Burns Waterway Harbor
Maintenance Dredging and Placement

Indiana

Environmental Assessment
Attachment 2 - Section 404(b)(1) Analysis

U.S. Army Corps of Engineers
Chicago District

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TABLE OF CONTENTS

I. Project Description

A. Locations

Burns Waterway Harbor is an authorized Federal navigation harbor located in Portage, Indiana on the southern shore of Lake Michigan (Figure 1). The harbor is located approximately 40 miles southeast of Chicago, Illinois and approximately 22 miles from the Illinois-Indiana and Indiana-Michigan state lines. The harbor is comprised of three main areas: the Arms, Outer Harbor, and Approach Channel. There is also an area adjacent to the federal harbor known as the Dredging Maintenance Area. This area is dredged to form a basin where littoral sand can be deposited rather than settle in the federal channel which will reduce the frequency of dredging the federal channel. The harbor is used for industrial activities.

The existing locations for placement of dredged material are: for the Approach Channel and Dredging Maintenance Area – the littoral zone adjacent to Ogden Dunes and Portage beaches, approximately two miles west of the Harbor; for the Outer Harbor and Arms – deep water approximately one mile north of the Harbor.

The additional locations being considered for placement of dredged material from the Approach Channel and Dredging Maintenance Area are (Figure 2): on beach placement at Portage Beach or Ogden Dunes Beach, adjacent to the existing near shore placement area.

B. General Description

The goal of the current action is to continue to conduct routine maintenance dredging at the Harbor, and it is proposed that any sediment dredged from the Approach Channel and Dredging Maintenance Area could be placed onshore in addition to the existing near shore placement.

USACE typically performs maintenance dredging of the Approach Channel and Dredging Maintenance Area every year or two with placement at the existing near-shore location.

C. Authority and Purpose

Construction, operation and maintenance of the existing Federal navigation project at Burn Waterway Harbor was authorized by the River and Harbor Act of 1965 and by subsequent amendment in 1970. The Approach Channel has an authorized depth of -30 feet Low Water Datum (LWD), -28 feet LWD in the Outer Harbor, and -27 feet LWD in the harbor Arms.

USACE has been performing maintenance dredging at Burns Waterway Harbor since 1976 with recent dredging operations typically occurring every year or two. Note that "purpose and need" are also discussed in the main EA document.

D. General Description of Dredged or Fill Material

(1) General Characteristics of Material

Sediment core samples were collected in the Burns Harbor Approach Channel and Maintenance Area in August 2019. Three core samples were collected from the management unit representing this area. The August 2019 sampling was part of a larger event which characterized the entire harbor. No new potential sources of contamination were presented. Materials present in the Approach Channel and Maintenance Area contain clean sand, free of fines and contaminants.

(2) Quantity of Material

The volume of sediment entering the Federal harbor due to littoral sediment transport was estimated to be 86,000 cubic yards per year (Morang 2012). Individual years may have significantly more or less dredging based on funding or special considerations (large storm events, low or high water levels, etc).

(3) Source of Material

The littoral drift pattern in the vicinity of Burns Harbor is predominately from east to west. The dredged areas act as sediment traps, where the littoral sediment settles, thus significantly reducing the amount of littoral sediment migrating west of the Harbor.

E. Description of the Proposed Placement Site(s)

(1) Location

The proposed beach placement sites are Portage Beach and Ogden Dunes Beach and the littoral zone along these beaches. The dredged material from Burns Harbor Approach Channel and Maintenance Area could be placed onshore, or placed along the shore to build up the eroded shoreline. Placement is dependent on the quantity requested and is limited to the annual dredging volume or less.

Material dredged from the Approach Channel and Maintenance Area could also be placed at the existing routine placement site in the littoral zone currently in use.

(2) Size

Portage Beach – Located in the City of Portage, IN and is approximately a quarter mile long.

Ogden Dunes Beach – Located in the town of Ogden Dunes, IN and is approximately 1 mile long.

The total quantity of annual dredging is dependent on shoaling patterns and funding, therefore in any given dredging year not all placement areas may be used. Over the life of the project some placement areas may be reused, or not used at all.

(3) Type of Site

The identified beach placement sites are beaches adjacent to Lake Michigan. Placement would be onshore or in the littoral zone (less than 18’ water). Placement is currently in the littoral zone.

(4) Type of Habitat

The natural habitat at these beaches before their development was most likely an open lacustrine shoreline with barrier enclosed ridge and swale complex. The beaches were likely sculpted by wave action that caused the movement and drift of littoral sand from east to west along the coastline. Wetlands exist at various distances and connectedness to the lake and as a result the organic soil depth and vegetation are quite variable. This natural condition can be seen fairly well at the Portage Beach, but at Ogden Dunes Beach the condition no longer exists due to development of the areas. The natural littoral drift cycle has also been disrupted by construction of in water structures that block or severely reduce the east to west sediment flow.

(5) Timing and Duration of Discharge

Dredging occurs at Burns Harbor dependent upon shoaling rates and appropriations. Historically, the harbor is dredged every year or two in spring, summer or early fall depending on weather conditions. The length of each individual dredging event various, but typically lasts approximately one to two months depending on dredging volume, equipment used, weather, and other factors.

F. Description of Placement Method

Material to be placed in the littoral zone is transported via bottom dump scow, mechanical crane, or hydraulic dredge (pipeline). Once the scow is in place, the bottom doors open and material is dropped down. Alternatively, a crane could be used to place small loads into the water or on-shore. Material can also be placed in the littoral zone or on the beach hydraulically. Material to be placed onshore or near shore (shallow water) is hydraulically pumped as a slurry onto the beach, either from a scow or pumped directly from the dredging location.

II. Factual Determinations

A. Physical Substrate Determinations

(1) Substrate Elevation and Slope

Approach Channel has an authorized depth of -30 feet Low Water Datum (LWD), and the Approach Channel and Maintenance Area are generally maintained at this depth. Material will be placed either onshore or in the littoral zone (less than 18 feet of water).

(2) Sediment Type

The sediment to be dredged is predominantly the result of littoral transport of Lake Michigan sand from areas east of Burns Harbor. The sediment in the potential placement areas is primarily of the same type.

