Burns Waterway Harbor
Maintenance Dredging and Placement

Indiana

Environmental Assessment

U.S. Army Corps of Engineers
Chicago District

May 2020

Page intentionally left blank
for double-sided printing

BURNS WATERWAY HARBOR
MAINTENANCE DREDGING AND PLACEMENT
PORTAGE, INDIANA

ENVIRONMENTAL ASSESSMENT

May 2020

TABLE OF CONTENTS

List of Figures

List of Tables

Attachment 01 –FONSI
Attachment 02 – 404(b)(1) Anti-Degradation Analysis
Attachment 03 – Contaminant Determination
Attachment 04 – Coordination
Attachment 05 – Public and Agency Comments

Chapter 1 – Purpose & Need

1.1 – National Environmental Policy Act and Related Procedures

The National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.), the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Parts 1500 to 1508), and the US Army Corps of Engineers' (USACE) NEPA implementing regulations (33 CFR Part 230) require that the USACE consider the potential environmental effects of a proposed action before making a decision on the proposed action. This Environmental Assessment (EA) includes the direct, indirect, and cumulative effects of dredging clean sand from the Burns Waterway Harbor Approach Channel and Maintenance Dredge areas along with placing the dredged material in a near shore open water area, or at on shore beach sites. This EA provides the USACE, other decision makers, and the public with the information needed to make an informed decision about the dredging and placement activities.

1.2 – Project Locations

Burns Waterway Harbor, also known as the Port of Indiana or "Big Burns" (to differentiate from Burns Waterway Small Boat 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 the Indiana-Michigan state borders. The harbor supports commercial navigation; while the smaller Burns Waterway Small Boat Harbor, located west of Burns Waterway Harbor is used as a recreational boat harbor.

1.2.1 Dredging

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. The existing Federal navigation project at Burn Waterway Harbor was authorized by the River and Harbor Act of 1965 and by a subsequent amendment in 1970. The approach channel has an authorized depth of -30 feet Low Water Datum (LWD), an authorized depth of -28 feet LWD in the outer harbor, and an authorized depth of -27 feet LWD in the harbor arms. The Dredging Maintenance Area is dredged to form a settling basin where littoral sand can be deposited rather than settle in the federal channel which will reduce the frequency of dredging the federal channel.

1.2.2 Placement Locations

The locations for the placement of the dredged sand are as follows (Figure 2):

Near Shore Area – An in-lake near shore (18feet depth or less) littoral placement area approximately two to three miles west of the Burns Waterway Harbor.

Portage Beach – An on-beach placement site located adjacent to the near shore placement area just over two miles to the west of the harbor. This placement area includes the shallow water shoreline of the beach.

Ogden Dunes Beach – A second on beach placement site that is located adjacent to the near shore placement area, just under three miles to the west of the harbor. This placement area includes the shallow water shoreline of the beach.

The default location for placement of dredged material from the Approach Channel and Dredging Maintenance Area is the littoral zone adjacent to Ogden and Portage beaches. The placement area for the Outer Harbor and Arms has typically been a deep water area approximately one mile north of Burns Waterway Small Boat Harbor.

Figure 1: Burns Waterway Harbor dredging area.

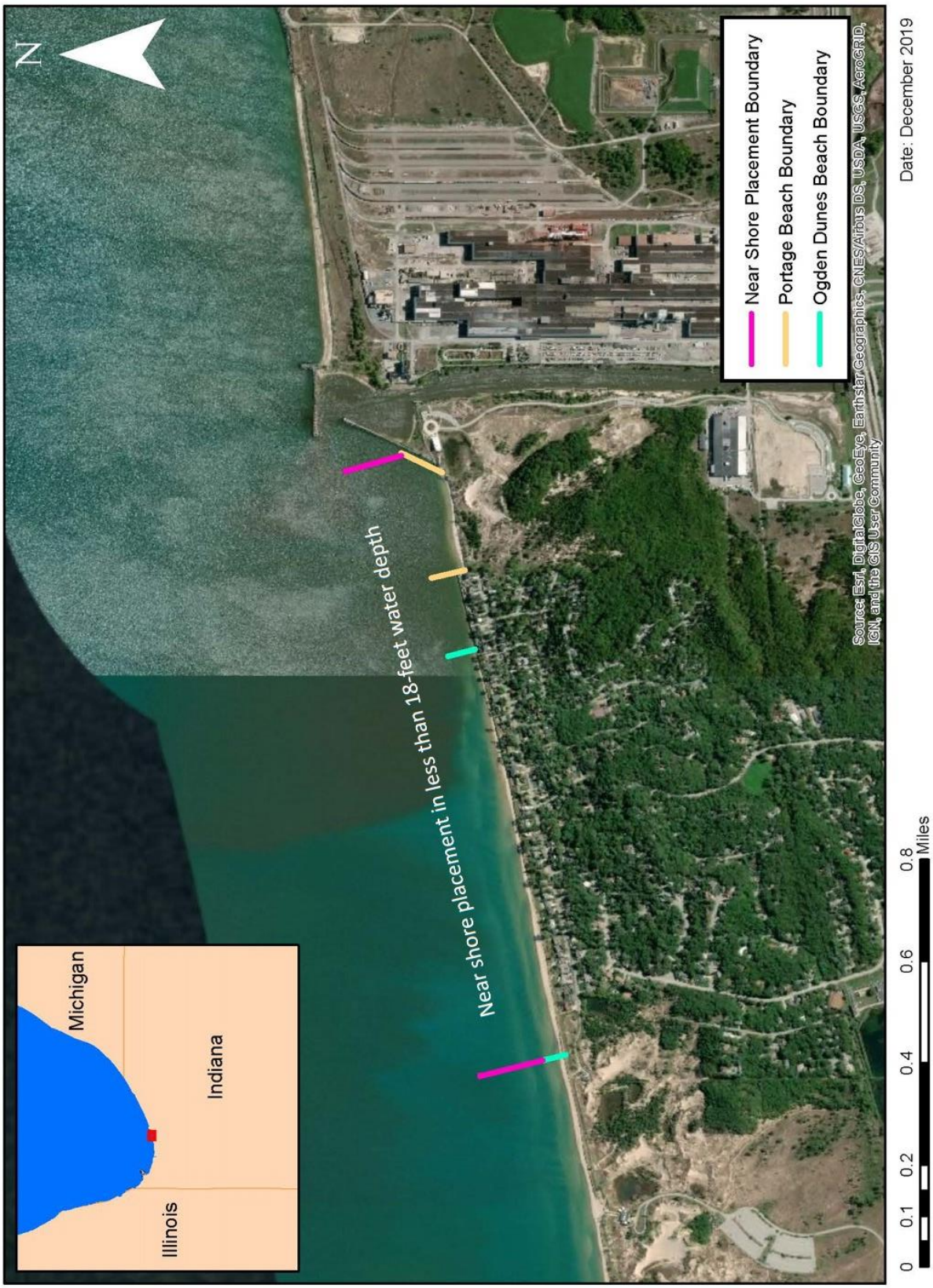

Figure 2: Potential placement areas for dredged material.

1.3 – Purpose & Need

The primary purpose of this federal action is to support the economic viability of the Burns Waterway Harbor.

The first need is to continue to dredge the harbor as needed to support commercial shipping. USACE regularly performs routine maintenance dredging within the Approach Channel and Dredging Maintenance Area in order to maintain appropriate depths for deep draft vessels entering and exiting the harbor. The failure to continue maintenance dredging within the Harbor would result in light loading the vessels and therefore increased transportation costs, which would result in an adverse economic impact to commercial operations.

The second need of this potential federal action is to better manage and protect Indiana's public shoreline through the beneficial use of dredge material suitable for beach nourishment. Due to the current high water levels of Lake Michigan, many beaches are eroding at an accelerated rate, threatening beach habitat and local infrastructure. By placing sand on/near the beach(es), a buffer zone is created that may help mitigate potential damage to the shoreline caused by wave action. The proposed project includes the dredging and placement of sand at near-shore or onshore locations.

The physical activity and environmental impacts of dredging and clean sand placement at some sites have already been assessed in previous NEPA documents and are incorporated by reference into this EA (see Section 1.4). They will not be reassessed in this EA. This EA will focus on placement of the dredged sand at the proposed near shore sites and on shore beach sites.

1.4 – Related NEPA Documentation and Studies

- USACE, Chicago. 1975. Environmental assessment for Department of the Army Burns Harbor, Indiana Maintenance Dredging.

- USACE, Chicago. 2000. Environmental assessment for Burns Waterway Harbor north breakwater maintenance Porter County, Indiana

- USACE, Chicago. 2000. Environmental assessment Burns Small Boat Harbor, Indiana dredging and disposal activities.

- USACE, Chicago. 2000. Supplemental environmental assessment for Burns Small Boat Harbor dredging maintenance unit 4B Porter County, Indiana.

- USACE, Chicago. 2001. Clean Water Act Section 404(b)(1) Contaminant Determination for Burns Waterway Harbor Dredging.

- USACE, Chicago. 2002. Environmental assessment for ongoing repairs of north and west breakwaters at Burns Harbor, Porter County, Indiana.

- USACE, Chicago. 2003. Environmental assessment Porter County, Indiana City of Portage. Burns Waterway Harbor maintenance dredging and erosion control mat placement.

- USACE, Chicago. 2005. Environmental assessment for maintenance dredging and disposal at Bailly Generation Station near Burns Harbor, Porter County, Indiana.

- USACE, Chicago. 2006. Finding of no significant impact. Maintenance dredging and disposal at NIPSCO Bailly Generation Station near Burns Harbor, Porter County, Indiana.

- USACE, Chicago. 2014. Clean Water Act Section 404(b)(1) Contaminant Determination for Burns Waterway Harbor Dredging.

- U.S. Department of the Interior, National Park Service (NPS). 2014. Shoreline restoration and management plan/Final environmental impact statement. Indiana Dunes National Lakeshore, Porter, Indiana.

- USACE, Chicago. 2020. Clean Water Act Section 404(b)(1) Contaminant Determination for Burns Waterway Harbor Dredging.

1.5 – Dredging History

USACE has been performing maintenance dredging at Burns Waterway Harbor since 1976 with recent dredging operations typically occurring every year or two. Depending on the year, there have been between 55,000 and 185,000 cyd of material dredged from the harbor (includes approach channel, maintenance area, outer harbor, and harbor arms) and the material's source would dictate the preferred placement location(s).

The Ogden Dunes littoral placement site was used as the placement site for material dredged from Burns Waterway Harbor in 1994, 2013, 2014, 2015, 2016, 2017, 2018, and 2019; Burns Small Boat Harbor in 2000, 2009, and 2013; and the Northern Indiana Public Service Company (NIPSCO) intake in 2006, 2007, 2008, and 2009. A deep lake disposal site approximately one mile north of Burns Small Boat Harbor was used as the placement location of material removed from the arms inside Burns Waterway Harbor in 2007, 2008, and 2014.

1.6 – Maintenance Dredging Approach Channel

The approach channel consists of an area adjacent to the Outer Harbor that extends beyond the existing breakwaters, parallel to the shore. The Approach Channel is 400 feet wide at the mouth of the harbor. The approach channel has an authorized depth of -30 feet LWD. The approach channel requires a deeper depth than the Outer Harbor because it is less protected from wave action and therefore subjected to greater oscillations in water levels. The deeper depth provides vessels some factor of safety against grounding. Additionally, the Burns Waterway Harbor is designated by the U.S. Coast Guard as a Harbor of Refuge. Maintaining deeper depths is critical for providing safe refuge for commercial vessels.

Significant shoaling has been encountered since 2011 and as a result, dredging has continued every year since then. Up until then, USACE maintained the harbor through dredging on an as needed basis, only dredging periodically as conditions required. Sediment sampling has occurred over the years as needed. The most recent sediment sampling was conducted in 2019 to determine the environmental acceptability of the dredged material placement in compliance with 33 C.F.R. 335.7, the Clean Water Act 404(b)(1), and the Indiana Coastal Management Plan, to the maximum extent practicable. The Approach Channel and Maintenance Area sediment is considered suitable for unrestricted use.

This EA analyzes the proposal that sediment dredged from the Approach Channel and Dredging Maintenance Area would be placed in a near shore littoral zone west of the harbor, or placed on the beach at one of the identified locations, also west of the harbor. These placement alternatives would meet the dual intent of clearing the navigational channel and beneficially using the sediment within the near shore

zone to prevent further coastal degradation. The Chicago District has determined this project to be consistent with the Indiana Coastal Management Program and with current practice. A concurrence of Federal Consistency is being sought from the Indiana Department of Environmental Management (IDEM). Additionally, the Chicago District will seek Section 401 Water Quality Certification from IDEM.

