Item 5:

Proposed Project Antidegradation Analysis

USACE - BUFFALO DISTRICT

DISCHARGES OF DREDGED MATERIAL ASSOCIATED WITH
2015 MAINTENANCE DREDGING OF SANDUSKY HARBOR, OHIO

Application for Ohio Environmental Protection Agency (OEPA) Section 401 State Water Quality Certification

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Section 1: Antidegradaton Analysis

1.1 Project Description

The project will entail the maintenance dredging of sediments from the authorized Federal navigation channels of Sandusky Harbor, Erie County, Ohio, including the Moseley Channel, lower Straight Channel, and Turning Basin in order to maintain sufficient depth for deep-draft vessels. The channels wills be dredged to authorized depth, plus one foot of advance maintenance dredging (Figure 1 in Item 6). To account for inaccuracies in the dredging process, up to an additional one foot of material may be dredged. An estimated total of approximately 450,000 cubic yards of material will be dredged from Sandusky Harbor Federal navigation channels during the 2015 dredging operation (minimum degradation alternative). This dredged material will be placed in the northwest corner of the eastern half of the existing two-square mile open-lake placement area, located approximately 3.25 miles north-northeast from the Sandusky Breakwater light at a bearing of N11° 15’ 2.46”E (Figure 2 in Item 6). This site has been used previously by the USACE for the placement of Sandusky Harbor dredged material. The dredging is scheduled to occur between 1 July 2015 and 15 March 2016. The project will be accomplished by a contractor of the Federal government.

The purpose of the project is to maintain sufficient water depths for commercial navigation in Sandusky Harbor. This project was congressionally authorized by the 1875, 1886, 1888, 1896, 1899, 1902, 1907, 1910, 1916, 1917, 1935, 1937, 1945, 1958, 1960 and 1962 River and Harbor Acts, 1976 and 1986 Water Resources Development Acts, 1985 Supplemental Appropriations Act and 1988 Energy and Water Appropriations Act. If the Federal navigation channels are not dredged to authorized depth, commercial navigation will eventually be adversely affected.

The environmental effects of the dredging operation are documented in the ***Final Environmental Impact Statement, Operation and Maintenance, Sandusky Harbor, Ohio (1975); and Environmental Assessment and Section 404(b)(1) Evaluation, Operation and Maintenance, Sandusky Harbor, Ohio (1985).*** These documents, and supplemental documentation, have been submitted to USEPA. Copies are available for examination at the Buffalo District office.

Material in the Sandusky Harbor Federal navigation channels consists primarily of silts and clays, with some fine sands and gravels. The quality of the material has been evaluated using 2005 and 2011 sediment data in accordance with formal Federal guidance contained in the U.S. Environmental Protection Agency (USEPA)/USACE Great Lakes Dredged Material Testing and Evaluation Manual (1998) and Evaluation of Dredged Material for Discharge into Waters of the U.S.—Testing Manual (1998). This evaluation specifically addresses the potential contaminant-related risks to aquatic life associated with placing the dredged material in open-lake waters. Based on this evaluation, material in Sandusky Harbor Federal navigation channels was toxicologically comparable to sediments at open-lake areas in the Western Basin of Lake Erie. Therefore, it has been determined that the dredged material meets Federal "contaminant determination" guidelines (40 CFR 210.11[d]) for open-lake placement. This dredged material will be placed in the northwest corner of the eastern half of the existing two-square mile open-lake placement area, located approximately 3.25 miles north-northeast from the Sandusky Breakwater light at a bearing of N11° 15' 2.46"E (Figure 2 in Item 6). This site has been used previously by the USACE for the placement of Sandusky Harbor dredged material.

Note that material present in the channels between Stations 265+00 and 220+00 (near junction of the Straight and Moseley Channels) has been determined to be predominantly sand in nature. However, existing project depths in this reach of the harbor are already below authorized project depths and will not be dredged during the FY15 dredging cycle. Therefore, no material to be dredged during this dredging cycle is proposed to be placed at the existing nearshore area near Cedar Point.

1.1.1 Preferred Design Alternative

This alternative would entail the dredging of an estimated 6500,000 cubic yards of material in 2015 from the Moseley, lower Straight, and Dock channels as well as the Turning Basin, with placement of the dredged material at the existing authorized open-lake placement area in Lake Erie (Figure 3 in Item 6). A contractor of the Federal government would accomplish the project. Mechanical equipment (e.g., clamshell bucket dredges with scow) would be used to complete the maintenance dredging operation. The project would take about 90 to 120 days to complete.

