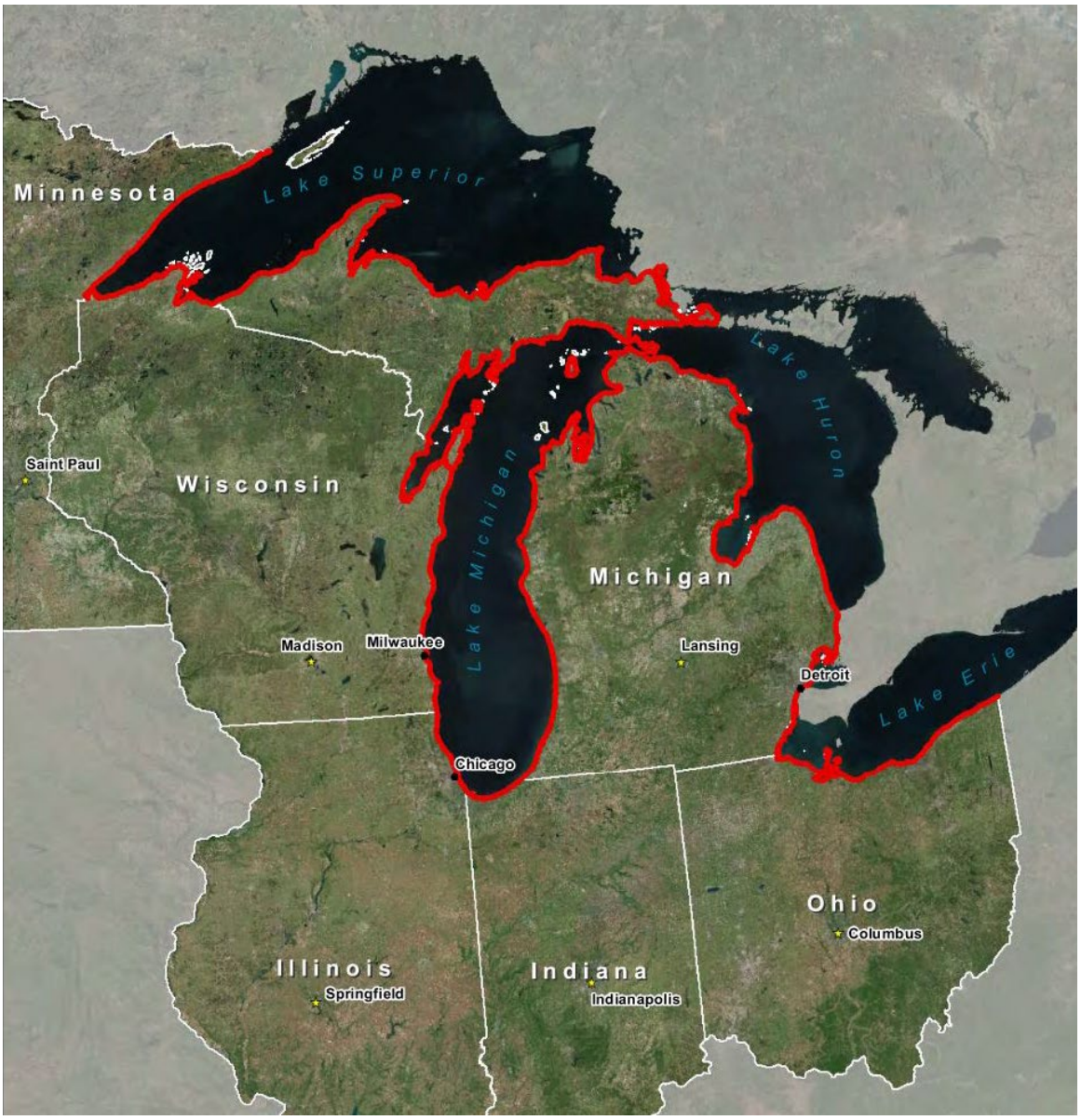

DRAFT

Programmatic Environmental Assessment

Great Lakes Shoreline Stabilization Projects

March 2021

FEMA

Federal Emergency Management Agency
Region V
Department of Homeland Security
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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
BP	before present
BRIC	Building Resilient Infrastructure and Communities
CAA	Clean Air Act
CATEX	Categorical Exclusion
CBRS	Coastal Barrier Resources System
CELCP	Coastal and Estuarine Land Conservation Program
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CMP	Coastal Management Program
CO	Carbon Monoxide
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBA	A-Weighted Decibels
DHS	U.S. Department of Homeland Security
DNR	Department of Natural Resources
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EGLE	Michigan Department of Environment Great Lakes and Energy
EHP	Environmental and Historic Preservation
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FR	Federal Register
GIS	Geographic Information System
GLANSIS	Great Lakes Aquatic Nonindigenous Species Information System
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
IDEM	Indiana Department of Environmental Management
I	Interstate
LANDFIRE	Landscape Fire and Resource Management Planning Tool

MBTA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NO_2	Nitrogen Dioxide
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREPA	Michigan Natural Resources and Environmental Protection Act
NRHP	National Register of Historic Places
NVC	National Vegetation Classification
NWP	Nationwide Permit
O_3	Ozone
PA	Public Assistance
Pb	Lead
PDM	Pre-Disaster Mitigation
PEA	Programmatic Environmental Assessment
PM	particulate matter
RCRA	Resource Conservation and Recovery Act
SEA	Supplemental Environmental Assessment
SHPO	State Historic Preservation Officer
SO_2	Sulfur Dioxide
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Load
TRI	Toxics Release Inventory
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
U.S.C.	U.S. Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDNR	Wisconsin Department of Natural Resources

SECTION 1. INTRODUCTION

The mission of the Federal Emergency Management Agency (FEMA) is to reduce the loss of life and property and protect our institutions from all hazards by leading and supporting the nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery. An important component of FEMA's mission is disaster resilience, which includes funding for activities that help communities reduce the future impacts of natural disasters to life and property.

Shoreline stabilization projects are funded under FEMA's Hazard Mitigation Assistance (HMA) programs, as authorized by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (Stafford Act). The HMA includes multiple funding programs, including the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program. Note, the PDM Program has been superseded by the Building Resilient Infrastructure and Communities (BRIC) Program, which also supports research-supported, proactive investment in community resilience. Shoreline stabilization measures that are eligible for HMA funding must meet the individual program requirements as set forth by FEMA. Currently, the requirements for hazard mitigation activities are found in the *Hazard Mitigation Assistance (HMA) Guidance* and *Hazard Mitigation Assistance Guidance Addendum* (FEMA 2015a and 2015b) (as amended). (*See* Section 9 for references listed by agency and year of publication.) The HMA Program allows for funding of nature-based solutions, such as wetland and floodplain restoration (FEMA 2020a).

Funding may also be requested from FEMA's Public Assistance (PA) Program for emergency protective measures and debris removal (emergency work) and permanent restoration of damaged facilities, including cost-effective hazard mitigation to protect the facilities from future damage. Eligible work must be required as a result of a declared incident, located within the designated area, and be proposed by a legal applicant (FEMA 2020d). Slope stabilization is not eligible under the PA Program unless slope instability poses a threat to life, public health and safety, or improved public or private property, or is related to an eligible disaster-damaged facility. If the instability causes a threat, emergency protective measures to stabilize the slope may be eligible for PA funding. If the instability is related to an eligible facility that was damaged as a result of a disaster, then slope stabilization measures may be eligible as permanent work (FEMA 2020c). The PA Program provides opportunities to use nature-based solutions, provided projects meet program eligibility requirements (FEMA 2020a).

Users of this PEA should note that FEMA grant programs are subject to change and this programmatic environmental assessment (PEA) will potentially cover eligibility changes and program changes.

The purpose of this PEA is to identify, at a programmatic level, the potential adverse and beneficial effects associated with certain shoreline stabilization measures for the Great Lakes shoreline within the States of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. FEMA's experience in conducting environmental planning and historic preservation (EHP) reviews for shoreline stabilization projects, as required by the National Environmental Policy Act (NEPA), provides sufficient information to determine the likely impacts of these eligible

activities on the human environment. This PEA captures and builds upon FEMA's knowledge and experience to evaluate the potential environmental effects of FEMA funding for eligible shoreline stabilization measures. The PEA also identifies specific shoreline stabilization measures that may not require additional NEPA review and actions that would require site-specific reviews that could be tiered under this PEA. Some projects or classes of activities may continue to require project-specific NEPA compliance reviews.

FEMA prepared this PEA in accordance with NEPA, the Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and agency guidance for implementing NEPA (DHS Instruction 023-01 and FEMA Instruction 108-01-1).

1.1 Shoreline Erosion and Stabilization

Shoreline stabilization measures combat the erosion of coastal land from wind, water, or ice movement. This process can be chronic (long-term) or episodic (short-term). Chronic erosion occurs as a result of slow processes, such as average daily wave action, changing lake levels, land subsidence, development, or watershed changes. Episodic erosion is the cross-shore movement of sediment that results from short-duration, high-intensity storm events or sudden slope failure. Current FEMA regulations limit PA funding to risks and losses occurring as the direct result of a storm event or episodic erosion; however, HMA program funding can be authorized for actions that are not a result of a direct storm event (FEMA 2018b). Shoreline erosion is primarily caused by erosive wave forces moving perpendicular to the shoreline. As a wave moves toward the shore, it begins to drag on the bottom, dissipating its energy. This eventually causes the wave to break or collapse. When waves break, the turbulence stirs up material from the shore bottom or erodes it from banks and bluffs. High wave energy and action impact shorelines through the combined effect of air compression and a mass of water (National Park Service [NPS] 2019c). Water level fluctuations, freezing, thawing, floating ice, and surface runoff from adjacent uplands may also cause shorelines to erode (NRCS 1996).