Chapter 2 – Proposed Alternatives

2.1 – No Action

Under the no action alternative, USACE would cease dredging operations in and around Burns Waterway Harbor. The no action alternative would not adversely impact cultural and archaeological resources and would not impact upland structures. Physical, biological, and social resources could be impacted in that if dredging were stopped the Approach Channel would continue to accumulate sand, potentially reducing employment, business and industrial activity in the area by limiting the shipping and transportation capabilities of the harbor. Without placement of materials, the beach would continue to erode landward impacting dune and swale environment that would be typically be protected by the beach. Ultimately, threatening habitat types that several species rely on at various life history stages. The impacts of this option are detailed in previous Environmental Assessments (EA) and Environmental Impact Statements (EIS) conducted for the project area in 1975, 2000, 2002, 2003, and 2005.

2.2 – No Deviation from Historical Activities

Under the No Deviation Alternative, USACE would dredge clean littoral sands from the Burns Waterway Harbor Approach Channel and Dredging Maintenance Area and would continue to place them in the near shore littoral area adjacent to Ogden and Portage beaches. Consistent with the Indiana Coastal Management Plan and with current practice, it is proposed that any sediment dredged from the Approach Channel is placed near shore in the littoral zone. This would allow commercial navigation to continue.

Near shore placement would involve the discharge of dredged material directly into Lake Michigan, into water depths less than 18-feet. Discharged dredged material settles through the water column and deposits on the bottom of the lake site. The dredged material may remain in a mound at the placement site or disperse depending on the material's physical properties and the hydrodynamics of the site. Open water placement is used for approximately 32% of Great Lakes dredged material. Generally, sand moves out of the open water placement sites in the Great Lakes consistent with the littoral and wave patterns along the shoreline.

2.3 –Beach and Shallow Water Placement Alternatives

Beach/littoral nourishment involves the placement of dredged material directly onto a beach under the ordinary high water mark or into the shallow water (< five feet water depth) near the shore by hydraulic pumping. Suitable dredged material is typically sand or fine sand, and may only stay on the beach for a limited time before being entrained into the littoral drift. Approximately 12% of Great Lakes dredged material is used for beach and littoral nourishment.

2.3.1 – Portage Beach and Ogden Dunes Beach

Ogden Beach is a beach managed by the town of Ogden Dunes and Portage Beach is a beach maintained by the Indiana Dunes National Park. They are approximately 2 miles to 3 miles west of the harbor. Both have been subject to significant erosion due to higher than average lake levels. This alternative would

include placing clean littoral sands along the length of the beaches, maximizing sustainability of these resources.

2.3.2 – Near Shore Placement

The near shore placement area is located adjacent to the two onshore beach locations in areas of water depth of less than 18 feet. Sand placed here would continue to move through the water column through drift action and would likely settle onto beaches further west of the placement area over time.

2.4 – Proposed Plan

The proposed placement plan would include a combination of placement on both beaches and within the littoral, near shore area (<5-feet of water) depending on available placement material and needs of the municipal beaches. If there is insufficient material, funding, or need for material, then the dredged material will be placed only at the near shore placement location adjacent to the beaches.

Maintenance dredging generally begins in the early summer with completion taking approximately 1-3 months.

2.5 – Compliance with Environmental Protection Statues, Executive Orders, and Regulations

As discussed in detail below, the recommended plan is in full compliance with appropriate statutes, executive orders and regulations, including the National Historic Preservation Act of 1966, as amended, Fish and Wildlife Coordination Act, as amended, Endangered Species Act of 1973, as amended, Section 10 of Rivers and Harbors Act of 1899, Clean Air Act of 1963, as amended, National Environmental Policy Act of 1969, as amended, Executive Order 12898 (Environmental Justice), Executive Order 11990 (Protection of Wetlands), Executive Order 11988 (Floodplain Management), and the Clean Water Act of 1972, as amended.

Chapter 3 – Affected Environment

This Chapter identifies those environmental, cultural and social resources that could potentially be affected by the proposed placement of clean dredged sands resulting from maintenance dredging at Burns Waterway Harbor.

3.1 – Physical Resources

3.1.1 – Geology

The study area is located within the Northern Moraine and Lake Region of the Great Lakes Section of the Central Lowland Province physiographic division. The underlying regional bedrock is at a transitional zone between Silurian-age rock, likely dolomite of the Niagaran Series (Willman 1971), and Devonian age rock also likely dolomite (Blatchley 1897). This rock resulted from marine deposition when all of northwestern Indiana and much of the neighboring Great Lakes region was the floor of a tropical sea from about 440 to 360 million years ago.

The area topography is the result of glacial action, sedimentation from post-glacial lake, and present-day effects of Lake Michigan. The most notable formations are the sand beaches and dunes. The soils near Burns Waterway Harbor consist of dune soils, Oakville fine sands, shoals sandy lam variant, Tyner loamy sand, and Warners loam (USACE 1978). Most of the area could be characterized as a dissected plain of glacial till. The region lies in the Northeastern Morainal Division, the region of most recent glaciation in Indiana. Glacial landforms are common features and are responsible for the rough topography over most of the area. Moraines and morainic systems are dominant topographic features and account for the hilly and rolling terrain. Deposits of glacial Lake Chicago formed most of the Chicago lakeplain north of the Valparaiso moraine. The Chicago lakeplain is a flat, poorly drained area of lakebed sediments. Long ridges of shore-deposited sands are noticeable topographic features.

Burns Waterway Harbor is located in the “Dunes area” of Indiana. The dunes area itself is about four miles wide in the western part of Lake County and tapers to about a half mile wide in the western portion of Porter County. The dunes themselves are almost all sand, but were formerly forested.

The Burns Harbor ground water system has a potential yield of 900 million gallons per day. The principal source of groundwater in this area is the unconsolidated rock layers of the Quaternary ager near the surface; the deeper bedrock is only a minor source (USACE 1978). The surrounding area draws its drinking water from Lake Michigan.

3.1.3 – Northwestern Indiana Littoral Drift

Seasonal variations in the dominant wind direction result in variability to the waves and currents experienced along the Lake Michigan shoreline. During the majority of the year, winds blow across the lake from the southeast, resulting in a circulatory pattern moving along the Indiana and Illinois shorelines in a counterclockwise direction. The resultant wave climate along this reach is relatively small. Beginning in late fall and continuing until spring, however, these trends reverse. Northerly winds drive waves towards the southern end of Lake Michigan generating a significantly larger wave climate. The dominant influence by northerly waves results in a net southward littoral drift along the east and west coasts of Lake Michigan. Waves from the south can influence a northward movement of beach and nearshore sediment of sand, gravel and cobble, however; the stronger northerly waves counteract this influence and produce a net southerly transport.

The Illinois, Indiana, and Michigan coasts were formerly a single continuous pathway for the southward transport of littoral sediment. This was part of a large-scale littoral transport cell that originated in Wisconsin near Sheboygan on the western shore and near Grand Haven, Michigan along the eastern shore. Both drift processes terminated in eastern Indiana between Gary and the Indiana Dunes (Chrzastowski et al 1994). Without anthropogenic influences on the coastal erosion processes, and with historical lake levels maintained, in a thousand years the bluff coast of Illinois would erode landward to an equilibrium position (Rovey & Borucki 1994). During this process, rates of erosion would decrease with time. However, the Illinois coast has experienced considerable reduction in the volume of littoral sediment in transport due to anthropogenic modifications. Construction of perpendicular structures such as jetties, piers and small boat harbors formed near-total barriers to littoral transport, fragmenting a continuous littoral cell into a series of cells. Coastal structures, in the vicinity of Chicago have completely isolated the southern Chicago lakeshore from any littoral sediment supply from the north. Likewise, development of coastal structures along the Indiana shoreline have further starved regional beaches of littoral materials.

3.1.3 – Sediment Quality

The most recent sediment sampling covering the study area was conducted in August 2019. A Tier 1 and Tier 2 Contaminant Determination was completed in January 2020 for the entire Burns Waterway Harbor. This evaluation included sediment and elutriate physical and chemical analyses. It found that the sediment within the Approach Channel and Dredging Maintenance Area is suitable for unrestricted use, including placement upland for beach nourishment or within the littoral zone. The sediment within the Outer Harbor and Harbor Arms is suitable for placement in deep lake placement north of the Harbor. Water quality impacts associated with dredged material placement would be short term and localized within the disposal area only; the dynamic and dispersive nature of Lake Michigan in the in-water placement areas would mitigate any potential negative long-term impacts associated with placement of dredged material. The 2020 404(b)(1) and Contaminant Determination analysis are included as attachments to this document (Attachments 2 and 3).

3.1.4 – Water Quality

Lake Michigan is an extremely important resource for drinking water supply, industrial water supply, fishing, recreation, and waterborne commerce. A water intake for Indiana American Water, which provides the drinking water for the region, is situated 2,000 feet from the shoreline of the placement area (outside of the proposed placement areas). There are also water intakes southeast of the approach channel, approximately 500-2000 feet from the shoreline (outside of the proposed dredging area). Factors potentially affecting water quality in the near shore lake zone include combined sewer overflows, tributary streams, and boat harbors.

Water quality of Lake Michigan in the vicinity of Portage, Indiana is regularly monitored by the Indiana Department of Environmental Management (IDEM). Every two years, Section 303(d) of the Clean Water Act requires states to publish a list of all waters that are not meeting water quality standards. The Lake Michigan Shoreline is listed on Indiana's 2018 impaired waters (IDEM 2018). Many beaches along the shoreline are considered impaired due to fish consumption restrictions caused by high levels of mercury and polychlorinated biphenyls. These anthropogenic pollutants are related to historical industrial activities and fossil fuel burning.

3.1.5 – Air Quality

The Federal Clean Air Act requires the U.S. Environmental Protection Agency (USEPA) to set national ambient air quality standards (NAAQS) for six criteria pollutants (carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur oxides) which are considered harmful to public health and the environment. Areas not meeting the NAAQS for one or more of the criteria pollutants are designated as "nonattainment" areas by the USEPA. The proposed project is in Porter County, Indiana. The local air quality in Porter County is considered 'non-attainment' under the Clean Air Act for 8-hour ozone (USEPA 2019). The county is currently in maintenance status for 8-hour Ozone and PM-2.5, however both standards were revoked in 1997 (USEPA 2019). See Table 1for additional details.

Once implemented, the project itself will be neutral in terms of air quality, with no features that either emit or sequester air pollutants to a large degree, including Green House Gas emissions. During the project construction, heavy equipment would cause minor, temporary air quality impacts, however all equipment will be in compliance with current air quality control requirements for diesel exhaust, fuels, and similar requirements. A general conformity analysis was not conducted due to the short and temporary nature of any air quality impacts.

Table 1: Porter County, Indiana status for NAAQS four criteria pollutants.

NAAQS	Area Name	Most Recent Year of Nonattainment	Current Status	Classification
1-Hour Ozone (1979) – NAAQS revoked	Chicago-Gary-Lake County, IL-IN	2004	-	Severe
8-Hour Ozone (1997) – NAAQS revoked	Chicago-Gary-Lake County, IL-IN	2009	Maintenance (since 2010)	Moderate
8-Hour Ozone (2008)	Chicago-Naperville, IL-IN-WI	2020	-	Serious
PM-2.5 (1997) – NAAQS revoked	Chicago-Gary-Lake County, IL-IN	2011	Maintenance (since 2010)	-

3.1.6 – Hazardous, Toxic & Radioactive Wastes (HTRW)

Burns Waterway Harbor Approach Channel and Maintenance Area have been dredged nearly every year since significant shoaling was encountered in 2011. Up until then, USACE maintained the harbor through dredging as needed. The sediment in the Approach Channel and Maintenance Area is mainly coarse littoral sand, free of fines and contaminants. The source of the sediment is littoral material from the eastern near shore areas in Lake Michigan.

The project area includes the following properties: BWH and associated structures, Indiana Dunes National Park (IDNP) [*previously known as the Indiana Dunes National Lakeshore (IDNL)]*, Indiana Port Commission, Burns Small Boat Harbor, Burns Waterway (also known as Burns Ditch), Portage Lakefront Park, and Ogden Dunes (see Figure 3). Properties adjacent to BWH are primarily industrial in nature. According to the Port, BWH users handle approximately two million tons of steel, 600 barges, 83,000 railcars, and 578,000 trucks every year. Products such as steel, grain, salt, fertilizer, cement, limestone, slag, and ethanol are shipped from the Port to markets across North America and the world. In addition, the harbor is surrounded by ArcelorMittal steel works to the east and U.S. Steel works to the west. Potential for contaminant migration is present in areas of the harbor, especially the harbor arms, where bulk materials are loaded/unloaded and stored adjacent to the waters of the harbor. Any contaminants

present in the East and West Harbor Arms of the harbor that originate from loading and unloading operations conducted in the harbor arms, or from migration due to surface water runoff from stockpiled materials, are likely to remain confined to those portions of the harbor with limited transport to the Outer Harbor through sediment dispersion. The Tier 1 analysis of the 2020 Contaminant Determination recommended a Tier 2 evaluation (sampling).

