved organic fraction or perhaps TSS in the elutriate sample. The results would suggest that the difference is most likely the result of dissolved organic carbon, which averaged 13.3 mg/L in the filtered (dissolved) elutriate sample. The partitioning coefficients for the metals are also very low for a dredged material slurry (yielding high dissolved concentrations), considering the high clay content and the initially high AVS/SEM ratios (about 2) of the sediments. However, the partitioning is characteristic of contaminant release for the TSS suspended for hours or days in the CDF. High TSS concentrations in the elutriate sample would also lower the apparent partitioning coefficient, but it would require TSS concentrations greater than 100 mg/L to significantly lower the apparent partitioning coefficient by an order of magnitude. Nevertheless, the use of these elutriate partitioning results would represent a worst case for discharge contaminant concentrations.

7. Pore Water Contaminant Partitioning. The partitioning of PAHs was computed using data from the analysis of bulk sediment and pore water data (EPA method 8270 and 8272) collected under the EPA GLLA investigation or from elutriate data collected by the USACE. The partitioning of PCBs was computed using the analysis of PCB congeners resulting from 28-day laboratory aqueous partitioning tests and from elutriate test data collected by the USACE. The partitioning of metals was computed only using elutriate data. The partitioning results from the pore water data are given in Table 2.

8. Selection of COCs for Effluent Analysis. The ratios of the average elutriate dissolved concentration to the water quality criteria or screening values for acute toxicity and chronic toxicity to aquatic organisms were computed for each contaminant having criteria or screening values. The eight contaminants having an average elutriate dissolved concentration greater than the criterion or screening value for acute toxicity were selected as the COCs for effluent analysis. The ratios of elutriate concentration to the criterion or screening value for chronic toxicity for these eight contaminants were also greater than the corresponding ratios for all of the other contaminants, confirming that the eight selected COCs would provide the greatest exceedances of water quality criteria and would be sufficient for determining water quality impairment. The eight selected COCs are copper, lead, mercury, Total PCBs, Total PAHs, benzo(a)anthracene, florene, and phenanthrene.

9. CDF Pond Water Quality. The CDF pond water quality is expected to deteriorate over the course of the disposal project as the dredged material mixes with existing CDF water and displaces the CDF water. Because the volume of dredged material and its carrier water is nearly twice the volume of the existing CDF water, a conservative assumption would be that the CDF pond water quality will approach the water quality of the average dissolved elutriate test. An incremental fill analysis assuming 2% of the dredged material mixes into the CDF water (based on the settling test results after only 4 hours of settling) was conducted to confirm the reasonableness of this assumption that the average dissolved elutriate would be a predictor of the effluent considering the large quantity of existing CDF water. The concentration of eight selected COCs in the dredged material from the 45 dredging subunits were used, proceeding from upstream to downstream in daily aliquots, to sequentially develop CDF water quality estimates. The partitioning of the eight COCs from suspended sediment to the ponded CDF water was conducted using the average partitioning results from the elutriate test to compute the final (worst case) CDF water quality. The results of the partitioning analysis are given in Table 3 along with the average dissolved elutriate and maximum pore water concentrations for comparison. The predicted CDF pond water concentrations fall between the average elutriate and pore water results.

10. Mixing within the Dike. The discharge from the CDF passes through the dike, predominantly through the constructed rock dike with a sheet pile wall in the upper portion of the dike and a sand/gravel filter core in the lower portion of the dike. This dike lies outside the Stony Point Breakwater and is exposed to wave action from Lake Erie. Waves run up the outside of the dikes and a portion of water in the wave crest infiltrates into the dikes. This infiltration builds a head above the lake level inside the dike and creates a flow throughout the depth of the outer dike. This infiltration induced flow mixes with the effluent discharge through the dike and dilutes the effluent within the dike. The average wave height and wave period during the dredging season is 0.86 meters and 3.9 seconds, respectively. Assuming a dike slope of 1.5 (H:V), a wave run up factor of 1.5 (a height of 1.5 times the wave height above the elevation of the wave trough or an additional half of the wave height above the wave crest) and an exchangeable porosity in the dike of 0.15 (about half of the porosity), the unit infiltration rate is on average 0.025 m^3/sec-m or about 30% of the wave volume. The length of the exchangeable dike is 1090 meters; therefore, the average infiltration rate is estimated to be 24.9 m^3/sec or 880 cfs.

11. Discharge Water Quality. Since the effluent discharge rate is predicted to be 7.8 cfs, the dilution factor in the dike is estimated to be a factor of 112. As such, the discharge through the outer face of the dike is predicted to have contaminant concentrations that are less than 1% of the contaminant concentrations in the CDF water. The predicted discharge concentrations are given in Table 4 where the values are compared with water quality criteria to examine compliance. All contaminants in the discharge are predicted to be in compliance.

12. Conclusions. A conservative (worst case) analysis of potential discharge water quality was performed. A practical worst case CDF water quality was estimated from elutriate data and compare with results from pore water data to demonstrate the potential degree of conservativeness. Then, a practical minimum infiltration rate induced by wave action was calculated using a conservative run up factor and a conservative exchangeable porosity, yielding an infiltration of only 30% of the wave volume. After applying the conservative dilution factor for the wave mixing within the dike, the projected disposal operation is predicted to meet water quality criteria without modification to the CDF (such as the incorporation of a separate cell within the CDF) or to the disposal operation (such as slowing the rate of disposal or recirculating water from the CDF to the barge for off-loading to reduce the discharge rate). All of the contaminants of concern are predicted to have discharge concentrations more than an order of magnitude below the water quality criteria for acute criteria and about a factor of two below the water quality criteria for chronic toxicity. Recirculation would further increase the dilution by up to a factor of four and could provide an additional factor of safety.

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Table 1. Average Elutriate Results			
Constituent	Average Dissolved Elutriate Conc ug/L	Average Bulk Sediment Conc mg/kg	Average Elutriate Partitioning Coefficient L/kg
PAHs (total)	201.26	63.38	315
ACENAPHTHENE	27.59	8.63	313
ACENAPHTHYLENE	BD	BD	
ANTHRACENE	16.34	7.54	461
BENZO(A)ANTHRACENE	7.59	2.62	345
BENZO(A)PYRENE	6.14	1.52	247
BENZO(B)FLUORANTHENE	7.90	1.66	211
BENZO(G,H,I)PERYLENE	BD	BD	
BENZO(K)FLUORANTHENE	4.30	1.59	369
BENZO[E]PYRENE	6.95	0.83	119
CHRYSENE	6.77	2.56	378
DIBENZ(A,H)ANTHRACENE	BD	BD	
FLUORANTHENE	29.84	11.18	375
FLUORENE	21.34	6.72	315
INDENO(1,2,3-C,D)PYRENE	2.00	0.39	194
NAPHTHALENE	19.74	3.79	192
PHENANTHRENE	57.41	18.24	318
PYRENE	23.39	7.21	308
1-METHYLNAPHTHALENE	22.91	6.31	275
2-METHYLNAPHTHALENE	39.82	13.97	308
BIPHENYL (DIPHENYL)	8.45	4.80	568
C1-CHRYSENES	BD	2.36	
C2-CHRYSENES	BD	1.94	
C3-CHRYSENES	BD	1.97	
C4-CHRYSENES	BD	0.40	
C1-FLUORAN/PYRENES	1.19	5.00	4205
C1-FLUORENES	1.18	4.92	4158
C2-FLUORENES	BD	4.31	
C3-FLUORENES	BD	3.80	
C1-NAPHTHALENES	1.50	13.24	8829
C2-NAPHTHALENES	2.00	10.62	5310
C3-NAPHTHALENES	1.30	9.44	7264
C4-NAPHTHALENES	1.80	5.82	3231
C1-PHENAN/ANTHRACENES	1.80	6.88	3822
C2-PHENAN/ANTHRACENES	0.96	5.86	6102
C3-PHENAN/ANTHRACENES	1.80	3.84	2132
C4-PHENAN/ANTHRACENES	BD	2.21	

(continued)

Table 1. Average Elutriate Results (concluded)			
Constituent	**Average Dissolved Elutriate Conc ug/L**	**Average Bulk Sediment Conc mg/kg**	**Average Elutriate Partitioning Coefficient L/kg**
PCBs (total)	3.15	0.46	146
PCB-1016 (AROCLOR 1016)	BD	BD	
PCB-1221 (AROCLOR 1221)	BD	BD	
PCB-1232 (AROCLOR 1232)	BD	BD	
PCB-1242 (AROCLOR 1242)	2.11	0.31	146
PCB-1248 (AROCLOR 1248)	BD	BD	
PCB-1254 (AROCLOR 1254)	0.79	0.20	257
PCB-1260 (AROCLOR 1260)	0.27	0.06	228
TOTAL ORGANIC CARBON	13300		
ALUMINUM	11939	11716	981
ANTIMONY	7.94	0.82	103
ARSENIC	39.02	11.60	297
BARIUM	147.77	96.85	655
BERYLLIUM	0.60	0.62	1033
CADMIUM	4.23	1.69	399
CALCIUM	34500	23892	692
CHROMIUM, TOTAL	263.8	33.50	127
COBALT	6.72	10.77	1603
COPPER	215.0	57.60	268
IRON	19297	31731	1644
LEAD	302.1	142.2	471
MAGNESIUM	7299	7787	1067
MANGANESE	406.1	539	1327
MERCURY	3.54	1.67	472
NICKEL	24.77	31.69	1279
POTASSIUM	9295	1545	166
SELENIUM	1.47		
SILVER	0.76	0.36	474
SODIUM	21123.	183.2	8.7
THALLIUM	0.56	0.50	893
VANADIUM	9.14	22.03	2410
ZINC	928.6	353.8	381

Table 2. Pore Water Results			
Constituent	Maximum Pore Water Conc ug/L	Average Bulk Sediment Conc mg/kg	Average Pore Water Partitioning Coefficient L/kg
PAHs (total)	2.069	63.38	30637
ACENAPHTHENE	0.445	8.63	1402
ACENAPHTHYLENE	BD	BD	
ANTHRACENE	0.196	7.54	21410
BENZO(A)ANTHRACENE	0.013	2.62	324909
BENZO(A)PYRENE	BD	1.52	
BENZO(B)FLUORANTHENE	BD	1.66	
BENZO(G,H,I)PERYLENE	BD	BD	
BENZO(K)FLUORANTHENE	BD	1.59	
BENZO[E]PYRENE	BD	0.83	
CHRYSENE	0.016	2.56	363817
DIBENZ(A,H)ANTHRACENE	BD	BD	
FLUORANTHENE	0.151	11.18	57629
FLUORENE	0.265	6.72	4287
INDENO(1,2,3-C,D)PYRENE	BD	0.39	
NAPHTHALENE	0.314	3.79	1295
PHENANTHRENE	0.234	18.24	10721
PYRENE	0.157	7.21	56874
1-METHYLNAPHTHALENE	0.198	6.31	318
2-METHYLNAPHTHALENE	0.079	13.97	1762
BIPHENYL (DIPHENYL)	BD	4.8	
PCBs (total)	0.014	0.46	182923

Table 3. CDF Pond Water Quality

Parameter	Constituent							
	Total PAHs	Benz (a) Anthracene	Fluorene	Phenan-threne	Total PCBs	Lead	Mercury	Copper
Acute Criteria, ug/L	25*	0.23	4.80	45	2	60	1.4	13
Chronic Criteria, ug/L	6.1*	0.03	0.54	5	0.014	3.7	0.77	8.8
Final CDF Pond, ug/L	25.89	2.35	0.658	2.9	0.618	135.15	0.69	185
Average Elutriate, ug/L	201.26	12.68	21.34	66.9	3.147	302.13	3.54	215
Maximum Pore Water, ug/L	2.07	0.013	0.27	0.234	0.014			
Ratio of Final CDF Pond to Acute Criteria	1.04	10.2	0.14	0.06	0.31	2.25	0.49	14.23
Ratio of Average Elutriate to Acute Criteria	8.05	55.1	4.45	1.49	1.57	5.04	2.53	16.54
Ratio of Max Pore Water to Acute Criteria	0.08	0.06	0.06	0.01	0.00			
Ratio of Final CDF Pond to Chronic Criteria	4.24	78.5	1.22	0.57	44.13	36.53	0.89	21.02
Ratio of Average Elutriate to Chronic Criteria	32.99	422.5	39.52	13.38	224.76	81.66	4.59	24.43
Ratio Max Pore Water to Chronic Criteria	0.34	0.43	0.50	0.05	1.00			

* Acute and chronic values for Total PAHs are based on Buffalo River site-specific measurements of the average Total PAHs (ug/L) in sediment porewater per Toxic Unit determined from the measurement of 34 PAHs in sediment pore water.

Table 4. Discharge Water Quality								
	Constituent							
Parameter	Total PAHs	Benz (a) Anthracene	Fluorene	Phenan-threne	Total PCBs	Lead	Mercury	Copper
Acute Criteria, ug/L	25*	0.23	4.80	45	2	60	1.4	13
Chronic Criteria, ug/L	6.1*	0.03	0.54	5	0.014	3.7	0.77	8.8
Final CDF Pond Conc, ug/L	25.89	2.35	0.658	2.9	0.618	135.15	0.69	185
Lake Conc, ug/L	0.000	0.000	0.000	0.000	0.000	1.000	0.000	3
Discharge Conc, ug/L	0.229	0.021	0.006	0.026	0.005	2.187	0.006	4.61
Ratio of Discharge to Acute Criteria	0.009	0.09	0.00	0.00	0.0027	0.0365	0.0044	0.35
Ratio of Discharge to Chronic Criteria	0.038	0.70	0.01	0.01	0.3906	0.5911	0.0079	0.52

* Acute and chronic values for Total PAHs are based on Buffalo River site-specific measurements of the average Total PAHs (ug/L) in sediment porewater per Toxic Unit determined from the measurement of 34 PAHs in sediment pore water.

CEERD-EP-R August 19, 2010

MEMORANDUM FOR Mr. Byron Rupp, CELRB-PM-PB

SUBJECT: Evaluation of Environmental Risks from Proposed Buffalo River GLRI Dredging Operations

Summary

Plans for dredging sediment in the Buffalo River Federal Navigation Channel are being prepared by U.S. Army Corps of Engineers under the US EPA Great Lakes Restoration Initiative (GLRI). The GLRI dredging is intended to complement the planned remediation of contaminated sediments located outside of the Federal Navigation Channel that is being planned under the U.S. EPA Great Lakes Legacy Act program. The following memorandum provides an analysis of the potential for unintended short-term environmental risks that may result following the partial removal of contaminated sediment under the GLRI dredging project and prior to removal of the remaining contaminated sediment under the GLLA remediation program.

