Clean Water Act
Section 404(b)(1) Evaluation of the Effects of Placing Fill Material into Waters of the United States

Woodtick Peninsula Habitat Protection and Enhancement Through Beneficial Use of Dredged Material
Section 204, Water Resources Development Act of 1992

17 February, 2022

Summary

This evaluation was prepared pursuant to Section 404(b)(1) of the Clean Water Act (33 USC 1344) and 40 CFR 230, "Guidelines for the Specification of Disposal Sites for Dredged and Fill Material." It addresses the proposed U.S. Army Corps of Engineers (USACE) discharge of sediments dredged from Toledo Harbor Federal Navigation Project at the Woodtick Peninsula placement site in Lake Erie as part of a Section 204 Beneficial Use of Dredge Material for Ecosystem Restoration Project. All relevant information, including contaminant-related sediment data, were considered in this Section 404(b)(1) Evaluation.

Fundamentally, the discharge of dredged sediment at Woodtick Peninsula complies with the Section 404(b)(1) Guidelines if it is determined that it would not result in unacceptable adverse effects to the aquatic ecosystem. The existing specified 115 acre placement area at Woodtick Peninsula is located five miles north of Toledo. The main impacts associated with the discharge of dredged sediment at this site would be a minor and direct. They would include intermittent and short-term increases in turbidity and total suspended solid concentrations in the water column, intermittent and short-term fluctuations in dissolved oxygen concentrations in the water column, intermittent and short-term avoidance or attraction to the area by fish, aquatic birds, reptiles, amphibians, and mammals, and short-term loss of benthic organisms and aquatic vegetation. Turbidity plumes, dissolved oxygen fluctuations, effects on benthos, fish and aquatic birds, would be localized and spatially limited. Placement of this dredged sediment would not cause or contribute to eutrophication or the development of any HABs. There would be no significant contaminant-related effects associated with the placement of dredged sediment. A long-term impact would be that dredged sediment deposition would increase the existing lake bottom elevation potentially leading to the expansion of submergent wetland habitat, including aquatic vegetation.

This Section 404(b)(1) Evaluation concludes that the discharge of sediments dredged from Toledo Harbor Federal Navigation Project at Woodtick Peninsula would not result in unacceptable adverse effects to the aquatic ecosystem, and therefore complies with the Section 404(b)(1) Guidelines.

Table of Contents

List of Figures

1. Project Description

1.1 Project Location, Description, and Authority

1.1.1 Project Location

Woodtick Peninsula is in southeastern Michigan along the western shoreline of Lake Erie, located in Monroe County, Michigan (Figure 1). Woodtick Peninsula is owned by the Michigan Department of Natural Resources (DNR). The peninsula is in an area of Lake Erie commonly referred to as North Maumee Bay. Woodtick Peninsula is located approximately 45 miles southwest of Detroit, Michigan and, at its most southern point, 5 miles north of Toledo, Ohio (Figure 2).

Figure 1: Woodtick Peninsula located along the western shoreline of Lake Erie, in Monroe County, Michigan.

Figure 2: Project Site located in Lake Erie's Maumee Bay, 45 miles southwest of Detroit, MI and 5 miles north of Toledo, Ohio.

Woodtick peninsula is a fine sand feature that was likely created by littoral movements of sand from the north down the Detroit River. Prior to European settlement and development of Monroe County, the peninsula extended south from the shoreline as an unbroken barrier beach approximately 19,000 feet in length and a maximum width of 2,600. Historical National Oceanic and Atmospheric Administration nautical charts of this area show Woodtick Peninsula as a series of islands separated by natural and man-made channels with an approximate 3.75-mile length, 500 to 1,500 feet width (Figure 3; https://historicalcharts.noaa.gov/). It is estimated from these historical charts that the present-day peninsula is 50% of its pre-World War I size (Lake Survey, 1919).

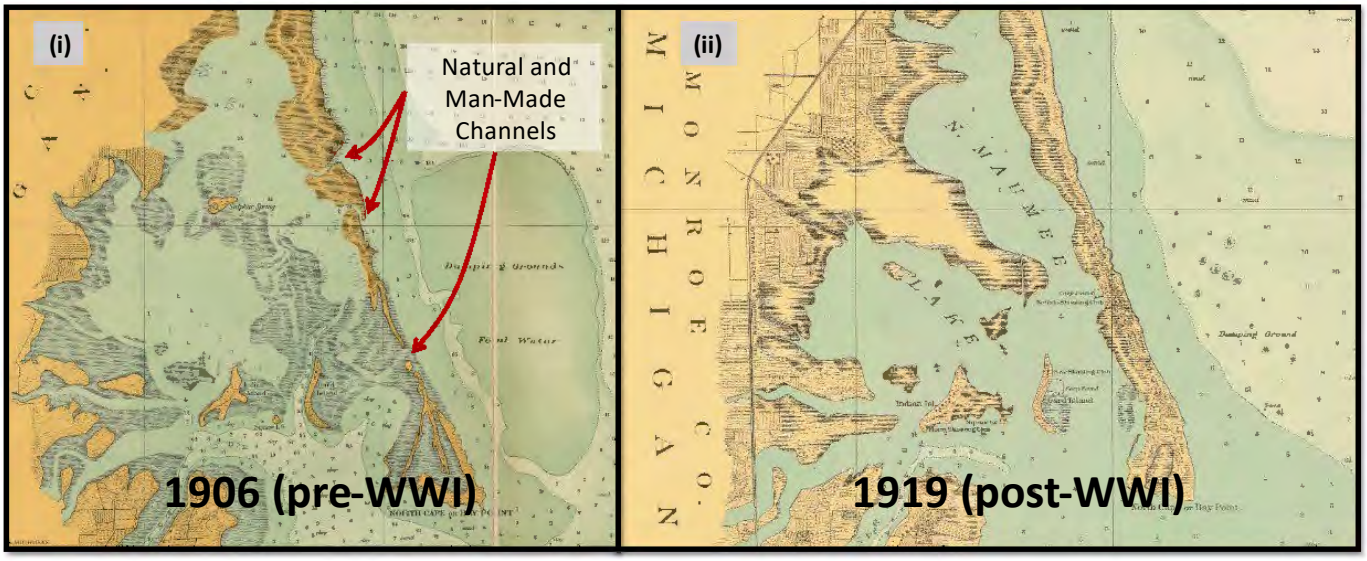

Figure 3: (i) 1906 NOAA Nautical Chart annotated to identify several natural and man-made channels on Woodtick Peninsula (pre-WWI) (Lake Survey, 1906). (ii) 1919 NOAA Nautical Chart. Notice lack of channels on the peninsula (post-WWI).

In July 1952 the J.R. Whiting Generating Plant, a coal-fired powerplant, entered into commercial service on the northernmost end of Woodtick Peninsula (State of Michigan). This plant operated from 1952 until final decommissioning in April 2016 by Consumers Energy Company. During that time, an intake channel was dredged at the southern end of the company property and an outflow channel was dredged along the western side of Woodtick Peninsula to provide cooling water for the powerplant (Figure 4. These channels physically cut off the DNR property from surrounding wetlands and the company property and remnants exist to this day.

Figure 4: Annotated NOAA historical chart of Western Lake Erie with the Consumers Energy Company's powerplant intake channel traced in orange and its outflow channel circled in red (NOAA, 2000).

In recent decades, shoreward migration of the peninsula (i.e., loss of wetlands on the lake-most side) and reduction in its size has been accelerated by high lake levels, erosion, breaching, and probably starvation of sand sources from the north (Meadows et al., 1992). These factors, primarily long-term erosion and human modifications to the littoral environment, have impacted the peninsula and surrounding shorelines. Woodtick Peninsula is now an irregular shape of varying width (Johnston et al., 2007a) and adjacent shorelines have been diked and reinforced to counter more extreme waves events not attenuated by the peninsula (Anderson et al., 2021). Drivers related to climate change such as storm energy and frequency and lake level fluctuations are likely to worsen erosion at Woodtick Peninsula and negatively impact its functional capability as a protective barrier for Erie Marsh.