The Chicago District completed a 2020 Contaminant Determination for hydraulically or mechanically dredging sediment from Burns Water Harbor. = The contaminant determination used a tiered approach that includes an evaluation of contaminant sources, transport and pathways, and physical and chemical tests including an evaluation of sediment, site water, and elutriate results. No new potential sources of contamination were present for the Approach Channel and Dredging Maintenance Area of Burns Waterway Harbor. The Tier 2 finding is that sediment within the Approach Channel and Dredging Maintenance Area is suitable for unrestricted use, including placement upland for beach nourishment or within the littoral zone (Attachment 3). The risk of encountering any HTRW materials during the dredging of Burns Waterway Harbor Approach Channel and Maintenance Area is considered very low.

3.1.7 – Climate

The climate of the study area is predominantly continental with some modification by Lake Michigan. The National Oceanic and Atmospheric Administration's (NOAA) Online Weather Data was queried for the Indiana Dunes National Lakeshore Area. Daily and monthly normals for temperature, precipitation, and snowfall between 1989 and 2010 were available (NOAA 2019a). The mean winter high temperature is 31.6°F while the mean winter low temperature is 17.6°F (January) (Table 2 and Figure 3). The mean summer high temperature is 81.5°F while the mean summer low temperature is 64.3°F (July) (Table 2 and Figure 3). Annual total precipitation normal for the Indiana Dunes National Lakeshore Area is 39.14 inches (Table 2 and Figure 3). In winter, total snowfall is generally heavy with an annual total snowfall normal of 40.3 inches (Table 3 and Figure 4). The majority of snowfall occurs between December and March with total snowfall normals ranging from 5.1 inches (i.e., March) to 15.3 inches (i.e., January) during this timeframe.

Table 2: Precipitation and Temperature Normals for the Indiana Dunes National Lakeshore Area (NOAA 2019a).

Month	Total Precipitation Normal (inches)	Mean Max Temperature Normal (˚F)	Mean Min Temperature Normal (˚F)	Mean Avg Temperature Normal (˚F)
January	2.00	31.6	17.6	24.6
February	1.82	35.4	21.3	28.3
March	2.23	45.4	29.7	37.6
April	3.53	57.3	40.0	48.7
May	3.93	68.1	49.0	58.5
June	4.10	81.5	64.3	72.9
July	4.10	81.5	64.3	72.9
August	4.17	79.8	63.1	71.4
September	3.53	73.8	55.6	64.7
October	3.64	61.6	44.0	52.8
November	3.44	48.8	34.5	41.7
December	2.41	35.6	22.3	29.0
Annual	**39.14**	**58.0**	**41.7**	**49.9**

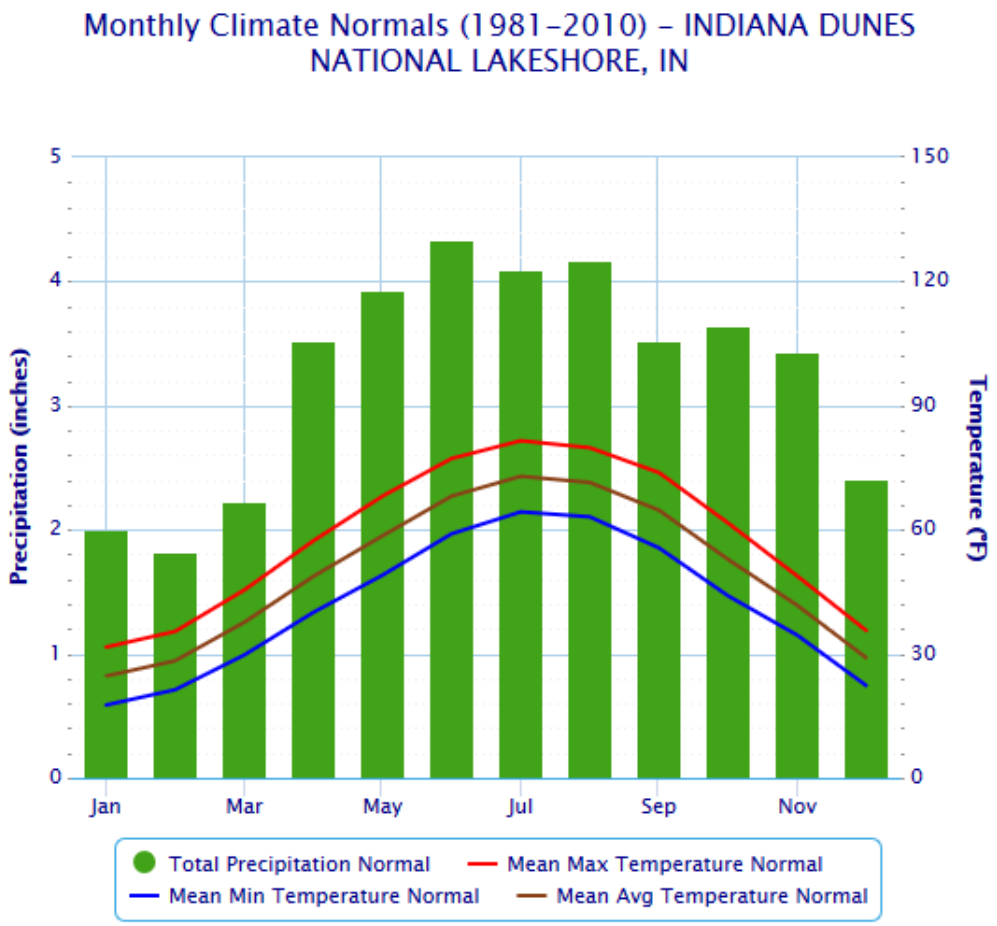

Figure 3: Precipitation and temperature Normals for the Indiana Dunes National Lakeshore area between 1981 and 2010 (NOAA 2019a).

Table 3: Snowfall normal for the Indiana Dunes National Lakeshore area between 1981 and 2010 (NOAA 2019a).

Month	**Total Snowfall Normal (inches)**
January	15.3
February	9.3
March	5.1
April	0.7
May	0.0
June	0.0
July	0.0
August	0.0
September	0.0
October	0.0
November	0.9
December	9.0
Annual	**40.3**

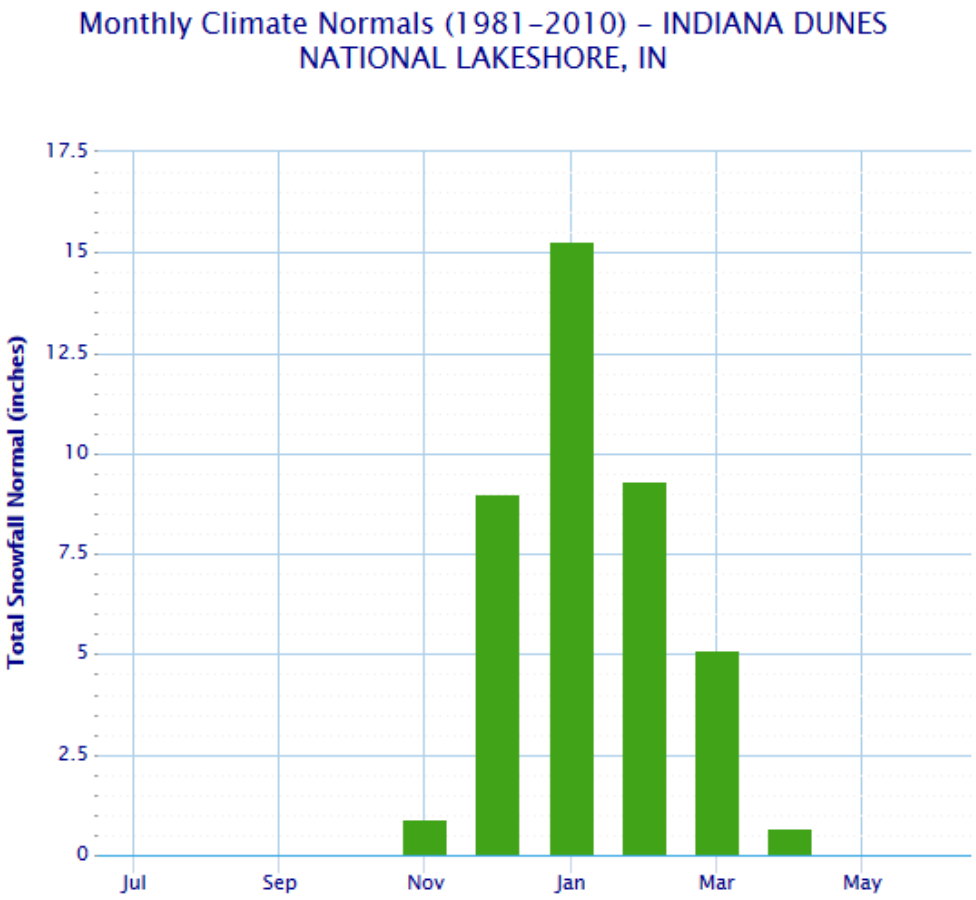

Figure 4: Snowfall normal for the Indiana Dunes National Lakeshore area between 1981 and 2010 (NOAA 2019a).

3.1.8 - Limnology

Lake Michigan's surface is approximately 577.5 feet above low water datum (LWD) (Table 4). The lake has a total surface area of 22,300 mi^2, with an average depth of 279 feet and a maximum depth of 923 feet. At its greatest extent, Lake Michigan is 307 miles long and 118 miles across. Only a relatively small amount of water flows out the bottleneck straits between lakes Michigan and Huron, so Lake Michigan holds its water a long time, nearly 100 years. Lake Michigan is bordered by 1,659 miles of shoreline, of which 43 miles of shoreline are located in Indiana.

The natural hydrology and littoral hydraulic process have been completely altered from their natural state. Sand is now transported and trapped at many different points due to the numerous structures along the whole southern basin of Lake Michigan. The project area is subject to very large waves during northerly storms.

Table 4: Characteristics of Lake Michigan

Great Lake	Water Surface Area ($mile^2$)	Surface Elevation (LWD, feet)	Length (miles)	Breadth (miles)	Maximum Depth (feet)	Drainage Area ($mile^2$)
Lake Michigan	22,300	577.5	307	118	925	67,900

Water levels within Lakes Michigan and Huron have been recorded since 1918. The lake wide period of record average (1918 to present) is currently 578.8 feet (IGLD 85) (NOAA-GLERL 2019b). Figure 5 depicts the changes that have been observed since 1918 to present for the lake-wide monthly average and the lake-wide annual average. The data for these lakes (i.e., Michigan and Huron) are presented together since hydrologically they are considered one lake.

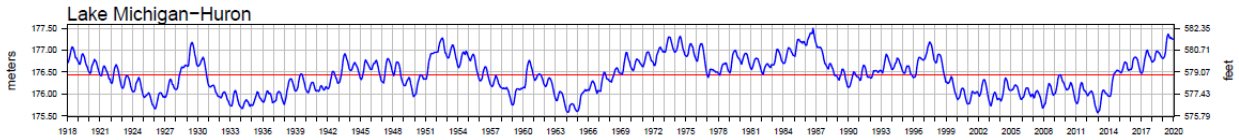

Figure 5: Water levels for Lake Michigan and Huron (USACE 2020).
Blue line indicates monthly mean water level and red line indicates long term annual average.

3.2 – Ecological Resources

3.2.1 – Great Lakes Wetland Habitat

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 Indiana Dunes National Park (IDNP) (includes Portage Lakefront and Riverwalk). Hydrogeomorphic Classification for Great Lakes Coastal Wetlands by Albert et al (2005) was utilized to delineate and characterize wetlands for this EA.

Lacustrine System / Open Lacustrine / Open Shoreline

The beach along the national park, Ogden Dunes, and the near shore areas are classified generically as an open lacustrine shoreline (Albert et al. 2005). The hydrogeomorphic setting for this type is driven by wave action sculpting and moving littoral sediment (cobble/sand/clay) hydrology provided directly by Lake Michigan water. Wetland plants cannot typically establish in this environment due to severe hydraulic forces of wave action and continually moving sediment. This wetland type (beach) is typically starved of organic matter and any hydrophytic plants that are able to colonize quiescent areas of the beach typically do not require large amounts of organic sediment. The resultant expanse of shallow water bars, spits, beaches and small foredunes of this wetland type can serve to dampen waves and create a more stable wetland system on the inland side, as is the case of IDNP.