The potential short-term risks to the environment were evaluated using two approaches. Short-term risks that may occur during the dredging operations were evaluated by predicting the resuspension of contaminated sediments during dredging operations for their potential impact to surface water quality and toxicity to aquatic life. Following removal of sediments in the navigation channel, the short-term risk associated with the newly exposed contaminated sediment was evaluated.

Model predictions indicate that sediment resuspension and water quality resulting from dredging operations may result in exceedances of National Recommended Water Quality Criteria for short-term exposures to dissolved copper, lead and mercury. The concentration of these metals that becomes dissolved into the water column depends on the amount of sediment resuspension during dredging operations and distance from the dredge . Engineering controls and risk management plans may be used to help minimize this potential risk. Sediment resuspended during dredging operations , that will migrate outside of the Navigation Channel, is not expected to have any significant impact on sediment quality in the River or Ship Canal nor have any long- term impacts on water quality.

At several locations, the exposed sediment bed and dredge residuals within the Navigational Channel exceeds the Probable Effect Concentration (PEC) screening value indicating that the sediment may be toxic to fish or other aquatic life immediately following dredging and prior to GLLA remediation project. However, the concentration of contaminants in surface sediments is expected to reduce over several months time as the natural deposition of river sediments begins to refill the Navigation Channel. Following six months of natural river sediment deposition, three Dredge Area subunits (DA-K, DA-O and DA-L) management areas are likely to exhibit toxicity to aquatic organisms life.. Following 12 months of natural sediment deposition, all of the Dredge

Areas subunits, except DA-L, would have contaminant concentrations below the Probable Effects Concentration (PEC) toxicity screening values. Dredge Area D-L is impacted with mercury and has a small footprint, 4000 square feet, and represents approximately 100 cubic yards of sediment. Following 24 months of natural sediment deposition, all of the dredge areas would have contaminant concentrations below toxicity screening values.

PCB and mercury concentrations in fish are expected to temporarily increase and then decrease in proportion to the temporary changes in water quality. The increase in PCB fish tissue concentrations may approach site-specific fish tissue criteria for the protection of Mink. However, this increase is expected to be short-lived with fish tissue concentrations dropping to levels below the current PCB concentrations measured in Buffalo River fish within 24 months. The concentration of mercury in fish is expected to follow a similar pattern to PCBs.

1. **Background.** Plans for dredging sediment in the Buffalo River Federal Navigation Channel are being prepared under the US EPA Great Lakes Restoration Initiative (GLRI). Locations within the Navigation Channel have been identified as contaminated from legacy industrial activities. In addition to removal of contaminated sediments within the Navigation Channel, the USEPA and various stakeholders are planning the remediation of contaminated sediments located adjacent to the Navigation Channel under the Great Lakes Legacy Act (GLLA). The GLRI dredging is intended to complement the GLLA sediment remediation project, by removing a significant mass of contaminated Buffalo River sediment. The draft plans for the GLRI project call for completion of dredging operations followed by dredging of contaminated sediments located outside the Navigation Channel under the GLLA project later in 2011 or 2012. One issue that needs to be addressed prior to executing these project plans, is evaluating the potential for unintended short-term environmental risks resulting from the partial removal of contaminated sediment prior to removal of the remaining contaminated sediment in 2011 or 2012 under the GLLA project.

   Several risk questions are presented in Section 2 that address whether acceptable or unacceptable short-term ecological risks may result from the proposed GLRI and GLLA project schedules. To answer these questions, two fundamental aspects of the dredging operations have been evaluated. These include:

   1) An assessment of the resuspension of contaminated sediments during dredging operations, the potential impact to surface water quality, and an analysis of short-term ecological risks.

   2) An assessment of the short-term risk associated with the sediment contamination that is expected to remain following GLRI dredging operations and prior to its removal by the GLLA dredging project.

   It is important to understand that the GLRI dredging project is not intended, nor will it be designed, to meet the risk-based preliminary remedial goals (PRGs) proposed in the draft

Feasibility Study (FS) for the GLLA remedial project[1]. The GLRI dredging program, however, is designed to remove the mass of contaminated sediments residing within the Buffalo River and Buffalo Ship Canal for which the Army Corps of Engineers has authorization to perform under Federal statute.

2. **Risk Questions.** The following provide explicit risk questions that have been developed to answer the generic question as to whether there will be acceptable or unacceptable short-term ecological risks resulting from the proposed GLRI and GLLA project schedules. These include:

   i. Will the temporary release of suspended sediment into the water column and associated contaminants result in unacceptable short-term toxicity to aquatic life downstream of the dredging operations?
   ii. Will the proposed dredging operations result in water quality that fails to meet Federal National Recommended Water Quality Criteria for short-term exposures?
   iii. Will the newly exposed surface sediment within the Navigation Channel result in toxic conditions to aquatic life (e.g. fish) that may swim through or forage in these contaminated areas prior to completion of the GLLA sediment remediation project?
   iv. Will dredge residuals that migrate outside of the Navigation Channel into areas not planned for future GLLA dredging result in surface sediment concentrations exceeding the risk-based PRGs for the GLLA project?
   v. Will the exposed contaminated sediment surface, dredge residuals and resuspended sediment potentially result in longer-term water quality that fails to meet National Recommended Water Quality Criteria for short-term exposures?
   vi. Will the dissolved concentration of PCBs and mercury in Buffalo River and Ship Canal water increase between the GLRI and GLLA dredging events and will this result in a significant increase in the concentration of PCBs and mercury in fish?

3. **Risk Screening Values.** Sediment and water quality screening values have been developed to support answering the risk questions presented above. These screening values include Criteria Maximum Concentration (CMC) values for water and Probable Effect Concentration (PEC) values for sediment to assess the short-term risks to aquatic life. The CMC and PEC values have been used for two scenarios: 1) To evaluate the potential for short-term impacts to water quality during dredging operations, and 2) to assess the potential for toxicity to fish and sediment dwelling organisms that may swim through or forage in contaminated sediments that remain between the GLRI and GLLA dredging operations. More stringent Criteria Continuous Concentration (CCC) screening values for water and site-specific Preliminary Remedial Goals (PRGs) and Threshhold Effect Concentration (TEC) values have been used to assess the potential for toxic effects to aquatic life from water impacted by dredge residuals and resuspended sediment that may be transported to areas outside of the areas being considered for future GLLA remediation.

[1] Buffalo River Great Lakes Legacy Act Project Coordination Team. 2009. DRAFT FINAL Feasibility Study for the Buffalo River, New York. October 30, 2009

3.1 Sediment

The Buffalo River PRGs are risk-based values that have been developed for the Draft GLLA remedial FS (Table 1a). The PRGs are site-specific clean-up goals that are designed to protect ecological receptors (aquatic and terrestrial) from chronic toxicity that may result from the broad array of the contaminants know to exist in Buffalo River sediments.

Additional toxicity screening values including TEC and NYSDEC Sediment Quality Values (SQVs), are presented in Table 1a. The TECs and SQVs are generic screening values originating from consensus screening values developed by MacDonald et al. (2000). These screening values are intended to identify the concentrations of sediment-associated contaminants below which, adverse effects to sediment dwelling organisms are not expected to occur.

Polycyclic aromatic hydrocarbons (PAHs) are present in Buffalo River sediments as complex mixtures of individual chemicals. Although TEC and SQVs are provided in Table 1a for some individual PAH compounds, the use of a total PAH screening value for the characterization of risk is preferred (US EPA, 2003; NYSDEC, 2007). The site-specific PRG for Total PAHs has been used in the following analysis to evaluate whether sediment samples may result in chronic toxicity to aquatic life.

The PEC and NYSDEC acute toxicity screening values have been identified to evaluate the potential for short-term toxic effects to fish and sediment dwelling organisms (Table 1a). The PEC values are intended to identify sediment concentrations above which adverse effects to sediment dwelling organisms can be expected. The NYSDEC acute toxicity screening values assume that sediments have an average total organic carbon content (TOC) of 2.46%. A site-specific acute toxicity value for Total PAHs has also been developed using the site-specific PRG for Total PAHs (16 mg/kg) and applying the expected Acute to Chronic toxicity ratio (ACR=4.16) for PAH mixtures and aquatic organisms (USEPA, 2003). Data collected from synoptic acute and chronic laboratory toxicity tests (using multiple species and individual PAHs) have shown that acute toxicity occurs, on average, at 4.16 times the concentration that results in chronic toxicity. The acute toxicity screening value developed for Total PAHs (67 mg/kg) shown in Table 1a is 4.16 times the site-specific PRG.

3.2 Water Quality

Water quality screening values have been developed to assess toxicity to fish as well as compliance with Federal National Recommended Water Quality Criteria for short-term exposures (Table 1b). These screening values have been used to interpret the results from model runs that predict water quality during and following the GLRI dredging operations.

Site-specific water quality screening values for assessing potential risk to fish survival and propagation were developed for chromium, copper and lead based on the expected lower limit for water hardness (98 mg/L) in the Buffalo River.

Table 1a: Buffalo River Risk-based Preliminary Remedial Goals (PRGs) and NYSDEC Sediment Quality Screening Values

Contaminant	CAS Number	Buffalo River PRGs[1] (mg/kg)		Consensus Toxicity Screening Values for Freshwater Sediments (mg/kg)		NYSDEC Guidance Values (mg/kg)			
				Threshold Effect Concentration	Probable Effect Concentration	Chronic Toxicity Sediment Quality Values (SQVs)[2]		Acute Toxicity Screening Values For Benthic Aquatic Life[3]	
		Value	Note	Value	Value	Value	Note	Value	Note
Arsenic	7440-38-1	-		9.8	33	10	Same as TEC	33	
Chromium Total	7440-47-3	-		43.4	111	43	Same as TEC	110	
Copper	7440-50-8	-		31.6	149	32	Same as TEC	110	
Lead	7439-92-1	90	1/3 mile SWAC	35.8	128	36	Same as TEC	110	
Mercury	7439-97-6	0.44	1/3 mile SWAC	0.18	1.06	0.18	Same as TEC	1.3	
PCB, Total	1336-36-3	0.2	1/3 mile SWAC	0.060	0.68	0.06	Same as TEC	68	TOC = 2.46%
PAH, Total (sum of 17)	130498-29-2	16	,cute = 67 mg/kg (4)	1.6	22.8	1.6	Same as TEC	67 [4]	
Naphthalene	91-20-3	-		0.18	0.56	0.18	Same as TEC	6	TOC = 2.46%
2-methylnaphthalene	91-57-6	-		-		-		61	TOC = 2.46%
Acenaphthene	83-32-9	-		-		-		-	
Fluorene	86-73-7	-		0.08	0.54	0.08	Same as TEC	2	TOC = 2.46%
Phenanthrene	85-01-8	-		0.2	1.17	0.2	Same as TEC	-	
Anthracene	120-12-7	-		0.06	0.85	0.06	Same as TEC	24	TOC = 2.46%
Fluoranthene	206-44-0	-		0.42		0.42	Same as TEC	-	
Pyrene	129-00-0	-		0.20	1.52	0.2	Same as TEC	228	TOC = 2.46%
Benz(a)anthracene	56-55-3	-		0.11	1.05	0.11	Same as TEC	2	TOC = 2.46%
Chrysene	218-01-9	-		0.17	1.29	0.17	Same as TEC	-	
Benzo(a)pyrene	50-32-8	-		0.15	1.45	0.15	Same as TEC	-	

[1] Risk-based Preliminary Remediation Goals (PRGs) developed for the Buffalo River Great Lakes Legacy Act (GLLA) Feasibility Study report. Buffalo River Great Lakes Legacy Act Project Coordination Team. 2009. Draft Final Feasibility Study for the Buffalo River, New York. October 30, 2009

[2] NYSDEC. 2007. DRAFT Numerical Guidance Values for Assessing Risk to Aquatic Life from Contaminants in Sediment. New York State Department of Environmental Conservation Division of Fish, Wildlife, & Marine Resources. June 19, 2007

[3] NYSDEC. 1998. Technical Guidance for Screening Contaminated Sediments New York State Department of Environmental Conservation Division of Fish, Wildlife and Marine Resources. March 2, 1998

[4] A site specific acute value for Total PAHs is calculated by multiplying the PRG (16 mg/kg) by the Acute to Chronic Ratio for PAHs (ACR= 4.16; USEPA, 2003)

Table 1b: Federal and New York State Water Quality Standards and Guidance Values

Contaminant	CAS Number	National Recomended Water Quality Criteria[1] CMC	CCC	NYS Water Quality Standards & Guidance (ug/L) Drinking Water	Human Consumtion of Fish	Fish Survival	Fish Propagation	Wildlife	Aesthetic
				H(WS)	H(FC)	A(A)	A(C)	(W)	(E)
Arsenic	7440-38-1	340	150	**50** [2]	-	**340**	**150**	-	-
Chromium III [3]	7440-47-3	560	73	**50**	**-**	**560**	**73**	-	-
Copper [3]	7440-50-8	13	8.8		**-**	**13**	**8.8**	-	-
Lead [3]	7439-92-1	63	2.5	**50**	**-**	**95**	**3.7**	-	-
Mercury	7439-97-6	1.4	0.77	**0.7**	**7×10^{-4}**	**1.4**	**0.77**	**0.0026**	-
PCB, Total	1336-36-3	-	0.014	**0.09**	**1.2×10^{-6}**	2 [4]	0.014 [5]	**1.2×10^{-4}**	-
PAH, Total	130498-29-2	25 [6]	6.1 [7]	-	-	-	-	-	-
Naphthalene	91-20-3	-	-	-	-	110	13	-	**10**
2-methylnaphthalene	91-57-6	-	-	-	-	42	4.7	-	-
Acenaphthene	83-32-9	-	-	-	-	48	5.3	-	**20**
Fluorene	86-73-7	-	-	50	-	4.8	0.54	-	-
Phenanthrene	85-01-8	-	-	50	-	45	5	-	-
Anthracene	120-12-7	-	-	50	-	35	3.8	-	-
Fluoranthene	206-44-0	-	-	50	-	-	-	-	-
Pyrene	129-00-0	-	-	50	-	42	4.6	-	-
Benz(a)anthracene	56-55-3	-	-	0.002	-	0.23	0.03	-	-
Chrysene	218-01-9	-	-	0.002	-	-	-	-	-
Benzo(b)fluoranthene	205-99-2	-	-	0.002	-	-	-	-	-
Benzo(k)fluoranthene	207-08-9	-	-	0.002	-	-	-	-	-
Benzo(a)pyrene	50-32-8	-	-	0.002	0.0012	-	-	-	-
Indeno(1,2,3-cd)pyrene	193-39-5	-	-	0.002	-	-	-	-	-
Dibenz(a,h,)anthracene	55-70-3	-	-						
Benzo(g,h,i)perylene	191-24-2	-	-						
Ammonia, Total	7664-41-7	18700 [8]	858 [8]	-	-	**1,000** [9]	-	-	-
Total Suspended Solids				-	-	-	-	-	200 [10]

[1] The Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect.