1.1.2 Minimum Degradation Alternative

This alternative would entail the dredging of an estimated 450,000 cubic yards of dredged material from the Federal navigation channels in 2015 from the Moseley and lower Straight Channels as well as the Turning Basin, with placement of the dredged material at the existing authorized open-lake placement area in Lake Erie (Figure 4 in Item 6). This is the minimum amount of dredging required in order to maintain a passable channel for deep draft commercial shipping. A contractor of the Federal government would accomplish the project. Mechanical equipment (e.g., clamshell bucket dredges with scow) would be used to complete the maintenance dredging operation. This project would take about 60 to 90 days to complete.

Note that the Minimum Degradation Alternative estimates dredging 250,000 cubic yards less than the Preferred Design Alternative. It is estimated that dredging activities specified in the Minimum Degradation Alternative will impact an estimated 91 acres less of channel bottom/habitat than what would be impacted under the Preferred Design Alternative. The estimated length of stream to be dredged under the Preferred Design and Minimum Degradation Alternatives are 24,250 and 13,580 linear feet, respectively. Note that the actual shoal thickness cannot be determined until just before the dredging begins. In addition, shoal thickness will vary throughout the harbor and greatly depend on weather conditions. Therefore, the above quantities are merely estimates regarding the acreage of Federal navigation channel to be dredged/impacted under either alternative.

1.2 Avoidance

The "No Action" alternative was considered but dismissed since it would not address the navigation needs of the harbor and substantial effects on commercial navigation and associated industries would occur as a result of this alternative. The overall value of the harbor as a water resource to commercial navigation would progressively deteriorate to a point at which deep-draft commercial vessels would no longer be able to navigate the harbor due to inadequate depths. The large industrial base that depends on the harbor to transport commodities would no longer be able to do so cost-effectively. The harbor would no longer be a viable alternative for the transportation of goods. This would negatively impact Sandusky Harbor. The harbor is the 90th leading port in the United States and is ranked 26th among Great Lakes Ports with a five year average (2006-2010) of over 2.6 million (M) tons of material shipped or received. The harbor generates $33M annually in direct revenue while supporting 2,327 jobs that generate over $151M per year in personal income. The loss of between one and two feet of channel depth would result in increased transportation costs of between $302,000 and $764,000 annually. If the harbor was closed to commercial traffic, commodities would have to be transported by rail and truck. This is predicted to increase annual emission rates by over 3,129 tons of harmful particulate matter (PM-10) and increase costs by $751,000 due to increased railroad related accidents, and $234,000 due to increased trucking related accidents.

For any USACE civil works O&M dredging project, Federal regulations require USACE to select the least cost, environmentally acceptable dredged material management alternative that is engineeringly feasible. This is commonly referred to as the "Federal Standard." "Environmentally acceptable" within this definition means compliance with NEPA and Clean Water Act Section 404(b)(1) Guidelines (if there is a discharge of dredged material into a water of the United States). One objective of the Federal Standard is to ensure that Federal dredging funds across states are spent in an equitable manner and in a way that does not favor any particular state policy relating to dredged material management. The USACE is responsible for determining compliance with the Clean Water Act Section 404(b)(1) Guidelines and for complying with NEPA. While beneficial use of the dredged material is often the preferred and most popular option, the actual implementation of such alternatives usually requires non-federal sponsorship and significant non-federal cost-sharing. Typically, when the discharge of dredged material is determined to meet Clean Water Act Section 404(b)(1) Guidelines, which

includes compliance with applicable state water quality standards (WQSs), open-lake placement is often the least costly alternative which meets the Federal Standard as is the CDF placement of dredged material that has not been determined to be suitable for open-lake placement. State requirements beyond compliance with Clean Water Act Section 404(b)(1) Guidelines exceed the Federal Standard and, if costly, require non-federal sponsorship and cost-sharing for implementation.

1.3 Minimization

Note that the Minimum Degradation Alternative estimates dredging 250,000 cubic yards less than the Preferred Design Alternative. It is estimated that dredging activities specified in the Minimum Degradation Alternative will impact an estimated 91 acres less of channel bottom/habitat than what would be impacted under the Preferred Design Alternative. The estimated length of stream to be dredged under the Preferred Design and Minimum Degradation Alternatives are 24,250 and 13,580 linear feet, respectively. Note that the actual shoal thickness cannot be determined until just before the dredging begins. In addition, shoal thickness will vary throughout the harbor and greatly depend on weather conditions. Therefore, the above quantities are merely estimates regarding the acreage of Federal navigation channel to be dredged/impacted under either alternative.