(3) Dredged/Fill Material Movement

Littoral transport is the movement of sediments in the near shore zone by waves and current. Littoral transport travels parallel to the coast in a predominantly east to west direction along the coast of Indiana in the cell from Michigan City Harbor to Burns Harbor. Material placed in the littoral zone either moves onto the beach or provides wave energy attenuation from the placement location. Material placed on the beach widens the existing beach for the same goal of wave energy attenuation. Material placed in either type of location will eventually rejoin the overall east to west littoral transport.

(4) Physical Effects on Benthos

Existing periphyton, epibenthic plankton, and benthic macroinvertebrate organisms that currently reside in the substrate of the area to be dredged or placement area(s) would be removed or disturbed when the dredged materials are removed from the water, placed back into the water, or placed on/near beaches. The existing sediment within the dredging area will need to be removed to allow for an adequate navigation depth. After this material is removed it will be transported to a predetermined deposition site

as listed above and placed upon the existing sediment in the area. Organisms that typically reside in high wave energy environments near shorelines are generally tolerant of turbid waters and adapted to elevated suspended solids concentrations. As a result, the periphyton, epibenthic plankton, and macroinvertebrate organisms would quickly repopulate, grow, and recolonize on/in the benthos after operations have ended.

(5) Other Effects

There would be no other significant substrate impacts.

(6) Actions Taken to Minimize Impacts

For open water placement a bottom dump scow minimizes resuspension by going into shallow water before opening. For onshore placement the slurry is pumped into a temporary settling basin, which allows the solids to settle out and clear water to return to the lake. Regardless of the placement method or location, the material to be dredged has a very low fine content and turbidity is expected to be relatively low during placement. No additional special measures would be taken to minimize temporary impacts.

B. Water Circulation, Fluctuation and Salinity Determinations

(1) Water

a) *Salinity*

Lake Michigan is a freshwater lake. The proposed work is not expected to increase or decrease the salinity of the water and will not add salts to the system.

b) *Water Chemistry*

As part of the 2019 Harbor sampling, a composite of equal volumes of sediment and site water was created from each of the three cores within the Approach Channel and Maintenance Area management unit for preparation of one elutriate sample. The elutriate sample was prepared using the standard elutriate preparation procedure mixing 4 parts sediment to one part water. This method is an approximation of placing the material in the water and gives a conservative estimate of potential contaminant partitioning into the water column. The elutriate sample was analyzed for aluminum, arsenic, barium, cadmium, chromium, hexavalent chromium, copper, iron, dissolved iron, lead, mercury, nickel, selenium, silver, zinc, ammonia nitrogen, oil & grease, chemical oxygen demand, total phosphorus, pH, hardness, alkalinity, total dissolved solids, total suspended solids, SVOCs, total PCBs, and BTEX. Overall the elutriate quality was consistent with results of testing in previous years. Comparison of the elutriate results to the State of Indiana Lake Michigan water quality standards suggested that no water quality standards were exceeded. Only short-term and localized increases are likely to occur during placement.

c) *Clarity and Color*

Since the dredged material has a low percentage of fines, it is unlikely to cause any considerable long-term effects on, or changes to the water clarity or color. Short-term, minor, and localized changes to the water clarity and color are expected due to temporary increases in the concentration of suspended solids and turbidity during work.

d) *Odor and Taste*

The dredged materials are not anticipated to cause any considerable long-term effects on, or changes to, the odor or taste of the water. As mentioned above, the placement will likely cause short-term, minor, and localized increases of suspended solids and turbidity. These changes might be associated with slight changes to odors or tastes in the water for organisms in the vicinity of the work area, but any potential changes are expected to be temporary and limited to the work area.

e) *Dissolved Gas Levels*

The dredged materials are not anticipated to cause any considerable long-term effects on, or changes to, the dissolved gas levels in the water. As mentioned above, the placement will likely cause short-term, minor, and localized increases of suspended solids concentrations and turbidity. These increases in the work area may have an effect on the dissolved gas and nutrient levels in the water column, which could adversely impact some of the aquatic plants and organisms near the site. In particular, increases of suspended solids and turbidity could slightly reduce the amount of dissolved oxygen in the water column, and this is because the biological and chemical content of the suspended solids might react with some of the dissolved oxygen. However, the aquatic plants and organisms that have adapted to the dynamic, high wave energy environments near the shoreline are generally tolerant of the turbid waters that occur during storm events, so most of the aquatic plants and organisms should be able to withstand the short-term and minor changes in dissolved gas and nutrient levels. In addition, the clean sand with low fines content is expected to have a low sediment oxygen demand. Changes to the dissolved gas levels in the water should be temporary and confined to the work area.

f) *Nutrients*

The dredged materials are not anticipated to cause any considerable long-term effects on, or changes to, the nutrient levels in the water. The work may cause temporary, minor, and localized changes to the suspended solids, turbidity, and nutrient levels. These changes could adversely impact some of the aquatic plants and organisms in the vicinity of the work area, but the aquatic plants and organisms along the shoreline should be tolerant of the turbid waters that occur during storm events and should quickly recover. Additionally, State of Indiana Lake Michigan water quality standards are met without consideration of a specific mixing zone, so any temporary impacts are expected.

g) *Eutrophication*

Eutrophication is commonly caused when water is subjected to prolonged and elevated nutrient levels, particularly nitrogen and phosphorus. The dredging and placement is expected to cause short-term, minor, and localized changes to the suspended solids, turbidity, and nutrient levels, but the nutrient levels should return to Lake Michigan background concentrations shortly after the materials have been placed and the suspended particles have settled from the water column. The changes to suspended solids, turbidity, and nutrient levels are temporary and confined to the work area.

h) *Others as Appropriate*

There would be no other significant water impacts.

(2) Current Patterns and Circulation, Current Flow and Water Circulation

The proposed project will place dredged material in the near shore open water or on the beach. Burns Harbor and the proposed placement areas are all part of the same dynamic littoral system of

Lake Michigan. Lake Michigan is an enormous lake, and the dredging and placement areas are comparatively small; any placed material will rejoin the overall littoral system after placement. The proposed project will not have a significant adverse effect on the current patterns, flow, direction, velocity, stratification or hydrologic regime of Lake Michigan.