[2] NYS Water Quality Standards are shown as bold text. All other NYS values are NYSDEC guidance.

[3] Federal and NYS values calculated assuming a minimum water hardness of 98 mg/L.

[4] Acute toxicity screening value for benthic aquatic life (NYSDEC, 1998)

[5] Chronic toxicity screening value for benthic aquatic life (NYSDEC, 1998)

[6] Acute and chronic values for Total PAHs are based on Buffalo River site-specific measurements of the average Total PAHs (ug/L) in sediment porewater per Toxic Unit determined from the measurement of 34 PAHs in sediment pore water.

[7] The acute toxicity screening value for Total PAHs is calculated by multiplying the chronic screening value by the Acute to Chronic Ratio (ACR= 4.16; USEPA, 2003).

[8] For protection of freshwater aquatic life including mussels assuming water pH 7.0 and 20 degrees C. Value expressed as Total Ammonia -N. Taken from the U.S. EPA. 2009. DRAFT 2009 Update Aquatic Life Ambient Water Quality Criteria For Ammonia - Freshwater, U.S. Environmental Protection Agency, Office of Water. December 2009. EPA-822-D-09-001.

[9] For toxicity resulting from un-ionized ammonia at an assumed pH 7.0 and temperture 15-30 degrees C. Value expressed is for Total Ammonia

[10] Taken from NYSDEC TOGs 5.1.9. Value expressed in mg/L

Water quality standards and guidance have been developed for several individual PAHs, however, the toxicity to ecological receptors from individual PAHs is believed to be additive and the use of a total PAHs as a screening value is more conservative and preferred (USEPA, 2003; NYSDEC, 2007). Site specific acute and chronic toxicity water quality screening values for Total PAHs have been developed using data from the analysis of 19 sediment porewater samples (EPA Method 8272) and the target lipid risk model (USEPA, 2003). The sediment porewater results were used to calculate the concentration of 17 PAHs in water below which chronic toxicity to fish or sediment dwelling organisms would not be expected (i.e. one toxic unit). The mathematical equation for developing the chronic screening value for Total PAHs is:

$$Total\ PAH_{17}\ Chronic\ Toxicity\ Screening\ Value\ for\ Water\ \ (\mu g/L) =$$

$$\frac{Total\ PAH_{17}\ Conc\ (\mu g/L)}{Toxic\ Unit_{34}} = \frac{\sum_{n=1}^{17}(PAH_i)}{\sum_{n=1}^{34}\left(\frac{PAH_i}{FCV_i}\right)} \qquad (Eq. 1)$$

Where:

PAH_i = Aqueous concentration of an individual PAH (µg/L)
FCV_i = Final Chronic Value for an individual PAH (µg/L)

Based on the composition of the PAH mixtures determined in sediment porewater, the average concentration of 17 PAHs that is expected to result in one Toxic Unit is 6.1 µg/L. Based on the acute to chronic ratio (ACR) of 4.16, the acute toxicity screening value for water was determined to be 25µg/L.

$$Total\ PAH_{17}\ Aqueous$$
$$Acute\ Toxicity\ Screening\ Value\ (\mu g/L)$$

$$= 6.1\ (\mu g/L) \times 4.16\ ACR = 25\ (\mu g\ Total\ PAH_{17}\ /L) \qquad (Eq. 2)$$

3.3 PCB and Mercury Bioaccumulation in Fish

To assess the potential for increases in PCB and mercury concentrations in fish following dredging operations, model predictions of water quality and sediment concentrations have been used to provide conservative estimates of the expected changes in fish-tissue PCB and mercury concentrations. Two lines of evidence have been used to predict the concentrations of PCBs and mercury in fish.

3.3.1 Propotional Increase. The concentration of PCBs and mercury in fish was predicted based on the current concentration of contaminants in fish and the predicted change in the dissolved concentration of PCBs and mercury in Buffalo River and Ship Canal water following navigation channel dredging. The current average PCB and mercury concentration in whole fish tissue collected by from the Buffalo River was determined in 2007 to be 0.28 and 0.06 mg/kg, respectively.[2] A fish body burden of 0.46 mg/kg wet wt. was identified in the GLLA FS to be protective of mink (this fish tissue concentration yielded a sediment PRG of 0.19 mg/kg sediment). A fish body burden of 0.5 mg/kg wet wt. was identified as the tissue criterion for mercury.

Assuming that the water to fish bioconcentration factor (BCF) for PCBs and mercury remains constant, the relative increase in fish tissue residues will be proportional to the relative increase or decrease in the predicted concentration in water.

To estimate the relative concentration of PCBs or mercury in fish following dredging operations, equation 3 for predicting fish tissue concentrations

$$Fish\ Tissue\ Conc\ (mg/kg) = {}^{BCF\ (L/kg)}\Big/_{Water\ Conc\ (mg/L)} \qquad (Eq. 3)$$

was used in the following equation:

$$\frac{Fish\ Tissue\ Conc_{\text{TIME 0, 6, or 24 Months}}}{Fish\ Tissue\ Conc_{\text{TIME Ø}}} = \frac{{}^{BCF}/_{Water\ Conc_{\text{TIME 0, 6, or 24 Months}}}}{{}^{BCF}/_{Water\ Conc_{\text{TIMEØ}}}} \qquad (Eq. 4)$$

Equation 4 was then solved for the tissue concentrations following dredging and simplified to yield:

$$Fish\ Tissue\ Conc_{\text{TIME 0, 6, or 24}} = Fish\ Tissue\ Conc_{\text{TIME Ø}} \times \frac{Water\ Conc_{\text{TIME 0, 6, or 24}}}{Water\ Conc_{\text{TIMEØ}}} \qquad (Eq. 5)$$

This model for predicting fish tissue concentrations represents an upper bound and is only approximate since the concentration of chemicals with large octanol-water partitioning coefficients (K_{OW}) such as PCBs (e.g., log K_{OW}s of 6 and 7) change only slowly in fish relative to water.[3] In addition, this model assumes that all of the PCBs or mercury measured in fish tissue originates from sediment and other sources of PCBs and mercury (e.g. combined sewer overflows and storm sewer outfalls) are not significant.

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[2] NYSDEC. 2007. Data Report for residues of organic chemicals and four metals in edible issues and whole fish for fish taken from the Buffalo River, New York. Skinner, L., B.Trometer, A.Gudlewski and J.Bourbon.

[3] U.S. EPA. 2003. Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000): Technical Support Document Volume 2, Development of National Bioaccumulation Factors, Final. Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency Washington, DC 20460. EPA-822-R-03-030.

3.3.2 Theoretical Bioaccumulation Potential (TBP) and Trophic Transfer. A second approach was used to predict the concentration of PCBs in fish tissue using a site-specific PCB biota-sediment accumulation factor (BSAF) and trophic transfer factor (TTF). The BSAF value was based on laboratory bioaccumulation tests using Buffalo Harbor sediment and the aquatic oligochaete *Lumbriculus variegates.* The tophic transfer factor was based upon pumpkinseed sunfish (*Lepomis gibbosus*) collected from Buffalo River. Details on the approach used and results are provided in Attachment 1.

4. **Water Quality Near Dredging Operations.** Water quality and the potential for acute toxicity near dredging operations was evaluated using the USACE DREDGE Model and data post processors, in the form of spreadsheet models. Modeling was used to predict the plume of suspended solids and contaminant concentrations in the water column. Input data for water quality modeling included the average contaminant concentrations for each of the 45 dredge area subunits. The average contaminant concentrations for surface sediments, sediment planned for removal, and in sediment at the dredge cut surface are presented in Attachment 2. The model runs assumed either a 1% loss rate, which is characteristic for mechanical dredges, or a 0.08% loss rate based on site-specific operations and sediment geotechnical properties including sediment liquidity, compaction and cohesion. Based on Buffalo River and Ship Canal sediment properties, water flow, and expected dredging equipment, these loss rates are believed to represent the likely range in sediment resuspension. Details of the modeling and data analysis are presented in Attachment 3.

   Eight contaminants of concern were identified for modeling based on aqueous concentrations measured in sediment elutriate tests. The elutriate tests demonstrated that copper, lead, mercury, benz(a)anthracene, fluorene, phenanthrene, Total PAHs, and Total PCBs could potentially exceed risk-based water quality screening values during dredging operations.

   The model analysis of sediment resuspension indicates that dissolved copper in the water column is expected to be the most significant short term chemical risk to aquatic life (Table 2). Nine Dredge Area subunits in the River and all of the Dredge Area subunits in the Ship Canal may exhibit toxicity 500 meters from dredging operations when a 1% loss rate is assumed. When a 0.08% loss rate is assumed only two Dredge Area subunits in the Ship Canal are predicted to exhibit toxicity. The rate at which dissolved copper decreases with distance is plotted for the worst case Dredge Area subunit as well as the area-weighted average for all Dredge Areas (Figure 1). As can be seen from these plots, the potential for toxicity to aquatic life from dissolved copper during dredging operations is potentially significant for the Ship Canal and much less for the Buffalo River. The primary factors controlling the concentration of dissolved copper in the water column are the high concentration of copper in suspended sediment, the potential for oxidation and dissolution, and the lack of water flow in the canal for mixing and dilution. This analysis indicates that engineering controls and management plans should be considered to reduce the resuspension of sediment in the Ship Canal during dredging operations. Although potential risk to fish and other aquatic organisms from dissolved copper within the Ship Canal in this model analysis appear to be significant, it is important to note that previous dredging operations in the Ship Canal have not resulted in reports of significant fish kills.

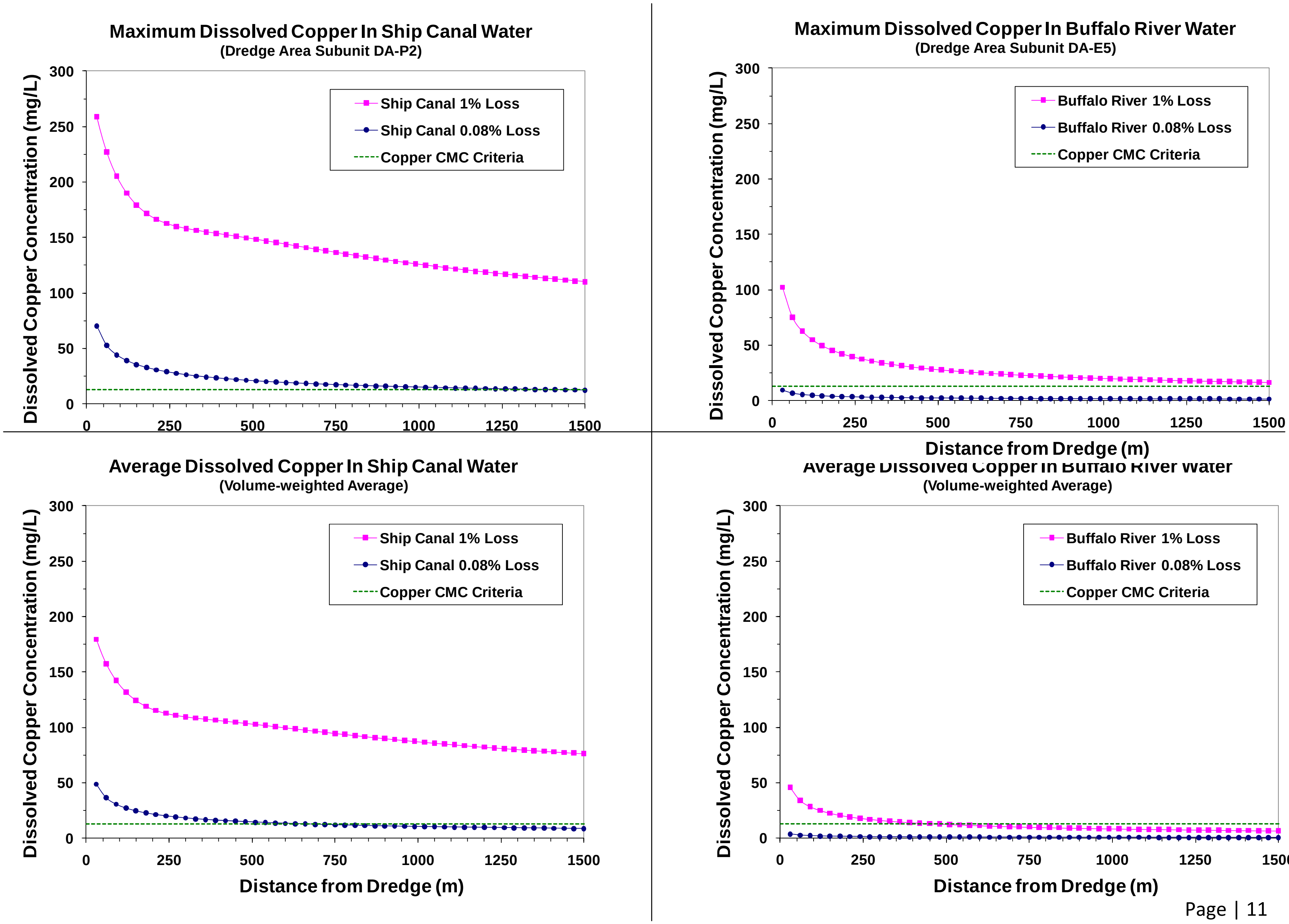
Table 2: Summary of Predicted Water Quality During Dredging Resuspension

Sediment	Maximum Average Sediment Concentration Within Dredge Area Subunits *					
	Copper mg/kg		Lead mg/kg		Mercury mg/kg	
Buffalo River (40 Dredge Area Subunits)	201		246		4	
Buffalo Ship Channel (5 Dredge Area Subunits)	94		113		1.3	
	Predicted Water Concentration 500 Meters From Dredge Area Subunit					
Dredge Loss Rate	1%	0.08%	1%	0.08%	1%	0.08%
Contaminant	Copper (µg/L)		Lead (µg/L)		Mercury(µg/L)	
CMC Water Quality Screening Value	13		63		1.4	
Buffalo River Maximum Value	**28**	2.3	32.8	2.8	0.52	0.045
Ship Canal Maximum Value	**148**	**21**	**130**	24	**1.50**	0.27
Buffalo River Dredge SubUnit Areas						
DA-E5	**28**	2.3	13	1.1	0.027	0.0024
DA-F2	**24**	2	8.8	0.75	0.021	0.0018
DA-F5	**17**	1.4	2.6	0.22	0.0080	0.00069
DA-F6	**22**	1.9	14	1.2	0.12	0.0099
DA-F8	**20**	1.7	7.6	0.65	0.023	0.0020
DA-F15	**17**	1.4	12	1.1	0.058	0.0050
DA-K	**23**	1.9	33	2.8	0.37	0.032
DA-L	**21**	1.8	27	2.3	0.52	0.045
DA-O	**16**	1.3	18	1.6	0.44	0.038
Ship Canal Dredge SubUnit Areas						
DA-P1	**79**	11	**109**	20	0.36	0.065
DA-P2	**148**	**21**	**130**	24	**1.50**	0.27
DA-P3	**72**	10	58	10	0.310	0.056
DA-P4	**120**	**17**	**102**	19	0.76	0.14
DA-P5	**92**	13	**109**	20	1.02	0.19

* Highlighted cells exceed Acute Toxicity Screening Values

Based on the partitioning data collected from modified elutriate testing, it is unlikely that the Water Quality Criteria for copper can be met without controls at a 500-m distance from the dredge. Under the best of conditions the dredge production rate should be restricted to about 3000 cubic yards per day. Care should be taken to minimize the disturbance of the sediment bed by minimizing the number of lifts used to achieve the desired channel depth. In addition, barge overflow and bucket draining should be avoided. Use of silt curtains would not reduce risk because 95% of the copper is expected to be in the dissolved form. A dredging elutriate test could be performed on the sediments from the Buffalo Ship Canal to verify the copper partitioning characteristics.