1.4 Magnitude of the Proposed Lowering of Water Quality

This alternative would result in a short-term, negligible lowering of ambient water quality, less than that which occurs during Lake Erie storm events. The main water quality impacts would be the generation of turbidity and variation of dissolved oxygen levels in the water column.

The material that would be dredged under this alternative consists of sediments that have deposited in the Federal navigation channels since the last maintenance dredging effort. These types of sediments are homogenous and residually contaminated with pollutants that are ubiquitous throughout the Great Lakes. A characterization of the Sandusky Harbor material is documented in the *Evaluation of Sandusky Harbor Federal Navigation Channel Sediments With Respect to their Suitability for Open-lake Placement* provided to OEPA in 2013 and 2014. This evaluation concluded that material in the Federal navigation channels was toxicologically comparable to sediments at open-lake areas in the Western Basin of Lake Erie and therefore meets USEPA/USACE guidelines for open-lake placement, pursuant to Section 404 of the Clean Water Act. This evaluation also contains 2011 data on the ambient concentrations of contaminants, such as metals, nutrients, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and pesticides in lake water. Standard elutriate test (SET) data on the dredged material indicate that discharge of this dredged material at the existing open-lake placement area in the Western Basin of Lake Erie complies with applicable Ohio State Water Quality Standards for the Protection of Aquatic Life. For the general effects of this alternative's lowering of water quality on aquatic life, refer to the 1985 EA/FONSI and Section 404(b)(1) Evaluation. This EA/FONSI documents that the placement of the dredged material at

the authorized area in the Western Basin of Lake Erie would not culminate in significant, adverse environmental impacts.

Open-lake placement of Sandusky Harbor dredged material constitutes internal loading and does not result in a net increase of sediments into the aquatic system. With respect to turbidity, the Western Basin is a naturally shallow and turbid aquatic ecosystem impacted by urbanization, point and non-point source pollution. Cultural eutrophication has been a chronic problem in the Basin due to nutrient loads that derive primarily from agricultural land use. These anthropogenic activities ultimately increase sediment load and turbidity in the Basin. Turbidity created by the mix of natural and anthropogenic activities within the Basin is enormous compared to that associated with the placement of Sandusky Harbor dredged material. Therefore, the open-lake placement of Sandusky Harbor dredged material results in short-term turbidity, and does not induce widespread and/or substantially increased background turbidity in the Basin.

Concerning short-term turbidity-related impacts, the results of a preliminary field investigation in August 2005 on turbidity plumes relating to the placement of Toledo Harbor (also located in the Western Basin) dredged material at an existing open-lake area indicated that plume migration was in a net northeasterly direction and decayed to near background (30 mg/L total suspended solids [TSS]) at 870 feet (0.17 miles) such that the maximum plume length observed was 1,115 feet (0.21 miles). The entire footprint of the plume remained within the boundaries of the existing open-lake placement area. A subsequent modeling effort predominantly showed that only 1.5% of the sediment that is open-lake placed would remain in suspension after four hours, and less than 1% would be expected to remain in suspension after 24 hours. The TSS concentration associated with open-lake placement would be less than 12 mg/L and 1 mg/L above background after four and 24 hours, respectively. Therefore, turbidity plumes associated with the placement of dredged material at the open-lake area are small in spatial extent and magnitude. Dredged material is typically released from a barge into the water column, and it therefore settles very rapidly as a mass that is similar to flocculent settling. Because it settles as a mass, very little turbidity is generated via a plume before the material reaches the lake bottom. Similarly, water quality monitoring conducted during placement events in 2013 estimated that only approximately 2.5% of the total amount of sediment placed remained suspended in the water column immediately after placement, with the bulk of the sediment immediately depositing to the lake bottom. The small fraction of sediment that is released to the water column undergoes exponential decline within the placement area, returning to near background levels within an hour through settling and dispersion. Assessed across the entire dredging season, open-lake placement contributions of residual suspended solids to the water column were estimated to represent only 0.48% of total suspended solids loading to western Lake Erie in 2013.

Based on this and other relevant scientific information, turbidity resulting from the placement of Sandusky Harbor dredged material in the Basin is short-term and spatially limited.