(3) Normal Water Level Fluctuations

Lake Michigan is an extremely large lake that has a huge surface area and contains an immense volume of water. According to the Great Lakes Atlas (Government of Canada and USEPA 1995), Lake Michigan has a water surface area of 22,300 square miles (57,800 square kilometers) and a volume of 1,180 cubic miles (4,920 cubic kilometers). It can take multiple months, seasons, or even years of persistently wet/dry conditions to cause an impact to the water levels of the Great Lakes (USACE 2013). The USACE, Detroit District, tracks the water levels in each of the Great Lakes, and the primary factors that determine water level changes are precipitation falling on the lake surface, runoff draining to the lake, evaporation from the lake surface, diversions into or out of the lake, and connecting channel inflows and outflows (USACE 2013). The very small volumes of material that would be moved for this project are insignificant in terms of water level impacts to the lake.

(4) Salinity Gradients

Lake Michigan is a fresh water lake, so the effect of the Project on salinity gradients is not applicable.

(5) Actions That Will Be Taken to Minimize Impacts

For open water placement a bottom dump scow minimizes resuspension by going into shallow water before opening. For onshore placement the slurry is pumped into a temporary settling basin, which allows the solids to settle out and clear water to return to the lake. The sediment being handled has a very low fines content. No additional special measures would be taken to minimize temporary impacts.

C. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site

The fines content of the Approach Channel and Maintenance Area dredged material is very low (1.8%, 2.1%, and 1.0%), with much less than 20% passing the #200 sieve. Since the dredged material has a low percentage of fines, it is unlikely to cause any considerable long-term effects on suspended particulates or turbidity levels. Short-term, minor, and localized increases in the concentration of suspended solids and turbidity are expected during work.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column

a) *Light Penetration*

The activities are expected to cause minor, temporary, and localized increases of suspended solids and turbidity that will likely decrease the clarity of the water and reduce the penetration of light through the water column. These minor increases are anticipated to be low relative to the increased levels of suspended solids and turbidity that typically result from storm events and adverse weather conditions. The project is therefore not expected to cause any long-term adverse impacts.

b) *Dissolved Oxygen*

Minor, temporary, and localized increases of suspended solids and turbidity might cause a slight reduction in the level of dissolved oxygen in the water. This reduction may be due to the biological and chemical content of the suspended solids, which could react with the dissolved oxygen and slightly lower concentrations in the water column.

c) *Toxic Metals and Organics*

Metals were measured in most sediment samples as part of the 2019 sediment sampling. Detected metal concentrations found in the sediment were similar to historic values. In general the Approach Channel and Maintenance Area samples had the lowest detected concentrations. Additionally the quality of material in the Approach Channel and Maintenance Area is similar to the quality of material found at its reference site.

As discussed in Section II.B.1.b *Water Chemistry*, an elutriate sample was tested for among other things phosphorus and ammonia. As concluded, the activities might cause minor, temporary, and localized increases of organics. However the project is not expected to cause any long-term adverse impacts.

d) *Pathogens*

The optional areas for dredged material placement are beaches and the adjacent shallows, while the existing placement location is near shore open water. Pathogens, particularly disease-causing bacteria and other germs, are a major concern for beaches along urbanized areas of Lake Michigan's coastline. Several municipalities routinely test the water for pathogenic bacteria such as *Escherichia coli* (*E. coli*) during the swimming and recreational boating season. Although *E. coli* is not harmful itself and is naturally occurring in the environment, the bacteria is a potential indicator of sewage contamination and the possible presence of human pathogens (bacteria, protozoa, and viruses) (Whitman and Nevers 2003). The sediment from the Approach Channel and Maintenance Area and a near shore reference site were both tested for E. coli. The Approach Channel sediment samples had lower concentrations of E. coli than the reference site. Whitman and Nevers (2003) suggest that potential sources include rainwater (sewage) overflows, leaking septic systems, and birds occupying the beach.

It has been shown that beach sand can act as a source of bacterial input into coastal waters (Stanford University 2007). Bacteria that is present in dry sand can be released into waterways when submerged in water such as during storm surges or high water levels. One potential source of beach contamination would be excrement from waterfowl that utilize the beach, or an adjacent area (parking lot, lawns, etc.) were rainwater can flow over and onto the beach.

One way to combat bacterial contamination of a beach would be conduct beach nourishment along the entire length of a beach. This would steepen the beach, increasing the distance to the water table and allowing water to more thoroughly drain from the beach's surface. The dryer sand is not as conducive to bacterial growth and should reduce the overall presence of bacteria in sand and potentially in the water directly offshore of the beach (Kinzelman and Oxley 2013). The nourished beach would likely not experience extended usage by waterfowl as they inhabit lower, wetter areas of the beach. This decreased usage by waterfowl could lead to decreased input sources of pathogenic bacteria coming from birds.

e) *Aesthetics*

The proposed project is not anticipated to cause any long term effects on, or changes to, the aesthetics of the water at the project site. There will likely be some temporary and minor increases of suspended solids and turbidity in the work area, and these increases are commonly associated with short-term and slight decreases of water clarity and/or changes to the color of the water. Nevertheless, these adverse aesthetic impacts should be short-term and minor, and the water is expected to return to a normal clarity and color as the suspended particles settle from the water column. In addition, the visual presence of barges, vessels, backhoes, and other construction equipment in the water or on the beach may generate noise and cause temporary and minor adverse impacts to the aesthetic beauty of the placement sites.

f) *Others as Appropriate*

The proposed project is not expected to have any other adverse effects on the chemical and physical properties of the water column.