Figure 1. Maximum and Average Predicted Dissolved Copper Concentrations with Distance from Dredge.



5. **Depth and Toxicity of Resuspended Sediments.** The potential for migration of resuspended sediments during dredging operations to areas outside of the Navigation Channel was also evaluated using the USACE DREDGE Model and data post processors (details provided in Attachment 3). The location expected to have the highest deposition of resuspended sediment is the turning basin directly downstream of Dredge Area DA-F. This area is expected to receive deposition from the dredging of reaches DA-D, DA-E, and DA-F. An average depth of 0.11 cm (0.08% loss rate) to 1.4 cm (1% loss rate) of sediment is expected over the 80-meter width of the Buffalo River downstream of Dredging Area DA-F. In the Buffalo Ship Canal, the maximum depth of deposition outside of the dredging unit was 0.70 cm at a loss rate of 1% and 0.06 cm at a loss rate of 0.08%. Sediments deposited downstream of the dredging operations will have a lower contaminant concentration than the resuspended sediment due to partitioning into the water column during transport. Due to this partitioning, the concentration of contaminants in residuals that deposit outside the Navigation Channel are not predicted to exceed the PRGs for lead, mercury, total PAHs and total PCBs.

6. **Toxicity of Newly Exposed Surface Sediments and Dredge Residuals.** Dredging of the Navigation Channel may expose sediments that are acutely toxic to aquatic life prior to completion of the GLLA sediment remediation project. The potential for exposed sediments and dredge residuals to be toxic was predicted based on the average concentrations of the exposed sediment bed and the expected average concentration of dredge materials for each Dredge Area subunit. Based on the sediment characteristics, expected dredging operations and equipment, it is estimated that 5 to 10% of the dredge cut will remain in the Buffalo River and Ship Canal as residuals resulting in a 2-inch (5-cm) residual layer. Details of the modeling and analysis are presented in Attachment 4.

   The average contaminant concentration in Buffalo River and Ship Canal surface sediments is not expected to increase significantly immediately following dredging indicating that a significant increase in risk to aquatic life is not expected on a river - or canal-wide basis (Table 3).

   An analysis of the exposed sediment bed and residuals at a finer spatial scale indicates that immediately following dredging copper, lead, mercury, benz(a)anthracene, PCB and total PAH concentrations may result in toxicity to aquatic life for 5, 7, 6, 14, 3, and 1 Dredge Area subunits, respectively (Table 4). However, following the dredging operations, contaminants in the top 5 cm of surface sediments are expected to drop in concentration as the result of the natural deposition of river sediments into the Navigation Channel. After six months, the likelihood for toxicity would be limited to five Dredge Area subunits (DA-E4, DA-K, DA-L, DA-O and DA-P5). Although Dredge Areas DA-E4 and DA-P5 exceed the PEC for benz(a)anthracene six months following dredging, these areas do not exceed the acute toxicity screening value for Total PAHs and Dredge Area DA-P5 does not exceed the PRG for Total PAHs. It is important to note, that the Dredge Areas DA-K, DA-L, and DA-O are

Table 3: Surface-weighted Average Concentrations of Contaminants (SWAC) in Buffalo River and Ship Canal Surface (top 5 cm) Sediment

	Copper mg/kg	Lead mg/kg	Mercury mg/kg	PCB, Total mg/kg	PAH, Total mg/kg	Benz(a)anthracene mg/kg
Sediment Screening Values						
PRG	-	90	0.44	0.20	16	-
PEC	149	128	1.1	0.68	22.8 (67)*	0.11
Average Background (Estimated for Buffalo River)						
	34	26	0.02	<0.067	2.6	0.27
Buffalo River Surface SWAC						
Prior to Dredging	77	76	0.37	0.13	10	0.69
Months Post Dredging						
0	71	74	0.35	0.13	11	0.72
6	38	41	0.19	0.069	5.9	0.38
12	22	23	0.11	0.035	3.0	0.19
24	5.73	6.40	0.030	0.010	0.91	0.06
Ship Canal Surface SWAC						
Prior to Dredging	59	93	0.74	0.22	15.9	1.36
Months Post Dredging						
0	65	88	0.66	0.17	11.4	1.06
6	54	75	0.56	0.14	9.5	0.88
12	46	60	0.47	0.11	8.0	0.72
24	30	45	0.34	0.07	5.4	0.51

[1] Prior to Dredging Values taken from Attachement 3, Table 3a

[2] Months Post Dredging taken from Attachement 3, Tables 5a, 5b, 5c and 5d, respectively.

limited in size and represent only 4000, 12000, and 9200 square feet, respectively (800, 100, and 2,400 cubic yards, respectively). At 12-months post dredging, only Dredge Area D-L is expected to have a surface sediment contaminant concentration (1.15 mg mercury /kg) exceeding the PEC (1.06 mg mercury/kg). Following 24 months of natural river sediment deposition all of the dredge areas would have contaminant concentrations below PEC toxicity screening values above which toxicity is expected (Table 4).

In this analysis, the upstream or background contribution of sediments to the Navigation Channel are considered to be clean or uncontaminated. The values presented in Table 4 are the predicted concentration above background post-dredging that result from the natural loading of River sediment into the Navigation Channel. The actual concentration of contaminants in the Navigational Channel over time will be dependent on the rate of loading from the continuing sources of River contamination including upstream sediments, urban storm sewers, and municipal combined sewer overflows.

Table 4: Summary of Predicted Contaminant Concentrations in Surface Sediments (mg/kg)

	Copper *(PEC = 149 mg/kg)*						Lead (PEC = 128 mg/kg)					
			Reduction in Dredge Residual Concentration Due to Native Sediment Loading						Reduction in Dredge Residual Concentration Due to Native Sediment Loading			
			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging
			0%	47%	71%	92%			0%	45%	71%	91%
Dredge Area Subunit	Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]			Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]		
	Buffalo River (Estimated Background ~ 34 mg/kg)						*Buffalo River (Estimated Background ~ 26 mg/kg)*					
DA-D1	68	87	73	39	21	5.9	63	80	68	37	20	6.0
DA-E4	39	93	70	37	20	5.6	29	132	80	44	24	7.0
DA-E5	207	390	201	107	57	16.2	100	-	97	53	29	8.5
DA-F1	37	77	53	28	15	4.2	53	114	49	27	15	4.3
DA-F2	-	157	174	93	50	14.1	45	135	66	36	19	5.8
DA-F4	39	-	47	25	13	3.8	133	0	55	30	16.1	4.8
DA-F6	68	-	162	87	46	13.1	52	0	102	56	30	9.0
DA-F9	91	121	94	50	27	7.6	132	185	147	80	43	13
DA-F10	52	144	76	41	22	6.1	74	142	90	49	26	8
DA-F11	37	62	48	26	14	4	184	181	166	91	49	15
DA-F13	37	109	76	41	22	6.2	40	291	141	77	42	12
DA-F15	29	100	123	66	35	9.9	51	137	92	50	27	8.1
DA-F17	-	117	80	43	23	6.4	46	230	61	33	18	5.3
DA-G1	37	41	38	20	11	3.1	52	98	40	22	12	3.5
DA-G2	36	25	36	19	10	3	66	55	61	33	18	5.4
DA-G3	35	28	30	16	8.6	2.4	51	27	34	18	10	2.9
DA-H1	53	41	44	23	12	3.5	71	86	59	32	17	5.2
DA-I	38	91	59	31	17	4.8	38	170	80	44	24	7.0
DA-J	44	91	91	49	26	7	45	112	112	61	33	9.8
DA-K	84	339	169	90	48	13.6	143	422	246	134	72	22
DA-L	54	54	154	82	44	12.4	494	-	205	112	60	18
DA-N	133	53	84	45	24	7	403	-	214	117	63	19
DA-O	116	-	116	62	33	9.4	136	0	136	74	40	12
			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging
			0%	18%	30%	54%			0%	15%	32%	49%
Dredge Area Subunit	Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]			Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]		
	Ship Canal (Estimated Background ~ 34 mg/kg)						*Ship Canal (Estimated Background ~ 26 mg/kg)*					
DA-P1	21	118	50	41	35	23	32	132	95	80	65	48
DA-P2	-	110	94	77	66	43	96	120	113	95	77	58
DA-P3	-	78	46	38	32	21	162	78	50	42	34	26
DA-P5	104	61	59	48	41	27	99	86	94	80	64	48

* Highlighted cells exceed Probable Effects Concentration Screening Values

[1] Dredge Prism Surface Concentration values taken from Attachement 3, Table 4a

[2] Surface Concentration w/ Residuals values taken from Attachement 3, Table 5a

[3] Maximum Potential Concentration Above Background for 6, 12 and 24 months values taken from Attachement 3, Table 5b, 5c, and 5d, respectively

Table 4: Summary of Predicted Contaminant Concentrations in Surface Sediments (mg/kg) (con't)

	Mercury *(PEC = 1.06)*						Benz(a)anthracene *(PEC=1.052)*					
			Reduction in Dredge Residual Concentration Due to						Reduction in Dredge Residual Concentration Due to			
			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging
			0%	46%	70%	91%			0%	47%	72%	92%
Dredge Area Subunit	Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]			Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]		
	Buffalo River (Estimated Background ~ 0.020 mg/kg)						*Buffalo River (Estimated Background ~ 0.274 mg/kg)*					
DA-D1	0.20	0.26	0.24	0.13	0.070	0.020	0.71	0.43	0.67	0.36	0.19	0.052
DA-E4	0.051	0.72	0.30	0.16	0.089	0.026	**1.4**	**3.0**	**2.3**	**1.2**	0.65	0.18
DA-E5	0.15	0.72	0.21	0.11	0.061	0.018	0.38	**3.0**	0.43	0.23	0.12	0.033
DA-F1	0.43	0.59	0.26	0.14	0.078	0.023	0.63	0.87	0.31	0.17	0.088	0.024
DA-F2	0.12	0.42	0.15	0.083	0.045	0.013	0.31	0.83	0.36	0.19	0.10	0.028
DA-F4	0.61	-	0.14	0.077	0.042	0.012	0.84	-	0.67	0.36	0.19	0.052
DA-F6	0.28	-	0.87	0.47	0.26	0.075	0.38	-	0.75	0.40	0.21	0.058
DA-F9	0.63	**1.1**	0.80	0.43	0.24	0.069	**1.2**	**1.9**	**1.4**	0.75	0.40	0.11
DA-F10	0.14	0.28	0.15	0.083	0.045	0.013	0.61	**2.9**	1.0	0.53	0.28	0.078
DA-F11	0.46	0.52	0.47	0.25	0.14	0.040	**1.9**	**2.0**	**1.7**	0.89	0.47	0.13
DA-F13	0.13	**1.8**	0.66	0.36	0.20	0.058	0.28	**2.2**	**1.1**	0.61	0.32	0.089
DA-F15	0.21	0.72	0.44	0.24	0.13	0.038	0.59	**1.6**	**1.1**	0.58	0.31	0.085
DA-F17	0.10	**1.1**	0.15	0.083	0.05	0.013	0.45	**1.9**	0.51	0.27	0.14	0.040
DA-G1	0.22	0.72	0.11	0.061	0.03	0.010	0.33	0.83	0.35	0.18	0.10	0.027
DA-G2	0.33	0.31	0.28	0.15	0.084	0.025	0.70	0.46	0.73	0.39	0.21	0.057
DA-G3	0.17	0.12	0.13	0.072	0.040	0.012	**1.2**	**1.1**	**1.2**	0.62	0.33	0.091
DA-H1	0.30	0.50	0.16	0.086	0.047	0.014	0.44	0.68	0.37	0.20	0.11	0.029
DA-I	0.083	0.95	0.28	0.15	0.083	0.024	0.30	**7.2**	**1.5**	0.78	0.41	0.11
DA-J	0.18	**1.3**	**1.3**	0.724	0.40	0.12	0.40	**1.2**	**1.2**	0.64	0.34	0.093
DA-K	0.80	**9.5**	**2.8**	**1.5**	0.82	0.24	1.0	**3.4**	**1.9**	0.99	0.52	0.14
DA-L	0.35	0.35	**3.9**	**2.1**	**1.2**	0.34	0.65	0.65	**3.2**	**1.7**	0.90	0.25
DA-N	**2.4**	0.25	0.78	0.42	0.23	0.068	**4.4**	0.61	**1.6**	0.88	0.46	0.13
DA-O	**3.3**	-	**3.3**	**1.8**	0.98	0.29	**1.8**	-	**1.8**	0.95	0.50	0.14
			Reduction in Dredge Residual Concentration Due to						Reduction in Dredge Residual Concentration Due to			
			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging
			0%	15%	28%	49%			0%	17%	32%	52%
Dredge Area Subunit	Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]			Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]		
	Ship Canal (Estimated Background ~ 0.020 mg/kg)						*Ship Canal (Estimated Background ~ 0.274 mg/kg)*					
DA-P1	0.12	0.48	0.30	0.25	0.21	0.15	0.26	**1.1**	0.63	0.52	0.42	0.30
DA-P2	0.69	**1.6**	**1.3**	1.1	0.90	0.64	0.89	**1.2**	**1.2**	1.00	0.81	0.58
DA-P3	**1.4**	0.52	0.26	0.22	0.18	0.13	**2.7**	0.89	0.82	0.69	0.56	0.40
DA-P5	1.1	0.78	0.86	0.72	0.61	0.44	**2.0**	**1.4**	**1.3**	**1.1**	0.86	0.61

* Highlighted cells exceed Probable Effects Concentration Screening Values

[1] Dredge Prism Surface Concentration values taken from Attachement 3, Table 4a

[2] Surface Concentration w/ Residuals values taken from Attachement 3, Table 5a

[3] Maximum Potential Concentration Above Background for 6, 12 and 24 months values taken from Attachement 3, Table 5b, 5c, and 5d, respectively