Communities and governments at the local, state, and federal levels can stabilize the shore and minimize the impacts of coastal erosion from wave and/or wind action. Options for community action include implementing setback regulations to control new development along shorelines or other zoning efforts to limit shoreline development, installing bioengineered solutions (e.g., beach nourishment and marsh and wetlands creation), and constructing hard engineering solutions (e.g., construction of breakwaters, bulkheads, and revetments).

1.2 Background

Water levels on the Great Lakes are highly variable and fluctuate in response to climate and weather. Currently, the Great Lakes are experiencing the highest water levels since the mid-1980s. Factors such as wave action, storms, wind, surface water runoff, and groundwater seepage continually reshape the shoreline (Michigan Department of Environment Great Lakes and Energy [EGLE] 2020). High water levels on the Great Lakes increase the risk of erosion and bluff recession and threaten property and infrastructure near the shoreline. High water levels may also lead to increased use of hard engineering measures (e.g., bulkheads) that can reduce the sediment supply to downdrift areas, leading to smaller beaches and increased erosion rates of downdrift bluffs and lakebed (U.S. Army Corps of Engineers [USACE] 2018a, 2018b, 2018c).

1.3 Study Area for This PEA

The area of analysis for this PEA encompasses the Great Lakes shorelines within the states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, as shown in **Figure 1-1**. The study area comprises the shorelines of Lakes Erie, Huron, Michigan, and Superior, including their connecting water bodies (e.g., Lake St. Clair), harbors, bays, and inhabited islands with populations of more than 10 in the 2000 and/or 2010 census. Encompassing approximately 3,797 miles of shoreline (409 federally managed miles, 89 tribally managed miles, and 496 state-managed miles), the study area for the PEA impact analysis extends one-quarter-mile inland and 500-feet lakeward from the shoreline.

To limit the extent of the study area, this PEA only covers projects with the primary purpose of shoreline stabilization and connected actions that are commonly associated with shoreline stabilization measures. FEMA assistance for shoreline stabilization projects is generally limited to nonfederal and tribal lands in areas eligible for funding under FEMA's HMA and PA programs.

1.4 Process for the Use of This PEA

The CEQ regulations at 40 C.F.R. §§ 1500.4(k) and 1501.11 encourage the development of program-level NEPA environmental documents and tiering from those programmatic documents to eliminate repetitive discussions, allowing for site-specific reviews that are focused on a narrower scope specific to the subsequent action. A PEA is used to address a group of projects that are similar in scope, scale, magnitude, and the nature of the impact. In addition, CEQ regulations at 40 C.F.R. § 1501.5 allow agencies to prepare an environmental assessment (EA) on any action at any time to assist agency planning and decision-making. FEMA developed this PEA under these CEQ authorities.

For a project to qualify under this PEA, the scope of the project and the nature of impacts must be evaluated in this PEA. A finding that the project conforms to the PEA must be documented using the compliance checklist provided in **Appendix A**. Additional project-specific analyses may be required if the context and intensity of a proposed project substantively differs from those described in this PEA. All projects using this PEA must undergo standard compliance procedures with regard to other federal laws, as described in the checklist (e.g., Endangered Species Act [ESA], National Historic Preservation Act [NHPA], Executive Orders [EOs] for Floodplain Management, Protection of Wetlands, and Environmental Justice).

Shoreline stabilization projects that are less complex may be eligible for categorical exclusions (CATEXs) and would not require coverage under this PEA. A CATEX is a class of action that FEMA established through public review and comment that would not typically result in significant impacts, either individually or cumulatively. The use of a CATEX for activities that promote resilience would still require an evaluation of extraordinary circumstances and compliance with environmental and historic preservation laws and EOs. If a specific project proposal is not included in the activities described in the Proposed Action and does not fall within the parameters of a CATEX, then a separate NEPA evaluation would need to be conducted.

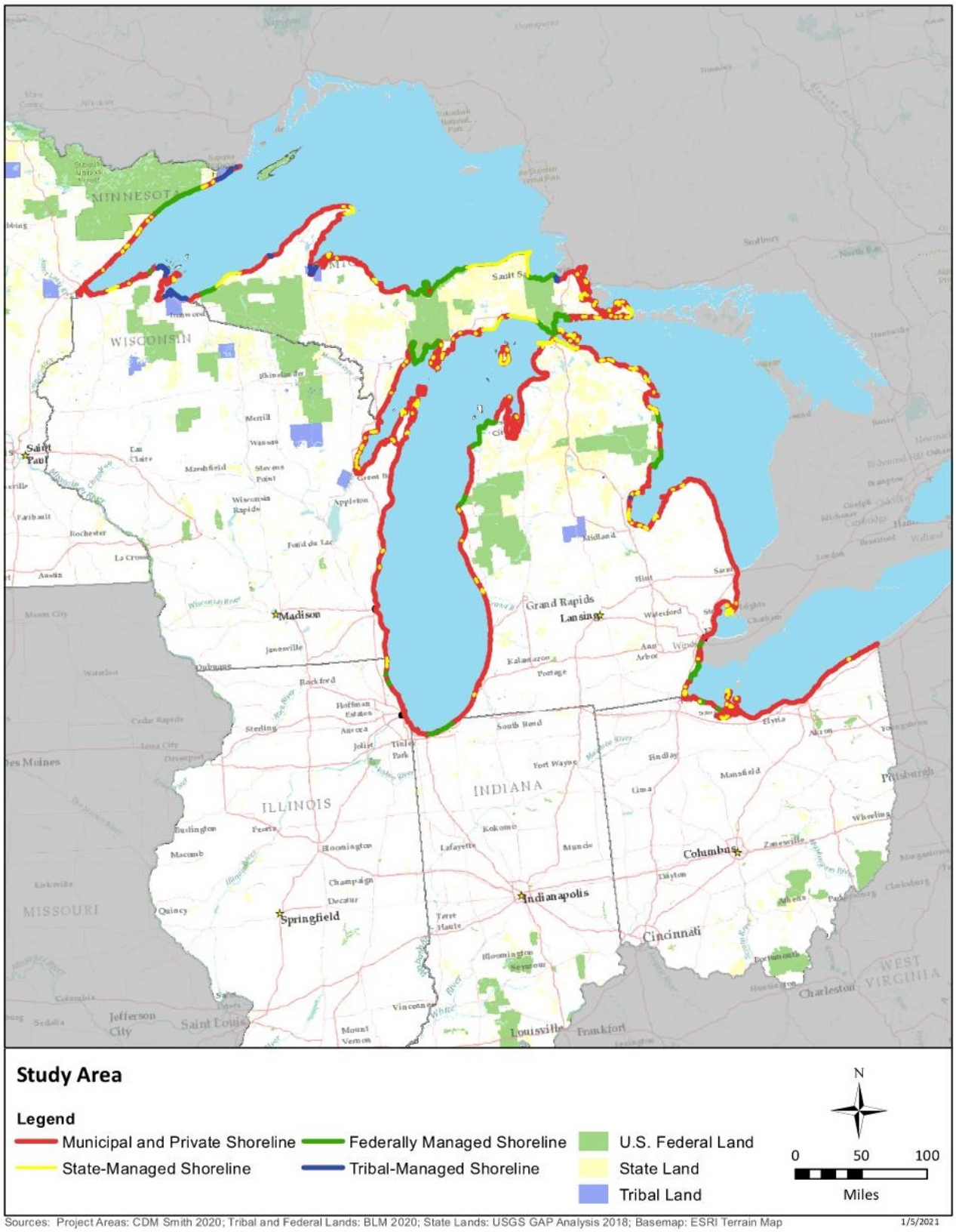


Figure 1-1. Study Area

It is expected that some shoreline stabilization projects will be more complicated and involve larger-scale efforts than those contemplated in this PEA. If a specific action is expected to (1) create impacts not described in this PEA, (2) create impacts greater in magnitude, extent, or duration than those described in this PEA, or (3) require mitigation measures to keep impacts below significant levels that are not described in this PEA, then a supplemental environmental assessment (SEA) would be prepared to address the specific action. The SEA would be tiered from this PEA in accordance with CEQ's NEPA-implementing regulations. Actions that are determined to require a more detailed or broader environmental review may require the preparation of a stand-alone EA or other applicable NEPA process.

This PEA is intended to facilitate FEMA's compliance with environmental and historic preservation requirements by providing a framework to address the potential impacts of shoreline stabilization actions. FEMA coordinates and integrates, to the maximum extent possible, the review and compliance processes required by other federal laws and policies such as Section 106 of the NHPA, Section 7 of the ESA, the Eight-Step Decision-Making Process of EOs 11988 and 11990, and others. This PEA provides a framework for integrating these requirements with NEPA compliance for shoreline stabilization projects.