(3) Effects on Biota

a) *Primary Production, Photosynthesis*

As discussed above in the discussion of light penetration, primary production generally refers to the fixation of solar energy by phytoplankton for an aquatic ecosystem. The dredging and placement of material will likely cause some minor, temporary, and localized increases of suspended solids and turbidity, but the effects are anticipated to be low relative to the increased levels of suspended solids that typically result from storm events and adverse weather conditions. The aquatic ecosystem in the area is likely comprised of aquatic organisms that typically reside in near shore dynamic, high wave energy environments, so they should be tolerant of turbid waters and adapted to elevated suspended solids concentrations and turbidity. The project is not expected to cause any significant or long-term adverse impacts to primary production or photosynthesis for the biota.

b) *Suspension/Filter Feeders*

The dredging and placement of material will cause some minor, temporary, and localized increases of suspended solids and turbidity, which could benefit suspension/filter feeders. The effects are anticipated to be low relative to the increased levels of suspended solids and turbidity that typically result from storm events and adverse weather conditions, and the project is not expected to have any long-term effects on suspension/filter feeders.

c) *Sight Feeders*

Persistently high turbidity levels can cause adverse impacts to sight-dependent species because the reduction in clarity can hinder the feeding ability of these species, and thereby limit their growth and increase their susceptibility to disease. The dredging and placement of material is expected to cause minor, temporary, and localized increases of suspended solids and turbidity, but, as mentioned previously, the effects are anticipated to be low relative to the increased levels of suspended solids and turbidity that typically result from storm events and adverse weather conditions. Although there may be minor, temporary, and localized impacts, the project is not expected to have any persistent, long-term, and adverse effects on sight feeders.

(4) Actions Taken to Minimize Impacts

The proposed actions that will be taken to minimize the adverse impacts are the same actions discussed earlier. Although there may be minor and temporary adverse impacts within the local work

area, these actions should minimize any broader effects outside the immediate vicinity of the work area.

D. Contaminant Determinations

The most recent Contaminant Determination for Burns Harbor was completed in 2020. The sediment was evaluated for hydraulic or mechanical dredging. It concluded that the sediment within the Approach Channel and Maintenance Area is suitable for unrestricted use, including placement upland for beach nourishment or within the littoral zone. See Attachment 3 to the Environmental Assessment.

E. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton

Plankton are pelagic, which means they live within the water column itself, as opposed to benthic organisms that live along the bottom (Water Encyclopedia 2016). Plankton generally drift along with the water currents and/or float on or near the water surface, as opposed to nekton, which are active swimmers that can propel themselves through water currents. Plankton are typically divided into phytoplankton, which includes photosynthesizing species like algae that derive energy from sunlight, water, and carbon dioxide, and zooplankton, which consume food in order to derive energy. Although most planktonic species are small and often microscopic, there are large plankton organisms that are still considered to be plankton because they drift with the water current.

Researchers have found that Lake Michigan has experienced substantial and complex changes to the food-web structure since the 1980s (Vanderploeg et al. 2012, Makarewicz et al. 1998, and Scavia et al. 1988). The paper by Vanderploeg et al. (2012) lists the following changes: (1) a decrease in phosphorus loading, (2) increased control of planktivorous alewife (*Alosa pseudoharengus*) by the introduction of Pacific salmon, (3) the invasion of the visual-feeding spined predatory cladoceran *Bythotrephes longimanus* in the mid-1980s from northern Europe, (4) invasion by a host of Ponto-Caspian species, including zebra (*Dreissena polymorphia*) and quagga mussels (*Dreissena rostiformis bugensis*) during the 1990s, and (5) loss of the spring phytoplankton bloom in 2007 and 2008 likely caused by intense filtering during winter and spring by quagga mussels following their massive population expansion into deep water starting in 2004.

The many changes, invasive or non-native species, and complex interactions that have occurred in Lake Michigan makes it difficult to assess and/or quantify the effects on different species and the food-web (Vanderploeg et al. 2012). The proposed dredging and placement project will cause some minor, temporary, and localized impacts to some phytoplankton and zooplankton. There are approximately 50+ species of plankton present in the Great Lakes with an estimated average biomass of several milligrams per cubic meter (Vanderploeg et al 2012; INHS 2019; NOAA 1993). Due to the nature of these organisms and large scale of Lake Michigan in comparison to the project site, the impacted populations of plankton in the vicinity should recover quickly, and no considerable long-term effects on plankton communities are anticipated.

(2) Effects on Benthos

Benthos refers to the organisms (plants and animals) that inhabit the bottom of a sea, stream or lake. For the current project, the benthos includes organisms that live on, in, or near the bottom of Lake Michigan. The removal of the dredged sediment material, as well as the placement of the material in open water near shore areas will cause some minor destruction and temporary adverse effects on the

existing benthos in the local work area. However, benthic communities that are established near the shoreline are generally tolerant and adapted to dynamic, high wave and energy environments. As such, the disturbed areas are likely to be recolonized quickly be the same species, and no long term effects or modifications to species diversity or dynamics is anticipated.

(3) Effects on Nekton

Nekton refers to the aquatic life (organisms) that can swim freely and are generally independent of the water currents (Water Encyclopedia 2016). The work activities are expected to cause minor auditory disturbances to nekton in the vicinity of the work area, and some aquatic organisms that are slow or unable to move away quickly enough could be injured or killed during the removal of dredged material or when the material is placed back into the water along or on the shore. However, compared to the tremendous size of Lake Michigan and its extensive shoreline, the work area is small. There might be some minor, temporary, and localized adverse impacts, but the proposed dredging and placement project is not anticipated to degrade or have any permanent or noticeable effects on the nekton or nekton habitat in Lake Michigan.

(4) Effects on Aquatic Food Web

When discussing the effects on plankton, it was previously noted that Lake Michigan experienced substantial and complex changes to the food web since the 1980s (Vanderploeg et al. 2012, Makarewicz et al. 1998, and Scavia et al. 1988). Although it is likely that proposed dredging and placement of material might cause effects on some food web organisms in the vicinity, particularly sedentary organisms along the bottom, the project sites are small compared to the extremely large size of Lake Michigan, and the food web organisms near the shoreline should be tolerant and adapted to dynamic, high wave and energy environments. The food web organisms should repopulate and become reestablished shortly after the project is completed, so any adverse impacts to the aquatic food web are expected to be minor, temporary, and localized. The dredging within the Burns Harbor project area and near or on shore placement activities are not expected to have any permanent or considerable long-term effects on the food web structure.