Barrier Enclosed System / Swale Complex / Ridge & Swale Complex

The IDNP is classified generically as a barrier enclosed ridge and swale complex (Albert et al 2005). This primary type of swale complex wetland occurs between relict beach ridges, which is known as a ridge and swale complex, but is also referred to as dune and swale or strandplain. The ridge and swale complex at IDNP is composed of a series of beach ridges separated by narrow swales, in which the ridges formed in response to cyclic fluctuations in Lake Michigan water levels over the past several thousand years. The current hydrogeomorphic setting is established by the beach and foredune (open shoreline) providing barrier to the harsh wave climates and littoral Lake Michigan. Because of the barrier, there is reduced mixing of Great Lakes waters and exclusion of coastal processes within the wetlands. The first couple of swales are typically in direct hydrologic connection to the lake; however, these ridge and swales continue for hundreds of feet inland in which other hydrologic inputs have influence. Organic soil depths are quite variable, as is the vegetation, which ranges from shrub swamp, to sedge meadow to wet savanna. These wetlands can also discharge water into the Lake, creating small streams for transient lake fishes and other aquatic organisms.

3.2.4 – Native Plant Communities

Remnants of the original lakeshore beach and dune communities exist east and west of Burns Waterway Harbor, however the foredune and beach areas are relatively small and narrow at sand placement sites. Due to the extensive commercial and residential development of the harbor area, there is no undisturbed natural vegetation at the Federal navigation project of the harbor. Typically, the wave active beach zones are known to have established population stands of the dune-forming marram grass (*Ammophila breviligulata*). The area directly south of Ogden Dunes Beach is the City of Ogden Dunes and much of the original dune plant community has been extirpated from that area. The Indiana Dunes National Park (which flanks Burns Waterway Harbor and the City of Ogden Dunes) as a whole is home to some 1,300 plant species, 11 of which are found nowhere else in the larger Chicago area. Further back from the shore on the dunes, plant species could include plant groups such as trillium (*Trillium sp.*); bearberry (*Arctostaphylos sp.*); black, red, and white oak (*Quercus sp.*); and prickly pear cactus (*Opuntia sp.*). The sand placement sites may currently also contain narrow strips of beach impacted by invasive species such as lyme grass (*Elymus arenarius*) found among the stands of the native marram grass.

3.2.5 – Macroinvertebrates

Several studies on aquatic macroinvertebrates in Southern Lake Michigan have been completed as well as a few within the Grand Calumet River and Indiana Harbor Canal. Garza and Whitman of the United States Geological Survey investigated macroinvertebrate assemblages of Southern Lake Michigan and observed macroinvertebrates from forty taxa. Approximately 81% of the observed taxa consisted of a species of segmented worm (*Chaetogaster diastrophus*) and a variety of round worms (*Nematoda* spp). Nalepa et al. also conducted surveys throughout southern Lake Michigan that encompassed areas adjacent to the City of Chicago. Their study identified three main groups of macroinvertebrates including Amphipods (Diporeia), worms (Oligochaeta), and bivalves (Sphaeriidae). Another study investigating the diet of Lake Whitefish (*Coregonus clupeaformis*) from 1985 to 2000 revealed a shift in the macroinvertebrate prey items with the establishment of the Zebra and Quagga mussels (*Dreissena polymorpha and Dreissena burgensis*). As *Dreissena* spp. filtered the water of Southern Lake Michigan it reduced the food availability to native macroinvertebrates and severely impacted populations of amphipods (*Diporeia* spp), the dominant food source for Lake Whitefish. At the turn of the century, Lake Whitefish along the southeast coast of Lake Michigan had turned to consuming Chironomidae as their primary prey item with *Dreissena polymorpha*, *Mysis relicta* and Spaeriidae supplementing the diet. Yellow perch diets were analyzed under yet another study in southeast Lake Michigan in 1998 and 1999. These fish were found to be consuming primarily *Mysis relicta*, Chironomidae, *Gammarus* spp. and Isopoda.

3.2.6 – Fishes

In general, the surf zone fish assemblage of Lake Michigan would be the target community that occurs within the sand placement areas. The shallow surf zone fish assemblage typically consists of Longnose sucker (*Catostomus catostomus*), Emerald Shiner (*Notropis atherinoides*), Common Carp (*Cyprinus carpio*), and Spottail Shiner (*Notropis hudsonius*), with less frequent presence of Burbot (*Lota lota*), Mimic Shiner (*Notropis volucellus*), Mottled Sculpin (*Cottus bairdii*), juvenile Yellow Perch (*Perca flavescens*) and juvenile Smallmouth Bass (*Mircropterus dolomieu*). The non-native Round Goby[I] (*Neogobius melanostomus*) can also be found within this habitat zone. (I = introduced/invasive). Species presence was determined utilizing the Chicago Region Fish Database (unpublished). Additionally, specimens collected from areas in Indiana located at or close to the project site are vouched at the IL Natural History Survey (INHS), and collections of the Field Museum of Natural History (FMNH).

Portage and Ogden beaches – Multiple historic fish collections were made at or near the sand placement zone and are documented in the collections of Chicago's FMNH and the INHS. Species recorded include Alewife[I] (*Alosa pseudoharengus*), Freshwater Drum (*Aplodinotus grunniens*), Longnose sucker (*Catostomus catostomus*), Cisco (*Coregonus artedi*), Lake Whitefish (*Coregonus clupeaformis*), Banded Killifish (*Fundulus diaphanus*), Burbot, Emerald Shiner, White Sucker (*Catostomus commersonii*), Lake Trout (*Salvelinus namaycush*), and Yellow Perch.

Burns Waterway Harbor – Multiple historic fish collections were made at or in the vicinity of Burns Waterway Harbor and are documented in the collections of Chicago's FMNH and the INHS. Species recorded from these collections include Alewife (*Alosa pseudoharengus*), Rockbass (*Ambloplites rupestris*), Freshwater Drum (*Aplodinotus grunniens*), White Sucker (*Catostomus commersonii*), Cisco, Common Carp, Gizzard Shad (*Dorosoma cepedianum*), Channel Catfish (*Ictalurus punctatus*), Smallmouth Bass, Shorthead Redhorse (*Moxostoma macrolepidotum*), Round Goby, Spottail Shiner (*Notropis hudsonius*), Rainbow Trout (*Oncorhynchus mykiss*), Yellow Perch, Trout Perch (*Percopsis omiscomaycus*), Brown Trout (*Salmo trutta*), and Walleye (*Sander vitreus*).

3.2.7 – Amphibians & Reptiles

Reptiles and amphibians that may be present in the area include those that utilize beach habitat. These are quite limited along the coast of Lake Michigan, and may include Painted Turtle[I] (*Chrysemys picta*), Red Ear Slider (*Pseudemys scripta*), Snapping Turtle (*Chelydra serpentina*), Blanding's Turtle (*Emydoidea blandingii*) and the Garter Snake (*Thamnophis sirtalis*). Any manmade rock structures near the beaches could support the State Threatened Mudpuppy (*Necturus maculosus*) salamander. These salamanders spend their entire life underwater, foraging rocky shoals for crayfish and other prey items. They prefer cold water and only migrate into the near shore area during the winter months.

3.2.8 – Birds

The shoreline of Lake Michigan is recognized as "one of the most important flyways for migrant songbirds in the United States by many ornithologists and birdwatchers worldwide" (Shilling and Williamson, BCN) and is considered globally significant. An estimated 5 million songbirds use the north-south shoreline of Lake Michigan as their migratory sight line. The Cornell Lab of Ornithology e-Bird website was queried for observational bird data near the project area. On the e-Bird website there are three locations in the immediate area of the project that have records of bird sightings totaling 205 identified species of birds. Table 5 provides a list of these species that have been observed within the vicinity of the project area.

Burns Waterway Harbor – An estimated 134 species of bird have been observed within or around the harbor. These species range from common urbanized resident species (e.g. Ring-billed Gull, Canada Goose, American Robin) to more transient species (e.g. Trumpeter Swans, Iceland Gull, and Snowy Owl).

Near Shore Area – The open water of Lake Michigan provides resting and forage habitat for many water fowl such as Divers, Mergansers, Terns, Gulls, and Raptors.

Portage Beach – An estimated 164 species of bird have been observed in the area of Portage Lakefront and Riverwalk. The beach provides foraging or resting habitat for species for Gulls, Cormorants, and swifts.

Ogden Dunes Beach – An estimated 136 bird species have been observed in the area of Ogden Dunes Beach. There are many similar species to those observed at Portage Beach as Ogden Dunes provides similar foraging and resting habitats. Some notable species that were not observed at Portage Beach include the Summer Tanager, Townsend's Solitaire, and Spotted Towhee.

Table 5: Nesting & Migratory birds recorded from Burns Waterway Harbor, Portage Lakefront and Riverwalk, and Ogden Dunes Pinery (eBird 2019).

Common Name	Scientific Name	Common Name	Scientific Name
Alder Flycatcher	*Empidonax alnorum*	Least Flycatcher	*Empidonax minimus*
American Avocet	*Recurviostra americana*	Lesser Black-backed Gull	*Larus fuscus*
American Black Duck	*Anas rubripes*	Lesser Scaup	*Aythya affinis*
American Coot	*Fulica americana*	Lincoln's Sparrow	*Melospiza lincolnii*
American Crow	*Corvus brachyrhynchos*	Little Gull	*Hydrocoloeus minutus*
American Goldfinch	*Spinus tristis*	Long-eared Owl	*Asio otus*
American Kestrel	*Falco sparverius*	Long-tailed Duck	*Clangula hyemalis*
American Pipit	*Anthus rubescens*	Mallard	*Anas platyrhynchos*
American Redstart	*Setophaga ruticilla*	Merlin	*Falco columbarius*
American Robin	*Turdus migratorius*	Mourning Dove	*Zenaida macroura*
American Tree Sparrow	*Spizella arborea*	Mute Swan	*Cygnus olor*
American White Pelican	*Pelecanue erythrorhynchos*	Nashville Warbler	*Leiothlypis ruficapilla*
American Wigeon	*Mareca americana*	Northern Cardinal	*Cardinalis cardinalis*
Ancient Murrelet	*Synthliboramphus antiquus*	Northern Flicker	*Colaptes auratus*
Baird's Sandpiper	*Calidris bairdii*	Northern Harrier	*Circus cyaneus*
Bald Eagle	*Haliaeetus leucocephalus*	Northern Mockingbird	*Mimus polyglottos*
Baltimore Oriole	*Icterus galbula*	Northern Pintail	*Anas acuta*
Bank Swallow	*Riparia riparia*	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Barn Owl	*Tyto alba*	Northern Shoveler	*Anas clypeata*
Barn Swallow	*Hirundo rustica*	Orange-crowned Warbler	*Vermivora celata*
Belted Kingfisher	*Megaceryle alcyon*	Orchard Oriole	*Icterus spurius*
Black Scoter	*Melanitta american*	Osprey	*Pandion haliaetus*
Black Tern	*Chlidonias niger*	Palm Warbler	*Setophaga palmarum*
Black-bellied Plover	*Pluvialis squatarola*	Parasitic Jaeger	*Stercorarius parasiticus*
Black-capped Chickadee	*Poecile atricapillus*	Pectoral Sandpiper	*Calidris melanotos*
Black-crowned Night-Heron	*Nycticorax nycticorax*	Peregrine Falcon	*Falco peregrinus*
Black-legged Kittiwake	*Rissa tridactyla*	Pied-billed Grebe	*Podilymbus podiceps*
Blue Grosbeak	*Passerina caerulea*	Pileated Woodpecker	*Dryocopus pileatus*
Blue Jay	*Cyanocitta cristata*	Pine Grosbeak	*Pinicola enucleator*
Blue-gray Gnatcatcher	*Polioptila caerulea*	Pine Siskin	*Spinus pinus*
Blue-winged Teal	*Anas discors*	Purple Finch	*Haemorhous purpureus*
Bohemian Waxwing	*Bombycilla garrulus*	Purple Sandpiper	*Calidris maritima*