Woodtick Peninsula is a natural shoreline feature located within the Erie Marsh Preserve and Erie State Game Area (owned by the Michigan Department of Natural Resources and The Nature Conservancy, respectively; Figure 5). Wetlands in the Western Lake Erie Regions are identified as one of 34 unique habitat areas in the North American Waterfowl Management Plan (USFWS,

1986) and one of 43 areas of greatest continental significance to North American ducks, geese, and swans (USFWS, 2012). In September of 2000, Woodtick Peninsula and nearby wetlands were designated as a site of regional importance in the Western Hemisphere Shorebird Reserve Network (WHSRN, 2021). Erie Marsh, located to the west of Woodtick Peninsula, is 2,149 acres is size, represents 11% of the remaining marshland is Lake Erie, and is a conservation target for the restoration of Lake Erie (TNC, 2012). Since the year 1993, 38 species of shorebirds (WHSRN, 2021) and 300 species of birds have been reported in Erie Marsh, which highlights the importance of Woodtick Peninsula as a protective barrier for this critical bird habitat. Additionally, Woodtick Peninsula contains shallow water habitat and coastal wetlands that are important spawning, nursery, and feeding habitat for a wide variety of game and forage fishes. This makes western Lake Erie an attractive and popular sport fishing destination in the Midwest and Great Lakes.

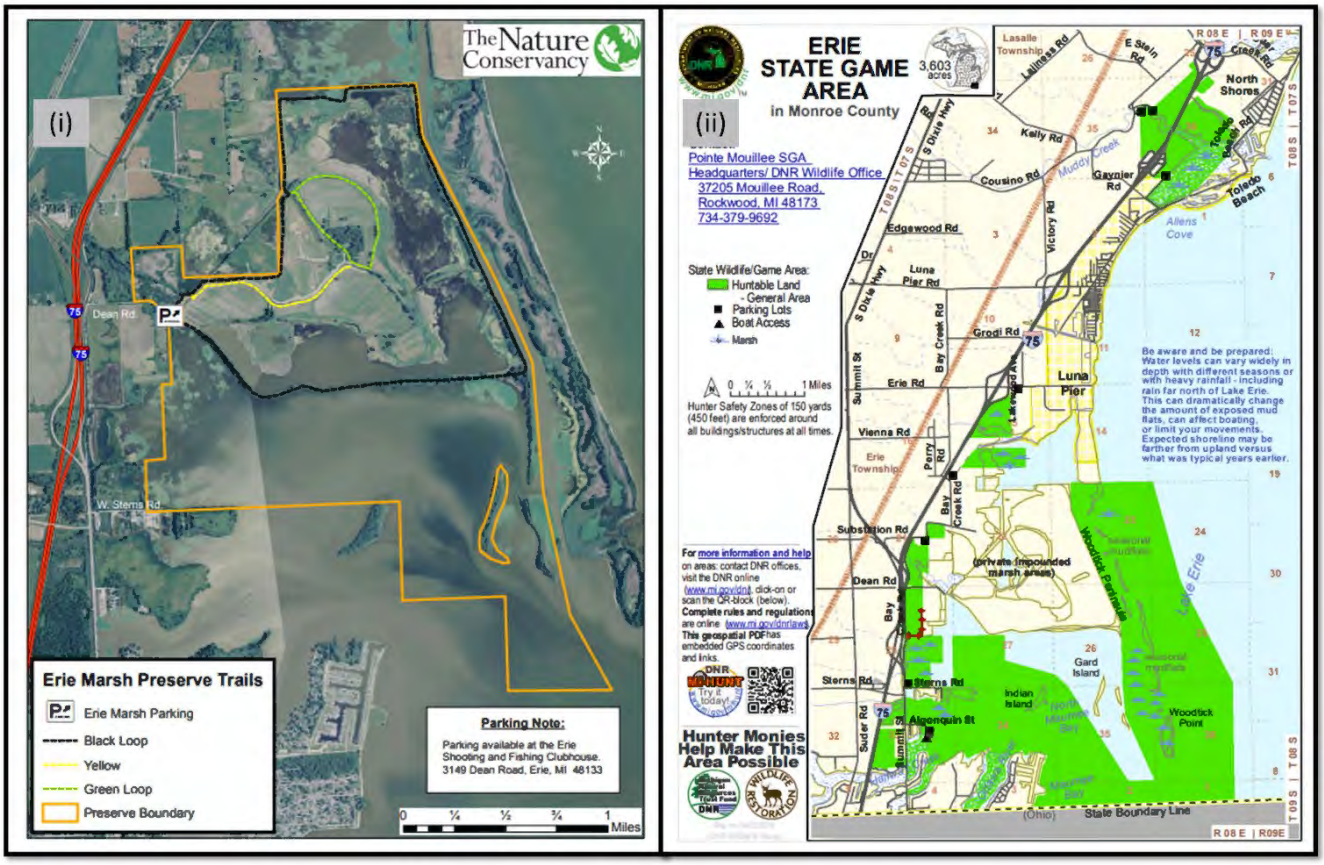

Figure 5: (i) The Nature Conservancy owned Erie Marsh Preserve outlined in yellow (The Nature Conservancy, n.d.) and (ii) the Michigan Department of Natural Resources owned Erie State Game Area mapped in green (Michigan Department of Natural Resources, 2019).

The loss of submergent and emergent wetlands on, and protected by, Woodtick Peninsula would have a negative impact on the local fishery and shorebird populations, as well as migratory bird populations that use the Great Lakes as stopover habitat. Since 1850, Lake Erie marshland from Vermilion, Ohio to the Detroit River has been reduced from over 1,500 square miles to less than 58 square miles. A number of cooperative efforts by the U.S. Fish and Wildlife Service, the Ohio Department of Natural Resources, the Michigan Department of Natural Resources, The Nature

Conservancy, and others are underway to restore western Lake Erie coastal wetlands. In the last decade, extensive wetland and habitat restoration efforts between private, state, and federal entities have taken place to restore and enhance the Erie Marsh Area

1.1.2 Project Description

The purpose of the project is to enhance coastal resiliency through beneficial use of dredged material on Woodtick Peninsula in a manner that addresses fluctuating Lake Erie water levels, varying wave energy, and climate change.

The proposed action would include the placement of dredged material in the nearshore adjacent to Woodtick Peninsula on the western side from approximately the mid-point of the peninsula to south of the terminus. An artificial reef structure of geosynthetic containers (GSCs) filled with dredged material and covered with rip rap will also be constructed in-water at the southern point of dredge placement.

Dredged material will be sourced from the Toledo Harbor Federal Navigation Project which is located to the south and east of Woodtick Peninsula. Toledo Harbor is the westernmost federal harbor on Lake Erie and is located at the mouth of the Maumee River in Toledo, Ohio. Toledo Harbor consists of two federal channels: a lake approach channel and the Maumee River channel. Starting at the mouth of the Maumee River, the lake approach channel extends 16 miles out into Maumee Bay. The Maumee River channel is approximately 7 miles in length. Generally, the U.S. Army Corps of Engineers, Buffalo District dredges between 600,000 and 1,000,000 cubic yards of sediments from Toledo Harbor Federal Navigation Channels annually.

1.1.3 Project Authority

Section 204 of the Water Resources Development Act of 1992, Public Law 102-580, provides the authority for USACE to carry out projects to reduce storm damage to property, to protect, restore and create aquatic and ecologically related habitats, including wetlands, and to transport and place suitable sediment, in connection with dredging, for construction, operation, or maintenance by the Secretary of an authorized Federal water resources project. It is a Continuing Authorities Program (CAP) authority, which focuses on water resource related projects of relatively smaller scope, cost, and complexity. Traditional USACE Civil Works projects are of wider scope and complexity and are specifically authorized by Congress. The CAP is a delegated authority to plan, design, and construct certain types of water resource and environmental restoration projects without specific Congressional authorization. The scope of the Section 204 feasibility study for Woodtick Peninsula is to determine if there are engineeringly feasible measures and alternatives that would restore and enhance habitat through the beneficial use of dredged material, in the vicinity of Woodtick Peninsula, while increasing coastal resiliency.