(5) Effects on Special Aquatic Sites

a) *Sanctuaries and Refuges*
There are no sanctuaries or refuges in the vicinity, so this topic is not applicable.

b) *Wetlands*
Brinson (1993) defines wetlands as the following:

> "Those areas that are inundated or saturated at a frequency to support, and which normally do support, plants adapted to saturated and/or inundated conditions. They normally include swamps, bogs, marshes, and peatlands."

The project site is in open freshwater lake habitat and highly trafficked public, municipal beaches. Since there are no identifiable wetland plants in the vicinity of the sites, this topic does not seem to be applicable.

c) *Mud Flats*
There are no mud flats in the vicinity of the site, so this topic is not applicable.

d) *Vegetated Shallows*
No vegetated shallows are in the vicinity of the site, so this topic is not applicable.

e) *Coral Reefs*
There are no coral reefs in freshwater environments, so this topic is not applicable.

f) *Riffle and Pool Complexes*
There are no riffle and pool complexes in the vicinity of the site, so this topic is not applicable.

(6) Threatened and Endangered Species

Federally-listed Threatened, Endangered, Proposed and Candidate Species were reviewed for the project area by the Chicago District. The following federally listed species and their critical habitats are identified by the USFWS as occurring within Porter County:

- Piping Plover (*Charadrius melodus*) – Endangered – Wide, open, sandy beaches with very little grass or other vegetation

- Sheepnose (*Plethobasus cyphyus*) – Endangered – Larger rivers and streams, usually in shallow areas with moderate to swift currents that flow over coarse sand and gravel.

- American Burying Beetle (*Nicrophorus americanus*) – Endnagered – Thought to be a habitat generalist with a preference for grasslands and open understory oak hickory forests. Additionally, they are carrion specialists that need at least dove or chipmunk sized carrion in order to reproduce. Likely extirpated.

- Spotted Turtle (*Clemmys guttata*) – Candidate – Marshy meadows, bogs, swamps, ponds, ditches, or other small water bodies.

- Blanding's Turtle (*Emydoidea blandingii*) – Candidate – Wetland habitats favoring shallow, clear, standing water with plentiful aquatic vegetation. Requires upland habitat of open sandy areas covered in shrubs and grasses for nesting.

- Eastern Massasauga (*Sistrurus catenatus*) – Threatened – Graminoid dominated plant communities (fens, sedge meadows, peat lands, wet prairies, open woodlands, and shrublands)

- Little Brown Bat (*Myotis lucifugus*) – Candidate – Roosts for active bats include buildings, trees, under rocks, and piles of wood near water. Hibernates in mines or caves.

- Indiana Bat (*Myotis sodalist*) – Endangered – Hibernates within caves or mines. Summer habitat includes wooded areas and they can be found under loose tree bark on dead and dying trees.

- Frosted Elfin (*Callophrys irus*) – Candidate – Open woods and forest edges. Also can be found in fields and scrubland.

- Golden-winged Warbler (*Vermivora chrysoptera*) Candidate – Breeds in deciduous woodland, in dry uplands or areas of think undergrowth in swampy areas. Can also be found on low cover woodland edges, hillside scrubland, overgrown pastures, or areas of patchy scrubs, sparse tree cover, or woody perimeters.

- Pitcher's Thistle (*Cirsium pitcheri*) – Threatened – Lakeshore dunes.

- Hall's Bulrush (*Schoenoplectus hallii*) – Candidate – Moist sands or sandy-peaty substrate along shore of shallow seepage lakes, ponds, and similar ephemeral wetlands.

- Karner Blue Butterfly (*Lycaeides Melissa samuelis*) – Endangered – Pine barrens and oak savannas on sandy soils and containing wild lupines (*Lupinus perennis*), the only known food plant of the larvae. Likely extirpated.

- Northern Long Eared Bat (*Myotis septentrionalis*) – Threatened – Hibernates in caves and mines – swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.

In a letter dated January 24, 2020 from the USFWS, the project was identified as being within the range of the following species: Indiana Bat, piping plover, Karner blue butterfly, northern long-eared bat, eastern massasauga rattlesnake, and Pitcher's thistle. Portions of the beach in Porter County, specifically those in Indiana Dunes National Park east of the dredge area, have been designated as critical habitat for the Piping Plover by the U.S. Fish and Wildlife Service (50 CFR Part 17). While no breeding pairs have been observed on the beach since the 1950's, migrant plovers occasionally are sighted during their spring and fall migrations. It was determined by USFWS that this species is unlikely to be impacted by the dredge activities as the dredge area is far enough away from the adjacent beach as to not likely impact shoreline activities of birds. Additionally, it was previously determined that the area most suitable for Piping Plover activities is approximately 2 miles east of the dredge area (NPS 2014) further decreasing the chance for dredge activities to impact the birds. The Pitcher's thistle is known to have a population on the dunes landward of the Portage Lakefront Park beach. Due to extensive beach erosion, the area where this plant has been known to occur has been severely impacted. Placement of sand on the beach will likely provide a buffer zone against wave action and will slow erosion of the dune area upland of the beach. However, prior to placement, the adjacent beach area with be surveyed to determine if and where any populations of the Pitcher's thistle exist. Any encountered populations will be marked so as to be avoided during placement operations.

(7) Actions Taken to Minimize Impacts

The proposed actions that will be taken to minimize the adverse impacts to the aquatic ecosystem and organisms are the same actions discussed earlier. There is the potential to include a pre-placement survey of the potential placement area(s) to ensure that any threatened or endangered species are not impacted, and to adjust the dredging/placement schedule to avoid critical life cycle stages if needed. Although there may be minor and temporary adverse impacts to the aquatic ecosystem and organisms within the local work area, these actions should minimize any broader effects on the aquatic ecosystem and organisms outside the immediate vicinity of the work area.

F. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

A mixing zone determination was not completed as part of the evaluation of Approach Channel and Maintenance Area material. Comparison of the Approach Channel and Maintenance Area elutriate result to the State of Indiana Lake Michigan water quality standards suggests that no parameters exceeded the standards, therefore the proposed placement is understood to comply with the applicable water quality standards. Additionally, the dynamic and dispersive nature of Lake Michigan would mitigate any potential negative long-term impacts associated with placement.