This PEA does not cover actions where there are likely to be significant effects and for which it would be appropriate to develop an environmental impact statement. CEQ regulations (40 C.F.R. § 1501.3) provide guidance to determine whether the effects of an action could be significant, including the following:

- In considering whether the effects of the Proposed Action are significant, agencies will analyze the potentially affected environment and degree of the effects of the action. Agencies should consider connected actions consistent with 40 C.F.R. § 1501.9(e)(1).
- In considering the potentially affected environment, agencies should consider, as appropriate to the specific action, the affected area (e.g., national, regional, or local) and its resources, such as listed species and designated critical habitat under the Endangered Species Act or historic properties that would require review under the National Historic Preservation Act. Significance varies with the setting of the Proposed Action. For instance, in the case of a site-specific action, significance would usually depend only upon the effects in the local area (40 C.F.R. § 1501.3(b)(1)).
- In considering the degree of the effects, agencies should consider the following, as appropriate to the specific action (40 C.F.R. § 1501.3(b)(2)):
    - Both short- and long-term effects
    - Both beneficial and adverse effects
    - Effects on public health and safety
    - Effects that would violate federal, state, tribal, or local laws protecting the environment

SECTION 2. PURPOSE AND NEED

2.1 Project Purpose

FEMA aims to increase disaster resilience by providing assistance to communities for projects that help prevent loss of life and property and reduce disaster recovery costs. Uniform provision of assistance is an essential goal of the HMA and PA programs. The purpose of shoreline stabilization assistance provided through FEMA's HMA and PA grant programs is to reduce risks associated with erosion hazards that affect people, structures, and infrastructure by mitigating the effects of flowing water, wave, or wind action. FEMA is responsible for providing resilient shoreline stabilization using accepted engineering practices, established codes, standards, modeling techniques, and best practices. Stabilization measures must also demonstrate that they are cost-effective based on FEMA benefit-cost analysis methods (FEMA 2018a).

2.2 Project Need

There is an increasing need to provide effective stabilization measures along the shorelines of the Great Lakes. Water levels on the lakes, despite being highly variable over the long term, have been rising since 2014. Currently, the Great Lakes are experiencing the highest water levels since the mid-1980s (**Figure 2-1**). Increases in lake levels are driven by unprecedented rainfall events and record ice cover during the past several winters, resulting in reduced winter evaporation rates (EGLE 2020). This trend follows a period of record low water levels that occurred from the early to mid-2000s, as shown in **Figure 2-1**. During low-water periods, the perceived risk of erosion decreases and can result in structures being built closer to the shoreline—these structures are at risk during high-water periods (EGLE 2020; USACE 2018a, 2018b, 2018c).

Typically, the Great Lakes are at their lowest levels in winter and highest levels in summer or fall. The annual rise in water levels ranges from 11 to 20 inches (National Oceanic and Atmospheric Administration [NOAA] 2020). Lake Michigan and Lake Huron have the most variability among the Great Lakes, with Lake Erie fluctuating at a slightly smaller amplitude. Lake Superior has a smaller variability in water levels, primarily because of its larger size relative to its drainage basin (Environmental Law and Policy Center 2019). Water level variability of the Great Lakes over a multidecadal time scale is shown in **Figure 2-2**.

During periods of high water levels and high wave action, structures and beaches become submerged, lakebeds experience downcutting, and rates of shoreline and bluff erosion and recession increase. The degree of shoreline erosion hazard depends on wave height and energy during storms and shoreline type and configuration. During these periods of high water or increased erosion, the risk of bluff failure increases, putting nearby structures, utilities, and transportation infrastructure at higher risk of damage or closure.

Waves are the most important erosive agents along shorelines. When waves break along a shore, the turbulence stirs up material from the shore bottom or erodes it from banks and bluffs. Materials such as fractured rock, particles, and sediments can become dislodged by breaking waves because of the combined effect of air compression and the impact of a mass of water. Waves can also throw particles against the shoreline, which can contribute to erosion through physical abrasion. Wave energy and thus erosion rates increase with large storm events (NPS

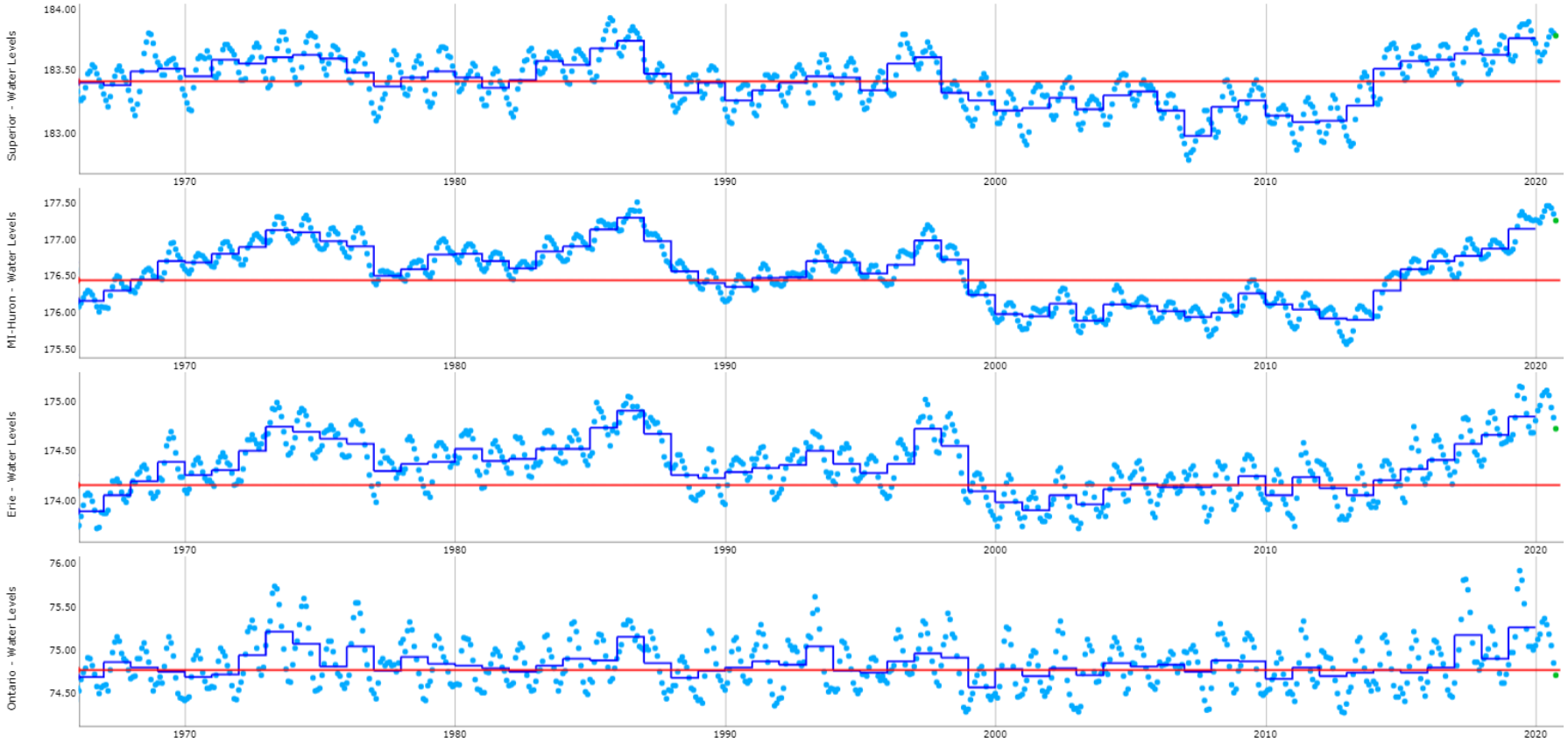
2019c). As the climate warms, storms are expected to increase in frequency and intensity, which may increase precipitation and wave energy and action, resulting in increased episodic erosion (Environmental Law and Policy Center 2019, FEMA 2018b).

Certain areas along Lake Erie's shoreline experience steady rates of erosion while others experience episodic events. According to USACE, the average shore recession rate along the lake is 1.4 feet per year, with recession rates in local areas ranging up to 56 feet per year (USACE 2018a). Erosion of the Lake Huron shoreline is ongoing at rates up to 5 feet per year. Much of Lake Michigan's shoreline is characterized by eroding bluffs with bluff recession rates up to 15 feet per year (USACE 2018b). The highest rates of erosion are in Illinois Beach State Park and along the shoreline of the North Point Marina, just south of the Wisconsin border. Shoreline recession on Lake Michigan has a long-term average of 10 feet per year (USACE 2018b). Portions of Lake Superior's shorelines are highly vulnerable to erosion as they are comprised primarily of a mixture of unconsolidated glacial materials (USACE 2020b). The highest rates of erosion are up to 17 feet per year along the Lake Superior shoreline in Grand Marais, Michigan (USACE 2020b). Eroding sandy beaches can lose between 3 to 6 feet per year, while bedrock erodes to a lesser extent at approximately 4 inches per year (Heinz Center 2000).

The State of Michigan has 185 miles of shoreline eroding at a rate of more than 1 foot per year, which are designated by the State as high-risk erosion areas (USACE 2020a). Five counties along the Lake Huron shoreline in the mid-lake area to the St. Clair River include high-risk erosion areas with over 1,600 property parcels impacted (USACE 2020a). The identification of high-risk erosion areas by states highlights the need for shoreline erosion mitigation measures.