The Detroit District (LRE) is the USACE District that will conduct this project. The identified non-Federal Sponsor (NFS) is the Michigan Department of Natural Resources (MDNR). Interested stakeholders include: The Nature Conservancy, Lake Erie Marsh Committee, Ducks Unlimited, U.S. Fish and Wildlife Service, Lake Erie Waterkeepers, North Maumee Archeological District, and the general public who recreate around Woodtick Peninsula.

1.2 Proposed Fill Material

1.2.1 Characteristics of Material

Dredged sediment from the Toledo Harbor Federal Navigation Project has historically been placed either at an open-water site located at approximately Lake Mile 11 or in a USACE dredged sediment confined disposal facility (CDF) located immediately to the southeast side of the Maumee River mouth. The dredged sediment is composed of clays, silts, and some fine sands. The source of the sediments dredged from the harbor is runoff of surficial fine-grain soils within the predominantly agricultural watershed of the Maumee River, as well as from the re-suspension of lake sediments in Maumee Bay and the Western Lake Erie Basin (WLEB). All sediment dredged from the harbor is suitable for open-lake placement in accordance with the most recent Clean Water Act Section 404(b)(1) Evaluation completed in September 2020.

1.2.2 Quantity and Source of Material

The quantity of proposed fill material is based on the Tentative Selected Plan (Alternative 4a) and estimated to require 156,000 cubic yards of sediment. The source of the sediments dredged from the federal navigation channel is runoff of surficial fine-grain soils within the predominantly agricultural watershed of the Maumee River as well as from the resuspension of lake sediments in Maumee Bay and the west Lake Erie basin.

1.3 Proposed Fill Site

1.3.1 Location and Size

This is estimated to require 156,000 cubic yards of sediment. Placed material will be sloped from an elevation of 570.75 closest to the existing peninsula to an elevation of 562 ft on the outer project limits at a slope of 1:20 (Figure 6). The artificial reef structure will be a roughly 450ft long curved line to an elevation of approximately 566.2-566.5 ft. Approximately 1200 cubic yards of sediment will be placed in the geosynthetic containers to create the barrier.

Figure 6: Alternative 4a mapped.

1.3.2 Habitat Type

The area surrounding Woodtick Peninsula, including the Erie Marsh Preserve, has extensive stands of submergent and emergent aquatic vegetation. This includes wild celery (*Vallisneria americana*), sago pondweed (*Potamageton pectinatus*), American lotus (*Nelumbo lutea*), yellow pond lily (*Nuphar variegatum*), white water lily (*Nymphae odorata*), floating pond weed (*Potomogeton nantans*), and coontail (*Ceratophyllum demersum*). Erie Marsh harbors some of Michigan's few remaining colonies of American lotus, which is listed threatened by the State of Michigan. Coastal wetlands in the Great Lakes provide habitat for aquatic and terrestrial species (ex: fishes, birds, reptiles, mammals, etc.), including resources for both shelter and food. Coastal wetlands also provide nutrient and sediment processing and retention and wave attenuation. This combination creates high-quality wildlife habitat that supports the highest species diversity of any Great Lakes ecosystem (TNC, 2012).

Shallow water habitat and associated coastal wetlands at Woodtick Peninsula are important habitat for spawning, nursery, and feeding for a wide variety of game fish and forage fish species, including northern pike (*Esox lucius*) and yellow perch (*Perca flavescens*). This is particularly true during the critical spring spawning periods when shallow water close to the peninsula warm earlier and are protected from extreme wave wash. Fish sampling in the area has identified 35 fish species from 13 families (Francis and Boase, 2007). Coastal Wetlands along the Lake Erie shoreline are a natural part of the Great Lakes Ecosystem and are particularly valuable as spawning, feeding and nursery habitats for the warm water fish species of the lake. In particular, western Lake Erie coastal wetlands are the primary walleye (*Sander vitreus*) nursery production area for all of Lake Erie, supporting a very important sport and commercial fishery (Herdendorf, 1992).

In the Great Lakes, wetlands also serve as critical stopover habitat for migratory birds. Thousands of ducks, geese, swans, shorebirds, and other migratory birds utilize this area as an important stopover during their spring and fall migrations. Fall aerial surveys have estimated bluebill duck (*Aythya affinis*) populations as high as 50,000 birds at one time during November. Bald eagles (*Haliaeetus leucocephalus*) have been observed nesting and foraging on Woodtick Peninsula. Many dabbling ducks, shorebirds, and marsh-loving songbirds can be seen in Erie Marsh in March and early April as they rest and refuel on their way to northern breeding grounds for the summer. They will return to this site in the fall on their way back to their Latin American and Caribbean winter homes.

1.3.3 Timing and Duration of Discharge

Placement of material will be dependent on both active dredging periods for the Toledo Harbor Federal Navigation Project and Lake Erie. Generally, dredging is limited to the fall and winter seasons, typically between July 1st and March 15th, providing approximately 80-160 days for construction activities.

Discharge of the material would occur on the same timeframe as dredging operations with placement potentially consisting of a series of discrete, episodic events based on the timing and transport of material from the Federal Navigation project.

It is anticipated that all discharge will be completed within one construction season, likely between July 1st and November 15th of the same year.

1.3.4 Description of Placement Methods

It is anticipated that material will need to be hydraulically placed due to the limited depth within the project area. Hydraulic placement will involve the re-suspension of dredge material in water to create a slurry capable of being pumped through a pipeline from the transfer/offload location to the point of discharge. The material at the discharge site will therefore have a high water content and elevated levels of suspended sediments. Best management practices to limit the turbidity at the point of discharge will be coordinated with appropriate regulatory agencies and employed during discharge, similar to other projects conducted within the Detroit District.

2. Factual Determinations

2.1 Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem

2.1.1 Physical Substrate Determinations

2.1.1.1 Substrate Elevation and Slope

The discharge of dredge material at Woodtick Peninsula is intended to increase the bottom elevation of the existing wetland. This increase in bottom relief may be up to several feet in some locations and will have a maximum slope of 1:20 on the outer edges of the placement area to maintain stability. A majority of the area will be brough to a final elevation of 570.75 (International Great Lakes Datum 1985), which is designed to be 6 inches below the long-term average water depth of Lake Erie (571.42 ft). Some compaction of this material is expected in the short term (1-3 years) as interstitial water equalizes, which would lower the elevation over time but not to an extent that would significantly impact the benthos.

2.1.1.2 Sediment Type

Sediment at the placement site is comprised primarily of silty sand and elastic silt with some clay. The portions of the peninsula subject to higher energy waves (Lake facing shore and southern terminus) have a higher percentage of sands (>65%) and almost no clay (<1%) while the protected portions of the peninsula (dredged channel and embayments) have a higher percentage of silt (>45%) and clay (~20%).

The proposed fill material consists primarily of clays and silts with some sand. A majority of the fill material is dredged from the Lake Approach Channel in Maumee Bay and the Western Lake Erie Basin. This material tends to have an equal or higher proportion of clays to silt, which would be a shift towards a higher proportion of finer material than is currently present.

2.1.1.3 Dredge Material Movement

Dredged sediment placed in the project area is subject to any currents and would behave in a manner similar to the existing bottom sediments. Minimal net migration of placed sediment would be expected under normal conditions. The presence of a high percentage of silt and clay in

the project area indicate an influence of vegetation coupled with a limited influence of currents, especially in the channel on the leeward side of the peninsula (Yang et al., 2008). Water quality monitoring of the existing dredge material open-water placement site and reference areas within the WLEB indicate that the open-water placement site does not contribute any additional resuspended sediment to the WLEB above background and that previous placement operations led to a permanent change in bathymetry relative to the surrounding lake bottom (Ecology and Environment [E&E]/LimnoTech 2014). When considering consolidation of the lake bottom and placed dredged sediment, USACE (2020) found the change in bathymetry to be consistent with the cumulative volume of dredged sediment placed at the site. Thus, with appropriate placement design, methods, and stabilization via vegetation re-establishment and construction of a revetment, no significant erosion and migration of sediment placed in the Project Area is expected to occur over the lifespan of the project.