(2) Determination of Compliance with Applicable Water Quality Standards

None of the proposed materials are expected to be a source of toxic or persistent contamination, and the materials are not anticipated to cause any considerable long-term effects on, or changes to, the water chemistry or quality. Minor, short-term, and localized adverse impacts may occur within the immediate work area due to increases in the concentration of suspended solids and turbidity that are associated with the dredging activities. The Approach Channel and Maintenance Area is currently maintained under an existing 401 Water Quality Certification. In general, the activities are expected to comply with the applicable water quality standards and no violations are anticipated.

(3) Potential Effects on Human Use Characteristic

a) *Municipal and Private Water Supply*

A water intake for Indiana American Water is situated 2,000 feet from the shoreline of the placement area (outside of the placement areas). There are also water intakes southeast of the Approach Channel, approximately 500-2,000 feet from the shoreline (outside of the dredging areas). State of Indiana Lake Michigan water quality standards were met without consideration for a mixing zone, so no specific spacing is recommended. However, the owner of the nearest intakes will be notified prior to the start of dredging each year.

b) *Recreational and Commercial Fisheries*

The dredging and placement activities that occur during the project will not have any effects on the operations of commercial fisheries because there are no commercial fisheries in the near shore vicinity of Burns Harbor or the anticipated beaches. There may be very minor, temporary, and localized disruptions for recreational fishing in the immediate vicinity of the project due to the implementation of restrictions around the site to ensure public safety and secure the construction site and equipment.

c) *Water Related Recreation*

It is likely that access to Burns Harbor will be impacted during dredging operations as well as beach access. These restrictions could potentially result in some minor, temporary, and localized inconveniences related to harbor accessibility for commercial or recreational boat users in the immediate vicinity of the project either entering/existing the harbor or in open water areas of the lake. However, the dredging operations are expected to be completed within a reasonably short duration, and the working area around the work barge(s) is expected to be small in relation to the harbor entrance channel and the near shore area of the lake. Additionally, there will likely be an impact to terrestrial access to beaches during placement of dredged material. These restrictions will also potentially result in some minor, temporary, and localized inconveniences at beaches to beach-goers, but should be short in duration.

d) *Aesthetics*

The proposed dredging operations will maintain the navigable channel depth and reduce sediment levels in the area of Burns Harbor. Dredging of the maintenance area will decrease the deposition of sediment in the navigable channel, decreasing the need for frequent extensive dredging operations within the channel itself. Placement of the dredged material on beaches or in near shore open water areas will provide needed nourishment to beaches that are experiencing erosion from the natural process of littoral drift.

During operations, it is likely that the aesthetics of the local area will occasionally be affected by the additional noise and operations of the vessels and heavy equipment while dredging is conducted. This may include the visual presence of barges, vessels, backhoes, and other construction equipment in the water or on the beach. Since the placement areas are at or near to public beaches, the activities may adversely impact the noise and visual aesthetics for these recreational areas. The active dredging and placement of sediment will likely cause short-term and temporary increases in the suspended solids and turbidity of the immediate area. These increases could reduce the aesthetic quality of the water by causing minor and temporary impacts to the clarity or color of the water in the local area. In general, the aesthetic effects are expected to be minor and temporary and should only impact those people and organisms in the immediate vicinity.

e) *Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves*

The Indiana Dunes National Park (IDNP) flanks Burns Waterway Harbor and the City of Ogden Dunes. The park as a whole received over 131,000 visitors in 2019, a record for the park. The placement site of Portage Beach is located approximately two to three miles west of the harbor and is part of the Portage Lakefront and Riverwalk of the IDNP. The beach is open to the public and the larger park offers walking trails, a fishing pier, a restored 900 foot breakwater, and a 3,500 square foot public pavilion. All of the sand placement sites and zones are classified as Lacustrine (lake) system wetland type, with an additional wetland type, barrier enclosed system, existing within the IDNP (includes Portage Lakefront and Riverwalk). The Park itself is home to some 1,300 plant species, 11 of which are found nowhere else in the larger Chicago Area. Portage Beach has been subject to drastic erosion due to higher than average lake levels and as such the dunes behind the beach have begun to erode, impacting the plant communities in the area. Placement activities will not negatively impact the dunes.

At the placement site there is a shipwreck located adjacent to the beach. The wreck is a wooden schooner, discovered in the 1970s and is buried under several feet of sand offshore. No work will occur within 100 feet of the shipwreck. In the general vicinity of the project there are three buildings that were identified in a letter from IDNR Division of Historic Preservation and Archaeology dated January 27, 2020 as having historical significance. These three houses are located at 86 Shore Drive (IHSSI Site #127-704-11003), 114 Shore Drive (IHSSI Site #127-704-11004), and Shore Drive (located three houses east of Cedar Trail; north side of Shore Drive, IHSSI Site #127-704-11001). These buildings and structures will not be subject to alterations and will not be impacted by the project.

The project is not anticipated to cause any permanent or long-term effects to the parks or lakefront, but as discussed above, there could be minor and temporary effects on the aesthetics of the local area.

G. Determination of Cumulative Effects on the Aquatic Ecosystem

The Section 404(b)(1) Guidelines indicate that cumulative effects are the effects attributable to the collective effect of numerous individual dredged or fill material placement events. Although the impact from one particular, individual dredged or fill material placement event may only cause a minor effect on the aquatic ecosystem, numerous individual dredged or fill material placement events could cause a more substantial effect on the aquatic ecosystem.

The Burns Harbor Maintenance Dredging and Placement Project is a continuous maintenance project. These operations have historically occurred every year or two depending on sedimentation rates. If sedimentation was allowed to continually occur in the maintenance area and approach channel the

natural littoral drift of sand along the coast will deposit material in the area. This deposition at the harbor will limit the amount that is deposited further east along the coast, effectively eliminating the replenishment process and increasing the near shore erosion rate at several beaches. Placement of sand from the harbor to areas to the east will return sand to the system and continue its movement along the coast, effectively maintaining the process of littoral drift and reducing the impact of erosion on those beaches.