There has been public concern that the open-lake placement of dredged material causes or intensifies harmful algal blooms (HABs) in Lake Erie. To address this concern, USACE sought an externally conducted study in 2013 to answer the question: "What is the Potential for Placement of Toledo Harbor Dredged Material in the Western Lake Erie Basin to Influence Harmful Algal Blooms?" A coordinated field sampling, laboratory testing and modeling program was initiated to monitor physical, chemical, and biological parameters before, during, and after sediment placement and assess the relative influence of sediment placement activities as an internal source of solids/nutrients. The combined monitoring, testing and modeling efforts indicated that phosphorus releases associated with sediment placement activities are insufficient to stimulate any additional significant growth of algae or significantly impact water quality in the Basin. The overall conclusion of the 2013 study is that the open-lake placement of dredged sediment from Toledo Harbor does not contribute to the development of HABs in the Basin.

Dredging and dredged material placement activities would result in the excavation, and some smothering and mortality of benthic macroinvertebrates, and the temporary avoidance of work areas by fish and wildlife species (i.e., mostly gulls and waterfowl). However, following dredging operations, the benthic communities would recolonize the impacted areas. A 2003 benthic community investigation on the Toledo Harbor open-lake placement area concluded that the diversity and abundance of macroinvertebrates within the area were similar to other reference areas in the Western Basin of Lake Erie. This study also showed that there was no association among sampling areas in relation to their proximity to the placement area, indicating that the placement of dredged material had no measurable long-term effect on the benthic community within or outside the area.

During dredged material placement operations, the modes of impact indicate that adverse impacts to fish are minor and short-term. The increase in suspended sediments and turbidity resulting from the open-lake placement of Sandusky Harbor dredged material is very small in comparison to ambient conditions, and is therefore unlikely to trigger any significant adverse effects to fish. Indigenous fish are naturally exposed and have likely adapted to naturally occurring and much more extended elevated suspended sediment events (such as during storm or high runoff events) relative to episodic open-lake placement events. At the open-lake placement area, discharge activities place mud on mud-bottom habitat; therefore, there is no resulting significant change to bottom substrate. The material settles within a few hours and becomes subject to the same resuspension forces typically affecting the surrounding lake bottom. Impacts on fish over the full range of possible effects include either an avoidance or attraction to the area by fish, or no noticeable effect. Some fishes have been observed to be attracted to open-lake placement operations because they have a tendency to feed on the benthic macroinvertebrates contained and released from the dredged material. Many fishes have a wide tolerance for turbidity, and fish behavior in response to a dredged material placement event depends on the species. The placement of dredged material at the open-lake area may result in some mortality to demersal fish eggs (e.g., from broadcast spawning species) existing on the lake bottom in very close proximity to the actual placement of dredged material due to suffocation from burial or siltation, and/or oxygen deficiency at the sediment-water

interface. Studies and modeling show that short- and long-term turbidity impacts associated with the open-lake placement of dredged material are negligible to minor. Therefore, it would not result in any measureable reduction of light penetration into the water column, or adversely affect phytoplankton and aquatic plant production and fish. Given the dredging period, limited spatial area of impact and natural population variations of these types of species, this type of impact would not culminate in any long-term, adverse impacts to any fish population. The open-lake placement of dredged material has a very low likelihood of causing turbidity-related adverse effects on fish, including commercially and recreationally important species such as walleye (*Sander vitreum*) and yellow perch (*Perca flavescens*). Successive 2012 and 2013 laboratory studies found that suspended sediment exposures to walleye eggs, walleye larvae and fingerlings mimicking sediment resuspension during dredging did not result in significantly reduced hatch success or fingerling survival, or evidence any sublethal effects through general gross morphological observation including an examination for gill lamellae abnormalities. The studies concluded that walleye eggs and fingerlings are relatively tolerant of suspended sediment concentrations likely to be encountered during dredging (and open-lake placement of dredged material) in the Great Lakes region.

Regarding impacts of open-lake placement of the dredged material on aquatic community structure and function, the aquatic ecosystem in the open-lake placement area, both before and after dredged material placement, is a profundal area within the Basin. It can be appropriately described as silt-bottom, warmwater, eutrophic habitat which supports a variety of benthic and pelagic organisms. Placement of dredged material at the open-lake area creates a mound, which results in some local bottom surface relief. This mound is subject to settling and lake currents in the Basin, which tend to flatten the mound over time following the cessation of dredged material placement operations. Available relevant evidence indicate that the aquatic ecosystem at the open-lake placement area is resilient, and that the periodic disturbance created by open-lake placement of dredged material is absorbed or accommodated by the ecosystem because its structure and function has not fundamentally changed to a different state. Ecosystem resilience signifies ecosystem health (gauged by species diversity) and ecosystem stability (the probability that all species persist).