Table 4: Summary of Predicted Contaminant Concentrations in Surface Sediments (mg/kg) (con't)

Dredge Area Subunit	PCBs, Total (*PEC = 0.68*)						PAHs, Total (Acute Toxicity Screening Value= 67)					
			Reduction in Dredge Residual Concentration Due to						Reduction in Dredge Residual Concentration Due to			
			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging
			0%	48%	73%	93%			0%	46%	71%	92%
	Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]			Current Surface Concentration[1]	Dredge Prism Surface Concentration[2]	Surface Concentration w/ Residuals[3]	Maximum Potential Concentration Above Background[4]		
	Buffalo River (Estimated Background <0.067 mg/kg)						*Buffalo River (Estimated Background ~ 2.56 mg/kg)*					
DA-D1	0.065	0.11	0.074	0.039	0.020	0.0054	12	11	13	6.8	3.6	1.0
DA-E4	0.016	0.43	0.14	0.074	0.039	0.010	36	67	54	29	16	4.5
DA-E5	0.019	0.094	0.041	0.022	0.011	0.0030	7.1	59	8.5	4.6	2.5	0.71
DA-F1	0.19	0.20	0.074	0.039	0.020	0.0055	9.1	13	5.3	2.9	1.5	0.44
DA-F2	0.069	0.37	0.10	0.053	0.028	0.0075	5.1	14	5.8	3.1	1.7	0.49
DA-F4	0.30	-	0.12	0.064	0.034	0.0091	13	-	9.8	5.3	2.8	0.82
DA-F6	0.057	-	0.26	0.14	0.072	0.019	8.2	-	18	10	5.3	1.5
DA-F9	0.30	0.56	0.29	0.15	0.078	0.021	19	34	23	12	6.7	1.9
DA-F10	0.082	1.5	0.16	0.081	0.042	0.011	9.0	43	16	8.5	4.6	1.3
DA-F11	0.91	0.83	0.76	0.40	0.21	0.056	30	30	25	14	7.4	2.1
DA-F13	0.031	0.12	0.058	0.030	0.016	0.0043	4.4	32	18	9.6	5.2	1.5
DA-F15	0.044	0.17	0.12	0.062	0.032	0.0087	10	32	19	10	5.6	1.6
DA-F17	0.073	0.55	0.092	0.048	0.025	0.0068	7.3	32	8.5	4.6	2.5	0.71
DA-G1	0.11	0.036	0.058	0.030	0.016	0.0042	5.5	15	5.9	3.2	1.7	0.50
DA-G2	0.035	0.015	0.043	0.023	0.012	0.0032	8.3	6.4	9.1	4.9	2.6	0.76
DA-G3	0.013	0.066	0.038	0.020	0.010	0.0028	14	14	14	7.7	4.1	1.2
DA-H1	0.30	0.11	0.23	0.12	0.062	0.017	7.5	12	6.7	3.7	2.0	0.57
DA-I	0.015	0.56	0.091	0.048	0.025	0.0067	4.8	96	21	11	6.2	1.8
DA-J	0.13	0.31	0.31	0.16	0.083	0.023	5.7	21	21	11	6.0	1.7
DA-K	0.70	2.6	1.4	0.71	0.37	0.099	23	54	35	19	10	2.9
DA-L	0.21	0.21	0.087	0.046	0.024	0.0064	9.0	9.0	73	39	21	6.1
DA-N	0.26	0.23	0.25	0.13	0.067	0.018	48	8.5	20	11	5.9	1.7
DA-O	1.3	-	1.27	0.66	0.35	0.093	28	-	29	16	8.3	2.4

Dredge Area Subunit			Reduction in Dredge Residual Concentration Due to						Reduction in Dredge Residual Concentration Due to			
			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging			Immediately Following Dredging	6 Months Post Dredging	12 Months Post Dredging	24 Months Post Dredging
			0%	19%	34%	57%			0%	17%	30%	53%
		Dredge Prism Surface Concentration[1]	Surface Concentration w/ Residuals[2]	Maximum Potential Concentration Above Background[3]				Dredge Prism Surface Concentration[1]	Surface Concentration w/ Residuals[2]	Maximum Potential Concentration Above Background[3]		
	Ship Canal (Estimated Background < 0.067 mg/kg)						*Ship Canal (Estimated Background ~ 2.56 mg/kg)*					
DA-P1	0.091	0.22	0.18	0.15	0.12	0.078	3.5	14	8.4	6.9	5.9	3.9
DA-P2	0.25	0.32	0.25	0.21	0.17	0.11	11	16	16	13	11	7.4
DA-P3	0.28	0.15	0.10	0.083	0.07	0.044	31	15	7.3	6.0	5.1	3.4
DA-P5	0.33	0.076	0.13	0.11	0.089	0.058	28	15	17	14	12	7.8

* Highlighted cells exceed Probable Effects Concentration Screening Values

[1] Dredge Prism Surface Concentration values taken from Attachement 3, Table 4a

[2] Surface Concentration w/ Residuals values taken from Attachement 3, Table 5a

[3] Maximum Potential Concentration Above Background for 6, 12 and 24 months values taken from Attachement 3, Table 5b, 5c, and 5d, respectively

7. **Water quality resulting from GLRI dredging residuals and bioaccumulation of Mercury and PCBs in Fish.** The exposed sediment surface and residuals following dredging will release contaminants into the water column that could potentially result in chronic toxicity to aquatic organisms and an unacceptable increase in the bioaccumulation of mercury and PCBs into fish. Contaminant concentrations in the water column of the Buffalo River and Ship Canal were predicted using the RECOVERY model for the period prior to dredging operations, immediately following dredging operations, and then after six, 12, and 24 months. The concentration of contaminants in the water column was predicted using the average surface sediment contamination levels for the Buffalo River and Ship Canal as well as the highest contaminant concentrations predicted for an individual Dredge Area subunit. This modeling indicated that all of the predicted contaminant concentrations in the water column were below the chronic toxicity screening criteria. Details of the modeling and analysis are presented in Attachment 4.

   The concentrations of PCBs and mercury in Buffalo River and Ship Canal water are expected to increase immediately after dredging and then decrease in concentration as new sediment is deposited into the Navigation Channel. As described in Section 3.3 above, the relative increase or decrease in the predicted water concentration can be used to estimate the relative impact of dredging operations on the concentration of PCBs and mercury in fish. Using this approach provides only an approximate estimate of fish tissue concentrations and should be considered an upper bound since 1) the concentration of chemicals with large octanol-water partitioning coefficients (K_{OW}) such as PCBs change only slowly in fish relative to water and 2) it assumes that all of the PCBs and mercury present in fish tissue are the result of sediment contamination and that other sources of contaminants (e.g. combined sewer outfalls (CSOs) and storm sewer outfalls (SSOs)) are not contributing to the concentrations measured in fish.

   Based on the predicted short-term increase in PCB concentrations in Buffalo River and Ship Canal water, average fish tissue concentrations are expected to temporarily increase from 0.28 mg/kg wet wt. to 0.53 and 0.41 mg/kg, in the Buffalo River and Ship Canal, respectively. These values are near the site-specific fish tissue criteria (0.46 mg/kg wet wt.) established for protection of mink. After this increase, PCB concentrations in fish are expected to decrease in the Buffalo River and Ship Canal to 0.07 and 0.22 mg/kg at 24 months, respectively, assuming that all of the PCBs present in fish tissue originate from contaminated sediments (Table 5). Mercury concentrations in fish tissue are also expected to temporarily increase following dredging and then decrease with the upper bound estimate of fish tissue concentrations at six months not exceeding the fish tissue criteria of 0.5 mg/kg wet wt (Table 4).

   A second approach based upon theoretical bioaccumulation potential and trophic transfer was used to predict the concentration of PCBs in fish tissue (Attachment 1). A site-specific BSAF value of 0.88 was used that is based on the measured bioaccumulation of PCBs by the aquatic oligochaete *Lumbriculus variegates* in Buffalo Harbor sediment. To extrapolate concentrations of PCBs predicted in worms to pelagic fish, a trophic transfer factor (TTF) of 1.33 for total PCBs was used that is specific to pumpkinseed sunfish (*Lepomis gibbosus*)

Table 5. Estimated Mercury and PCB Fish Tissue Concentrations

	Predicted Change in Water Chemistry			
	PCBs		Mercury	
	Buffalo River	Ship Canal	Buffalo River	Ship Canal
1. Modeled Water Chemistry (µg/L)				
Prior To Dredging	0.00018	0.0017	0.00031	0.0030
Imediately After Dredging	0.00065	0.0029	0.0014	0.0086
- Fractional Change	3.5	1.7	4.6	2.9
Six Months Post Dredging	0.00034	0.0025	0.00079	0.0075
- Fractional Change	1.9	1.5	2.6	2.5
12 Months Post Dredging	0.00018	0.0020	0.00043	0.0063
- Fractional Change	1.0	1.2	1.4	2.1
24 Months Post Dredging	0.000048	0.0013	0.00013	0.0046
- Fractional Change	0.3	0.8	0.4	1.5
2. Predicted Tissue Concentration (mg/kg)				
Remedial Target	0.46	0.46	0.5	0.5
Prior To Dredging (Measured)	0.28	0.28	0.06	0.06
6 Months Post Dredging (Predicted)	**0.53**	0.41	0.15	0.15
12 Months Post Dredging (Predicted)	0.28	0.33	0.08	0.13
24 Months Post Dredging (Predicted)	0.07	0.22	0.02	0.09

collected from Buffalo River. Details on the approach used and results are provided in Attachment 1.

The analysis of surface sediment before and after the GLRI dredging shows that, on average across dredged areas, total PCBs in fish would increase approximately 0.05 mg/kg or 69% immediately following dredging. Excluding "Area O" prior to dredging (total PCB bioaccumulation = 0.62 mg/kg), none of the predicted total PCB bioaccumulation values in pelagic fish prior to or following the GLRI dredging (range 0.006 mg/kg to 0.45 mg/kg) significantly exceeded the fish tissue concentration protective of mink (0.46 mg/kg).

8. **Conclusions.** Predictions of sediment resuspension and water quality 500 meters from dredging operations in the Ship Canal may result in copper concentrations exceeding Recommended National Water Quality Criteria and acute toxicity to fish if engineering controls or risk management plans are not implemented The exposed sediment bed and dredge residuals in several Dredge Area subunits may be acutely toxic to fish or other aquatic life immediately following dredging and prior to GLLA remedial dredging operations. However, the concentration of contaminants in surface sediments will reduce over time due to the natural deposition of river sediments into the Navigation Channel. Following six months of natural river sediment deposition, the potential for acute toxicity to lead or mercury would be limited to five Dredge Area subunits (DA-K, DA-L, DA-O). Following 12 months of natural sediment deposition, all of the dredge areas, except DA-L, would have contaminant concentrations below acute toxicity screening values. Dredge Area D-L has a small footprint, 12000 square feet, and represents a very small volume of sediment (100 cubic yards).

Sediment resuspended during dredging operations, which may migrate outside of the Navigation Channel, is not expected to have any significant impact on sediment quality in the River or Canal nor have any long-term impact on water quality.

PCB and mercury concentrations in fish are expected to temporarily increase and then decrease in proportion to the temporary change in water quality. The increase in PCB fish tissue concentrations may approach site-specific fish tissue criteria for the protection of Mink six months following dredging operations. However, this increase is expected to be short-lived with fish tissue concentrations dropping to levels below the current PCB concentrations measured in Buffalo River fish within 24 months. The concentration of mercury in fish will follow a similar pattern to PCBs.

Joe Kreitinger, PhD
Environmental Toxicologist
Risk Assessment Branch

Paul R. Schroeder, PhD, PE
Research Civil Engineer
Environmental Engineering Branch

APPENDIX D

COMMENTS/RESPONSES ON DRAFT EA/FONSI

From:	Hmsmoke@aol.com
To:	christin.m.cardus@usace.army.mil
Subject:	(no subject)
Date:	Wednesday, July 14, 2010 9:38:29 AM

in return of your mailing
I run the river a lot and if your people would do the top half too from 90 to the lake but you'll stop at Bailey ave because of the bridges
when was the last time a lake freight was up to the end of what your going to dredge I have not in many yr's seam a huge boat passed smith St a couple of small tugs up to south park
so you have the money to brunt and that what you need to do to keep your job
sorry I don't see any reason to bother to do all this work and next yr watch them do the sides and fill your work in oh I missed something /
I'm not speaking as a river keeper but I'm one of them and we don't all ways see eye to eye

Hyde Hitchcock

From: randy deschamps
To: Cardus, Christine M LRB
Date: Monday, July 19, 2010 10:06:40 AM

Hello and thank you for our concerns with the Buffalo river,without writing a book,I guess just a few concerns would be,what effect will this have on the wildlife?, as well as the overflows from the sewer runoffs and progress in general of the most recent developement plans and/or what is slated for and along the Buffalo river?What amount of dollars are going to be allocated and what are the determining factors to go ahead with this project.IE.. Im sure the question of does this make sence? ,can we afford not to do this,will stirring up all the past sediment do more harm than good?I feel that we Have turned the corner of past mistakes but where do we draw the line and impede progress? over the years I've encountered each and opposite extremes.From the lovers of the land to the individuals who uneducated,would seemingly be unconcerned with detremental acts and the environmental impact this can have.Can you also give us or publish any info as to the current integrity of the waterways and will this be available in the process?I look forward to hearing fronm you and godspeed Randy

---

From: Ronsgonefishing@aol.com
To: Cardus, Christine M LRB
Subject: Dredging Buffalo River
Date: Thursday, July 15, 2010 2:04:46 PM

Christine,
I have no comments to make at this time on this project on the Buffalo River.

I am trying to get more information though on the Emergency Streambank Protection Project on the Cayuga Creek in the Village of Depew-Town of Cheektowaga.
I have a brief letter but wonder what classification this holds with the NYS DEC? It stated that I should review the enclosed EA/FONSI. But there was nothing to review only the letter. Any assistance you can send is appreciated.

Ronald Urban, Chairman
NY Trout Unlimited
PO Box 815
Port Ewen, NY 12466
home: 845.339.5938
cell: 914.388.3878

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
270 Michigan Avenue, Buffalo, New York 14203-2915
Phone: (716) 851-7220 • **FAX:** (716) 851-7226
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

July 27, 2010

Ms. Christine Cardus
Environmental Analysis Team
US Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Ms. Cardus:

Buffalo River Dredging
Buffalo, Erie County

On behalf of the New York State Department of Environmental Conservation (DEC), I have reviewed the Environmental Assessment documents (July 2010) addressing the proposed dredging of the Buffalo River. I understand that the public comment period is open until August 9, 2010.

Provided below are comments and/or observations that are provided to your team for review.