There will likely be impacts to the aquatic community in the immediate area around dredging operations and around placement area(s). However, these disturbances are expected to be small, localized, and temporary. Given this and the overall size of the near shore area of Lake Michigan the aquatic ecosystem should quickly recover from the minor effects, and no long-term permanent, or cumulative effects are anticipated.

H. Determination of Secondary Effects on the Aquatic Ecosystem

According to the Section 404(b)(1) Guidelines, secondary effects are the effects associated with the placement of dredged or fill material, but they are not a direct result from the placement of dredged or fill material. For example, secondary effects may include the effects from activities to be conducted on fast land that was created by the placement of dredged or fill material.

Onshore placement of material may increase the beach width. The additional beach potentially created would be similar to the currently existing beach. Activities on the increased beach are not expected to cause any secondary effects on the aquatic ecosystem.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

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

No adaptation of the Section 404(b)(1) guidelines was made for this evaluation.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem

The “no action” alternative would be to cease dredging operations in and around Burns Harbor. This alternative is unacceptable since the Federal Government has determined that there is an economic benefit to the navigational maintenance activities and Congress has authorized and funded the actions. The “no deviation” alternative would be to continue to dredge the Approach Channel and Maintenance Area and place at the existing near shore placement site only. This measure is also unacceptable because there would be no sand made available for potential beach nourishment at the additional areas. Dredging of the harbor allows commercial and recreational navigation to continue and the additional beach placement areas allow for sustaining additional beaches and beneficially using the clean sediment.

C. Compliance with Applicable State Water Quality Standards

Comparison of the Approach Channel and Maintenance Area elutriate results to the State of Indiana Lake Michigan water quality standards suggests that no water quality standards were exceeded. Additionally, the dynamic and dispersive nature of Lake Michigan would mitigate any potential negative long-term impacts associated with placement. Only short-term and localized increases are likely to occur during placement.

D. Compliance with Clean Water, Endangered Species, National Historic Preservation and Marine Sanctuaries Acts

The project is expected to be in compliance with applicable Toxic Effluent Standards under Section 307 of the Clean Water Act; with the Endangered Species Act of 1973; with the National Historic Preservation Act of 1966; and with the Marine Protection, Research, and Sanctuaries Act of 1972 (not applicable because the proposed project is in Lake Michigan, and the Great Lakes are fresh water lakes that are not included in the Act).

E. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects

The proposed fill activity is not expected to have any significant, long-term adverse impacts on recreational, aesthetic, and economic values; or on human health or welfare including municipal and private water supplies, recreational and commercial fisheries, plankton, fish, shellfish, wildlife communities (including community diversity, productivity, and stability), or special aquatic sites.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems

It was indicated previously that the work activities may cause minor auditory disturbances to nekton in the vicinity of the work area, and some aquatic organisms that are slow or unable to move away quickly enough could be injured or killed during sediment removal or when the material is placed back into the water. However, these impacts are not considered to be significant because, compared to the tremendous size of Lake Michigan, the work area is small. There might be some minor, temporary, and localized adverse impacts, but the proposed Project is not anticipated to degrade or have any permanent or noticeable effects on the nekton or nekton habitat in Lake Michigan.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability

Lake Michigan is enormous in comparison to the size of the project site, and no long-term adverse effects are expected on aquatic ecosystem diversity, productivity, or stability. Furthermore, it should be noted that the elevated levels of suspended solids would be expected to settle or dissipate within a relatively short time period, and the minor and temporary increases of suspended solids concentrations produced by dredging operations, as well as the placement operations, are expected to be considerably lower than the increased turbidity that would typically result from adverse weather conditions that produce high waves and strong currents.

F. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

In order to prevent adverse aquatic ecosystem impacts during placement, material to be placed in open water is transported via bottom dump scow, sealed scow, or pipeline. Once a bottom dump scow is in place, the bottom doors open and material is dropped directly down, minimizing resuspension. Alternatively, material could be placed in water or on shore in discrete aliquots using a crane and bucket. Material to be placed onshore is hydraulically pumped as a slurry into a temporary settling basin, which allows the solids to settle out and clear water to return to the lake, or could be pumped directly into the shallow water along the shore to build up the eroded coast.

G. On the Basis of the Guidelines, the Proposed Placement Sites for the Discharge of Fill Material is:

Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize adverse effects on the aquatic ecosystem.