Unlike other discharges regulated under the Clean Water Act as external sources of pollutants (i.e., point source wastewater discharges), the origin of this dredged material is within the aquatic ecosystem and therefore the material would be an internal source both prior to dredging and after being placed in the open-lake. In other words, it is not new to the aquatic system. Under existing formal USEPA/USACE guidelines and guidance under Section 404 of the Clean Water Act, the material is thoroughly sampled and tested to demonstrate that it presents no significant increased risk to aquatic life or human health in comparison to the lake bottom sediments on which it is being placed. In a mechanical dredging operation, the material is excavated from the channel using a clamshell bucket, put into a scow and transported to the designated open-lake area where it is then discharged from a scow and released to the lake environs. The dredged material falls as a cohesive mass through the water column coming to rest on the lake bottom, typically as a mound with a mild slope. Generally, more than 95 percent of the material remains in the cohesive mass while less than 5 percent

of it is suspended in the water. This suspended sediment results in short-term, localized turbidity which rapidly dissipates in the water column due to dispersion and settling. The turbidity fades to background conditions within about an hour time period. This temporary increase in turbidity is limited in spatial extent and typically remains within close vicinity of the point of discharge, well within the boundaries of the open-lake placement area. The material is thoroughly sampled and tested to ensure that contaminants are not released with the suspended sediments at concentrations that could be harmful to aquatic life and human health. After settling, the dredged material remains in-place along with the surrounding lake bottom sediments. While the newly deposited sediment is subject to lake bottom currents and waves, open-lake placement areas are selected to be relatively low-energy environments with low current velocities and low wave shear forces, offering little potential for erosion and resuspension. If the dredged material placed on the lake bottom is resuspended, it would still behave the same as the surrounding lake bottom sediments. Sediment from the placement area resuspend at the same rate as other areas of similar depth in the Basin. As the deposited sediment does not erode at a high or accelerated rate, sediment has accumulated within the placement area as a mound over several years of placement activities. The size of this mound is controlled primarily by consolidation of the placed sediment and underlying lake bottom. This qualitative description of open-lake placement, based on extensive existing information and USACE experience in dredged material handling and management, challenges the perception that open-lake placement of dredged material is a discharge that is "toxic" or results in widespread, long-term turbidity or migration of sediments.

1.5 Technical Feasibility and Cost Effectiveness

This alternative is technically feasible, as it involves routine maintenance dredging and dredged material placement procedures. Equipment is readily available to accomplish this type of work. The most recent benefit to cost (B/C) ratio for this alternative with respect to commercial navigation in the harbor is greater than or equal to 1. Costs of this project have ranged from $2.50 to $6.37 per cubic yard of dredged material over the past five years.

1.6 Economic Considerations

A large industrial base depends on the harbor to receive commercial goods and ship them off-site for a reasonable cost. As such, maintaining depth within the harbor would allow for the cost-effective transport of commodities through the local community. The harbor is the 90th leading port in the United States and is ranked 26th among Great Lakes Ports with a five year average (2006-2010) of over 2.6M tons of material shipped or received. The major commodity shipped through Sandusky Harbor is coal. This commerce has a substantial positive impact on the local economy by providing jobs that support the transportation, processing and production of these commodities, as well as by maintaining competitive price levels on commercial goods. The harbor generates $33M annually in direct revenue while supporting 2,327 jobs that generate over $151M per year in personal income. Construction of the project itself would support about 10-20 blue-collar jobs in the dredging industry for a period of about two to five

months. In addition, social and economic benefits associated with recreational navigation would accrue with harbor maintenance.

Substantial effects on commercial navigation and associated industries would occur as a result of not maintaining the harbor. The overall value of the harbor as a water resource to commercial navigation would progressively deteriorate to a point at which deep-draft commercial vessels would no longer be able to navigate the harbor due to inadequate depths. The industrial base that depends on the harbor to transport commodities would no longer be able to do so cost-effectively. The harbor would no longer be a viable alternative for the transportation of goods. The loss of between one and two feet of channel depth would result in increased transportation costs of between $302,000 and $764,000 annually. If the harbor was closed to commercial traffic, commodities would have to be transported by rail and truck. This is predicted to increase annual emission rates by over 3,129 tons of PM-10 and increase costs by $751,000 due to increased railroad related accidents, and $234,000 due to increased trucking related accidents.