2.1.1.4 Physical Effects on the Benthos

Since the physical composition (e.g. particle size distribution) of the dredged sediment is similar, but more fine, than that of the substrate currently in the project area minor changes in the substrate are expected which will impact the community composition post-construction . It is very likely that non-native dressenid mussels will be the primary component of the re-colonizing community, including on artificial reefs if constructed (See section 2.2.1.2; Henley et al., 2000). The vegetative community will be similar, with minor loss of disturbance-intolerant species that will require additional time to recolonize (See section 2.2.1.1).

2.1.2 Water Circulation, Fluctuation, and Salinity Determinations

2.1.2.1 Water Circulation

2.1.2.1.1 Current Pattern and Flow

No significant effects are anticipated given that all alternatives leave some portion of the existing channel west of Woodtick Pennsula intact. Areas where fill is to be placed will still be connected to current and flow from the channel and Lake Erie. There will be some wave displacement at the southern terminus of Woodtick Peninsula where the revetment is constructed, which will re-direct flow around the revetment and potentially reduce wave period and amplitude from Lake Erie.

2.1.2.1.2 Velocity

A majority of the fill area is on the leeward side of the peninsula, which is a low velocity environment. Increasing the elevation of the benthos at the site may cause greater bottom friction, further reducing wave velocity where elevation is increased following dredge material placement.

2.1.2.1.3 Stratification

Western Lake Erie is relatively shallow and generally well-mixed. The placement of fill will increase the bottom elevation of a shallow, nearshore marsh, which does not currently experience significant stratification and would not see any significant stratification as a result of the placement of fill.

2.1.2.1.4 Hydrologic Regime
No significant effects.

2.1.2.2 Water Fluctuation
No impacts are expected to occur as a result of the placement of fill at Woodtick Peninsula. The finished project will be mostly open shoreline subject to the natural water fluctuation of Lake Erie. No water level control structures are being constructed or altered as part of the design. The project will also have no impact on the groundwater or floodplains, which will continue to influence water levels in a similar manner following project completion.

2.1.2.3 Water Salinity
Not applicable, including salinity gradients.

2.1.3 Effects on the Physical Properties of the Water Column

2.1.3.1 Suspended Particulate/Turbidity Determinations
The open-water placement of dredged sediment would result in episodic, short-term, localized increased in total suspended solids (TSS) concentrations and/or turbidity. Due to the placement areas at Woodtick Peninsula are shallow, nearshore areas, placement would be limited to hydraulic placement or mechanical placement with a clam-shell bucket.

Hydraulic placement will create a sediment slurry that will settle to the bottom in accordance with the settling rates of each size fraction present in the dredge material. The fine content of the dredge material is reduced during each phase of the dredging process (from source-site dredging, through transport, to placement), but turbidity plumes are present as a result of the resuspension of material when using hydraulic methods (Coor and Ousley, 2019). In a majority of studies cases, more than 50% of fines were lost during hydraulic dredging. Hydraulic placement of dredge material in shallow environments (< 1m; < 3.3 ft) does see localized increases in turbidity, but this rapidly dissipate within 20m (~65.6 ft) of the placement area and on the order of hours (Fall et al., 2021). For example, at an open-water placement site offshore of Ashtabula, Ohio, in the Central Lake Erie Basin transmissivity in the water column (percent of light transmitted, as a measurement of turbidity) returned to virtually ambient values within an hour of the discharge of a dredged sediment slurry, and while transmissivity upon discharge temporarily dropped to zero, it also dropped to zero following typical Lake Erie storm events (Sweeney, 1978).

In Maumee Bay and WLEB, water column TSS concentrations during runoff and storm events can range between about 50 to over 300 mg/L over a period of days (Herdendorf et al. 1977; Paul et al. 1982; Lick and Kang 1987; E&E/LimnoTech 2014). In effect, the elevated TSS concentrations from such events occur over the entire Maumee Bay and WLEB and persist for far longer (i.e., days) than the short-term (i.e., matter of minutes to an hour), intermittent, spatially isolated TSS events associated with the discharge of dredged sediment.

Use of turbidity barriers surrounding the site of discharge has been shown to be effective at containing turbidity within the barrier, however buildup of material along the bottom may

produce mud-flows that move along the bottom outside the enclosed area (Goodwin and Michaelis, 1984). Once placement has ended and the dredged sediment has settled on the lake bottom, its contribution to TSS via resuspension is expected to be minimal. Resuspension events would largely be associated with storm and runoff events; the impact of these events would be correlated with the direction of such events (*i.e.* waves from the east would have minimal impact on placement areas on the west side of the peninsula) and potentially reduced by the construction of the revetment on the southern terminus of the peninsula.

2.1.3.2 Light Penetration

The placement of dredged sediment would result in negligible, episodic, short-term (order of hours), localized reductions in light penetration into the water column. As suspended sediment precipitates, light penetration will increase to background levels.

2.1.3.3 Dissolved Oxygen

Fine-grained dredged sediments are generally anoxic due to aerobic decomposition of organic matter within said sediments. Nearshore placement would result in episodic, short-term, localized fluctuations (both decreases and increases) in dissolved oxygen levels in the water column. The changes would result during active placement and dissipate as sediment precipitates and settles on the bottom. Any fluctuations would largely be moderated through water flow, proximity to the water/atmosphere interface, and mixing of shallow waters (*i.e.* shallow water is more likely to be well mixed).

2.1.3.4 Nutrients

Small amounts of nitrogen and phosphorus would be expected to be released during dredged sediment placement (USACE 2016, 2018). Most of the released phosphorus would be particulate phosphorus, a form which is not readily available for use in algal growth and would quickly settle to the bottom along with the sediments to which it is attached. Very small releases of dissolved phosphorus, which is more bioavailable to algae, would rapidly dissipate in the water column to ambient conditions from dilution and dispersion, along with re-adsorption to the settling sediment particles. Dredged sediment-associated nutrients rarely have an adverse effect on eutrophication-related water quality at open-water placement sites mainly because the events are short-lived, there is typically fairly rapid dilution of the discharged sediment and nutrient release is small relative to dilution (Jones and Lee 1981).

Field monitoring of open-water placement of Toledo Harbor dredged sediment indicated very little release of dissolved total phosphorus, including soluble reactive phosphorus (SRP), with particulate phosphorus quickly depositing along with the suspended solids (to which it is adsorbed) to the lake sediment bed (E&E/LimnoTech, 2014). Soluble reactive phosphorus is considered to be 100% bioavailable to support algal growth and therefore is the most important form of phosphorus to influence eutrophication including harmful algal blooms (HABs). The released SRP rapidly decreased to background concentrations as it was dispersed in the water column and re-adsorbed to the settling sediments. The investigation concluded that sediment resuspension associated from the open-water placement of Toledo Harbor dredged sediment was not a source of bioavailable phosphorus and therefore unlikely to contribute significantly to phytoplankton primary production or photosynthesis.

2.1.4 Contaminant Determinations

Contaminant background data on lake water were evaluated as part of the Clean Water Act Section 404(b)(1) Evaluation of the Toledo Harbor Federal Navigation Project material (USACE, 2020). Metals and organics would be introduced to the water column from the open-water placement of dredged sediment and would primarily be associated with suspended solids. These releases would be intermittent and short-term, as upon discharge, the contaminant concentrations in the water column would immediately begin to decrease to ambient conditions from dilution and dispersion. Standard elutriate tests (SETs) were conducted to predict the release of dissolved contaminants to the water column that would result from discharge of the dredged sediment (USACE 2016, 2018). The elutriate testing showed that releases of polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and pesticides would be non-detectable. Low-level releases of several metals occurred. All metal and organic contaminant releases would comply with applicable state water quality standards (WQSs) for the protection of aquatic life (USACE, 2020).