1. Cover Letter and Sec 2.0: It is noted that the placement of dredged material into the confined disposal facility (CDF) is restricted during the period that gulls are nesting. This period should be included in the document.

2. Sec.1.2: The section references grouting repairs to the steel pile wall to 'restore complete functionality'... Additional information should be provided here to describe how the CDF was functioning before the repairs and the associated environmental impacts.

3. Sec 2.1: The section states "select areas in the river. . .will be avoided." The documents do not define these areas.

4. Sec 2.1: It is not clear if oil booms will be deployed only when 'significant oil' is observed, or will they be employed at all times? If they are only deployed when

problems arise, please note that the rigger should not be "significant oil or grease slicks" but rather any evidence of an oil sheen.

5. Sec 3.1: The section includes a statement that up to 450,000 cy of sediment is "contaminated" requiring removal. However, the Remedial Investigation & Feasibility Study (RIFS) only identifies 210,000 cy of contaminated sediment within the navigational channel requiring removal, i.e. above Remedial Goals (RGs).

6. Sec 4.2.7.2: The excerpt from the draft FS has since been revised, and the current version should be used.

7. Sec 4.2.9: The excerpt from the draft FS has since been revised, and the current version should be used.

8. Sec 5.2.2: This section suggests that contaminated sediments will be exposed by the dredging, and in some areas the increase in exposure concentrations are significant. It may be advisable to remove these areas from the dredging proposal until such time as the GLLA dredging occurs to allow the dredging to be comprehensive in nature, thereby eliminating the duration of exposure.

9. Sec 5.2.2: This section states that "sediment resuspended during dredging which may *migrate outside* the dredging project limits. . ." It is recommended that measures be taken to eliminate the possibility of migration outside the project limits.

10. Sec 5.2.2: This section states that "Deposition of clean sediment from upstream sources is expected to rapidly cover. . .however the rate of deposition will be variable. . ." Are there calculations in an appendix or elsewhere that support this statement? The areas of variability should also be defined.

11. Sec 5.2.2 and 5.3.2: This section states that completion of the advanced maintenance dredging should allow future sediment dredging to preclude the need for confined disposal. It is the DEC's position that <u>not until the GLLA sediment removal is completed</u> will the possibility of precluding the need for confined disposal be made available. This is due to continued sloughing of contaminated side slopes into the navigational channel.

12. Sec 5.2.9: This section reviews possible impacts to fish tissue from water quality changes and fails to discuss the possibility of exposure to exposed contaminated sediment. (See comment 19)

13. Sec 5.3.6: The section states "it is *anticipated* that mechanical dredging will be used. . ." Section 5.3.5 says it *will* be used.

March 11, 2010 Memo: Evaluation of Dredged Material Placement in Buffalo Harbor Confined Disposal Facility

14. Sec 1: ". . .including both the *truly* dissolved concentration. . ." Does "truly" mean actual?

15. Sec 2: This section discusses using harbor or CDF water to achieve discharge water quality standards. It is not sure what is meant by this statement nor how using water for the CDF helps meet the standard.

16. Sec 5: It is stated that contaminants remain in an anoxic state. Has this been field proven?

17. Sec 5: The report assumes repairs restore the function of the CDF as originally designed. Will there be a report attesting to the success of the repairs?

Draft April 15 2010 Memo: Evaluation of Environmental Risks from Proposed Buffalo River GLRI Dredging Operations

18. Summary: This section states that exposed sediment bed and dredge residuals are predicted to be acutely toxic to fish. The memo concludes that four areas would exceed the Probable Effects Concentration (PEC). It is suggested that consideration be given to dredging these areas jointly with the GLLA dredging project to avoid the exposure especially since the proposed GLRI dredging is "not designed to meet GLLA RGs" as stated in this document.

19. Sec 1: It is understood that dredging will not occur until July 2011. Therefore, remove references to 2010.

On behalf of the Department, I thank you for the opportunity to provide these comments and observations. I look forward to further discussions to resolve or better understand the proposed actions.

Sincerely,

Martin L. Doster

Martin L. Doster, P.E.
Regional Hazardous Waste Remediation Engineer

MLD:sz

cc: Mr. David Denk, Deputy Permit Administrator - DEC
Mr. Gerard Palumbo - DEC
Mr. Russ Biss - DEC
Mr. Byron Rupp - USACE
Ms. Mary Beth Ross - GLNPO
Ms. Jill Jedlicka - Buffalo Niagara Riverkeeper
Mr. John Morris - Honeywell

BUFFALO NIAGARA RIVERKEEPER®

August 5, 2010

Ms. Christine Cardus
Environmental Analysis Team
US Army Corps of Engineers- Buffalo District
1776 Niagara Street
Buffalo, New York 14207

RE: Buffalo Niagara Riverkeeper Comments on Buffalo River Dredging FONSI

Dear Ms. Cardus:

Please accept the following as official comments on behalf of Buffalo Niagara Riverkeeper. Comments or questions you may have received from Riverkeeper Riverwatch volunteers or "captains", do not reflect the official position of Buffalo Niagara Riverkeeper, and should be accepted as individual citizen comments.

Comment 1: Cover letter, fifth paragraph, second sentence, states *"An estimated 450,000 to 650,000 cubic yards of sediment would be removed from the Federal navigation channel, with actual quantities dependent on final funding levels and contract prices"*.

- This volume estimate is inconsistent with the volume identified in the Draft GLLA Remedial Investigation/Feasibility Study (RI/FS). Please explain. Also, if navigation dredging is driven by funding levels and contract prices, how are decisions made regarding dredge limits and boundaries, and would a modified budget affect the overall approach to the dredge footprint?

Comment 2: Cover letter, second to last paragraph states *"…avoidance of dredging in select areas within the river and ship canal that contain high levels of contamination."*

- Is this area within segment DA-P with high copper concentrations, or DA-L with high mercury concentrations? Please define and explain further.

Comment 3: Section 1.2, page 1-2, last paragraph. The consistent placement of dredged material along the northeasterly side of CDF has "*effectively created a terrestrial habitat along the breakwater side…*"

- Please define more clearly if this terrestrial habitat is inside or outside of the CDF, what kind of species and populations exist in this created habitat and does the presence of the habitat contribute to increased ecological risk or bioavailability?

Comment 4: Section 2.1 "General Environmental Considerations". As described in Comment #2, this section states that *"select areas in the river and ship canal that contain high levels of contamination will be avoided."* In addition, "*oil booms will be deployed during operations…"*

- Where are the "select locations", and what is the long term management plan for these contaminants?
- Many areas of high levels of oil and grease have already been identified, and Riverkeeper recommends the proactive deployment of booms in dredge areas with known contamination of oil and grease.

Comment 5: Section 4.2.7.2 "Benthos" and Section 4.2.9 "Fisheries", are both pulled from a Draft of the RI/FS that has since been modified. Please update these sections.

Comment 6: Section 4.3.7 "Recreation", 1st paragraph. *"Some limited unsupervised swimming has also been observed in the river. Limited recreational game fishing occurs on the Buffalo River".*

- The reference for this anecdotal observation is from NYSDEC, 1989. Since that time, several other studies and river observations indicate that recreational use of the Buffalo River is more than "limited" during the warm weather months. Therefore, disruptions of recreational activity during dredge operations, though unavoidable, will be significant. Plans must be put into place to proactively inform and educate the river-using public about the risks from swimming, fishing, paddling or boating, and the disruptions to be expected.

Comment 7: Section 5.2.2 "Sediment Quality", third paragraph. The statement of *"across the project area, the average concentration of surface contamination is not expected to substantially increase following dredging…"*

- Are average concentrations calculated using the full 6.2 miles of the AOC, or is this a general statement about the SWAC values for one-third mile segments as used in the RI/FS?

Comment 8: Section 5.2.2, fifth paragraph. *"Sediment resuspended during dredging which may migrate outside of the project limits…"*

- It is the position of Buffalo Niagara Riverkeeper that any and all actions be taken to control the possibility of contaminant migration outside of the project limits.

Comment 9: Section 5.2.2, sixth paragraph, last sentence. *"…rate of deposition will be variable"*.

- Please refine this statement to describe the expected deposition rates, timelines associated with deposition, and potential range of rates dependent on the location within the river. The variability corresponding to river mile location would be useful information to understand the site specific areas of the river that may have longer timeframes to be "covered," and therefore longer periods of human and ecological risk.

Comment 10: Section 5.2.3, "Water Quality', third paragraph. General discussion on potential of water quality exceedances,

- It is the position of Buffalo Niagara Riverkeeper that any and all actions be taken to control the possibility of contaminant migration outside of the project limits. In addition, a proactive approach to public education including highly visible signage, advanced warning, and recommended protective measures be available throughout the duration of the project.

Comment 11: Section 5.2.7, "Plankton and Benthos", second paragraph. *"Ultimately, this plan would improve habitat for benthos in these areas over the long-term…"*

- Please define the number of months or years that qualifies as "long-term".

Comment 12: Section 5.2.9, "Fisheries", fourth paragraph. Discussion on fish tissue concentrations of PCBs and mercury,

- The paragraph is misleading and confusing as written and leads the reader to believe that there has already been a drop in fish tissue concentrations over the last 24 months. The last sentence states that there will be long-term beneficial impacts to the fish community. Please define the timeline associated with "long-term", and re-iterate what those beneficial impacts to the fish community will be.

Comment 13: Section 5.3.3, "Business and Industry and Employment and Income", second paragraph. *"No adverse impact from the project on local business is anticipated"*

- There is no discussion on the measures or scheduling that will keep disruptions to a minimum for the local marinas, dock owners, and bridge operators. There is a potential to severely disrupt the daily operations of some local businesses and the access to recreational watercraft for the marinas in the City Ship Canal, if dredging in that section of the river occurs prior to the October 15, 2011.

Comment 14: General Comment

- Is it expected that a representative from the US Army Corps will be on board and actively monitoring the dredging operations at all times to ensure that all safety protocols, environmental controls, and other state and federal rules and regulations are adhered to? Since there are limited environmental controls available during this kind of dredge operation, it is critical that they be implemented and enforced, especially during an operation that will take place 24 hours a day, 7 days a week.

Comment 15: General Comment

- Buffalo Niagara Riverkeeper is expecting to commence a GLRI-funded shoreline habitat restoration project at the "RiverBend" site near the limits of the dredge operations. Segment DA-A (~1,700 cy) lies near the RiverBend site, but not directly within the habitat project footprint. This shoreline restoration project will commence in 2011-2012. Please maintain communication with Riverkeeper regarding the dredging schedule and activity in the upper reaches of the river, to avoid possible interference of other barge traffic or mobilization of heavy equipment along the shoreline.

CC: Ms. Mary Beth Giancarlo Ross, USEPA-GLNPO
Mr. Martin Doster, NYSDEC
Mr. Byron Rupp, USACE
Ms. Julie Barrett O'Neill, Buffalo Niagara Riverkeeper
Mr. John Morris, Honeywell

From:	Judith A. Abbott
To:	Cardus, Christine M LRB
Cc:	Patrick M. Palmer; Deanna M. Ripstein; Anthony J. Forti
Subject:	NYS DOH staff comments on Buffalo Harbor Dredging Environmental Assessment
Date:	Tuesday, August 10, 2010 3:34:57 PM

Christine:

Thank you for the opportunity to submit NYS Department of Health staff level comments on the Buffalo Harbor Dredging Environmental Assessment. Below are our comments:

Comment 1. Dredging Impacts on Fish Concentrations

In the "Selected Plan" (page 5-29), regarding increases in fish PCB levels from dredging, the report states: "However, this increase is expected to be short-lived; fish tissue concentrations in the Buffalo River have dropped within the last 24 months to levels below the current PCB concentrations measured in fish within the river." The meaning of this statement is unclear and the basis for the statement was not explained or supported in the document. Please clarify and provide text to support this statement.

Comment 2. Public Water Supply Intakes

In addition to the public water supply intake for the Erie County Water Authority, the report (Section 5.3.5) should acknowledge the intakes for Tonawanda (NY1404556), DuPont (NY1403740), ECWA (NY1400443), and Grand Island (NY1400451), which are located further north in the Niagara River. While there will not likely be any measurable impact from dredging near these public water supply intakes, the USACE and NYSDEC should be aware of there existence and location.

Please contact us if you need any clarification. Thanks.

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Comments and USACE responses on draft Environmental Assessment/Finding of No Significant Impact dated July 9, 2010

Hyde Hitchcock, submitted via email July 14, 2010

Comment 1: When was the last time a lake freight was up to the end of what your going to dredge?

Response 1: The last time deep-draft commercial vessels used the upper reaches of the Buffalo River Channel was likely within the 2000 to 2002 timeframe. Use of Federal navigation channels within Buffalo Harbor by lake freighters varies substantially. Dredging of these channels to accommodate deep-draft navigation is economically justified because the benefits of dredging exceed the costs (2008 benefit:cost [B:C] ratio = 2.3:1).

Comment 2: I don't see any reason to bother to do all this work and next yr watch them do the sides and fill your work in?

Response 2: The Great Lakes Restoration Initiative (GLRI) dredging will remove a mass of contaminated sediments from Buffalo Harbor Federal navigation channels. The Great Lakes Legacy Act (GLLA) project would include dredging of side slopes and possibly areas below the Federal navigation channels, as well as areas within these channels that were not dredged under the GLRI project. The vast majority of this material would not fill in the Federal navigation channels. Most of the material that would deposit into these channels would be sediments from the upstream watershed.

Randy Deschamps, submitted via email July 19, 2010

Comment 1: What effect will this have on the wildlife?

Response 1: Wildlife impacts are addressed in Section 5.2.12 in the Environmental Assessment /Finding of No Significant Impact (EA/FONSI).

Comment 2: As well as the overflows from the sewer runoffs and progress in general of the most recent development plans and/or what is slated for and along the Buffalo River?

Response 2: Please visit http://www.buffaloriverrestoration.org to obtain more information about projects slated for the Buffalo River vicinity.

Comment 3: What amount of dollars are going to be allocated and what are the determining factors to go ahead with this project.

Response 3: A total of $8,350,000 has been allocated for this GLRI dredging project, which also includes repairs to the Buffalo Harbor confined disposal facility (CDF). At this time, the key factors toward determining whether to progress with the project include satisfactory resolution of environmental issues (through coordination of the EA/FONSI) and securing awardable contract bids for the work.

Comment 4: I'm sure the question of does this make sense? Can we afford not to do this; will stirring up all the past sediment do more harm than good?

Response 4: Each alternative in the EA/FONSI was weighed against the "No Action" alternative. The conclusion was that the proposed alternative would have benefits that outweigh the "No Action" alternative.

Comment 5: I feel that we have turned the corner of past mistakes but where do we draw the line and impede progress? Over the years I've encountered each and opposite extremes. From the lovers of the land to the individuals who uneducated, would seemingly be unconcerned with detremental acts and the environmental impact this can have.