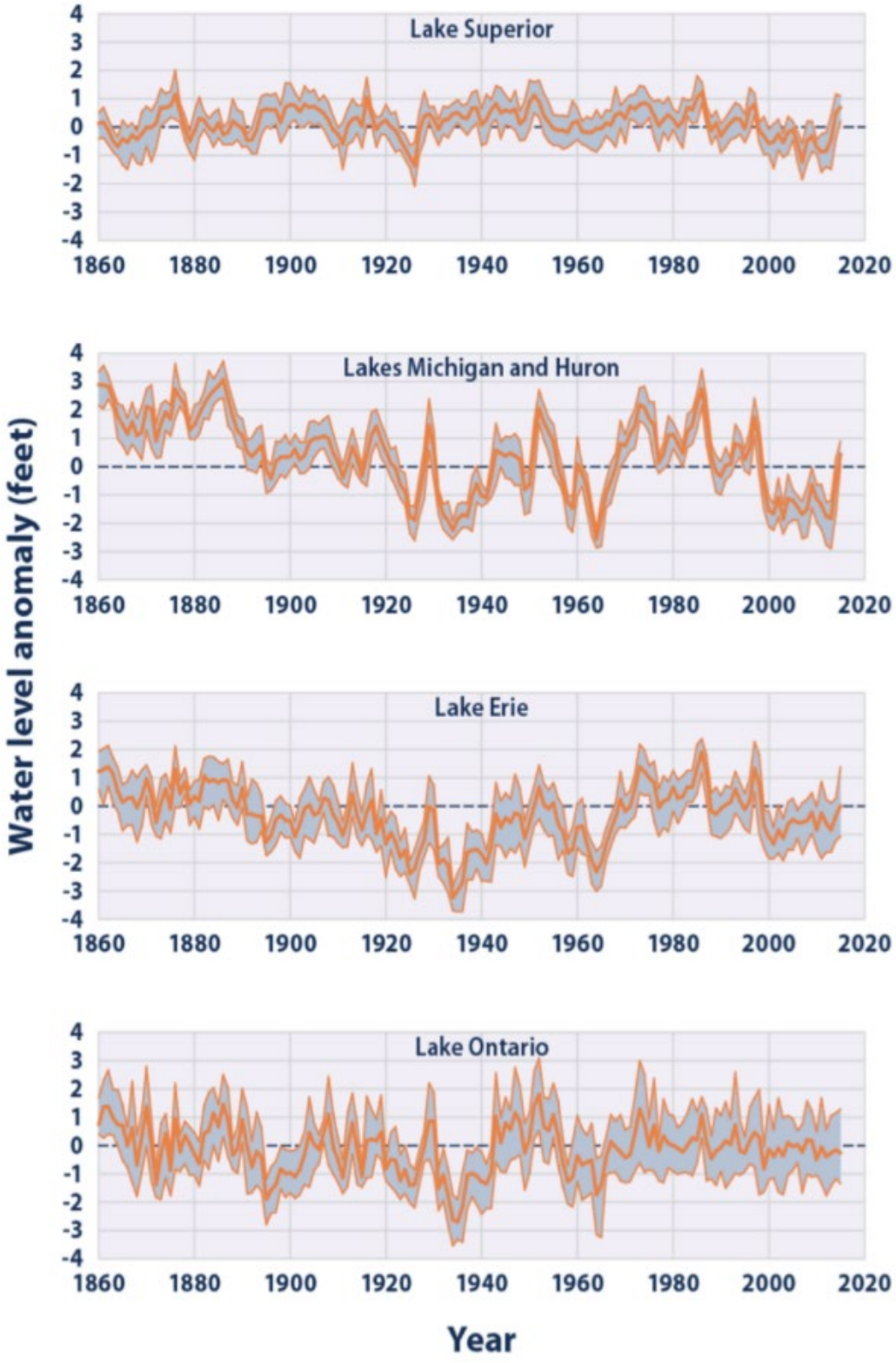
Shoreline erosion threatens ecosystem health by causing loss of coastal wetlands and dune systems. Loss of shoreline wetlands and dunes can also lead to increased rates of shoreline erosion, thus creating a cycle of increasingly vulnerable shorelines. Wetland vegetation causes wave energy to be dissipated before it erodes bottom sediments or reaches shoreline soils. The loss of energy as waves move across coastal wetlands also reduces wave height, further protecting shorelines and reducing the potential for flooding. Dunes form a resilient barrier to wave energy that protect inland areas from erosion and flooding.

Erosion can enhance invasive species habitats, particularly for zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena rostriformis*), which prefer hard bottom substrates. These invasive mussel species promote the growth and concentration of Type E botulism bacteria, which can harm birds and fish that feed on the mussels (USACE 2018a, 2018b, 2018c). These invasive mussels also result in severe impacts on infrastructure, such as water intakes, vessels, and recreational use of shorelines.



Source: NOAA 2020a
Notes: Blue dots indicate the lake-wide monthly water level averages.
Dark Blue lines indicate lake-wide annual water level averages.
Red lines indicate lake-wide period of record water level averages.

Figure 2-1. Great Lakes Water Level Variation 1960 to 2020 (Meters)



Source: Environmental Law and Policy Center 2019

Figure 2-2. Great Lakes Water Level Variation – 1860 to 2015 (feet)

SECTION 3. ALTERNATIVES

This section describes the two alternatives evaluated in the PEA: the No Action alternative and the Proposed Action.

3.1 No Action Alternative

Under the No Action alternative, FEMA would not take or fund any action. There could be a range of possible outcomes if FEMA funding is not provided, depending on the amount of available alternative funding and a community's priorities. Because of the broad range of communities located along the Great Lakes shorelines, it is impossible to predict each community's actions, time frame, and standards to which the work would be completed. Therefore, to provide a consistent basis for comparison to the Proposed Action, it is assumed, for the purposes of this PEA, that damaged facilities would either remain in a state of disrepair (i.e., they would not be repaired or replaced) and eroding shorelines would be stabilized using ad hoc efforts that may not include suitable engineering or a focus on long-term resilience and hazard mitigation. In the absence of appropriately engineered solutions, the No Action alternative for a given project area is expected to lead to continued deterioration and erosion of the shoreline because of the unmitigated effects of flowing water, wave and/or wind action, and storm and flooding events.

3.2 Proposed Action

The Proposed Action includes shoreline stabilization measures that are eligible for FEMA funding. Connected actions are described in **Section 3.3**. These measures may be implemented individually or in combination with one another. PA programs fund projects that help communities respond to and recover from Presidentially declared disasters or emergencies. Other FEMA-funded projects must show an increased level of protection for communities or residential areas. Generally, HMA programs fund mitigation projects on nonfederal lands that can show risk reduction to the developed environment. Design guidance for coastal structures can be found in the *USACE Coastal Engineering Manual* (USACE 2011).

There would be no defined size limit on shoreline stabilization measures covered by this PEA; although, some smaller projects may be eligible for NEPA coverage under a CATEX (as described in **Section 3.4.3**). Although this PEA does not include a defined size limit on length of activities, very large or complex projects may still require a separate evaluation. FEMA will review each project to determine if it should be covered by this PEA or whether another level of evaluation would be more suitable, including an SEA, a stand-alone EA, or an environmental impact statement.

There are several CATEXs that may be applicable to shoreline stabilization projects and a CATEX should be used for NEPA compliance when appropriate. Potentially applicable CATEXs are described in more detail in **Section 3.4.3**.

3.2.1 Bioengineered Stabilization Measures

Bioengineered stabilization measures covered by this PEA use native vegetation and other suitable plant species together with engineered structural components to stabilize and reduce erosion along a shoreline. Bioengineered measures alone, without engineered structural elements, may be used in areas of low to moderate wave action. These measures provide a self-sustaining, low-maintenance solution for many impaired shoreline conditions. The design principles require an integrated watershed and sediment-transport-system-based approach. Bioengineering approaches use sound engineering practices and ecological principles to assess, design, construct, and maintain living vegetative systems that are blended into the shoreline and coastal ecosystem. (FEMA 2018a).

The implementation of bioengineered projects may require excavators and other heavy equipment to install structural components and place sediment, but would not typically require heavy equipment to plant vegetation. Exceptions may include using heavy equipment to conduct broadcast seeding and to place willow bundles in engineered slopes. In areas of steep bluffs, project materials and heavy equipment may be delivered from the waterside via watercraft such as a tug and barge or surplus navy landing craft, and construction could take place with heavy equipment located on a spud barge. Nature-based methods are most appropriate in low to medium wave energy environments. Bioengineered measures may or may not require in-water work. If in-water work is required, the potential for environmental impacts may be greater and project implementation methods would need to be clearly defined to assess whether potential impacts are described in this PEA. Best management practices (BMPs) for equipment use are described in **Section 5**.