2.2 Potential Impacts on the Aquatic Ecosystem and Organisms

2.2.1 Determination of the Effects on Biota

2.2.1.1 Effects on Primary Production and Photosynthesis

Western Lake Erie, including Maumee Bay has primary production from both phytoplankton and submerged aquatic vegetation (SAV, AKA macrophytes) occurring in the photic zone. The phytoplankton community includes diatoms, green algae, chrysophytes, cryptophytes, dinoflagellates, and cyanobacteria (Reavie et al., 2014). In the mid-1900s, cyanobacteria were a dominant portion of the phytoplankton community (Chaffin et al., 2014), became less so in following regulatory changes in the 1970s (Makarewicz, 1993), and have increased in density and biomass since the 1990s (Reavie et al., 2014). The SAV community includes native and non-native species of water lilies, cattails, reeds, and aquatic plants and grasses.

Release of dredge material during placement operations will have direct effects on primary production, including light penetration into the water column, burial or smothering of plant matter (including seeds), changes in water depth, and changes to the soil type. Indirect effects include the release of nutrients associated with dredge material.

Impacts to light penetration are discussed in section 2.1.3.2. It is expected that placement will have negligible, episodic, short-term, localized reductions in light penetration into the water column that will have no significant impact on primary production or photosynthesis.

During a site assessment in June 2021 SAV was observed on the western (leeward) side of Woodtick Peninsula. Species observed included pond lilies (*Nymphaeaceae*), coontail (*Ceratophyllum sp.*), water stargrass (*Zosterella dubia*), curly-leaf pondweed (*Potamogeton sp.*), water-milfoil (*Myriophyllum sp.*), sago pondweed (*Stuckenia pectinata*), wild celery (*Vallisneria americana*), cattails (*Typha sp.*), and common reed (*Phragmites australis*). It is expected that existing biomass would be buried beneath placed dredge of various depth depending on proximity to the shore and final design. Studies have found that thin-layer placement (< 23cm/9

inches) has minimal to negligible impacts on the growth and primary production of wetland habitats (Reimold et al., 1978; Ray, 2007). Thicker layer placement will smother plant mass, reducing seed germination, seedling survival, growth of adults, and organic litter decomposition (Wang et al., 1994). All growth and survival metrics were greater with increased plant size or decreased sediment load/thickness. It is therefore expected that SAV, and associated primary production and photosynthesis, will be negatively impacted in areas where more than 9 inches of dredge material will be placed until such time as the area is re-colonized or restored with SAV.

The penetration of light through the water column and ability of SAV to maximize use of available light are key components of competition between SAV and phytoplankton (Kim et al., 2018). As water depth increases, light penetration decreases to a point where primary production and photosynthesis are energetically unfavorable, leading to a shift in the community from SAV to phytoplankton. The placement of dredge material to increase the bottom elevation of areas adjacent to Woodtick Peninsula will therefore have a positive impact on the long-term primary production and photosynthesis of SAV.

Within the Great Lakes soil type is correlated with plant life, with SAV typically being indicators of silt-dominated substrate (Johnston et al., 2007b). The particle size distribution of these was >45% silt with lesser percentages of sand and clay (ALS Environmental, 2021). Dredge materials from the Toledo Harbor Federal Navigation Project are primarily composed of clays and silts (35-99%; USACE, 2020).

It should be noted that all observed SAV species have been classified as tolerant or very tolerant to disturbances (with the exception of wild celery, which was neither tolerant nor intolerant) and occupying a broad ecological niche (Croft and Chow-Fraser, 2007). In general, these species can grow relatively quickly, assimilate nutrients from both the water column and benthos, and outcompete other species for available light. As such, recolonization of submergent wetlands where dredged material is placed would be expected to occur in the short-term (3-5 years) and cover approximately 55 more acres of shallow bottomlands.

2.2.1.2 Effects on Suspension/Filter Feeders

Suspension and filter feeding organisms include freshwater clams and mussels (native and non-native), zooplankton, and benthic macroinvertebrates. Organisms present in, or adjacent to, placement areas may be buried beneath placed material (Bolam, 2011) and or temporarily affected by increases in TSS concentrations (Ellis et al., 2002).

Burial of organisms within the sediment can have detrimental impacts with as little as 6 cm (2.4 inches) of overdepth, even for organisms capable of vertically moving with sediment (Wilber et al., 2007; Bolam, 2011). This negative impact is also linked to the percentage of organic content in the placed sediment, with vertical migration of organisms being negatively impacted in a study where organic content of placed material increased from 0.8% to 3.3% (Bolam, 2011).

Increases in TSS have been shown to negatively impact the physiology of suspension feeders in the short term as well as their distribution within an ecosystem when TSS increases persist over longer time periods (such as an entire construction season; Ellis et al., 2002). Placement of

dredge material will likely negatively impact macroinvertebrate density during and in the short term (1-3 years) following project construction (Koel and Stevenson, 2002).

The project will result in a larger are of wetland habitat similar to that in existence at Woodtick Peninsula, which will allow for recolonization by mussels (native and non-native) over the lifespan of the project. The additional creation of an artificial reef will likely lead to an increase in the abundance of dreissenid mussels, as these species are more dominant on hard substrates (Wilson et al., 2006). This colonization of the artificial reefs by dreissenids would lead to a macroinvertebrate community defined by deposit-feeding organisms, small gastropods, and predatory invertabrates, which differ from that of a native mussel community on hard substrate (Ricciardi et al., 1997).

Combined the environmental consequences of the alternatives would likely impact the invertebrate community through mortality and displacement of existing and adjacent communities during construction and then re-colonization of the project area with a community that is different in structure and function (Henley et al., 2000). It is very likely that non-native dressenid mussels will be the primary component of the re-colonizing community, including on artificial reefs if constructed. The presence of dressenid mussels will impact the aquatic macroinvertebrate community but not the insect community which should return to a similar state over the lifespan of the project.

2.2.1.3 Effects on Fishes

The nearshore wetlands of Woodtick Peninsula likely serve as a primary nursery for recreationally and commercially important species, such as walleye and yellow perch (Roseman et al., 2005; Sullivan and Stepien, 2014). The direct impacts from the project alternatives short-term physiological and behavioral changes in fish present within the project area, in addition to affecting any incubating eggs subject to increased sediment loads (Kjelland et al., 2015).

The potential biological effects of turbidity on fish vary largely based on the composition and concentration of TSS relative to background (Servizi and Martens, 1987; Zimmerman et al., 2003), frequency and duration of exposure (Newcombe and MacDonald, 1991; Robertson et al., 1997), species and life stage (Servizi and Martens, 1987; Ryan, 1991) and acclimation (e.g., Redding et al., 1987; Bunt et al., 2004; Kemp et al., 2011).

Adults will be capable of moving out of the area of effect, but may not choose to do so leading to additional physiological stressors from the increased sediment load. Depending on the species, these stressors may be subleathal, lethal, or both depending on the concentration and duration of exposure. The increase in suspended sediments will also alter the predator-prey dynamic, leading to changes in feeding behavior, feeding success, and predator avoidance (Kjelland et al., 2015). The response and tolerance to these changes is species-specific, with scientific literature indicating that opportunistic species experience less disruption than specialized trophic groups when exposed to dredging-related increases in turbidity. Combined, this indicates that the placement of dredge material will lead to changes in the behavior of adult fishes within the placement area, followed by adaptation to the new environment over the lifespan of the project.

These behavioral changes will not necessarily result in any positive or negative impacts to populations on the whole.