Bonaparte's Gull	*Chroicocephalus philadelphia*	Red Crossbill	*Loxia curvirostra*
Brewer's Blackbird	*Euphagus cyanocephalus*	Red-bellied Woodpecker	*Melanerpes carolinus*
Brown Creeper	*Certhia americana*	Red-breasted Merganser	*Mergus serrator*
Brown Pelican	*Pelecanus occidentalis*	Red-breasted Nuthatch	*Sitta canadensis*
Brown Thrasher	*Toxostoma rufum*	Red-eyed Vireo	*Vireo olivaceus*
Brown-headed Cowbird	*Molothrus ater*	Redhead	*Aythya americana*
Bufflehead	*Bucephala albeola*	Red-headed Woodpecker	*Melanerpes erythrocephalus*
Canada Goose	*Branta canadensis*	Red-necked Grebe	*Podiceps grisegena*
Canvasback	*Aythya valisineria*	Red-shouldered Hawk	*Buteo lineatus*
Carolina Wren	*Thryothorus ludovicianus*	Red-tailed Hawk	*Buteo jamaicensis*
Caspian Tern	*Hydroprogne caspia*	Red-throated Loon	*Gavia stellata*
Cedar Waxwing	*Bombycilla cedrorum*	Red-winged Blackbird	*Agelaius phoeniceus*
Chimney Swift	*Chaetura pelagica*	Ring-billed Gull	*Larus delawarensis*
Chipping Sparrow	*Spizella passerine*	Ring-necked Duck	*Aythya collaris*
Clay-colored Sparrow	*Spizella pallida*	Rock Pigeon	*Columba livia*
Common Gallinule	*Gallinula galeata*	Rough-legged Hawk	*Buteo lagopus*
Common Goldeneye	*Bucephala clangula*	Ruby-crowned Kinglet	*Regulus calendula*
Common Grackle	*Quiscalus quiscula*	Ruby-throated Hummingbird	*Archilochus colubris*
Common Loon	*Gavia immer*	Ruddy Duck	*Oxyura jamaicensis*
Common Merganser	*Mergus merganser*	Ruddy Turnstone	*Arenaria interpres*
Common Redpoll	*Acanthis flammea*	Rusty Blackbird	*Euphagus carolinus*
Common Tern	*Sterna hirundo*	Sabine's Gull	*Xema sabini*
Common Yellowthroat	*Geothlypis trichas*	Sanderling	*Calidris alba*
Cooper's Hawk	*Accipiter cooperii*	Sandhill Crane	*Grus canadensis*
Dark-eyed Junco	*Junco hyemalis*	Savannah Sparrow	*Passerculus sandwichensis*
Double-crested Cormorant	*Phalacrocorax auritus*	Scarlet Tanager	*Piranga olivacea*
Downy Woodpecker	*Picoides pubescens*	Semipalmated Plover	*Charadrius semipalmatus*
Dunlin	*Calidris alpina*	Semipalmated Sandpiper	*Calidris pusilla*
Eared Grebe	*Podiceps nigricollis*	Sharp-shinned Hawk	*Accipiter striatus*
Eastern Bluebird	*Sialia sialis*	Short-eared Owl	*Asio flammeus*
Eastern Kingbird	*Tyrannus tyrannus*	Slaty-backed Gull	*Larus schistisagus*
Eastern Meadowlark	*Sturnella magna*	Snow Bunting	*Plectrophenax nivalis*
Eastern Phoebe	*Sayornis phoebe*	Snow Goose	*Anser caerulescens*
Eastern Towhee	*Pipilo erythrophthalmus*	Snowy Owl	*Bubo scandiacus*
Eastern Wood-Pewee	*Contopus virens*	Song Sparrow	*Melospiza melodia*
European Starling	*Sturnus vulgaris*	Sora	*Porzana carolina*
Evening Grosbeak	*Coccothraustes vespertinus*	Spotted Sandpiper	*Actitis macularius*

Field Sparrow	*Spizella pusilla*	Spotted Towhee	*Pipilo maculatus*
Forster's Tern	*Sterna forsteri*	Summer Tanager	*Piranga rubra*
Fox Sparrow	*Passerella iliaca*	Surf Scoter	*Melanitta perspicillata*
Franklin's Gull	*Leucophaeus pipixcan*	Swainson's Thrush	*Catharus ustulatus*
Gadwall	*Mareca strepera*	Swamp Sparrow	*Melospiza georgiana*
Glaucous Gull	*Larus hyperboreus*	Townsend's Solitaire	*Myadestes townsendi*
Golden-crowned Kinglet	*Regulus satrapa*	Tree Swallow	*Tachycineta bicolor*
Gray Catbird	*Dumetella carolinensis*	Trumpeter Swan	*Cygnus buccinator*
Great Black-backed Gull	*Larus marinus*	Tufted Titmouse	*Baeolophus bicolor*
Great Blue Heron	*Ardea herodias*	Tundra Swan	*Cygnus columbianus*
Great Crested Flycatcher	*Myiarchus crinitus*	Turkey Vulture	*Cathartes aura*
Great Egret	*Ardea alba*	Varied Thrush	*Ixoreus naevius*
Greater Scaup	*Aythya marila*	Veery	*Catharus fuscescens*
Greater White-fronted Goose	*Anser albifrons*	Virginia Rail	*Rallus limicola*
Green Heron	*Butorides virescens*	Warbling Vireo	*Vireo gilvus*
Green-winged Teal	*Anas crecca*	Western Grebe	*Aechmophorus occidentalis*
Hairy Woodpecker	*Dryobates villosus*	Whimbrel	*Numenius phaeopus*
Harlequin Duck	*Histrionicus histrionicus*	White-breasted Nuthatch	*Sitta carolinensis*
Harris's Sparrow	*Zonotrichia querula*	White-crowned Sparrow	*Zonotrichia leucophrys*
Hermit Thrush	*Catharus guttatus*	White-throated Sparrow	*Zonotrichia albicollis*
Herring Gull	*Larus argentatus*	White-winged Crossbill	*Loxia leucoptera*
Hoary Redpoll	*Acanthis hornemanni*	White-winged Scoter	*Melanitta deglandi*
Hooded Merganser	*Lophodytes cucullatus*	Wild Turkey	*Meleagris gallopavo*
Horned Grebe	*Podiceps auritus*	Willet	*Tringa semipalmata*
Horned Lark	*Eremophila alpestris*	Wilson's Phalarope	*Phalaropus tricolor*
House Finch	*Haemorhous mexicanus*	Wilson's Snipe	*Gallinago delicata*
House Sparrow	*Passer domesticus*	Wilson's Warbler	*Cardellina pusilla*
House Wren	*Troglodytes aedon*	Winter Wren	*Troglodytes hiemalis*
Iceland Gull	*Larus glaucoides*	Wood Duck	*Aix sponsa*
Indigo Bunting	*Passerina cyanea*	Yellow Warbler	*Setophaga petechial*
Killdeer	*Charadrius vociferus*	Yellow-bellied Sapsucker	*Sphyrapicus varius*
King Eider	*Somateria spectabilis*	Yellow-rumped Warbler	*Setophaga coronate*
Lapland Longspur	*Calcarius lapponicus*	Yellow-throated Warbler	*Setophaga dominica*
Laughing Gull	*Leucophaeus atricilla*		

3.2.9 – Mammals

A list of mammals was assembled utilizing publications and available data that have potential to occur within the project area. Large mammal habitat is degraded or non-extant within the study area; however, coyote (*Canis latrans*) make up the large mammal potential for the area. Small mammals that have the potential to occur within the area include common urban species such as black rat (*Rattus rattus*),

Norwegian rat (*Rattus norvegicus*), eastern gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), eastern chipmunk (*Tamias striatus*), Virginia opposum (*Didelphis viginiana*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvagius floridanus*), and raccoon (*Procyon lotor*).

3.2.10 – Threatened & Endangered Species

Federal

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 Mussel (*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 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.

State of Indiana

State-listed endangered species were reviewed for the project area by the Chicago District. The following listed species and their critical habitats are identified by IDEM as occurring within Porter County.

Common Name	***Species Name***	**Common Name**	***Species Name***
Sheepnose	*Plethobasus cyphyus*	Elk Sedge	*Carex garberi*
Kansas Prairie Leafhopper	*Prairiana kansana*	Finely-nerved Sedge	*Carex leptonervia*
Helianthus Leafhopper	*Mesamia stramineus*	Mud Sedge	*Carex limosa*
	Aethes patricia	Pipsissewa	*Chimaphila umbellate ssp. cisatlantica*
Opalescent Apamea	*Apamea lutosa*	Hill's Thistle	*Cirsium hillii*
Nebraska Silver Bordered	*Boloria selene nebraskensis*	Pitcher's Thistle	*Cirsium pitcheri*
Frosted Elfin	*Callophrys irus*	Clinton Lily	*Clintonia borealis*
Smoky-eyed Brown	*Lethe Eurydice fumosus*	Silky Dogwood	*Cornus amomum ssp. amomum*
Black Arches Moth	*Melanchra assimilis*	Bunchberry	*Cornus canadensis*
A Pyralid Moth	*Pyla arenaeola*	Houghton's Nutsedge	*Cyperus houghtonii*
Leadplant Leafwebber Moth	*Sciota dammersai*	Long-bract Green Orchis	*Dactylorhiza viridis*

Persius Duskywing	*Erynnis persius persius*	Clinton Woodfern	*Dryopteris clintoniana*
A Noctuid Moth	*Oligia obtusa*	Small-fruited Spike-rush	*Eleocharis microcarpa*
Four-lined Cordgrass Borer	*Resapamea stipata*	Downy Gentain	*Gentiana puberulenta*
Phlox Moth	*Schinia sanguinea*	Pipewort	*Eriocaulon aquaticum*
Lake Sturgeon	*Acipenser fulvescens*	Bicknell Northern Crane's-bill	*Geranium bicknellii*
Spotted Turtle	*Clemmys guttata*	American Manna-grass	*Glyceria grandis*
Kirtland's Snake	*Clonophis kirtlandii*	Creeping St. John's-wort	*Hypericum adpressum*
Blanding's Turtle	*Emydoidea blandingii*	Jointed Rush	*Juncus articulatus*
Eastern Mud Turtle	*Kinosternon subrubrum subrubrum*	Bayonet Rush	*Juncus militaris*
Smooth Green Snake	*Opheodrys vernalis*	Brown-fruited Rush	*Juncus pelocarpus*
Eastern Massasauga	*Sistrurus catenatus*	Beach Peavine	*Lathyrus japonicas*
Butler's Garter Snake	*Thamnophis butleri*	Pale Vetchling Peavine	*Lathyrus ochroleucus*
Henslow's Sparrow	*Ammodramus henslowii*	Smooth Veiny Pea	*Lathyrus venosus*
Upland Sandpiper	*Bartramia longicauda*	Least Duckweed	*Lemna minuta*
American Bittern	*Botaurus lentiginosus*	Pale Duckweed	*Lemna valdiviana*
Piping Plover	*Charadrius melodus*	Drummond Hemicarpha	*Lipocarpha drummondii*
Northern Harrier	*Circus hudsonius*	Northern Appressed Bog Clubmoss	*Lycopodiella subappressa*
Marsh Wren	*Cistothorus palustris*	Globe-fruited False-loosetrife	*Ludwigia sphaerocarpa*
Sedge Wren	*Cistothorus platensis*	American Cow-wheat	*Melampyrum lineare*
Least Bittern	*Ixobrychus exilis*	Climbing Hempweed	*Mikania scandens*
Loggerhead Shrike	*Lanius ludovicianus*	Cutleaf Water-milfoil	*Myriophyllum pinnatum*
Black-crowned Night-heron	*Nyctanassa nycticorax*	Clustered Broomrape	*Orobanche fasciculata*
King Rail	*Rallus elegans*	Eastern Eulophus	*Perideridia americana*
Virginia Rail	*Rallus limicola*	Prairie Fame-flower	*Phemeranthus rugospermus*
Cerulean Warbler	*Setophaga cerulea*	Yellow-fringe Orchis	*Platanthera ciliaris*
Golden-winged Warbler	*Vermivora chrysoptera*	Gay-wing Milkwort	*Polygala paucifolia*
Northern Long Eared Bat	*Myotis septentrionalis*	Balsam Poplar	*Populus balsamifera*
Little Brown Bat	*Myotis lucifugus*	Nuttall Pondweed	*Potamogeton epihydrus*
Indiana Bat	*Myotis sodalist*	Vasey's Pondweed	*Potamogeton vaseyi*
Tricolored Bat	*Perimyotis subflavus*	Short-beaked Bald-rush	*Rhynchospora nitens*
Franklin's Ground Squirrel	*Spermophilus franklinii*	Globe Beaked-rush	*Rhynchospora recognita*

Running Serviceberry	*Amelanchier humilis*	Heartleaf Willow	*Salix cordata*
Bristly Sarsaparilla	*Aralia hispida*	Hall's Bulrush	*Schoenoplectus hallii*
Mead's milkweed	*Asclepias meadii*	Torrey's Bulrush	*Schoenoplectus torreyi*
Least Grape-fern	*Botrychium simplex*	Bulrush	*Scirpus expansus*
Beck Water-marigold	*Bidens beckii*	Ledge Spike-moss	*Selaginella rupestris*
Northern shorthusk	*Brachyelytrum aristosum*	Strict Blue-eyed-grass	*Sisyrinchium montanum*
Bluehearts	*Buchnera americana*	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*
Foxtail Sedge	*Carex alopecoidea*	Northern White Cedar	*Thuja occidentalis*
Awned Sedge	*Carex atherodes*	Nodding Trillium	*Trillium cernuum var. macranthum*
Atlantic Sedge	*Carex atlantica ssp. atlantica*	Horned Bladderwort	*Uticularia cornuta*
Howe Sedge	*Carex atlantica ssp. capillacea*	Highbush-cranberry	*Viburnum opulus var. americanum*
Little Prickly Sedge	*Carex echinata*	White-grained Mountain-ricegrass	*Ozyopsis asperifolia*

A letter was sent to INDNR notifying them of the project, and in a letter dated 21 June 2019, InDNR indicated that the project was unlikely to impact state listed species. Only the Piping Plover, plover critical habitat, and Pitcher's Thistle have been identified as occurring close to the project's proposed sediment placement site. The plover and its critical habitat are unlikely to be impacted by dredging operations or placement per USFWS's letter of concurrence dated 30 March 2020. The impacts to the Pitcher's Thistle population adjacent to the placement site are documented above.