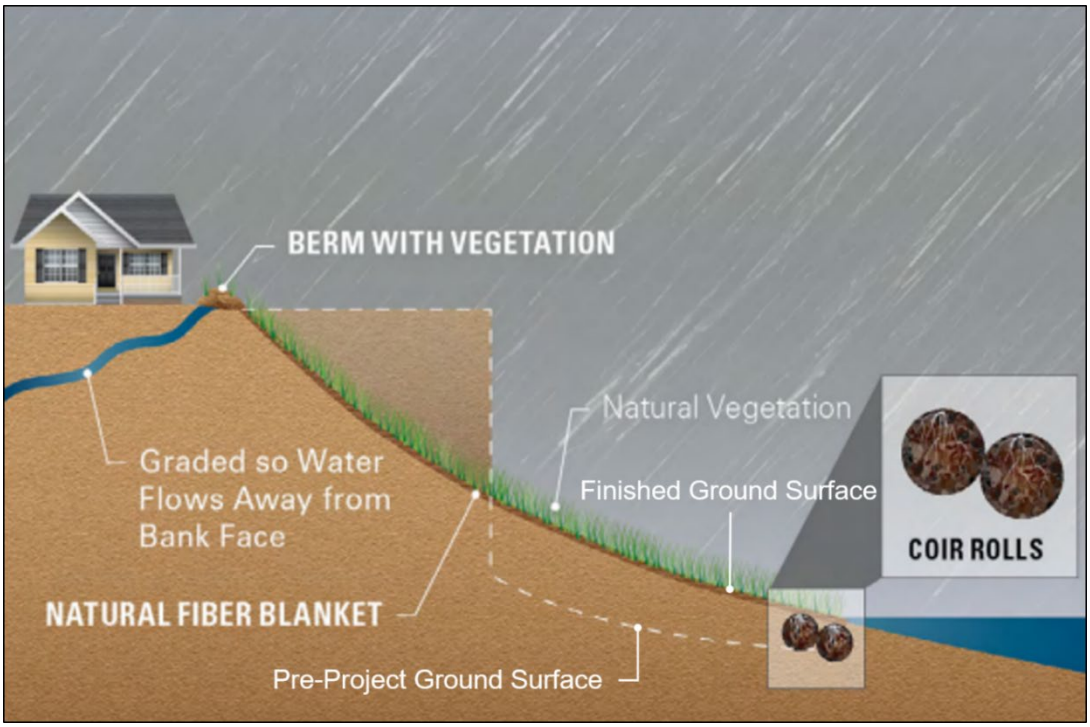
Bank Regrading/Stabilization

Bank regrading involves the stabilization of an unstable and over-steepened slope by regrading the slope to retreat (to slope backward) the bank crest or by placing fill at the bank toe. Stabilization is achieved by diverting surface runoff from the eroding bank face by creating berms or installing drywells or French drains to encourage infiltration. Temporary erosion controls may be installed, including coir rolls and natural fiber blankets. Native, deep-rooted vegetation may also be planted on the bank to stabilize soils. Plant roots help to hold soil in place and the presence of vegetation slows the velocity of surface water running down the slope, helping to prevent runoff from eroding the soil. A conceptual representation of this measure is provided in **Figure 3-1**.

Marsh and Wetlands Creation, Restoration, or Enhancement

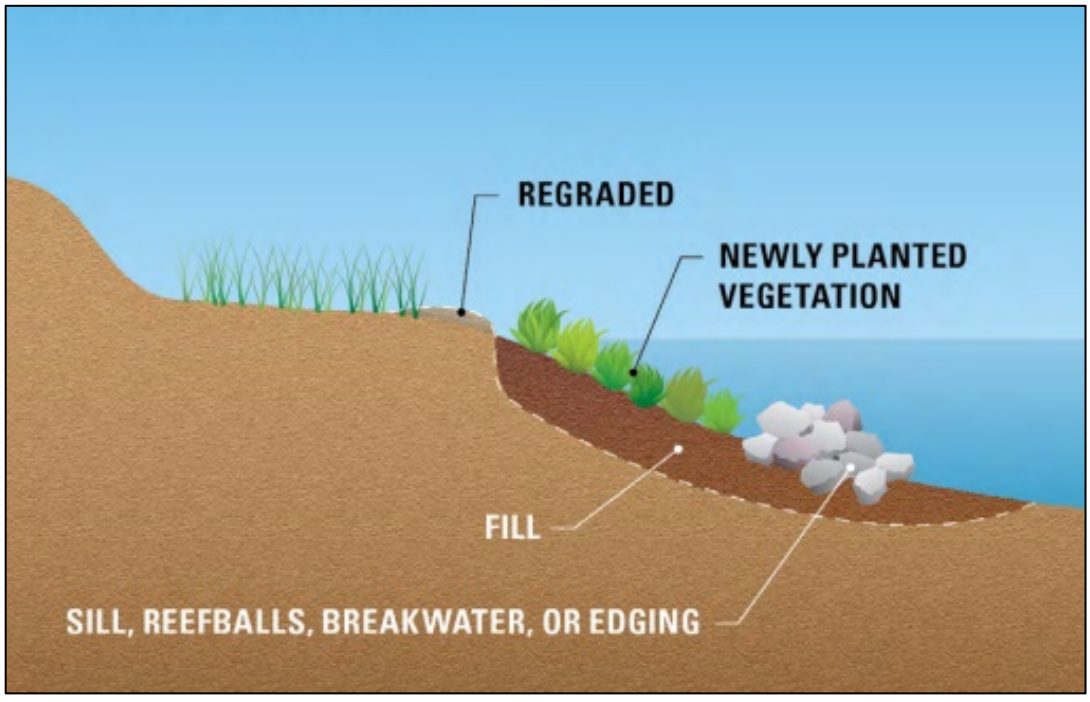
As a measure to reduce wave energy, coastal marshes and wetlands can be created on non-wetland sites where the conditions exist to produce and sustain a marsh or wetland. Restoration is the rehabilitation of a degraded wetland or the reestablishment of a destroyed marsh or wetland. Enhancement is the alteration of an existing wetland to improve its functions (U.S. Geological Survey [USGS] and U.S. Environmental Protection Agency [EPA] 2002). These approaches may include a number of actions, such as regrading unstable slopes or removing fill material, placing sediment that is appropriate for marsh vegetation, filling drainage channels or restoring historical channels, and planting native marsh vegetation along the future marsh platform. In low-wave-energy environments, sills may be installed parallel to the vegetated shoreline to reduce wave energy and prevent erosion. In higher-wave-energy environments,

breakwaters might be installed to attenuate wave energy and collect sediment. A conceptual representation of this measure is provided in **Figure 3-2**.



Source: FEMA 2018a

Figure 3-1. Bank Regrading/Stabilization



Source: FEMA 2018a

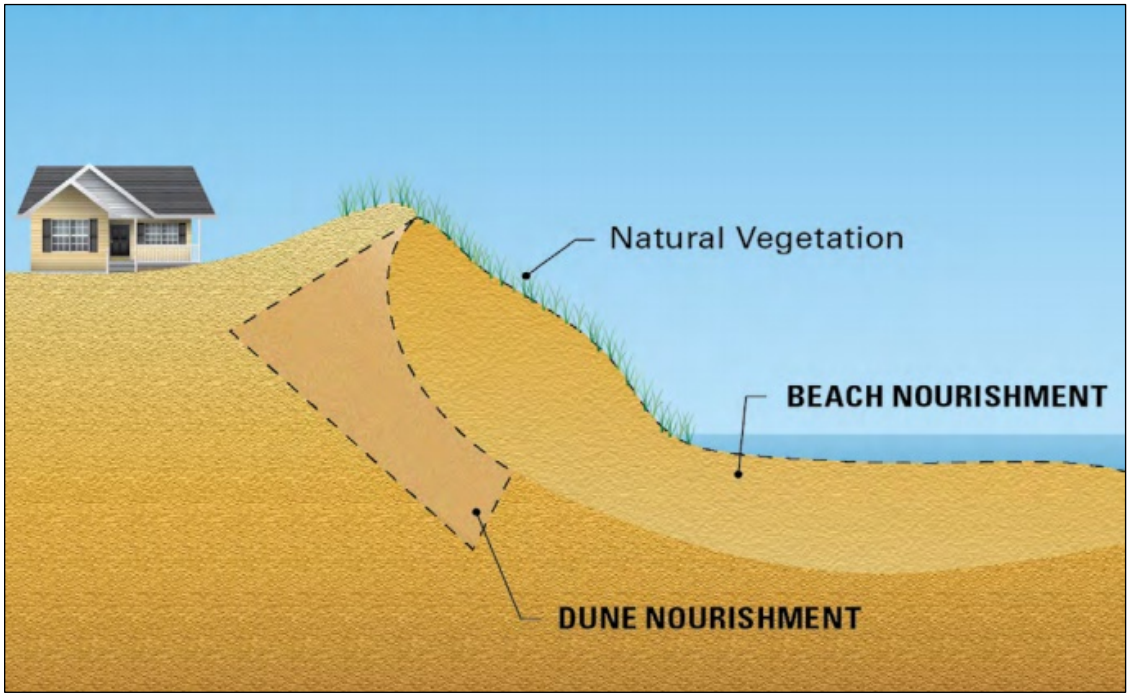
Figure 3-2. Marsh and Wetlands Creation, Restoration, or Enhancement

Sills and breakwaters used in marsh projects should be engineered, as both are wave energy dissipation structures with differing design considerations. Both types of structures are designed to function for a selected design water elevation and wave height. The structures should be designed so that the rock weight is enough to resist expected wave uplift forces and each structure would have an offshore toe buried to resist scour from expected waves. The potential scour depth is a function of the design wave height or water elevation.

Common wetland design elements include (1) selecting a site based on site and watershed criteria (e.g., level of development, location of nearby water bodies, existing wetland characteristics), (2) analyzing the hydraulics to determine inflows and outflows of surface waters, water levels, and the timing and duration of soil saturation, (3) determining water sources and quality (e.g., potential chemical inputs into the area), (4) augmenting or mulching soils in the project site to support establishment of wetland vegetation, (5) selecting wetland plants appropriate to the setting and the goals of the project, (6) implementing a buffer zone around the wetland (e.g., an area of upland vegetation, a fence, sediment basin) to protect the area from disturbance and trap undesirable materials, and (7) maintaining the wetland or marsh (USGS and EPA 2002).