Project impacts to eggs and larvae may be more pronounced than to adults. Walleye eggs, fingerlings, and newly hatched larvae demonstrate resistance to sediment loads typically found during dredging operations, however these results were for short-duration exposures (2-3 days) which will likely be exceeded during active construction of this project (Suedel et al., 2012; Suedel et al., 2014). As a result, if placement operations were to occur during normal periods of fish spawning and egg incubation, it would be expected to lead to a decrease in egg hatching and survival of larval fish within the project area. Outside of the project area, no significant impacts to eggs and larvae are likely to occur.

Placement of Toledo Harbor Federal Navigation project material will lead to the loss of fish spawning and nursery habitat during, and in the years following, construction. This impact is correlated with the loss and re-establishment of aquatic vegetation. Certain species show evidence of genetic isolation within the Great Lakes and the Huron-Erie corridor; a significant impact to more than one year class could impact the populations localized around Woodtick Peninsula however direct multi-year impacts are not expected (Sullivan and Stepien, 2014). As the SAV communities re-establish and the target ecosystem state is achieved over the lifespan of the project, the increase in submergent wetland habitat will have a beneficial impact on fishes in western Lake Erie through the expansion of important coastal wetland habitat (Roseman et al., 2005). The restoration and expansion of SAV will also serve to address existing beneficial use impairments (BUIs) in the Maumee River and Maumee Bay Area of Concern (Miller et al., 2018).

The placement of an artificial reef will creating additional 3-dimensional hard substrate habitat. Artificial reefs of similar design have been found to be successful at attracting recreational species and spawning fish, with the highest levels of success observed for artificial reefs (determined based on limiting non-native species and promoting desirable species) when the reefs were constructed using quarried limestone between 4-8 inches (10-20cm) in diameter (Manny et al., 2015; McLean et al., 2015). This type of material reduces the chance that non-native sea lamprey (*Petromyzon marinus*) and round goby (*Neogobius melanostomus*) will colonize the reef and either use it as spawning ground or prey of eggs of native fish species (Manny et al., 2015).

The placement of dredge material at Woodtick Peninsula will result in short term (<5 years) negative impacts to fish species in the project area, followed by a long term benefit as the target state is achieved. This benefit may be realized by both native and non-native species, however neither group will gain a greater benefit than the other, leaving the existing competition for resources in effect.

2.2.1.4 Effect on Birds

Direct impacts to the bird community of Woodtick Peninsula include disruption of activity at Woodtick Peninsula as a result of construction activity. Birds would likely avoid the area where construction equipment was located, and associated feeding and nesting would be similarly

disrupted through the prey avoidance of the area and loss of in-water feeding areas. Nesting activities that may occur on the adjacent peninsula may similarly be disrupted by the additional construction traffic and noise during construction. The re-establishment of SAV over the lifespan of the project will increase the available in-water habitat units for birds. This will primarily be an indirect effect as it will take time for the SAV community to regain its structure and function.

Western Lake Erie contains high-priority wetlands for marsh birds (Grand et al., 2020), which includes Woodtick Peninsula given the lack of development and distance from urban centers (Tozer, 2016) and its habitat area in combination with the adjacent Erie Marsh (Steen et al., 2006). The environmental consequences of the Alternatives will likely be disruption of bird abundance and use of Woodtick Peninsula habitat during construction followed by a return and re-use of Wootick Peninsula for both permanent and migratory bird habitat. As the submergent wetlands, and planted emergent wetland in Alternatives 3 and 5, regain full ecological structure and function a greater richness and abundance of bird species will occur in conjunction with bird use of the Woodtick wetlands (Steen et al., 2006).

Bald eagles are documented as roosting and nesting in the Project Area. As such, the Alternatives have the possibility of disturbing bald eagles as outlined in the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. The Alternatives would fall under Category B Temporary Impacts according to the National Bald Eagle Management Guidelines (USFWS, 2007). As such, avoidance measures and distance will be coordinated with the USFWS and incorporated into any plans and specifications for the selected Alternative. This coordination, and the results thereof, will serve as appropriate mitigation under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

2.2.1.5 Effect on Reptiles and Amphibians

The direct impacts of the Project Actions will likely result in avoidance of the project area by reptiles and amphibians. The proposed dredge placement areas for all Alternatives will provide adequate access to high quality habitat adjacent to the project actions (Hunt et al., 2013). Individuals that do not leave the project area will likely experience decreased physiological function, survival, feeding success, and predator avoidance (Calderon et al., 2019).

Indirect impacts of the project include the expansion of submergent habitat. This will provide more non-urbanized wetland habitat that has limited influence from anthropogenic development (Hunt et al., 2013; Calderon et al., 2019). As such, the environmental consequences of the alternatives with respect to reptiles and amphibians will be short term disruption and potential decrease in survival followed by the expansion of a functioning wetland capable of supporting a high richness and diversity of Great Lakes reptile and amphibian species (Hecnar, 2004; Weiten et al., 2012).

2.2.1.6 Effect on Mammals

Direct impacts from Project Actions would be primarily restricted to the obligate wetland mammal in the project area are muskrat. All other mammals would either avoid or leave the project area in order to avoid construction activity and equipment. Muskrat themselves would

also avoid construction equipment but stay within their established range, some of which fall within the Project Area.

Given that muskrat primarily feed on aquatic vegetation, the placement of dredge material on the leeward side of the peninsula would bury and kill SAV currently serving as the primary food source for muskrat (indirect effect). This would cause the muskrat to switch to a more omnivorous diet, move into other muskrats' territories to gain access to food, or die through starvation.

The re-colonization and re-establishment of SAV over the lifespan of the project would increase the available SAV and EAV habitat to support muskrat. Therefore, muskrat would be expected to continue to inhabit the Woodtick Peninsula wetlands following completion of the project actions. Depending on the establishment of each muskrat's range, the project actions have the potential to support a greater number of muskrat, or increase survival of young through greater access to food and more available food (in the form of SAV).

Therefore, the environmental consequences of the alternatives with respect to mammals are expected to be short-term negative direct and indirect impacts to muskrat populations at Woodtick Peninsula followed by positive impacts over the lifespan of the project. This project will not have any long-term negative consequences on muskrat populations and may provide a slight positive impact over the lifespan of the project.

2.2.1 Determination of Cumulative Effects on the Aquatic Ecosystem

No significant, adverse cumulative effects on the aquatic ecosystem would be expected to occur as a result of the discharge of this dredged sediment. Scientific literature indicates that the aquatic ecosystems of Lake Erie are resilient, and that the periodic disturbance created by open-water placement of dredged sediment is absorbed or accommodated by the ecosystem because its structure and function does not fundamentally change over the long-term to a different state. The placement location and configuration for this project are intended to expand submerged wetland habitat zones capable of sustaining aquatic vegetation and associated ecosystems.

2.2.2 Determination of Secondary Effects on the Aquatic Ecosystem

No significant, adverse secondary effects on the aquatic ecosystem would be expected to occur as a result of the discharge of this dredged sediment. Secondary adverse effects would be minimal due to the limited spatial and temporal impacts from the discharge of dredged sediment (e.g., short-lived episodes, small turbidity plumes, and short-term effects on benthos, fish and aquatic birds). Discharge of the dredged sediment at the open-water placement site would increase the bottom elevation in some areas, which are intended to result in the expansion of submergent wetland habitat and aquatic vegetation. The construction of the artificial may also have a secondary effect of increasing sediment deposition around the southern terminus of the peninsula, which may lead to long-term expansion of Woodtick Peninsula and associated shallow water habitats.

2.2.3 Federally Listed Threatened and Endangered Species

2.2.3.1 Indiana Bat

Indiana bats (*Myotis sodalis*) may be directly impacted due to project actions, including interactions with equipment while foraging and flying. Since bats are mobile, their primary reaction to these activities will be avoidance of the project area or equipment, which will minimize the impact to their population. No trees are going to be cut and no equipment will be working on Woodtick Peninsula itself for project actions, which will not impact the roosting availability or behavior within or near the peninsula.