Response 5: Comment noted.

Comment 6: Can you also give us or publish any info as to the current integrity of the waterways and will this be available in the process?

Response 6: The existing conditions of the Buffalo River and Ship Canal are described in Section 4 of the EA/FONSI.

Martin Doster, New York State Department of Environmental Conservation, letter dated July 27, 2010

Comment 1: Cover Letter and Sec 2.0: It is noted that the placement of dredged material into the confined disposal facility (CDF) is restricted during the period that gulls are nesting. This period should be included in the document.

Response 1: This text in the EA/FONSI was edited to include the restricted period during which the gulls are nesting "which encompasses March 1 until July 15."

Comment 2: Sec.1.2: The section references grouting repairs to the steel pile wall to 'restore complete functionality' ... Additional information should be provided here to describe how the CDF was functioning before the repairs and the associated environmental impacts.

Response 2: Additional text added to this section of the EA/FONSI. The CDF is presently about 25 to 30 feet deep and the sheet piles (and gaps) are exposed to water from the upper six feet of the CDF pond. The dredged material is pumped into the CDF on the opposite side of the facility from the dikes that are undergoing repair. In addition, the dredged material flows to the bottom of the CDF since it is heavier (denser) than the water. The separation between the inlet and the gaps as well as the vertical separation between the dewatering dredged material on the bottom and the surface gaps allows the suspended solids to settle out before the water is discharged. Presently, water from dredged material placed in the CDF is discharged both through gaps in the sheet pile and seepage through the filter core. Due to the remaining capacity in the CDF, the residence time for water within the facility has generally been about 50 days. This allows adequate time for most particulates associated with the dredged material to settle out prior to the water moving through the dikes. It is estimated that suspended solids concentrations in water being discharged through the dike has typically been about 10 mg/L, thereby approaching lake background levels. In addition, water from lake wave action serves to dilute CDF discharge water as it moved through the dike walls, resulting in no detectable impact to lake water quality from CDF material. Consequently, any discharge of water through these dike gaps would not contravene applicable New York State water quality criteria.

Comment 3: Sec 2.1: The section states “select areas in the river. . .will be avoided.” The documents do not define these areas.

Response 3: Reference to Section 3.2 of the EA/FONSI was added to this section to clarify this statement.

Comment 4: Sec 2.1: It is not clear if oil booms will be deployed only when ‘significant oil’ is observed, or will they be employed at all times? If they are only deployed when problems arise, please note that the rigger should not be “significant oil or grease slicks” but rather any evidence of an oil sheen.

Response 4: Text in EA/FONSI changed to “Oil booms will be deployed should any oil sheen be observed during dredging operations.”

Comment 5: Sec 3.1: The section includes a statement that up to 450,000 cy of sediment is “contaminated” requiring removal. However, the Remedial Investigation & Feasibility Study (RI/FS) only identifies 210,000 cy of contaminated sediment within the navigational channel requiring removal, i.e. above Remedial Goals (RGs).

Response 5: The dredged material volume targeted in the GLRI project are relative to a depth of dredging that is two feet deeper than the depths used to calculate the volume estimated in the RI/FS. Additionally, areas that area planned to be dredged include sediments in the Federal navigation channels that are less contaminated; mainly in-between areas identified in the RI/FS as included in the dredge footprint in Remedial Alternative 5 (filled in for logistical reasons).

Sentence in Section 3.1 of the EA/FONSI edited to clarify “As this plan does not meet the needs of removing additional contaminated sediments from the aquatic environment in the Federal navigation channels, it was eliminated as a viable alternative.”

Comment 6: Sec 4.2.7.2: The excerpt from the draft FS has since been revised, and the current version should be used.

Response 6: Text found in this section of draft EA matches the text in the latest version of the draft FS provided by DEC.

Comment 7: Sec 4.2.9: The excerpt from the draft RI/FS has since been revised, and the current version should be used.

Response 7: Text changed in Section 4.2.9 of the EA/FONSI.

Comment 8: Sec 5.2.2: This section suggests that contaminated sediments will be exposed by the dredging, and in some areas the increase in exposure concentrations are significant. It may be advisable to remove these areas from the dredging proposal until such time as the GLLA dredging occurs to allow the dredging to be comprehensive in nature, thereby eliminating the duration of exposure.

Response 8: Several areas exposed by the GLRI dredging are expected to temporarily increase the potential for exposure and toxicity to aquatic life. This potential will rapidly decline as much less contaminated sediments from the upstream watershed begin to cover and bury these exposed areas. Areas DA-K, DA-L, DA-O have the highest concentrations of mercury, lead and total PCBs, and exhibit the greatest risk to aquatic life. These areas are predicted to exceed the probable effect concentration (PEC) screening value six months after dredging (See Table 4 in Appendix C of EA/FONSI), and Area DA-L is expected to exceed the PEC for mercury after 12 months. Although It is important to note that although areas DA-P5 and DA-E4 show elevated levels of the individual PAH compound benz(a)anthracene, total PAH concentrations at these areas (range 8.5 to 17 mg/kg) are below or very similar to the GLLA project remedial action goal (PRG) of 16 mg/kg for total PAHs.

When making risk management decisions on dredging operations, it is important to understand the conservative assumptions and uncertainty in the assessment of risk. The analysis conducted to assess risk to aquatic life has assumed a low rate at which the contaminated sediments will be covered by the clean sediment that is naturally deposited in the Federal navigation channels from upstream areas. Although the actual rate of sediment deposition is highly variable and location dependent, the assumed rate of four centimeters (cm) per year is believed to be conservative (See response to Comment 10 below). In addition to this assumed rate of sediment burial, we have also included the very conservative assumption that mercury and lead present in the sediment is 100% available to exert toxicity and/or for uptake by aquatic organisms (i.e., geochemical characteristics of sediment were not considered in order to refine our estimates of toxicity to aquatic life). Specifically, we have not taken into account the chemical binding of sulfide in our risk analysis; the metal binding capacity of sulfide has a large impact on the potential for exposure, resulting toxicity, and the potential risk from mercury and lead to aquatic organisms.

The determination to remove areas DA-L from the GLRI dredging plan was a risk management decision that balanced the potential for short-term risk and long-term benefit of permanently removing the contaminated sediments, as well as risk analysis uncertainties. In response to this comment (and related comments #18 from NYSDEC and Comment 4 from Buffalo-Niagara River Keepers [BNRK),]), we have modified the GLRI dredging plan to reserve areas DA-K and DA-O with area DA-L for future dredging under the potential future GLLA project. All three of these areas were identified as “resample” areas in the GLLA RI/FS (DA-L corresponds to Resample Area 5, DA-K corresponds to Resample Area 6, and DA-O corresponds to Resample Area 4.)). By postponing dredging in these areas for completion under the GLLA project, there is a shorter period of potential exposure and lower potential risk for fish and other transient aquatic life through these areas prior to burial of the sediment contaminants. Further information can be found in Appendix C in the EA/FONSI.

Comment 9: Sec 5.2.2: This section states that "sediment resuspended during dredging which may *migrate outside* the dredging project limits. . ." It is recommended that measures be taken to eliminate the possibility of migration outside the project limits.

Response 9: Text added to section to read: "Sediment resuspended during dredging which may migrate outside of the dredging project limits is not expected to have any significant impact on sediment quality in areas outside the planned dredging areas. Measures taken to address this include the following dredging controls: (1) An enclosed clamshell bucket will be used to reduce sediment resuspension and turbidity in the water column; (2) except for *de minimus* discharges, the overflow of supernatant from scows containing the dredged material will be prohibited; and (3) production rates will be regulated during dredging to reduce the release of contaminants in the water column.

Comment 10: Sec 5.2.2: This section states that "Deposition of clean sediment from upstream sources is expected to rapidly cover. . .however the rate of deposition will be variable. . ." Are there calculations in an appendix or elsewhere that support this statement? The areas of variability should also be defined.

Response 10: The burial rate of the residuals remaining in the Federal navigation channel surface following dredging by less contaminated sediment from upstream sources has been conservatively modeled assuming the deposition of four cm (1.6 inches)/yr within the Buffalo River Channel and one cm (0.4 inches)/yr in the Ship Canal. These rates of deposition were estimated based on the observed shoaling of sediments within the areas planned for dredging. A review of the 2008 after-dredge surveys and the 2009 project condition surveys indicate that areas of the River Channel at the river bends have shoaled-in by ten feet. Other areas shoaled in at least one foot, although this was inconsistent. Dredging operations routinely remove four feet or more of sediment from many locations in the River Channel on a two to three-year dredging cycle. Previous model estimates of the average sediment deposition indicate that approximately ten cm (about four inches) of sediment enters the channel each year. The rate and spatial variability in the deposition of less contaminated sediment from upstream sources is expected to follow historical patterns with the highest rates of deposition initially occurring at the upstream terminus of the River Channel, with shoaling moving downstream as sediment accumulates at the river bends. Additional text was added to this section of the EA/FONSI.

Comment 11: Sec 5.2.2 and 5.3.2: This section states that completion of the advanced maintenance dredging should allow future sediment dredging to preclude the need for confined disposal. It is the DEC's position that not until the GLLA sediment removal is completed will the possibility of precluding the need for confined disposal be made available. This is due to continued sloughing of contaminated side slopes into the navigational channel.

Response 11: Understood. The text in Sections 5.2.2 and 5.3.2 of the EA/FONSI was revised to state, "Completing advanced maintenance at this point should support the third GLLA Remedial

Action Objective to 'Reduce or otherwise address legacy sediment COC concentrations to improve the likelihood that future dredged sediments (for routine navigational, commercial, and recreational purposes) will not require confined disposal' (Environ et. al., 2010). Both GLRI and GLLA dredging projects would substantially increase the potential for future navigation dredged sediment to be suitable for unconfined management (i.e., preclude the need for confined disposal such that it could be placed in the open-lake or beneficially used). This would reduce long-term needs for the existing CDF and provide restoration benefits to the entire Buffalo River ecosystem."

Comment 12: Sec 5.2.9: This section reviews possible impacts to fish tissue from water quality changes and fails to discuss the possibility of exposure to exposed contaminated sediment (see comment 19).

Response 12: Text added to sentence to include "exposure to contaminated sediments."

Comment 13: Sec 5.3.6: The section states "it is *anticipated* that mechanical dredging will be used. . ." Section 5.3.5 says it *will* be used.

Response 13: Text changed to *will*.

Comments 14-17 reference - March 11, 2010 Memo: Evaluation of Dredged Material Placement in Buffalo Harbor Confined Disposal Facility

Comment 14: Sec 1: ". . .including both the *truly* dissolved concentration. . ." Does "truly" mean actual?

Response 14: Yes, truly means actual in this context.

Comment 15: Sec 2: This section discusses using harbor or CDF water to achieve discharge water quality standards. It is not sure what is meant by this statement nor how using water for the CDF helps meet the standard.

Response 15: Reusing water from the CDF, (as opposed to using water from the lake) as a means to hydraulically transport dredged sediment from scows into the CDF will result in less water in the CDF and lower water levels. A lower water level within the CDF results in a lower hydraulic head between the CDF and lake, as well as a lower rate of water transport through the filter core of the dike. The lower rate of water transport through the dike permits greater mixing of CDF water with lake water prior to entering the lake, which reduces the concentration of contaminants in CDF effluent discharged into the lake.

Comment 16: Sec 5: It is stated that contaminants remain in an anoxic state. Has this been field proven?

Response 16: Submerged soil and sediment quickly becomes anoxic due to the restricted transport of oxygen in sediment porewater and the on-going oxygen demand from reduced compounds (e.g., sulfides, ferrous iron, ammonia nitrogen, etc) and microbial degration of organic carbon. Most depositional sediments, including those submerged in CDFs, are anoxic below the top few centimeters. The shallow depth of biologically active zones residing above anoxic sediments has been demonstrated at numerous contaminated sediment sites.

Comment 17: Sec 5: The report assumes repairs restore the function of the CDF as originally designed. Will there be a report attesting to the success of the repairs?

Response 17: There will be a report that will detail the repair and document the success of the project. A copy of this report will be provided to NYSDEC.

Comments 18- 19 reference - Draft April 15 2010 Memo: Evaluation of Environmental Risks from Proposed Buffalo River GLRI Dredging Operations

Comment 18: Summary - This section states that exposed sediment bed and dredge residuals are predicted to be acutely toxic to fish. The memo concludes that four areas would exceed the Probable Effects Concentration (PEC). It is suggested that consideration be given to dredging these areas jointly with the GLLA dredging project to avoid the exposure especially since the proposed GLRI dredging is “not designed to meet GLLA RGs” as stated in this document.

Response 18: We have modified the GLRI project dredging plan by removing areas DA-K, DA-L and DA-O. Please refer to the response to Comment 8 above.

Comment 19: Sec 1: It is understood that dredging will not occur until July 2011. Therefore, remove references to 2010.

Response 19: References to 2010 were removed in the EA/FONSI text and the Evaluation of Environmental Risks Memo.

Buffalo Niagara Riverkeeper, letter dated August 5, 2010

Comment 1: Cover letter, fifth paragraph, second sentence, states *“An estimated 450,000 to 650,000 cubic yards of sediment would be removed from the Federal navigation channel, with actual quantities dependent on final funding levels and contract prices”*.

This volume estimate is inconsistent with the volume identified in the Draft GLLA Remedial Investigation/Feasibility Study (RI/FS). Please explain. Also, if navigation dredging is driven by funding levels and contract prices, how are decisions made regarding dredge limits and boundaries, and would a modified budget affect the overall approach to the dredge footprint?

Response 1: The dredging contract will include approximately 450,000 cy of GLRI dredging and 150,000 cy of operation and maintenance (O&M)-funded dredging. The dredging quantity of 650,000 cy was included in the EA/FONSI to account for possible increases due to shoaling that may occur prior to the work or other factors that could increase the final quantity. The current quantity for the GLRI dredging are greater than that provided in the RI/FS. GLLA RI/FS quantities were based on specific sample points and prescribed areas of contamination based on sediment evaluations. Also, GLRI dredging contract limits are generally deeper to 24 feet below

LWD and extend across the width of the Federal navigation channels; the GLLA project plans for the dredging of comparably smaller areas with irregular limits as described in the RI/FS.

Comment 2: Cover letter, second to last paragraph states *"…avoidance of dredging in select areas within the river and ship canal that contain high levels of contamination."* Is this area within segment DA-P with high copper concentrations, or DA-L with high mercury concentrations? Please define and explain further.

Response 2: We have modified the GLRI dredging plan by removing areas DA-K, DA-L and DA-O. See Comment Response 8 to NYSDEC.