Beach/Dune Nourishment

Beach/dune nourishment involves the placement of clean compatible sediment (based on mean grain size and material) to widen beaches and add sediment to the shoreline system. When beach nourishment is used to create dunes, native deep-rooted beach grasses are often planted at the top of the dune and upper beach to trap and stabilize the sediment and filter stormwater runoff, as shown in **Figure 3-3** (FEMA 2018a). Projects related to beach/dune nourishment are ineligible for HMA funding; but, under certain circumstances, are eligible for PA funding.



Source: FEMA 2018a

Figure 3-3. Beach/Dune Nourishment

3.2.2 Hard Stabilization Measures

Hard stabilization measures use engineered structures to reduce the force of water against the shoreline or increase shoreline resistance to erosive forces. These measures may be effective for shoreline stabilization but often have neutral to negative impacts on shoreline ecosystems and habitats, such as sediment starvation of downdrift shorelines. These measures are generally more appropriate in areas of high-wave-energy action and should be designed and evaluated carefully to avoid negative effects and degradation of the environment. The implementation of hard engineering measures would require excavators and other heavy equipment and vehicles. In areas of steep bluffs, project materials and heavy equipment may be delivered via watercraft such as a tug and barge or surplus navy landing craft, and construction could also take place with heavy equipment on a spud barge. Hard engineering measures may or may not require in-water work. If in-water work is required, there is a potential for environmental impacts to be greater and project implementation methods would need to be clearly defined to assess whether potential impacts are described in this PEA. BMPs for equipment use are described in **Section 5**.

Individual hard stabilization projects may span, or have impacts that span, multiple jurisdictions (i.e., international, state, local, or tribal). This PEA includes thresholds to help subapplicants determine whether projects may have cross-jurisdictional impacts. These thresholds have been determined through a literature review of downdrift impacts from shore-parallel hard stabilization measures (i.e., seawalls, bulkheads, and revetments), shore-perpendicular hard stabilization measures (i.e., groins and jetties), and breakwaters. A review of the literature focused on scour in front of shore-parallel erosion control structures and excess erosion along the adjacent shoreline in order to adequately design return walls. The downdrift impacts of shore-parallel structures as a function of the structure length has not been heavily studied, but some laboratory tests have shown that the downdrift impact of the structure can be three to four times the structure length (Kraus and McDougal 1996). The downdrift impacts of shore-perpendicular structures are thought to be three to five times the structure length (Caufield 1997). Breakwaters have similar downdrift impacts as groins (Mangor et al. 2017). An SEA may be needed in cases where a jurisdictional boundary is located downstream from the proposed project area at a distance of less than four times the length of the proposed shore-parallel structure (if a seawall, bulkhead, or revetment) or five times the length of a proposed shore-perpendicular structure (if a groin, jetty, or breakwater). In these instances, subapplicants would need to coordinate with appropriate downdrift jurisdictional authorities and permitting agencies may require inclusion of downdrift mitigation actions.

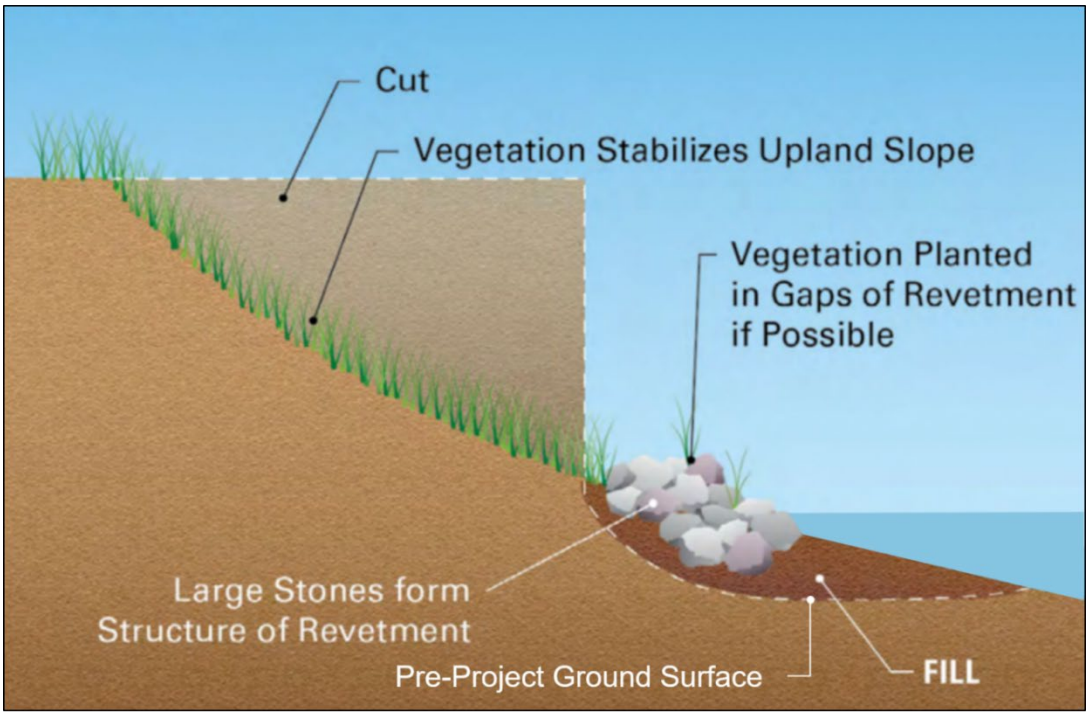
Revetments

Revetments are structures that are installed to fit the slope and shape of the shoreline and are used to dissipate wave energy and provide an immediate barrier against erosion (**Figure 3-4**). These structures may consist of rock (or riprap), concrete, cellular blocks, or other materials. A rock or riprap revetment is the installation of large rocks along a shoreline. Rocks may be angular or rounded materials sized to withstand the expected erosive forces at the site. A concrete revetment is an arrangement of concrete structures installed to fit the shape of a graded shoreline slope. Various concrete component shapes, sizes, and configurations may be used as revetments, such as walls, articulated concrete blocks, or A-jacks (U.S. Department of Agriculture Natural Resources Conservation Service [NRCS] 1996). Revetment installation can also include slope regrading and the installation of native vegetation on the slope above a

revetment or within the spaces between the revetment rocks to increase stability and create habitat, as described in **Section 3.2.1**.

Revetments can provide long-term stability and long life with minimal maintenance, particularly if native or desirable vegetation is planted in spaces between revetment rocks to inhibit the growth of invasive weeds. They can be designed for high-wave-energy areas and may be flexible enough to reform if the foundation is eroded away or settlement occurs. Each revetment design must consider location-specific conditions such as bank slope and stability, expected wave action, hydraulic conditions, and anticipated scour depths. Geotechnical investigations and hydraulic modeling may be required to characterize site conditions (NRCS 1996). Revetment toes extend into the lakebed to a depth that correlates with protection against toe scour from wave action. The scour depth is usually associated with the design water level (e.g., 100-year flood event), but designs may also consider long-term lake level fluctuations.

Revetments can increase erosion of shorelines adjacent to the structure, as wave energy travels parallel to the shoreline where it may dissipate on an unprotected segment of shoreline. The hard surface created by a revetment may reflect wave energy back away from the shore, which then rebounds onto the opposite shore of a cove or bay, thus increasing erosion on the opposite side. Revetments are also subject to toe failure, particularly in areas with large water level fluctuations; although a revetment will slump to fill a toe failure, at some point the entire structure will fail (NRCS 1996).



Source: FEMA 2018a

Figure 3-4. Example Revetment Design

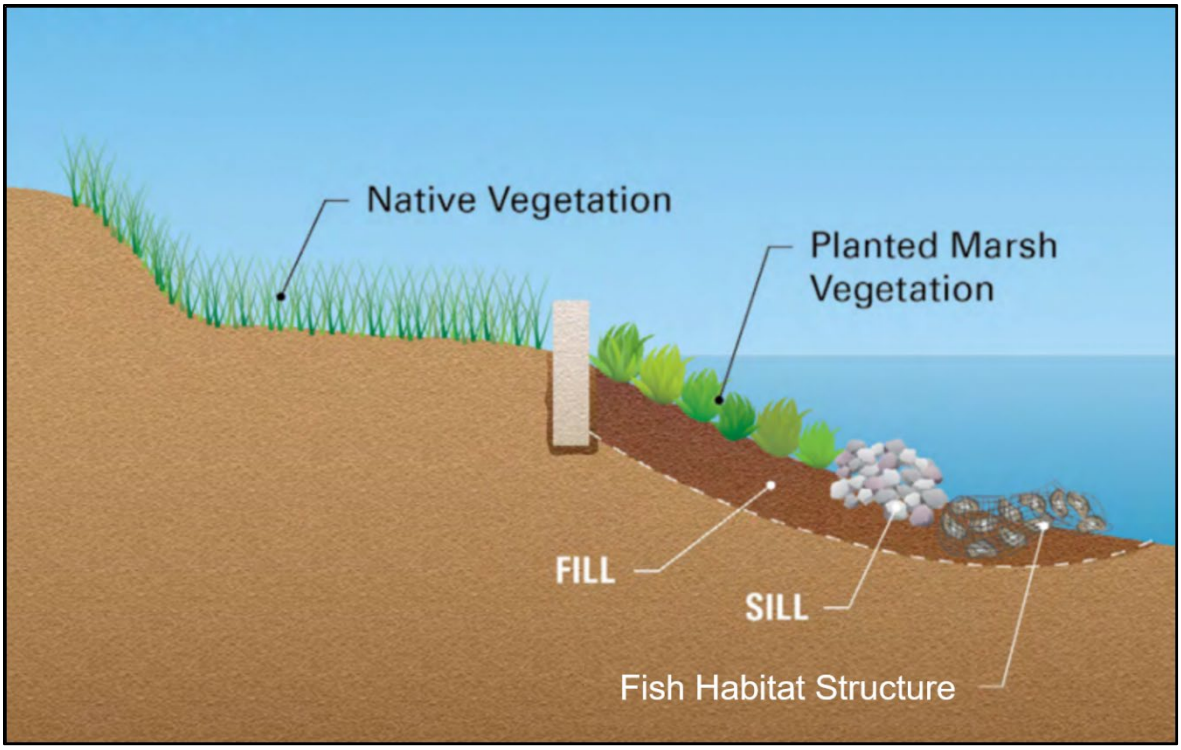
Basic design requirements for revetments include the following (NRCS 1996):

- Revetment materials should be selected and sized based on expected erosive forces at the site.
- Maximum recommended shoreline slope for a revetment is 1 foot vertical to 1.5 foot horizontal. Grading may be required to achieve this slope.
- Revetments should extend up the bank to the elevation at which vegetation would provide adequate soil stabilization. Potential wave runup should be considered to determine the full extent of the revetment.
- Base of the revetment must be founded below the maximum scour depth or placed on nonerosive material. The potential for prolonged periods of low water should be considered because it may focus wave energy at the base of the revetment.
- Toe protection, including toe buttresses, is required to prevent failure.