1.7 Cumulative Impact

The overall cumulative impact of the proposed project is considered to be socially and economically beneficial. The most substantial cumulative effect resulting from this project would be to facilitate continued unrestricted navigation which would benefit the associated upland industries within Sandusky Harbor. Implementation of the proposed project would work toward sustaining the integrity of Sandusky Harbor from economic and social perspectives. Dredged material management through the open-lake placement would have minor, localized adverse short-term affects, most of which are related to water quality and the benthic community. The ability to properly manage dredged material through open-lake placement would enable the continued maintenance of the Federal navigation channels which would facilitate the continued use of Sandusky Harbor and the associated community facilities and activities that it benefits. In this way, it would substantially benefit community and regional sustenance and growth needs. The long-term socioeconomic benefits of this dredging on the region's socio-economic condition would far outweigh the temporary, localized minor adverse effects.

With respect to open-lake placement of dredged material, this alternative would result in a short-term, minor reduction of water quality in the receiving waters. Testing and evaluation indicates that placement of the dredged material at the open-lake area would not significantly impact aquatic life. The main water quality impacts would be the generation of turbidity and variation of dissolved oxygen levels in the water column. These impacts would be short-term and spatially limited. Turbidity would not increase to an extent that it would result in any significant reduction of light penetration into the water column, or adversely affect phytoplankton and aquatic plant production, and fish.

Dredging and dredged material placement activities would result in the excavation, smothering and mortality of benthic macroinvertebrates. Following dredging operations, benthic

communities are expected to recolonize the impacted areas. The open-lake placement areas are located to avoid any significant fish spawning areas. The fish community is generally adapted to natural levels of turbidity in the lake and open-lake placement of the dredged material would not significantly increase ambient turbidity levels over the long-term. Fishes may avoid or be attracted to open-lake placement events, or may not show any noticeable effect, and would return following the completion of dredging operations. The aquatic ecosystems at the open-lake placement areas are resilient. The periodic disturbance created by open-lake placement of dredged material is absorbed or accommodated by the ecosystem because its structure and function would not fundamentally change to a different state. Wildlife species (i.e., mostly gulls and waterfowl) would temporary avoid work areas and would return following the completion of dredging operations. No effects to any listed Threatened or Endangered species would occur.

1.8 Indirect Impacts

The main indirect water quality impacts relating to the discharge of dredged material include the potential influence of open-lake placement of dredged material on Lake Erie HABs, and the potential of the deposited dredged material to erode and resuspend in the water column. These impacts are described below.

There has been public concern that the open-lake placement of dredged material causes or intensifies HABs in Lake Erie. This perception is not supported by existing science and engineering. While dredged material does contain phosphorus, only a very small fraction of that phosphorus is actually available for algal growth when it is released from the material to the water during open-lake placement. The small amounts that are released rapidly dilute to concentrations that cannot measurably stimulate or increase algal growth. Very conservative predictions determined through standard sediment elutriate testing and water quality modeling performed by the United States Army Engineer Research and Development Center (USAERDC) showed that the extent and duration of released phosphorus from dredged material would be very localized and short-lived. Consequently, such conditions would be inadequate to trigger or increase the occurrence of HABs, or to significantly impact water quality in the Western Basin of Lake Erie. The bulk of the dredged material sediment (and associated phosphorus content) immediately deposits on the lake bottom. Subsequent release of phosphorus from the deposited dredged material is the same as or less than the existing lake sediments and would not represent any additional contribution of phosphorus to the aquatic ecosystem.

To further address this concern, USACE sought an externally conducted study in 2013 regarding Toledo Harbor dredging to answer the question: “What is the Potential for Placement of Toledo Harbor Dredged Material in the Western Lake Erie Basin to Influence Harmful Algal Blooms?” A coordinated field sampling, laboratory testing and modeling program was initiated to monitor physical, chemical, and biological parameters before, during, and after sediment placement and assess the relative influence of sediment placement activities as an internal source of solids/nutrients. The combined monitoring, testing and

modeling efforts indicated that phosphorus releases associated with sediment placement activities are insufficient to stimulate any additional significant growth of algae or significantly impact water quality in the Basin. The overall conclusion of the 2013 study is that the open-lake placement of dredged sediment from Toledo Harbor does not contribute to the development of HABs in the Basin.

Since dredged material placed at the open-lake area would not be subject to any significant erosion and resuspension due to depth, no meaningful resuspension of the dredged material is expected. Regardless of this, if the dredged material did erode, the resuspended solids would behave similarly to the existing lake bottom sediments at the respective site.

1.9 Construction Storm Water Management Plans

N/A

1.10 Post-Construction Storm Water Management Plans

N/A