Comment 3: Section 1.2, page 1-2, last paragraph. The consistent placement of dredged material along the northeasterly side of CDF has "*effectively created a terrestrial habitat along the breakwater side…*" Please define more clearly if this terrestrial habitat is inside or outside of the CDF, what kind of species and populations exist in this created habitat and does the presence of the habitat contribute to increased ecological risk or bioavailability?

Response 3: Some additional text was added to this section to clarify. The habitat that sentence describes exists inside the CDF and is an area that gulls utilize for nesting each year. The following (Section 4.3) is an excerpt from of the September 2008 *Contaminant Monitoring Assessment of Confined Disposal Facility Dike 4, Buffalo Harbor*, states:

> "The pre-construction use of CDF No. 4 by waterfowl was limited by the Lake Erie waves, currents, severe lake winds and ice conditions which likely impaired any nesting or foraging activity (USACE 1973). The primary type of waterfowl that likely utilized the area (prior to construction) for resting and feeding during migrations were diving ducks (e.g., lesser scaup, *Aythya afinis* and common goldeneye, *Bucephala clangula*). It was concluded at this time, however, that use of this area for disposal of dredged material should have little long-range effect on waterfowl. However, the EIS also noted that in general, the acreage created by the other CDFs (constructed prior to 1973) were among the only significant wildlife habitat areas along the Buffalo waterfront. While small in comparison with the total acreage of the waterfront, these areas were found in 1973 to contribute to wildlife resources (e.g., primary habitat, foraging, etc.), as well as support healthy plant life (USACE 1973). The proposed post-closure plan for CDF No. 4 is wildlife use. Current observations of CDF No. 4 indicate that gull and tern species visit the site from April to June, although the majority of their feeding probably occurs outside of CDF No. 4.
>
> The EIS also indicated that the area of CDF No. 4 did not constitute a unique fishery resource, nor was it an important fish spawning ground (USACE 1973).
>
> No threatened and endangered species were identified for the area at the time of the EIS. As of issuance of this report, CDF No. 4 has not been identified as a habitat for any threatened or endangered species (NYSDEC 2004).
>
> The *Contaminant Monitoring Assessment* was performed in order to determine whether or not further management actions need to be taken at the dredged material confined disposal facilities in order to ensure protection of human health and the environment. It included a screen of constituents measured in CDF water, soil, and sediment against concentrations deemed protective of human health and the environment by USEPA. It also included bioaccumulation studies on

CDF material for those constituents which did not pass this conservative screen against these risk-based concentrations (i.e., PAHs and metals). The *Contaminant Monitoring Assessment* concluded that terrestrial and aquatic bioaccumulation of PAHs and metals from Buffalo Harbor CDF No. 4 dredged material are apparently not occurring to any greater extent than bioaccumulation of these constituents from unimpacted reference areas. Therefore, it is concluded that the dredged material within the CDF is not posing a risk to human health or environmental receptors outside the facility.

USACE 1973. *Final Environmental Impact Statement. Diked Disposal Area. Buffalo River, Buffalo Harbor, Black Rock Channel, Tonawanda Harbor, Erie County, NY*. USACE, Buffalo District. EIS.NY.73.1473.F.

NYSDEC. 2004. *New York State Natural Heritage Report for the Buffalo CDF No. 4.* Letter to Mr. James Miller, USACE-LRB-TD-EA, May 6, 2004.

Comment 4: Section 2.1 "General Environmental Considerations". As described in Comment #2, this section states that *"select areas in the river and ship canal that contain high levels of contamination will be avoided."* In addition, "*oil booms will be deployed during operations…"*Where are the "select locations", and what is the long term management plan for these contaminants? Many areas of high levels of oil and grease have already been identified, and Riverkeeper recommends the proactive deployment of booms in dredge areas with known contamination of oil and grease.

Response 4: Areas that will be avoided under the GLRI dredging include DA-L, DA-O and DA-K. They will be left in place for the GLLA dredging to address during their design and remedial activities. A response plan will be prepared by the contractor for managing oil sheens during dredging operations. Oil booms will be positioned for immediate use during dredging in areas where sheens are anticipated, and oil booms will be deployed when visible sheens are present.

Comment 5: Section 4.2.7.2 "Benthos" and Section 4.2.9 "Fisheries", are both pulled from a Draft of the RI/FS that has since been modified. Please update these sections.

Response 5: Text changed in EA/FONSI for Section 4.2.9, text was identical to latest draft RI/FS for Section 4.2.7.2.

Comment 6: Section 4.3.7 "Recreation", 1st paragraph. "*Some limited unsupervised swimming has also been observed in the river. Limited recreational game fishing occurs on the Buffalo River"*. The reference for this anecdotal observation is from NYSDEC, 1989. Since that time, several other studies and river observations indicate that recreational use of the Buffalo River is more than "limited" during the warm weather months. Therefore, disruptions of recreational activity during dredge operations, though unavoidable, will be significant. Plans must be put into place to proactively inform and educate the river-using public about the risks from swimming, fishing, paddling or boating, and the disruptions to be expected.

Response 6: In Winter 2010-2011, the USACE-Buffalo District will prepare an outreach plan to communicate with the public information related to GLRI dredging operations in the Buffalo River and Ship Canal. This plan will be implemented in Spring 2011.

Comment 7: Section 5.2.2 "Sediment Quality", third paragraph. The statement of *"across the project area, the average concentration of surface contamination is not expected to substantially increase following dredging…"* Are average concentrations calculated using the full 6.2 miles of the AOC, or is this a general statement about the SWAC values for one-third mile segments as used in the RI/FS?

Response 7: The average SWAC values before and after dredging were calculated using the measured and predicted concentration of contaminants present in the areas of the Federal navigation channel planned for GLRI dredging.

Comment 8: Section 5.2.2, fifth paragraph. *"Sediment resuspended during dredging which may migrate outside of the project limits…"* It is the position of Buffalo Niagara Riverkeeper that any and all actions be taken to control the possibility of contaminant migration outside of the project limits.

Response 8: Measures in place to control sediment resuspension during dredging are described in Section 2.1 of the EA/FONSI. In addition, in Winter 2010-2011, the USACE-Buffalo District will prepare an outreach plan to communicate with the public information related to GLRI dredging operations in the Buffalo River and Ship Canal. This plan will be implemented in Spring 2011.

Comment 9: Section 5.2.2, sixth paragraph, last sentence. *"…rate of deposition will be variable"*. Please refine this statement to describe the expected deposition rates, timelines associated with deposition, and potential range of rates dependent on the location within the river. The variability corresponding to river mile location would be useful information to understand the site specific areas of the river that may have longer timeframes to be "covered," and therefore longer periods of human and ecological risk.

Response 9: As stated in the GLLA RI/FS (Environ et al., 2010), "explicit modeling of sediment transport has not been conducted, [however], the hydrodynamic results provide insight into likely patterns of suspended solids deposition". To summarize, areas that have been most recently dredged are those that are most subject to deposition. Areas further upstream in the river will be covered in more rapidly than downstream areas. Section 4.2.3 of the GLLA RI/FS continues as follows: "Deposition, accretion, and sediment armoring is governed by velocities available to convey sediment and shear stresses that act to transport sediment. Because the channel is regularly dredged, the channel areas are maintained in a state of disequilibrium with respect to erosion and deposition, creating an environment that is generally depositional. Deposition will tend to be greater in areas that have been recently dredged, have lower velocities, and lower shear stresses.

Several historical studies have been conducted to assess the rate of sediment mass transport (sediment loading) into the lower Buffalo River and Lake Erie, and also to estimate rates of sediment accretion, or shoaling, within the dredged portion of the lower river (USACE 1988, USEPA 1994). These studies and historical dredge data provide relatively consistent independent estimates of the total sediment load to the lower Buffalo River ranging from 45,000 to 70,000 cubic yards (CY) per year, and provide a basis for a preliminary description of sediment transport in the Buffalo. The deposition of solids in the navigational channel will occur in two different ways: as suspended solids deposited from the water column, and as bedload progressing from the upstream end of the navigational channel. It is expected that bed load will make up a significant component of the total solids load transported to the river. In navigationally dredged systems like the Buffalo River, bed load deposition tends to be focused at the upstream limit of navigational dredging, and deposits in a focused "wedge" of relatively coarse materials. If allowed to proceed, this wedge of relatively rapid deposition moves the upper boundary of the navigational channel downstream with successive years of deposition. At the same time, deposition of finer suspended materials occurs at locations downstream, where the greater depths and slower velocities make conditions favorable for solids deposition."

In addition, the vast majority of the GLRI dredging will occur in the upper half of Buffalo River Channel. Studies performed by local colleges and universities (see Singer et al., 2008 for example and additional references) indicates the GLRI dredge areas fall mainly within the depositional reaches that preferentially receive basin and riverine inputs (coarser bedload and silty washload). The lower reaches (downstream) also receive deposits of variable textures, yet these areas are influenced by lake seiche events that could reduce fine sediment accumulation rates in select reaches (yet accretion is dominant). Since the Buffalo River is a overall sediment receiving water course, the rate of river-bottom burial after strategic dredging will be in less than four inches per year (a USACE estimate) and thus the rate of recovery will be high in the upper half and less dynamic in the lower half of the AOC, which simply indicates those reaches requiring more rigorous remedy performance monitoring.

Comment 10: Section 5.2.3, "Water Quality', third paragraph. General discussion on potential of water quality exceedances. It is the position of Buffalo Niagara Riverkeeper that any and all actions be taken to control the possibility of contaminant migration outside of the project limits. In addition, a proactive approach to public education including highly visible signage, advanced warning, and recommended protective measures be available throughout the duration of the project.

Response 10: Measures in place to control sediment resuspension during dredging are described in Section 2.1 of the EA/FONSI.

Comment 11: Section 5.2.7, "Plankton and Benthos", second paragraph. "Ultimately, this plan would improve habitat for benthos in these areas over the long-term…" Please define the number of months or years that qualifies as "long-term".

Response 11: Long-term refers to 24 months after the completion of the GLRI dredging project.

Comment 12: Section 5.2.9, "Fisheries", fourth paragraph. Discussion on fish tissue concentrations of PCBs and mercury. The paragraph is misleading and confusing as written and leads the reader to believe that there has already been a drop in fish tissue concentrations over the last 24 months. The last sentence states that there will be long-term beneficial impacts to the fish community. Please define the timeline associated with "long-term", and re-iterate what those beneficial impacts to the fish community will be.

Response 12: This sentence in the EA/FONSI was rewritten as follows: "However, this increase is expected to be short-term; tissue residues in fish in the Buffalo River and Ship Canal are predicted to decrease within 24 months to levels below current PCB concentrations measured in fish within the river (see Appendix C of USAERDC 2010a)." Long-term refers to beyond 24 months; benefits to the fish community would be reduced exposure to contaminated sediments over the long-term.

Comment 13: Section 5.3.3, "Business and Industry and Employment and Income", second paragraph. *"No adverse impact from the project on local business is anticipated."* There is no discussion on the measures or scheduling that will keep disruptions to a minimum for the local marinas, dock owners, and bridge operators. There is a potential to severely disrupt the daily operations of some local businesses and the access to recreational watercraft for the marinas in the City Ship Canal, if dredging in that section of the river occurs prior to the October 15, 2011.

Response 13: All dredging will be performed within the authorized Federal navigation channels, so there will likely be enough room for vessels to bypass the dredging operation. Further, the dredging contract requires the Contractor to obstruct navigation as little as possible. When necessary, the Contractor is required to move the dredge equipment to afford practicable passage of vessels. Bridge operations will be coordinated with Mr. Don Poleto from the City of Buffalo Department of Public Works for roadway bridges, and with CSX Transportation personnel for railroad bridges.

Comment 14: General Comment.

Is it expected that a representative from the US Army Corps will be on board and actively monitoring the dredging operations at all times to ensure that all safety protocols, environmental controls, and other state and federal rules and regulations are adhered to? Since there are limited environmental controls available during this kind of dredge operation, it is critical that they be implemented and enforced, especially during an operation that will take place 24 hours a day, 7 days a week.

Response 14: The USACE controls contract compliance on all its construction contracts, including dredging projects, with a detailed Quality Control/Quality Assurance program. The contract requires the Contractor to be responsible for developing and implementing a Quality Control plan which will verify contract compliance. Quality Control (QC) personnel must maintain a presence at the site at all times that work is being performed and monitor ongoing operations. QC staff have complete authority and responsibility to take any action necessary to ensure contract compliance. To insure that the QC system is working, the Corps in turn provides Quality Assurance (QA) on the contractor's QC program by using a combination of on-site inspections and automated monitoring of dredge and scow positioning using the USACE's national Silent Inspector System. It has been found that the dual QC/QA system ensures that the dredging operations are conducted in accordance with contract requirements.
Due to budgetary constraints we cannot guarantee that an inspector will be onboard 24/7. Given the specialized controls for this project, every effort will be made to increase the presence of oversight from multiple in-house personnel throughout the span of the project.

Comment 15: General Comment. Buffalo Niagara Riverkeeper is expecting to commence a GLRI-funded shoreline habitat restoration project at the "RiverBend" site near the limits of the dredge operations. Segment DA-A (~1,700 cy) lies near the RiverBend site, but not directly within the habitat project footprint. This shoreline restoration project will commence in 2011-2012. Please maintain communication with Riverkeeper regarding the dredging schedule and activity in the upper reaches of the river, to avoid possible interference of other barge traffic or mobilization of heavy equipment along the shoreline.

Response 15: Coordination with Riverkeeper and Corps project management will be maintained with regard to these projects.

New York State Department of Health submitted via email August 12, 2010

Comment 1: Dredging Impacts on Fish Concentrations. In the "Selected Plan" (page 5-29), regarding increases in fish PCB levels from dredging, the report states: "However, this increase is expected to be short-lived; fish tissue concentrations in the Buffalo River have dropped within the last 24 months to levels below the current PCB concentrations measured in fish within the river." The meaning of this statement is unclear and the basis for the statement was not explained or supported in the document. Please clarify and provide text to support this statement.

Response 1: This sentence in the EA/FONSI was rewritten as follows: "However, this increase is expected to be short-term; tissue residues in fish in the Buffalo River and Ship Canal are predicted to decrease within 24 months to levels below current PCB concentrations measured in fish within the river (see Appendix C of USAERDC 2010a)." Long-term refers to beyond 24 months; benefits to the fish community would be reduced exposure to contaminated sediments over the long-term.

Comment 2: Public Water Supply Intakes. In addition to the public water supply intake for the Erie County Water Authority, the report (Section 5.3.5) should acknowledge the intakes for Tonawanda (NY1404556), DuPont (NY1403740), ECWA (NY1400443), and Grand Island

(NY1400451), which are located further north in the Niagara River. While there will not likely be any measurable impact from dredging near these public water supply intakes, the USACE and NYSDEC should be aware of their existence and location.

Response 2: Text added to document to list the other water supply intakes.