Bulkheads and Seawalls

Bulkheads are vertical walls constructed of concrete, steel, or aluminum sheet piling (**Figure 3-5**). They are commonly constructed parallel to the shoreline and are primarily designed to hold soil in place. Bulkheads may only provide minimal protection from waves but can provide robust shoreline erosion protection by acting as physical barriers between the water and ground surface as well as retaining walls for the shoreline. Bulkheads require seepage control components to balance hydrostatic loads and allow groundwater flow to the lake and, in high lake conditions, back from the lake into the groundwater system. They must be designed and constructed for the range of lake stage and wind-wave conditions expected to manage potential overtopping and erosion. Failure of the bulkhead can occur due to scouring at the base of the bulkhead from wave action, and the toe of the structure must be protected. Bulkheads can be constructed along any shoreline and require moderate maintenance, depending on the construction material chosen. Sheet pile walls and concrete walls, for example, will eventually need replacement because of corrosion (NRCS 1996).

Seawalls are structures constructed parallel to the shore that are intended to provide protection from waves in addition to holding soil in place. When wave energy is reflected off of the wall, erosion at the toe of the wall may increase (NPS 2019c). Both bulkheads and seawalls can increase erosion of shorelines adjacent to the bulkhead as wave energy travels parallel to the shoreline where it may dissipate on an unprotected segment of shoreline.



Source: FEMA 2018a

Figure 3-5. Example Bulkhead Design

Each bulkhead and seawall must be designed based on location-specific conditions such as substrate types, expected wave action, hydraulic conditions, and existing bank stability. Geotechnical investigations and hydraulic modeling may be required to characterize site conditions. Site conditions will dictate the types of materials used and the structural design requirements. Structure design, including pile thickness and embedment depth, is dependent on bulkhead or seawall height and soil conditions, and structures must be designed by a registered engineer. Basic design requirements for bulkheads include the following considerations (NRCS 1996):

- Toe protection to mitigate scouring
- Seepage control to balance hydrostatic loads
- Concrete bulkheads must be designed to resist sliding and overturning
- All metal components (e.g., piling, connections, anchoring) should be corrosion-resistant

Bulkheads and seawalls are suitable for high energy wave environments with appropriate engineering. Gravel and/or cobble beach may be constructed in front of the structures to reduce the impacts of waves and erosion on the toe or the face of the structure. Elements such as planting of native vegetation landward of the bulkhead or installing fish habitat structures or large woody debris offshore can reduce impacts on the ecology of the shoreline system (FEMA 2018a).

Breakwaters

Breakwaters are structures constructed parallel to the shore (**Figure 3-6**). Breakwaters are intended to break waves and dissipate wave energy before it reaches the shoreline, reduce the force of wave action, and encourage the accretion of sediment on the beach (FEMA 2018a). Breakwaters are usually constructed with rock or concrete, can be floating or fixed to the lakebed, and can be continuous or segmented. Breakwaters allow sediments carried by longshore currents to be deposited between the structure and shoreline. The accretion of sediment may help to stabilize wetlands, beaches, and dunes and provide shelter for new shoreline marsh habitat (NPS 2019a). However, like other hard engineering measures, breakwaters can also cause increased erosion downdrift of the structure (American Geosciences Institute 2020).

Source: NPS 2019a

Figure 3-6. Breakwater Example

Groins and Jetties

Groins are structures that are installed perpendicular to the shore to trap littoral drift. Groins are generally installed in groups, or groin fields (**Figure 3-7**). The sand trapped between groins acts as a buffer between incoming waves and the shoreline. Groins are most effective when littoral drift is transported in a single direction. Filling the groin with sand may be necessary in cases where littoral transport of clay and silt rather than sand occurs (NRCS 1996). The clay and silt fraction of the littoral drift are small-diameter grain sizes and will not fall out of suspension to form a stable protective beach feature.

Groins must extend far enough into the water to retain desired amounts of sand. The distance between groins generally ranges from one to three times the length of the groin, but this distance may be reduced if groins are used with bulkheads. When building a groin field, it is recommended to start with the downdrift groins and progress in a updrift manner. There should also be time between construction of adjacent groins to allow for entrapment of sand. If one is not relying on the natural processes of littoral transport, then sand can be filled in the groin compartment as construction progresses. The landward end of the groins should extend into the

bank or to the bulkhead. The shoreline height of the groin should generally be at mean high water elevation plus 2 or 3 feet for wave surge height (NRCS 1996).

Jetties are also installed perpendicular to the shoreline and often located adjacent to shipping channels. Jetties can be constructed with rock, timber, concrete, gabions, or rock-protected earth (NRCS 1996). Jetties are used to minimize the deposition of sediment within the channel and protect the channel against storm waves. Often, two jetties are installed on opposite sides of a shipping channel (American Geosciences Institute 2020).

Source: NPS 2019d

Figure 3-7. Groin Example

3.3 Connected Actions

Connected actions are actions that may be implemented as part of a shoreline stabilization project but are not stabilization measures in themselves. This PEA covers projects whose primary purpose is shoreline stabilization. Connected actions may or may not be funded through FEMA programs, but they would be dependent on the implementation of the shoreline stabilization project proposed for funding by FEMA. If a project includes some shoreline stabilization as a secondary component or a lesser component of some other activity, then FEMA may tier off this PEA and prepare an SEA, if appropriate. The following activities are evaluated in this PEA as Connected Actions to the Proposed Action.

Infrastructure Relocation or Repair

Existing infrastructure near a shoreline may be relocated as part of a stabilization project to improve its resiliency from erosion and flooding. The type of infrastructure that may be relocated or repaired includes, but is not limited to, sewers, culverts, water lines, roadways, or trails, and existing bioengineered land features such as wetlands. Infrastructure relocation may also include

the elevation of infrastructure for further protection from flooding and wave action. This action also includes the repair of damaged infrastructure to pre-disaster conditions. For either relocation or repair, the existing capacity and function of the infrastructure would not change.

Piers and Boardwalks

Piers are platforms built on columns or pillars that extend into the water and allow the current to flow under the structure relatively undisturbed. Boardwalks are platforms that follow the shoreline. Both structures are built to facilitate the movement of people and goods over wet, marshy, or sensitive land (e.g., dunes), and therefore protect against erosion from pedestrian and vehicle activity. FEMA may fund the repair of existing piers or boardwalks that were damaged as a component of a larger shoreline stabilization project. New boardwalks may be constructed to increase the resilience of the shoreline stabilization project such as to control human activity across restored dunes.

Rain Gardens and Bioswales

Rain gardens and bioswales are stormwater management practices that are designed to manage rainwater where it falls and are often small in scale. Rain gardens and bioswales are implemented to collect and treat runoff from areas of impervious surface such as parking lots. These features that slow surface runoff and promote infiltration before the water reaches the shoreline may reduce shoreline erosion and improve the effectiveness of other shoreline stabilization measures. FEMA may fund the construction of rain gardens or bioswales as a component of a shoreline stabilization project (e.g., repair or modification of an existing parking lot that the public uses for shoreline access).

Rain gardens are shallow, depressed areas in the landscape that collect and absorb stormwater runoff and allow it to soak into the ground. Typically, rain gardens are planted with native grasses and flowering perennials. They can be a cost-effective and aesthetic way to reduce runoff from a property. Design and construction of a rain garden typically involves the following steps: (1) site selection based on site soil types and drainage patterns, (2) determining catchment area based on expected runoff volumes, (3) rain garden sizing and design of underdrain or overflow structures (if necessary), (4) garden construction, and (5) plant installation. Basic maintenance may involve routine weeding and watering (Texas A&M AgriLife Extension Service 2012). If the rain garden is planted with native plants, then it may also provide some wildlife habitat benefits.

Bioswales are vegetated or mulched channels that collect, treat, and absorb runoff as it flows down a slope (FEMA 2020). Bioswales can be used to treat stormwater runoff from low-density, impervious areas near shorelines, or along linear impervious surfaces such as roadways or sidewalks. Bioswales reduce the velocity and erosive force of surface runoff. Similar to rain gardens, they are a cost-effective and aesthetic method to control runoff and protect water quality (EPA 2020f).