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V. Figures

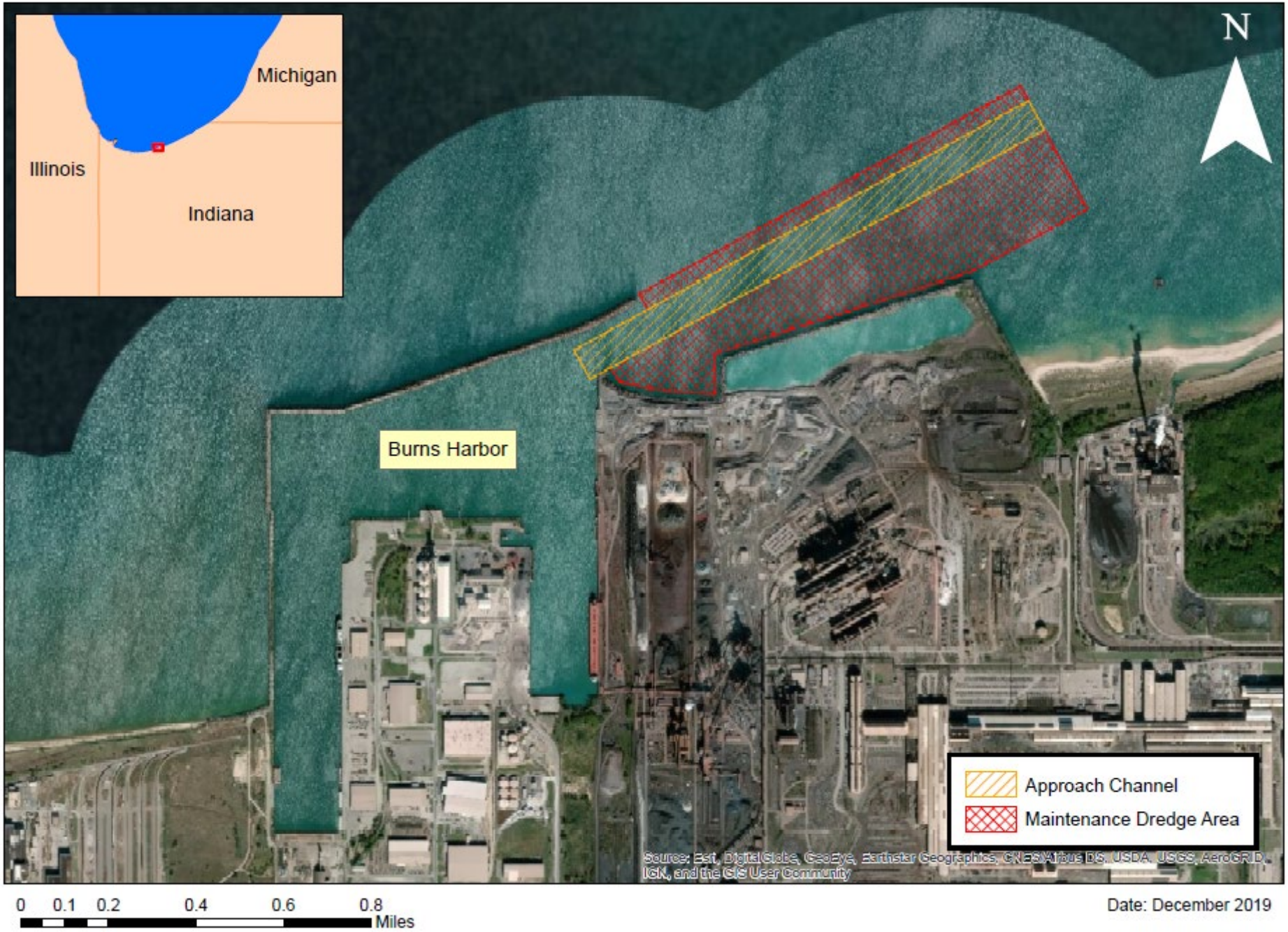

Figure 1: Burns Waterway Harbor dredging limits

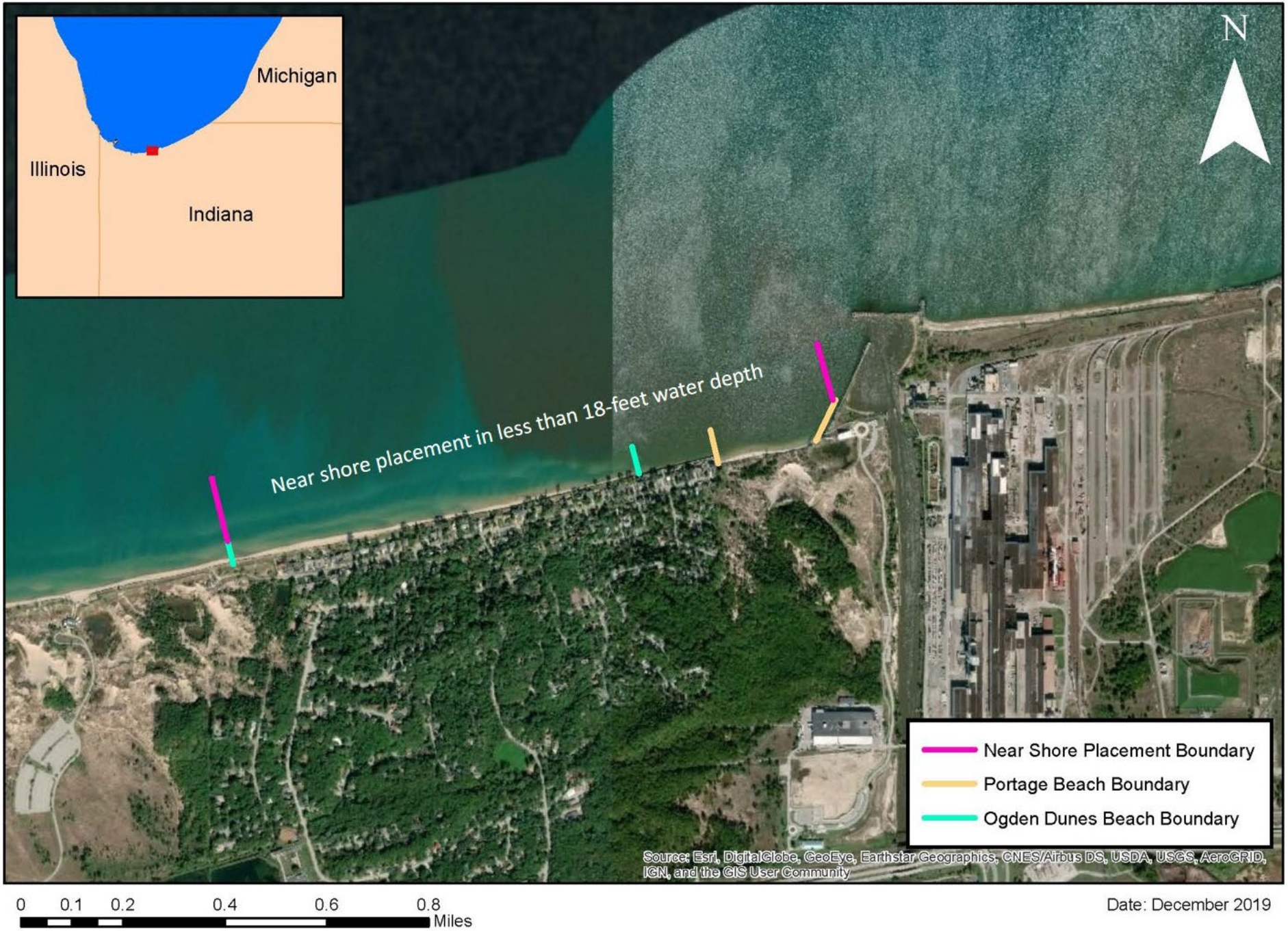

Figure 2: Burns Waterway Harbor dredge material placement area.