3.3 – Cultural & Social Resources

3.3.1 – Social Setting

Ogden Dunes Beach – The beach is located in the town of Ogden Dunes along approximately 1 mile of the southern coast of Lake Michigan. Ogden Dunes has a population of 1,123 (2018), 12.5% of which are under the age of 18. The median household income is $110,357 (2018).

Portage Beach and Burns Waterway Harbor – The beach and harbor are located in the City of Portage, IN. The beach is approximately a quarter mile long. Portage has a population of approximately 36,806 (2018) with a medium household income of $54,245 (2018) and a medium house value of $163,843 (2017).

The U.S. Census Bureau's American Fact Finder and Quick Facts (U.S. Census Bureau 2020) for Ogden Dunes, and Portage, Porter County, IN were reviewed for socioeconomic information and presented in Table 6.

Table 6: 2018 U.S. Census data for cities in Porter County, IN

Category	Ogden Dunes	Portage	Porter County	Indiana
Total Population	1,123	38,806	169,594	6,732,219
Under 18 years	12.5%	22.7%	22.1%	23.4%

Under 5 years	5.3%	5.7%	5.4%	6.3%
White	94.2%	83.5%	92.2%	85.1%
Black or African American	0.0%	9.1%	4.2%	9.8%
American Indian and Alaska Native	0.2%	0.2%	0.4%	0.4%
Asian	2.0%	1.7%	1.5%	2.5%
Native Hawaiian and Other Pacific Islander	0.0%	0.1%	0.0%	0.1%
Hispanic or Latino	0.0%	19.0%	10.3%	7.1%
Two or more races	3.6%	2.9%	1.7%	2.1%
High School Graduate or Higher	99.2%	88.5%	93.1%	88.6%
Bachelor's Degree or Higher	69.6%	15.7%	28.2%	25.9%
Median Household Income	$110,357	$54,245	$68,044	$54.325
Below Poverty Level	3.2%	16.9%	8.9%	13.1%

3.3.2 – Archaeological & Historic Properties

The Burns Waterway Harbor approach channel and maintenance area are not considered to be of historical significance by the Indiana DNR's Division of Historic Preservation and Archaeology (DHPA) as stated in their letters of 27 January 2020 and 20 March 2020. 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. The area will be identified to the contractor with the instruction that no work is to 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.

A letter was received from the Miami Tribe of Oklahoma (January 9, 2020) and from the Pokagon Band of Potawatomi (January 8, 2020) indicating no presence of Cultural Resources within the work limits.

3.3.3 – Recreation

Portage Beach – Is a part of the Portage Lakefront and Riverwalk of the Indiana Dunes National Park. 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.

Near Shore Area – Recreational activities within this zone would be swimming, boating, and fishing.

Ogden Dunes Beach –The Town of Ogden Dunes maintains this beach on the shore of Lake Michigan for swimming, sunbathing, picnicking, and kiteboarding.

Chapter 4 – Effects Determination

The effects determination provided in this document only pertains to those sites already identified in this assessment. If new sites become available and are to be considered for placement of dredged material, said sites will be required to meet criteria outlined below. Coordination will also be required between all interested parties and agencies. Placement may include any combination of near shore littoral placement and upland beach placement (above or below the ordinary high water mark).

4.1 – Impacts of Plan Types

4.1.1 – No Action Plan

Under the no action alternative, USACE would cease dredging operations in and around Burns Waterway Harbor. The no action alternative would not adversely impact physical resources; biological resources; or cultural and archaeological resources. Social resources would be impacted in that the harbor's approach channel would eventually no longer be usable for commercial shipping, adversely affecting the commercial industries that use the harbor. The impacts of this option are detailed in previous Environmental Assessments (EA) and Environmental Impact Statements (EIS) conducted for the project area in 1975, 2000, 2002, 2003, and 2005. Given the current need of the two beaches for sand it is probable that the shoreline would continue to erode landward, thereby threatening National Park Service land and residential properties adjacent to the shoreline.

4.1.2 – No Deviation from Historical Activities

Under the No Deviation Alternative, USACE would dredge clean littoral sands from the Burns Waterway Harbor Approach Channel and Dredge Maintenance Area and continue to place the materials in the near shore littoral area adjacent to Ogden and Portage beaches. This would allow commercial navigation to continue, but would not provide any materials to reduce ongoing beach and shoreline erosion occurring along the beaches at Ogden Dunes and Portage. Shoreline erosion would continue to affect those communities and their resources.

4.1.3 – Beach and Shallow Water Placement (Recommended Plan)

The recommended placement plan would include a combination of placement on both beaches and within the shallow (<five feet) littoral, near shore area depending on available placement material and needs of the municipal beaches. The impacts to various resources are detailed in the following sections.

4.2 – Physical Resources

4.2.1 – Geology

All of the proposed alternatives would have on beach placement of sand or placement of sand into the littoral drift system, which would support sediment transport and efforts to slow down coastal erosion of coastal glacial features and till/outwash materials; however be it minor and short term. It is anticipated that all of the alternatives would have no adverse effects to geologic resources.

4.2.2 – Littoral Drift Processes

All of the proposed alternatives that place sand into the littoral drift system would support increasing sediment transport quantities and efforts to slow down coastal erosion; however the effects will be minor

and of short duration when compared to the greater natural littoral drift system. It is anticipated that the two dredging alternatives would have no adverse effects to littoral drift resources.

4.2.3 – Sediment Quality

The sediment quality at Burns Waterway Harbor would not be impacted by the dredging and sediment placement activities. It is anticipated that any dredged areas would re-shoal within a few years. The sediment quality at the placement locations would not be impacted by the placement of Burns Waterway Harbor materials; the sediment along the entire Indiana coastal zone consists of similar sands as the placement materials. The proposed work would only increase the mass of sediment at discrete locations, but would not impact sediment quality nor would the placement change the well-established sediment migration patterns that exist along the coast.

4.2.4 – Water Quality

The proposed plans that place sand into the littoral drift system would have temporary and localized impacts on Lake Michigan at the dredging and particularly at the sediment placement location, due to the mixing of the sediment the water and the release of water entrained in the sediment to the water column. The main impacts would be turbidity (cloudiness) caused by the suspension of fines, and the potential release of nutrients due to the release of soluble nitrogen and phosphorus compounds contained in the sediment matrix. Both of these conditions would be temporary, and any released materials would be quickly mixed within the water column and diluted to levels below impact. No long term impacts are identified. The proposed upland placement alternatives would have minimal short term impacts to the Lake Michigan water quality. A detailed analysis of the project's impacts to water quality can be found in the 404(b)(1) analysis (attachment 2).

4.2.5 – Air Quality

The local air quality in Porter County is considered 'non-attainment' under the Clean Air Act for 8-hour ozone. The proposed project is within the non-attainment zone. Due to the small scale and short duration of these projects, the main sources of emissions would be vehicle emissions and dust associated with the construction activities. The project does not include any stationary sources of air emissions, and a General Conformity Analysis was not completed. The temporary mobile source emissions from this project is *de minimis* in terms of the National Ambient Air Quality Standards and the State Implementation Plan. The project is not expected to be a significant source of Green House Gas emissions. All construction vehicles will comply with federal vehicle emission standards. USACE and its Contractors comply with all Federal vehicle emissions requirements. USACE follows EM 385-1-1 for worker health and safety, and requires all construction activities to be completed in compliance with Federal health and safety requirements.

4.2.6 – Hazardous, Toxic & Radioactive Wastes (HTRW)

The sediment in the Approach Channel and Maintenance Area is mainly coarse littoral sand, free of fines and contaminants. The source of the sediment is littoral material from the eastern near shore areas in Lake Michigan.

The Chicago District completed a 2020 Contaminant Determination for hydraulically or mechanically dredging sediment from Burns Water Harbor (Attachment 3). No potential sources of contamination were present for the Approach Channel and Maintenance Area of Burns Waterway Harbor. The Tier 2 finding is that sediment within the Approach Channel and Maintenance Area is suitable for unrestricted use, including placement upland for beach nourishment or within the littoral zone. There is no known HTRW

at the proposed placement sites. The risk of encountering any HTRW materials during the dredging of Burns Waterway Harbor Approach Channel and Maintenance Area and placement at the proposed sites is considered very low.

4.2.7 – Climate

Construction of the recommended plan would not have any short-term or long-term impacts to climate. Additional fossil fuels would be needed during the dredging and placement process for the operation of associated construction vehicles. However, there would be no measurable impact on climate, even though there may be localized increases in greenhouse gas emissions during operations. Once operations are complete, additional fossil fuels would not be needed for operation of the navigation channel.

4.2.8 – Limnology

Construction of the recommended plan does not include the placement of material features that would disrupt lacustrine processes. Manual movement of sediment from the shoaling area of the harbor to littoral or beach placement zones would facilitate sediment transport that would normally occur along the lakefront if the harbor was not there. Dredging operations are returning the trapped sand to the littoral drift process so that it may continue to accumulate on downstream beaches and in the water column as it migrates westward along the coast. Therefore, the recommended plan would have no short-term or long-term adverse impact to lacustrine processes.

4.3 – Ecological Resources

4.3.1 – Great Lakes Wetland Habitat

All of the lacustrine and coastal wetland areas characterized for sand placement require transport of glacial deposition sands, till and outwash to sustain their hydrogeomorphic setting and associated hydrologies. All of the dredging alternatives would place sand onto open beach or into the surf zone, which are the natural zones for littoral sands to continue through the drift process. It is anticipated that all of the alternatives would have no adverse effects to Great Lakes wetlands of Lacustrine Open Shoreline and Barrier Enclosed Ridge and Swale Complex. The No Action alternative of not placing sand at the two beaches misses the opportunity to contribute to offsetting shoreline erosion effects. Adverse effects to the ridge and swale complex would occur should the beach and foredune barrier be eroded or ruptured due to lack of littoral drift sands passing through this coastal reach.

4.3.2 – Native Plant Communities

All of the alternatives would place sand onto open beach or into the surf zone, which are the natural zones for littoral sands to continue through the drift process. These zones are naturally barren, with minimal to no plant life due to wave action and continually moving substrates (Albert 2005). The only plant that could be negatively impacted during placement operations would be the federally listed Pitcher's Thistle. This plant is not typically found in the surf zone of the beach, but rather on the more stable foredune complex. Depending on how far the beach has eroded, populations of this thistle may be impacted and placement may take place closer to the populations than it would if the beach was there. Consistent with the recommendations of the USFWS letter of 30 March 2020, prior to placement a beach survey will take place to identify locations of Pitcher's Thistle to minimize impacts to the population. Additionally, the municipal beaches that practice beach-combing would also contribute to maintaining plant free beach zones. It is anticipated that all of the alternatives would have no adverse effects to bluff, dune or beach plant communities.

4.3.3 – Macroinvertebrates

All of the dredging alternatives would place sand onto open beach or into the surf zone, which are the natural zones for littoral sands to continue through the drift process. These zones are naturally barren with continually shifting sands and substrates. Due to these conditions, macroinvertebrate diversity is low, and those taxa that live in the conditions are adapted to sands and gravels continually been entrained and deposited by waves (Albert 2005). It is anticipated that all of the alternatives would have no adverse effects to littoral macroinvertebrate communities.

4.3.4 – Fishes

All of the dredging alternatives would place sand onto open beach or into the surf zone, which are the natural zones for littoral sands to continue through the drift process. These zones are naturally barren with continually shifting sands and substrates, which provides spawning and foraging conditions for surf zone fishes. Although surf zone fishes have adapted to continually moving substrates, large piles of sand that could sit in the surf zone for durations longer than a day or two could impact fish eggs embedded in the shifting sands and gravels. To avoid minor effects to surf zone fish spawning and recruitment, it is recommend to spread sand in as thin a layer as possible and to leave gaps between sand piles as to not cover the entire affected area.