Indirect effects may include impacts to foraging success positively, negatively, or a combination. Prey insects may be attracted by the increase in ambient lighting if construction activities occur at night, which could concentrate prey and increase foraging success. This temporary increase in light may also allow for insects to better avoid predation, reducing foraging success near to the construction activity. Both of these impacts could occur simultaneously, resulting in no significant change in foraging success.

The Indiana bat was Federally listed as Endangered on 11.March.1967 wherever found. It is also listed in the State of Michigan as an Endangered Species. The determination for the Indiana bat is based on the following rationale:

1. No know hibernacula (locations where bats hibernate) occur near to the project site;
2. Designated critical habitat for the Indiana Bat do not occur in the States of Michigan or Ohio;
3. No trees will be cut as a result of project actions;
4. Ambient light will only increase temporarily if construction activities occur at night, and;
5. Bats are mobile and capable of avoiding objects and equipment.

As such, the determination for the Indiana Bat is “May affect, not likely to adversely affect” (Appendix E).

2.2.3.2 Northern Long-Eared Bat

Northern long-eared bats (*Myotis septentrionalis*) may be directly impacted due to project actions, including interactions with equipment while foraging and flying. Since bats are mobile, their primary reaction to these activities will be avoidance of the project area or equipment, which will minimize the impact to their population. No trees are going to be cut and no equipment will be working on Woodtick Peninsula itself for project actions, which will not impact the roosting availability or behavior within or near the peninsula.

Indirect effects may include impacts to foraging success positively, negatively, or a combination. Prey insects may be attracted by the increase in ambient lighting if construction activities occur at night, which could concentrate prey and increase foraging success. This temporary increase in light may also allow for insects to better avoid predation, reducing foraging success near to the construction activity. Both of these impacts could occur simultaneously, resulting in no significant change in foraging success.

The northern long-eared bat was Federally listed as Threatened on 04.May.2015 wherever found. It is also listed in the State of Michigan as a Species of Special Concern. The determination for the Northern Long-eared bat is based on the following rationale:

1. No know hibernacula (locations where bats hibernate) occur near to the project site;
2. There is no designated critical habitat for the Northern Long-eared Bat;
3. No trees will be cut as a result of project actions;
4. Ambient light will only increase temporarily if construction activities occur at night, and;
5. Bats are mobile and capable of avoiding objects and equipment.

As such, the determination for the Northern Long-eared Bat is "May affect, not likely to adversely affect" (Appendix E).

2.2.3.3 Piping Plover

The piping plover (*Charadrius melodus*) is a designated endangered species both Federally and in the State of Michigan. Critical habitat for this species in the Great Lakes, was designated on 7.May.2011. As such, the piping plover is managed under the authority of the Federal Endangered Species Act of 1973 (ESA; PL 93-205, as amended) as well the Michigan Department of Natural Resources under the Natural Resources and Environmental Protection Act of 1994. The determination for the Piping Plover is based on the following rationale:

1. The project area is a natural peninsula that meets some of the habitat requirements of piping plover (i.e. sandy beach, gravel or pebble substrate, little or no vegetation);
2. The project location is outside of designated critical habitat for piping plover in the Lake Erie;
3. No piping plover has been observed in or near the project area,
4. Raptors have been observed in the project area that may prey on piping plover (adults and hatchlings; USFWS, 2020), and;
5. The project objectives will not result in the modification or creation of piping plover habitat.

Furthermore, other areas of Lake Erie have suitable habitat, and are designated as critical habitat for the Piping Plover. As such, the determination with respect to piping plover is "No Effect."

2.2.3.4 Red Knot

The Red Knot (*Calidris canutus rufa,* AKA Rufa Red Knot) was Federally listed as Threatened wherever found on 12.January.2015. It is not listed in the State of Michigan, though its listing has been recommended. The determination for the Red Knot is based on the following rationale:

1. Red Knots have been observed in western Lake Erie near to the project site but very infrequently;
2. Western Lake Erie only serves as stopover habitat on a seasonal basis;
3. Red Knots do not have designated critical habitat in the Great Lakes, and;
4. Project actions would not result in any impacts to Red Knot habitat or food.

Due to this rationale, the determination for the Red Knot is "No Effect."

2.2.3.5 Eastern Massasauga

The eastern massasauga (*Sistrurus catenatus*) was Federally listed as Threatened wherever found on 30.September.2016. It is also listed as a species of special concern in the State of Michigan. The determination for the Eastern Massasauga is based on the following rationale:

1. Eastern massasauga have not been observed in the project area or county;
2. The project area is best classified as southern wet meadow habitat, which is not the primary habitat for this species, and;
3. Project actions would take place in-water during the summer and fall and therefore not disrupt any active hibernation.

As such, the determination for the Eastern Massasauga is "No Effect."

2.2.3.6 Northern Riffleshell

The northern riffleshell (*Epioblasma torulosa ragiana*) was Federally listed as Threatened whenever found on 22.January.1993 and is also listed as endangered in the State of Michigan. The determination for the northern riffleshell is based on the following rationale:

1. Woodtick Peninsula, the adjacent wetlands, and western Lake Erie basin do not contain habitat or stream features typical for the species;
2. Mussel surveys have not observed any live individuals in either the Detroit or Maumee Rivers since 1990 and 2009, respectively, and;
3. The northern riffleshell is particularly sensitive to disturbances in habitat and water chemistry;
4. Multiple non-native species now occur in western Lake Erie that could prevent or limit the expansion or re-introduction of the northern riffleshell.

As such, it is not expected that any populations of the northern riffleshell occur within the project area or would be able to re-establish as a result of project actions. Therefore, the determination for the northern riffleshell is "No Effect."

2.2.3.7 Rayed Bean

The rayed bean (*Villosa fabalis*) was Federally listed as Endangered wherever found on 15.March.2012. It is also listed as Endangered in the State of Michigan. The determination for the rayed bean is based on the following rationale:

1. The project area in Woodtick peninsula has limited habitat typical for this species;
2. The last reports of the rayed been in this geographic area are from 1984;
3. The Final rule for an Endangered Determination for the rayed bean indicates that the rayed bean is considered eliminated in Lake Erie;
4. The non-native zebra mussel, which led to the elimination of the rayed bean from Lake Erie, still persists in Lake Erie and was observed at Woodtick Peninsula in 2021;
5. Identified populations of rayed bean are functionally disconnected from western Lake Erie, preventing or limiting their expansion or re-introduction, and;
6. The species as a whole is imperiled, and continues to decline where still extant.

For these reasons, it is highly unlikely that any rayed bean will be present in or adjacent to the project area, nor would recruitment of new individuals occur during the proposed actions. The determination for the rayed bean is, therefore, "No effect."

2.2.3.8 Karner Blue Butterfly

The Karner Blue Butterfly (*Lycaeides melissa samuelis*) is a Threatened species in the State of Michigan that is also listed as Endangered wherever found at the Federal Level. When listed on 14.December.1992, no critical habitat was included for this species, and none has been designated since that time. The determination for the Karner Blue Butterfly is based on the following rationale:

1. Woodtick Peninsula is not oak savannah habitat and no wild lupine has been documented at this site;
2. The most recent observations of Karner Blue in Monroe County were reintroduced individuals at Petersburg State Game Area, ~20 miles to the northwest, in 2008, and;
3. Karner Blue are known for being poor fliers with limited ranges and population expansion or distribution.

As a result, the determination for the Karner Blue Butterfly is "No effect."

2.2.3.9 Eastern Prairie Fringed Orchid

The eastern prairie fringed orchid (*Platanthera leucophaea*; AKA prairie white-fringed orchid) was federally listed as Threatened wherever found on 28.September.1989 and is also listed as Endangered within the State of Michigan. No critical habitat has been designated for this species, however its endangered status within Michigan affords it extra protections within the State, even on private lands. The determination for the eastern prairie fringed orchid is based on the following rationale:

1. Woodtick peninsula contains habitat that meet the requirements for this species;
2. Field surveys of the project area indicate wetland habitat is dominated by woody growth or the common reed (Phragmites spp.);
3. No active land management measures that create disturbances or retard community succession regularly occur;
4. Populations within the Lake Erie prairies are known to naturally fluctuate more than other populations, and ;
5. The status of hawkmoth pollinator populations is not known for the project area.