4.3.5 – Amphibians & Reptiles

All of the dredging alternatives would place sand onto open beach or into the surf zone, which are the natural zones for littoral sands to continue through the drift process. These zones are naturally barren with continually shifting sands and substrates. Due to these conditions, amphibian and reptile diversity is absent to low. It is anticipated that all of the alternatives would have no adverse effects to amphibian or reptile communities.

4.3.6 – Birds

All of the dredging alternatives would place sand onto open beach or into the surf zone, which are the natural zones for littoral sands to continue through the drift process. These zones are naturally barren with continually shifting sands and substrates, where birds do not nest. However, due to these conditions, certain species of birds have adapted to feeding on macroinvertebrates in these areas, such as certain Sandpiper and Plover species. Also, wading birds and diving duck species likely hunt for fish in the surf zone. Due to sand placement beneficially supporting littoral drift properties, it is anticipated that all of the alternatives would have no adverse effects to resident or migratory bird communities.

4.3.7 – Mammals

All of the dredging alternatives would place sand onto open beach or into the surf zone, which are the natural zones for littoral sands to continue through the drift process. These zones are naturally barren with continually shifting sands and substrates. Due to these conditions, mammal diversity is absent to low. It is anticipated that all of the alternatives would have no adverse effects to mammalian communities.

4.3.8 – Threatened & Endangered Species

<u>Federally Listed Species</u>

The USFWS recommends consideration of potential beneficial or adverse impacts to listed species for each potential sand placement area. In a letter dated January 24, 2020, USFWS determined that the dredging and placement operations was unlikely to adversely affect any threatened or endangered species aside from the Pitcher's Thistle. The Pitcher's Thistle can occur on beaches, but the species prefers the more stable areas near the foredune as opposed to the active wave beach and surf zones. Since placement of material will occur at the shore and in the littoral zone, away from the preferred foredune habitat, any Pitcher's Thistle present on the beach should be unaffected. If the beach has been eroded completely, there is a chance for placement operations to affect this population. Before placement, a survey of the placement area for the thistle will be conducted to determine where individual plants are located. Plants will be marked if they have the potential to be impacted by placement operations. Marking will serve as a way to indicate areas to avoid direct placement and potential smothering of the species. Adverse effects to the Pitcher's Thistle would occur if sand was not continually placed on these beaches since beaches would be expected to reduce in size significantly or disappear altogether and allow the Ridge & Swale Complex to become compromised by changes in hydrology and being exposed to direct coastal wave forces. A follow up letter from USFWS was received March 30, 2020 indicating that the above survey plan adequately protects the Pitcher's Thistle and no further consultation was required.

Figure 6: Pitcher's Thistle, restoration at 63rd Street Beach (USACE, Chicago Park District).

4.4 – Cultural & Social Resources

4.4.1 – Social Setting

The impacts of the alternatives on Cultural and Social Resources in the area were previously analyzed in the previous NEPA documentation list in section 1.4 as such, only the recommended plan's impacts will be discussed in this section. The recommended plan would have no impact to the social setting within the area. The placement of dredged material would benefit the area by minimizing storm induced impacts to the foredune complex and subsequent adjacent infrastructure located in the City of Ogden Dunes and

Portage Lakefront and Riverwalk. Additionally, the dredging operations will maintain a viable channel into Burns Waterway Harbor for deep draft commercial operation and shipping to continue at the port.

The potential impacts of dredging and placement of clean sediments onto the Portage and Ogden Dunes beaches and adjacent littoral areas was evaluated on its impact to minorities, low-income households, and children (i.e., under the age of 18). To evaluate potential impacts to minority populations and low-income households, socioeconomic data from Porter County and the State of Indiana were compared to socioeconomic data for the Town of Ogden Dunes, Indiana and City of Portage, Indiana. Approximately 5.8% and 12.5% of Ogden Dunes and Portage respectively are comprised of minority populations. The minority population of Ogden Dunes does not exceed that of the County (7.8%) or state (14.9%), but the minority population of Portage does exceed the county and state. The recommended project would be implemented in an area where there is a significant minority population (Portage) compared to the County and State, however the recommended project is expected to have a beneficial impact by providing shoreline protection to the National Park Service Property, which is utilized by residents in the area.

In terms of poverty, 3.2% of households in the Town of Ogden Dunes and 16.9% in Portage are below the poverty line, whereas an average of 8.9% of households in Porter County and 13.1% of households in the State of Indiana are below the poverty line. While these data indicate that a higher percentage of low-income households occur within the Portage area of the project as compared to the County and State as a whole, the implementation of the recommended plan is not expected to have a disproportionate impact on low-income households. The recommended project is expected to have a beneficial impact overall by providing storm protection to the National Park Service Property, which is utilized by residents in the area.

Lastly, approximately 12.5% of the total population in the Town of Ogden Dunes and 22.7% of the Portage population are comprised of children under the age of 18. In comparison, approximately 22.1% of the total population in Porter County and 23.4% of the total population in Indiana are comprised of children under the age of 18. These percentages indicate that there is a lower or near identical percentage of children under age 18 within the project area as compared to the County and State. Therefore, the recommended project would have no disproportionate impact on children.

4.4.2 – Land Use History

Burns Waterway Harbor was constructed between 1965 and 1970 and USACE has conducted routine dredging operations in the area on and off since 1994. The harbor is primarily used for industrial shipping purposes since its construction.

4.4.3 – Recreation

The beach placement area at Portage is a public beach that sees a variety of activities during the appropriate time of year. Placement of dredged material on or near the beach is expected to provide sand nourishment and replenish sand that has been lost through erosion caused by the littoral drift process. The near shore placement area is expected to also provide sediment through the drift process to areas to the west. The dredging activity is expected to allow for deeper draft navigation into and out of Burns Waterway Harbor for industrial marine traffic.

4.4.4 – Archaeological & Historic Properties

The Burns Waterway Harbor approach channel and management area are not considered to be of historical significance by the Indiana DNR's Division of Historic Preservation and Archaeology (DHPA).

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 can 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 structures were determined to not be subject to alterations and will not be impacted by the project. The INDNR Division of Historic Preservation and Archaeology concurred with the determination that the project would not affect historic or archaeological resources on 27 January 2020, and on 20 March 2020.

The Miami Tribe of Oklahoma and from the Pokagon Band of Potawatomi have indicated no presence of Cultural Resources within the work limits. Both tribes have concurred with the determination of no impact to historically or archaeologically significant sites in correspondences dated January 9, 2020, and January 8, 2020 respectively.

4.4.5 – 17 Points of Environmental Quality

The 17 points are defined in Section 122 of the Rivers, Harbors and Flood Control Act of 1970 (P.L. 91-611). Effects to these points are discussed as follows:

Noise – Temporary increases in noise from sand off-loading machinery would be noticeable by beach goers, but would not extend beyond the park boundaries since sand off-loading operations would be water based.

Displacement of People – The recommended plan's sand placement will not displace any people.

Aesthetic Values – The recommended plan's sand placement could have minor short term impacts during placement but after placement could enhance the visual aesthetics of the municipal beaches.

Community Cohesion – The recommended plan's sand placement would not disrupt community cohesion.

Desirable Community Growth – The recommended plan's sand placement would not affect community growth.

Desirable Regional Growth – The recommended plan's sand placement would not affect regional growth.

Tax Revenues – The recommended plan's sand placement could potentially save municipal tax payers money.

Property Values – The recommended plan's sand placement would not negatively affect property values.

Public Facilities – The recommended plan's sand placement would help maintain public and semi-public facilities.

Public Services – The recommended plan's sand placement would allow public services to continue, including recreation, public safety and economic driven activities.

Employment – The recommended plan's sand placement would provide short term beneficial impacts during construction activities.

Business and Industrial Activity – The recommended plan's sand placement would support local businesses and industries that support beach and water recreation.

Displacement of Farms – Since there are no farms within the study area none will be displaced.

Man-made Resources – The recommended plan's sand placement would not adversely affect man-made resources.

Natural Resources – The recommended plan's sand placement would support sustaining existing natural resources of the study area.

Air Quality – Any of the alternative plans would be *de minimis* in terms of CAA compliance. Temporary vehicle emission impacts would meet current federal regulations. Greenhouse gas emissions are expected to be negligible.

Water Quality – The recommended plan's dredging and sediment placement would have temporary, localized impacts on water quality during sediment placement activities, particularly in the form of turbidity. Because of the coarse nature and limited fines associated with the sediment, any impacts would be temporary. Lake Michigan as a whole would experience negligible short term impacts from the project, and would experience beneficial long term impacts from improved shoreline stability.

4.5 - Cumulative Effects

Consideration of cumulative effects requires a broader perspective than examining just the direct and indirect effects of a proposed action. It requires that reasonably foreseeable future impacts be assessed in the context of past and present effects to important resources. Often it requires consideration of a larger geographic area than just the immediate "project" area. One of the most important aspects of cumulative effects assessment is that it requires consideration of how actions by others (including those actions completely unrelated to the proposed action) have and will affect the same resources. In assessing cumulative effects, the key determinant of importance or significance is whether the incremental effect of the proposed action will alter the sustainability of resources when added to other present and reasonably foreseeable future actions. Cumulative environmental effects for the proposed littoral sand placement areas on the Indiana shore of Lake Michigan were assessed in accordance with guidance provided by the Council on Environmental Quality (CEQ) and the U.S. Environmental Protection Agency (USEPA 315-R-99-002).

4.5.1 - Scope of Cumulative Effects Analysis

Through this environmental assessment, the cumulative effects issues and assessment goals are established, the spatial and temporal boundaries are determined, and the reasonably foreseeable future actions are identified. Cumulative effects are assessed to determine if the sustainability of any of the resources is adversely affected with the goal of determining the incremental impact to key resources that would occur should the proposed work be implemented. The spatial boundary being considered is normally in the general area of the proposed activity; however, the area may be expanded on a case-by-case basis if some particular resource condition necessitates broadening the boundary. The analysis will only include the immediate area since the proposed activity is a highly localized activity at an existing man made structure.

Projecting reasonably foreseeable future actions can be difficult. The recommended action, sand placement along Indiana's shore of Lake Michigan, is reasonably foreseeable; however, the actions by others that may affect the same resources are not as clear. Projections of those actions must rely on judgment as to what are reasonable based on existing trends and where available, projections from qualified sources. Reasonably foreseeable does not include unfounded or speculative projections. Some future projections were taken from watershed and specific studies generated for the general project area. In this case, reasonably foreseeable future actions include:

- Continued reduction in erosion from littoral sand inputs and/or shoreline armoring
- Continued reduction and attenuation of littoral sands from east shore structures
- Continued use of dredged littoral sands to supplement actively erosive shoreline reaches
- Continued maintenance and nourishment of sandy beaches

4.5.2 - Cumulative Effects on Resources

The recommended sand placement areas are beneficial impacts, but considered to be localized compared to the whole southern Lake Michigan littoral drift system. Generally, the removal of sand from one spot within the littoral system and placing it in another spot is quite negligible and the effects are short term when considering the quantities and ceaseless movement of littoral sands in the system. The physical and ecological/biological impacts associated with littoral drift processes were started to the Illinois and Michigan's north shores over 100 years ago with the development and build-out of the southern Lake Michigan shoreline. The recommended sand placement will temporarily abate minor shoreline erosion and potentially result in a cumulative economic and social effect by reducing local costs for sand placement and allowing the funding to be utilized for other municipal/public resources. Implementation of any of the alternatives would not result in a significant cumulative environmental effect since the greater littoral drift system, lake levels and storm driven waves far outweigh any of the minor and short term affects resulting from sand placement.

Physical Resources

The combination of the Recommended Project and the potential slowing of shoreline erosion would have no cumulative negative impact on physical resources within the area. Dredging and placement described by the recommended plan along with other potential future actions would not require the use of a large number of construction vehicles over a long period of time that would cumulatively have the potential to affect climate or air quality. The Recommended Project and future actions would not change the land use of the area. Future actions such as the shoreline improvement, could temporarily increase turbidity in the area. However, this would only be a temporary increase and BMPs would be in place to minimize turbidity impacts.

Biological Resources

The combination of the Recommended Project and the potential future shoreline improvements would have no cumulative negative impact on biological resources within the area. Dredging and placement activities of the Recommended Project and future actions would not overlap, therefore, there would be no cumulative temporal effect to biological resources, such as migratory birds or wildlife, in the area. Future actions such as the shoreline placement, could temporarily impact aquatic resources through the increase in turbidity. This would be a short-term impact. The onshore terrestrial community would be impacted in that beach and dune erosion would be slowed as there would be a new beach. This beneficially impacts those plant and animal communities located on the dunes as the new beach would supply protection and

buffer incoming wave action for a time. This would be particularly beneficial to the Pitcher's Thistle in the area as the erosion of the dune habitat where this plant resides would be slowed. The Recommended Project is not expected to have any long-term impacts to fish or aquatic macroinvertebrates.

Cultural and Historic Resources

The combination of the recommended plan and the potential future shoreline improvements would have no cumulative impact on cultural and historic resources within the area. Dredging and placement activities for the recommended plan as well as any future actions would occur outside of the affected area of three historic houses 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). There is a shipwreck located adjacent to the beach buried under several feet of sand offshore. No work or placement will occur within 100 feet of the shipwreck.

Cumulative Effects Summary

Along with direct and indirect effects, cumulative effects of the Recommended Project were assessed following the guidance provided by the Presidents' Council on Environmental Quality (Table 7). There have been numerous effects to resources from past and present actions, and reasonably foreseeable future actions can also be expected to produce both beneficial and adverse effects. The effects of the Recommended Project are expected to be relatively minor.

Table 7: Environmental Impact Summary

Potential Impact Area	Past Actions	Proposed Direct Impacts	Cumulative Impact
Climate	Adverse	No impact	No impact
Geology & Soils	Adverse	No impact	No impact
Limnology	Adverse	No impact	No impact
Water Quality	Adverse	No impact	No impact
Air Quality	Adverse	No impact	No impact
Land Use	Adverse	Beneficial impact	Beneficial impact
Aquatic Communities	Adverse	No impact	No impact
Terrestrial Communities	Adverse	No impact	No impact
Archaeological & Historical Properties	No impact	No impact	No impact
Recreation	No impact	Beneficial impact	Beneficial impact
Social Setting	No impact	No impact	No impact

Chapter 5 – Conclusions & Compliance

5.1 – Compliance with Environmental Statutes

The recommended plan is in full compliance with appropriate statutes, executive orders, memoranda and USACE regulations including the Natural Historic Preservation Act of 1966; the Endangered Species Act of 1973; the Fish and Wildlife Coordination Act; EO 12898 (environmental justice); EO 11990 (protection of wetlands); EO 11988 (floodplain management); and the Rivers and Harbors Act of 1899. The potential project is in compliance with the Clean Air Act; the Clean Water Act, and the National Environmental Policy Act of 1969. There were no adverse environmental effects identified which cannot be avoided should the proposal be implemented [40 C.F.R. 1502.16; NEPA Section 102(2)(C)(ii)]. The proposed work does not have local and short-term effects to uses of the environment or Lake Michigan's coastal zone [40 C.F.R. 1502.16; NEPA Section 102(2)(C)(iv)]. There have been no irreversible and irretrievable commitments of resources identified resulting from the proposed action should it be implemented [40 C.F.R. 1502.16; NEPA Section 102(2)(C)(v)].

5.1.1 – Environmental Justice

EO 12898 (Environmental Justice) requires that, to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. Per Executive Order 12898 (Environmental Justice), the USEPA Environmental Justice website has been consulted (March 15, 2020) and indicates that the project is within an Environmental Justice area. This supports the information shown in Table 6 where it was indicated that has a significantly higher percentage of its population that are below the poverty line as compared to the county, state, and Ogden Dunes. However this project will not have an adverse effect on those populations as its goal is to use dredged material to reestablish a beach and protect the currently eroding shoreline at Portage and Ogden Dune beaches.

5.1.2 – Clean Air Act

Burns Waterway Harbor and the proposed placement locations are within non-attainment areas for 8-hour ozone. Due to the small scale, short duration and nature of the dredging project, it is assumed that the project is de minimis with regard to ozone and ozone precursors. Although a General Conformity analysis was not conducted, other Chicago area projects that are much larger in scale and earthwork have emissions well below the level of significance under the Clean Air Act and based on those experiences it is assumed that the proposed project is de minimis for air impacts.

5.1.3 – Section 401 / 404 of the Clean Water Act

The proposed project would include dredging and placing the dredged sediment within or near the littoral zone, with direct return of water. Based on elutriate testing, water quality impacts associated with the placement are expected to be localized and temporary, and to be fully consistent with USACE guidance. Further discussion of the proposed action can be found in the Section 404(b)(1) Contaminant Determination. USACE will seek a Section 401 Water Quality Certification from IDEM and comply with the Indiana Coastal Zone Management requirements.

5.1.4 – USFWS Coordination

Informal consultation with the USFWS commenced with a project scoping letter dated December 20, 2019. The service requested that the USACE evaluate the continuing practice of placement of dredged material in an area 1,500 feet offshore and recommended that material be placed on Portage Beach as far east as possible. The recommended plan outlined in Section 2.4 favors near shore or on beach placement of sands. Thus the Chicago District concurs with the Service that the most beneficial sand placement area for fish, wildlife, and habitat protection benefits would be on shore or in waters immediately adjacent.

USFWS recommended that quality of sediment/sands and need for testing be addressed. This was evaluated in the Section 404(b)(1) Contaminant Determination. The most recent evaluation of sediment was conducted in August 2019.

USFWS did not provide formal consultation, but has recommended that USACE evaluate the condition and location of the population of Pitcher's Thistle that is being threatened by beach and dune erosion. The Chicago District will evaluate locations of individuals during the growing season before placement begins so as to identify individuals/populations that can be avoided during sand placement. USFWS concurred with this method and agrees that this project is unlikely to adversely affect endangered or threatened species as stated in a letter dated March 30, 2020.

5.1.5 – State of Indiana Natural Resources Coordination

Coordination with the INDNR commenced with a project letter dated May 16, 2019. In a letter received July 1, 2019 the USACE was granted Federal Consistency for the dredging operations at Burns Harbor.

The Indiana Lake Michigan Coastal Zone Office was sent a follow up letter indicating that the proposed activity complies with Indiana's approved coastal management program and will be conducted in a manner consistent with such program. In a letter dated January 21, 2020, the coastal zone office offered items to be considered when drafting this EA. At the start of the public review process, this EA was provided to the INDNR with a letter identifying that "The proposed activity complies with Indiana's approved coastal management program and will be conducted in a manner consistent with such policies." All conditions of the consistency determination shall be implemented in order to minimize adverse impacts to the coastal zone.

5.1.6 – State of Indiana Historic Preservation Act

Coordination with the Indiana Division of Historic Preservation and Archaeology (IDHPA) commenced with a project scoping letter dated December 20, 2019. The INDNR DHPA has indicated that there is unlikely to be impacts to historic buildings or structures in a correspondence dated January 27, 2020. The letter does indicates the need to be cognizant of the archaeological site located in the lake during placement activities. The district will take appropriate measures during the planning and construction phases so as to not impact the indicated archaeological site. A response from the state concerning public lands and/or listed species was not received. Based on the location and nature of the proposed sand placement alternatives, it is anticipated that "no historic terrestrial properties will be effected". Appropriate measures will be taken to avoid impacting the known historic shipwreck that is in the placement area. During the public comment period for this EA a follow up letter received March 20, 2020 from INDNR DHPA indicating that all concerns regarding cultural resources had been addressed in the EA and no archaeological investigations were needed. Several tribes were also sent letters during the scoping process. The Miami Tribe of Oklahoma and Pokagon Band of Potawatomi concurred with the

determination of no impact with letters of no objection dated January 9, 2020, January 8, 2020, and March 16, 2020 respectively.

5.1.7 – EO 13112 Invasive Species

This Executive Order calls for actions "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause..." This EO utilizes the laws of the United States of America, including the National Environmental Policy Act of 1969, as amended (42 U.S.C.§ 4321 et seq.), Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 U.S.C.§ 4701 et seq.), Lacey Act, as amended (18 U.S.C.§ 42), , , Plant Protection Act of 2000 (P.L. 106-224, Title IV), Endangered Species Act of 1973, as amended (16 U.S.C.§ 1531 et seq.), and other pertinent statutes. Completed in 2001, the National Invasive Species Management Plan, served as a comprehensive "blueprint" for federal action on invasive species, as well as NISC's primary coordination tool. The 2008 Plan identified prevention as the first line of defense, and calls for preventing the introduction and establishment of invasive species to reduce their impact on the environment, the economy, and health of the United States. Executive Order (EO) 13112 also includes specific duties for federal agencies in regard to invasive or nuisance aquatic species. Excerpts from the Order relating to federal agencies are contained in the following paragraphs:

> (a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law,
>
> (1) Identify such actions;
>
> (2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and

Any native planting work associated with the federal action of sand placement would be in compliance via removing non-native ornamental landscaping plants and replacing with native coastal bluff, dune and beach species known to be beneficial to migratory birds and pollinators.

5.1.8 – EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds

Federal agencies shall restore or enhance the habitat of migratory birds and prevent or abate pollution or detrimental alteration of the environment for migratory birds. This project lies within a significant portion of the Mississippi Flyway along the southern shoreline of Lake Michigan that particularly favors both ecological and economically valuable species including neo-tropic migrants and waterfowl. The sand placement work would be in compliance by restoring and preserving existing Lacustrine Open Shoreline and Barrier Enclosed Ridge and Swale Complex wetlands.

Chapter 6 – Finding of No Significant Impact (FONSI)

An Environmental Assessment was completed for the recommended project. The Environmental Assessment has found that there would be no adverse effects resulting from implementation of the recommended plan. A 30-day Agency and Public Review period was held from March 6, 2020 to April 10, 2020. All pertinent comments received were incorporated into the document. The NEPA documents and supporting appendices were placed on the Chicago District's Civil Works webpage for maximum distribution. The FONSI has been updated with Agency responses after the 30-day Agency and Public Review and the full FONSI document is located in Attachment 1.

Bibliography

Albert, D.A., D.A. Wilcox, J.W. Ingram, T.A. Thompson. 2005. Hydrogeomorphic Classification for Great Lakes Coastal Wetlands. Journal of Great Lakes Res. 31 (Supplement 1):129-146

Blatchley, W.S. 1897. The geology of Lake and Porter Counties. In Indiana Department of Geology and Natural Resources, Twenty-Second Annual Report, pp. 25-104.

Chicago Metropolitan Agency for Planning (CMAP). 2010. Land Use Inventory for Northeast Illinois, 2010. Available at: https://datahub.cmap.illinois.gov/dataset/land-use

Chrzastowski, M.J., T.A. Thompson, C.B. Trask. 1994. Coastal geomorphology and littoral cell divisions along the Illinois-Indiana coast of Lake Michigan. Journal of Great Lakes Research. 20(1): 27-43.

eBird. 2019. The Cornell Lab of Ornithology. Available at: https://ebird.org/home

Indiana Department of Environmental Management (IDEM). 2018. Indiana Integrated Water Monitoring and Assessment Report to the U.S. EPA. Available at: https://www.in.gov/idem/nps/2647.htm

National Oceanic and Atmospheric Administration (NOAA), 2019a, NOWData – NOAA Online Weather Data. NOAA for the Chicago Area. National Weather Service Forecast Office, Chicago, IL. Available at: https://w2.weather.gov/climate/xmacis.php?wfo=lot

National Oceanic and Atmospheric Administration – Great Lakes Environmental Research Laboratory (NOAA-GLERL). 2019b. Great Lakes Dashboard Project (GLDP) - Great Lakes Water Levels. Available at: https://www.glerl.noaa.gov/data/dashboard/GLD_HTML5.html

U.S. Department of the Interior, National Park Service (NPS). 2014. Shoreline restoration and management plan/Final environmental impact statement. Indiana Dunes National Lakeshore, Porter, Indiana.

Rovey, C.W. II and M.K. Borucki. 1994. Bluff evolution and long term recession rates southwestern Lake Michigan. Environmental Geology. 23(4): 256-263.

USACE. 1978. Final environmental impact statement relating to operation and maintenance activities at Burns Small Boat Harbor, Indiana. Chicago District, Chicago, IL 201pp.

USACE. 2020. Great Lakes Hydraulics and Hydrology. Available at: https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Information-2/Water-Level-Data/

U.S. Environmental Protection Agency (USEPA). 2019. Indiana Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Available at: https://www3.epa.gov/airquality/greenbook/anayo_in.html

U.S. Fish and Wildlife Service Northeast Region. 2014. Rufa Red Knot background information and threats assessment. Supplement to endangered and threatened wildlife and plants; Final threatened status for the Rufa Red Knot (*Calidris canutus rufa*). [Docket No. FWS-R5-ES-2013-0097; RIN AY17]

Willman, H. B., 1971, Summary of the geology of the Chicago area: Circular 460, Illinois State Geological Survey, Urbana, IL.