While there have not been recent surveys of Woodtick Peninsula to determine if any eastern prairie fringed orchids are currently present, the project actions will not result in any impacts to potential habitat for this species in the project area. As such, the determination for the eastern prairie fringed orchid is "Not likely to adversely affect."

2.3 Potential Impacts on Special Aquatic Sites

2.3.1 Sanctuaries and Refuges

Woodtick Peninsula is not an official wildlife sanctuary or refuge. However, its relatively inaccessibility makes it a wildlife refuge by nature. The placement of dredge material will not impact the accessibility or access routes to or from Woodtick Peninsula, therefore it will not impact the status or function of the peninsula as a physical refuge.

Immediately adjacent to Woodtick Peninsula, Erie Marsh is considered a component of the Detroit River International Wildlife Refuge, which is managed by the U.S. Fish and Wildlife Service (https://www.fws.gov/refuge/detroit_river/). This project will not have any direct

impacts on Erie Marsh, or the Detroit River International Wildlife Refuge but will provide an indirect benefit through the preservation of Woodtick Peninsula as a barrier peninsula which should benefit the Refuge in the long-term.

2.3.2 Wetlands

The Erie State Game Area and Erie Marsh Preserve to the west are identified Wetlands in the Western Lake Erie Region in the North American Waterfowl Management Plan (Figure 5; USFWS, 1986). This area was designated as one of 34 unique habitat areas in the North American Waterfowl Management Plan (USFWS, 1986) and one of 43 areas of greatest continental significance to North American ducks, geese, and swans (USFWS, 2012). In September of 2000, Woodtick Peninsula and nearby wetlands were designated as a site of regional importance in the Western Hemisphere Shorebird Reserve Network (WHSRN, 2021). Erie Marsh, located to the west of Woodtick Peninsula, is 2,149 acres is size, represents 11% of the remaining marshland is Lake Erie, and is a conservation target for the restoration of Lake Erie (TNC, 2012).

This project will serve to create additional submerged wetlands surrounding Woodtick Peninsula but do so by placement in and adjacent to existing wetlands. This will have a short term disturbance to the structure and function of the wetlands but is expected to rebound within the short-term (3-5 years) and produce a net gain in wetlands over the lifespan of the project.

The construction of an artificial reef at the southern terminus will also provide additional protection to waves and erosion forces to the identified wetlands. The reef also has to potential to expand wetlands through natural deposition of sediment.

2.3.3 Mud Flats

Seasonal mud flats exist along the Woodtick Peninsula and result from natural fluctuations in Lake Erie water levels. Existing mud flats may be directly buried beneath placed sediment, resulting in a change in the location and conditions by which mud flats are exposed. Given that this project will not have any impact on water fluctuation within the system (see Section 2.1.2.2), the only expected impact to mud flats will be their location and area, which will be altered through placement of dredge material and achieve a new equilibrium once the placed sediment finishes settling and dewatering.

2.3.4 Vegetated Shallows

Impacts to vegetated shallows are detailed in Section 2.2.1.1.

2.3.5 Coral Reefs

Not applicable.

2.3.6 Riffle and Pool Complexes

Not applicable.

2.4 Potential Effects on Human Use Characteristics

2.4.1 Municipal and Private Water Supplies

Raw lake water is not typically consumed by humans. There is a drinking water intake for the City of Toledo ~9 miles to the east-southeast of Woodtick Peninsula. Any changes in parameters affecting taste would be short-lived and not expected to be transported to the water intake.

2.4.2 Recreational and Commercial Fisheries

Western Lake Erie coastal wetlands are the primary walleye (*Sander vitreus*) nursery area for all of Lake Erie, supporting a very important sport and commercial fishery (Herdendorf, 1992). This area is also a destination for recreational fishing due to the proximity to public and private marinas, and quality habitat for a diversity of fishes due to the large wetland complex.

This project is expected to be completed within a single construction season, likely occurring in late summer and fall which is past fish spawning windows. As such, the placement of dredge material may disrupt the fishing for a single season and may impact a single year class of production (see Section 2.2.1.3). Following completion of construction, fishing access and operations should experience no disruptions or impacts.

2.4.3 Water-Related Recreation

The peninsula offers recreation opportunities for local boating, fishing, and paddling enthusiasts. Access to the peninsula is only via water, as the private company, Consumers Energy, owns the northern land access. For safety reasons, water-related recreation may need to be temporarily restricted in the immediate vicinity of the project site during construction but will return to existing levels and status upon completion.

2.4.4 Aesthetics

2.4.4.1 Taste

See Section 2.4.1.

2.4.4.2 Odor

The atmospheric exposure of organic matter which may be contained in the dredged sediment may result in a short term, localized, odor in the immediate vicinity of the project site. This odor will be similar to those naturally occurring in wetlands experiencing atmospheric exposure and will naturally abate or fluctuate in conjunction with water fluctuations that cause exposure.

2.4.4.3 Color

The placement of dredged sediment may result in short term, localized changes to the water's color and clarity in the immediate vicinity of the project site. See Section 2.1.3.

2.4.4.4 Clarity

The placement of dredged sediment may result in short term, localized changes to the water's color and clarity in the immediate vicinity of the project site. See section 2.1.3.

2.4.5 Pathogens

The nearshore placement of dredged sediment would not significantly influence pathogens. Within Lake Erie, low energy environments with compacted sediments could serves as a source for bacterial contamination at the sediment-water interface (with respect to human pathogens; VanMensel et al., 2020). There is therefore the potential for a small increase in new bacterial pathogen community transfer at this interface should human activity occur regularly or increase at the sediment-water interface following project completion.

2.4.6 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

Woodtick Peninsula is almost entirely public, State of Michigan, owned land included in the Erie State Game Area. A private organization, the Nature Conservancy, owns the Erie Marsh Preserve, east of the peninsula. Access to the peninsula is only via water, as a private company (Consumer's Energy) owns the northern land access. For safety reasons, water access to the peninsula may need to be restricted in the immediate vicinity of the project site during construction. Following construction, the project should not affect the public's use of the Erie State Game Area or the Erie Marsh Preserve.

3. Findings of Compliance

3.1 Adaptation of the Section 404(b)(1) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

3.2 Evaluation of Alternatives

Alternatives to enhance coastal resiliency through beneficial use of dredged material on Woodtick Peninsula were considered, and are discussed in-depth, in the Woodtick Peninsula Section 204 Beneficial Use of Dredged Material for Ecosystem Restoration Project, Monroe County, Michigan: Draft Integrated Feasibility Report and Environmental Assessment and Draft FONSI.

3.3 Compliance with State Water Quality Standards

The discharge of dredged sediment would not cause or contribute to violation of any applicable state water quality standards (WQSs) and will be further coordinated with the State of Michigan Department of Environment, Great Lakes, and Energy.

3.4 Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act (CWA)

The discharge of dredged sediment would not violate the toxic effluent standards of Section 307 of the CWA.

3.5 Compliance with the Endangered Species Act (ESA) of 1973

This project is being evaluated for all effects on federally listed species in accordance with the ESA. It was determined that project would not jeopardize the continued existence of any federally listed threatened or endangered species, or their designated critical habitat. These determinations will be further recorded in an Environmental Assessment and provided to the USFWS.

3.6 Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection Restoration and Sanctuary Act of 1972

This project is compliant in that the project site is not in a designated marine sanctuary.

3.7 Evaluation of the Extent Waters of the United States would be Degraded

The discharge of dredged sediment 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.

3.8 Appropriate and Practicable steps taken to minimize potential adverse impacts of the discharge on aquatic ecosystems

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

3.9 Compliance with Section 404(b)(1) Guidelines

On the basis of the Section 404(b)(1) Guidelines, the discharge of dredged sediment 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.

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