Structure Acquisition and Demolition or Relocation

FEMA may fund the acquisition and demolition or relocation of an existing structure as a component of a larger shoreline stabilization project. The demolition or relocation of a structure may be necessary to achieve shoreline stabilization goals. For example, the demolition of a

residential or commercial structure located on a bluff may be necessary where slope regrading and revegetation is proposed.

Generally, property acquisition and structure demolition or relocation projects are implemented to remove structures from a floodplain and to preserve the open space where the structure was removed. Under this activity, a community would purchase a flood-prone structure from a willing seller and then demolish it or relocate it to a site outside the floodplain. The purchased property would be deed-restricted and maintained as open space in perpetuity to restore and/or conserve the natural floodplain functions. Federal law requires properties acquired with FEMA funds in structure demolition or relocation projects to be maintained as open space in perpetuity and the subrecipients to be responsible for oversight in ensuring and enforcing proper land use and for coordinating with FEMA on any future land use or property disposition issues (FEMA 2015).

3.4 Alternatives Considered and Eliminated from Evaluation

This section describes shoreline resilience activities considered but eliminated from evaluation in the PEA because they are either ineligible activities or activities that fall within the parameters of a CATEX.

3.4.1 Activities with a Primary Purpose Not Related to Shoreline Management

Activities that do not have a primary purpose of shoreline stabilization and are not connected actions to a shoreline stabilization project are not eligible for coverage under this PEA. Common examples may include activities with a primary purpose of improving stormwater management, reducing flood risks, or constructing or maintaining harbors.

3.4.2 Activities Ineligible for HMA or PA Funding

FEMA policies for the HMA and PA programs do not typically allow funding of the following types of projects; therefore, they were not retained as alternatives for consideration under this PEA.

- Projects on federally owned land and land adjacent to federal lands when the proposed project falls under the primary or specific authority of another federal agency
- Projects affecting Coastal Barrier Resource System units
- Projects not associated with an eligible shoreline stabilization project that are dependent on a contingent action to be effective and/or feasible (i.e., not a stand-alone project that solves a problem independently or constitutes a functional portion of a solution)
- Projects for maintenance activities, deferred or future, without an increase in the level of protection
- Purchase of equipment to accomplish eligible work (e.g., excavators)

- Activities intended solely to remedy a code violation without an increase in the level of protection
- For PA programs, activities that are not required to address damage caused by a Presidentially declared incident, or address an immediate threat resulting from a declared incident

3.4.3 Actions Covered by CATEXs

Projects that are covered by a CATEX should use the CATEX for compliance with NEPA and would not need to use the PEA. Therefore, activities that would be covered by a CATEX are not evaluated in this PEA.

CATEX N5 *Federal Assistance for Actions in Coastal Areas Subject to Moderate Wave Action or V Zones* provides coverage for repair, hazard mitigation, new construction, or restoration actions of less than one-half acre within the following areas: seaward of the limit of moderate wave action or areas within the V zone. Actions must be consistent with state or tribal enforceable policies or approved coastal management programs, must not be located within, or affect a Coastal Barrier Resource System unit, and must not result in man-made alterations to sand dunes or permanent removal of vegetation. Actions must follow federal requirements and local codes and meet additional criteria if there would be a substantial improvement or new construction of structures. Applicable actions include the repair and new construction of jetties and groins, repair and elevation of structures, repair of functionally dependent facilities such as piers and bathrooms, and beach restoration projects (except projects that result in human alteration to sand dunes, such as beach nourishment).

CATEX N7 *Federal Assistance for Structure and Facility Upgrades* provides assistance for the reconstruction, elevation, upgrading to current codes and standards, and improvements of pre-existing facilities in existing developed areas with substantially completed infrastructure, when the immediate project area has already been disturbed, and when those actions do not alter basic functions, do not exceed capacity of other system components, or modify intended land use. This CATEX does not include actions within or affecting streams or stream banks, or actions seaward of the limit of moderate wave action (or V zones when the limit of moderate wave action has not been identified). Generally, this CATEX is not intended to cover improvements, upgrades, or construction where there may be adverse effects on flood levels or local hydrology. Applicable actions include flood-related retrofits, reconstruction, and upgrade to codes and standards.

CATEX N8 *Federal Assistance for New Construction* covers new construction and associated site preparation activities in undisturbed or undeveloped areas when the activities comprise less than one acre and follow BMPs to control noise, water, and air pollution. This CATEX does not apply to new construction in undisturbed or undeveloped floodplains, wetlands, or seaward of the limit of moderate wave action (or V zone when the limit of moderate wave action has not been identified). This CATEX covers a range of activities typically necessary for new construction, including field work, temporary staging, and construction equipment and vehicle use.

CATEX N12 *Federal Assistance for Planting of Indigenous Vegetation* covers the planting of native vegetation, such as planting grasses for dune and bank stabilization. A range of large-scale

and small-scale projects have met the criteria for this CATEX. No acreage limit applies to this CATEX.

3.4.4 Non-engineered or Ad Hoc Solutions

Shoreline stabilization measures proposed for funding by FEMA must be designed by a registered engineer. Activities that are non-engineered, or ad hoc, are not covered under this PEA. This may include projects that are not based on an engineering analysis or have an incomplete or inappropriate engineering analysis. Examples of such activities include the placement of ad hoc materials such as concrete rubble, tires, or vehicles along a shoreline.

SECTION 4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the affected environment or existing conditions for each resource and evaluates the environmental consequences of the No Action alternative and the Proposed Action. Each subsection includes a description of the relevant laws that impact the analysis and a discussion on whether additional consultation and coordination would be required on a project-specific basis when tiering from this PEA. The evaluation of the Proposed Action describes the potential impacts of each eligible activity and provides potential mitigation measures and BMPs that may be employed to avoid, minimize, or mitigate impacts. Although not funded by FEMA, activities to maintain projects are generally required. These maintenance activities are analyzed under each subsection as a Connected Action.

In this PEA, *study area* refers to this area around the shoreline, as shown in **Figure 1-1** and described in **Section 1.3** and the term *project area* relates to specific hypothetical projects. Users of this PEA will need to consider whether potential impacts for a specific shoreline stabilization project or connected action are adequately described in this PEA. If potential impacts are adequately described, then the project may qualify for coverage under this PEA. If project-specific activities would extend beyond the study area described in **Section 1.3**, a limited scope SEA might need to be prepared.

4.1 Evaluation Criteria and Thresholds

For each resource, the context (i.e., geographic extent or setting) and intensity (i.e., magnitude) of potential impacts were evaluated based on the criteria shown in **Table 4.1**. Impacts described throughout this document are direct effects unless otherwise noted as indirect or secondary.

Table 4.1. Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/Negligible	Resource area would not be affected, or changes or benefits would be either nondetectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, although the changes would be small and localized. Impacts or benefits would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional-scale impacts or benefits. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.

Impact Scale	Criteria
Major	Changes would be readily measurable and would have substantial consequences on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Table 4.2 establishes the criteria for determining if a proposed project may be covered under the Finding of No Significant Impact (FONSI) for this PEA, or through a tiered SEA if extraordinary circumstances exist requiring extra coordination, consultation, or mitigation measures that are not discussed in this PEA. In these situations, an SEA would be prepared, focusing on the resources where the extraordinary circumstances exist. If a project is consistent with the scope and potential impacts described and would apply the mitigation measures proposed in this PEA, then no further NEPA documentation would be required. If a proposed project would extend beyond the study area or its impacts are not fully described in this PEA, an SEA may need to be prepared. See Section 5 (Best Management Practices and Mitigation Measures) and Section 6 (Summary of Impacts) for a summary of potential effects and mitigation measures that would be required to avoid or minimize adverse effects. Note that a project must still result in a FONSI if an SEA is prepared; if additional mitigation measures still do not result in a FONSI, then an environmental impact statement may be required.

Table 4.2. Thresholds for Preparing Tiered SEAs

Area of Evaluation	Project Covered by This PEA	Tiered Supplemental Environmental Assessment Required
Soils and Topography	Negligible or minor impacts on soils or topography. Or Mitigation measures are used to reduce potential impacts to a minor level.	The proposed project would impact a shoreline with exposed bedrock. The proposed project would cause downdrift erosion across jurisdictional boundaries (see thresholds described in **Section 3.2.2**).

Area of Evaluation	Project Covered by This PEA	Tiered Supplemental Environmental Assessment Required
Air Quality	Emissions in nonattainment and maintenance areas would be temporary and less than exceedance levels. Emissions in attainment areas would not cause air quality to go out of attainment for any National Ambient Air Quality Standards (NAAQS). Or Mitigation measures are used to reduce potential impacts below the level described above.	The proposed project would result in new long-term source(s) of air emissions.
Climate	Greenhouse gas emissions would be temporary and less than exceedance levels. Or Mitigation measures are used to reduce potential impacts below the level described above.	The proposed project would result in new long-term source(s) of greenhouse gas emissions.
Visual Resources	Negligible or minor impacts on visual quality and aesthetics. Or Mitigation measures are used to reduce potential impacts to a minor level.	Historic or scenic resources are present that may be adversely affected.

Area of Evaluation	Project Covered by This PEA	Tiered Supplemental Environmental Assessment Required
Water Quality	Negligible or minor impacts on water quality and would not exceed water quality standards or criteria. Localized and short-term alterations in water quality and hydrologic conditions relative to historical baseline may occur. Or Mitigation measures are used to reduce potential impacts to a minor level.	The proposed project would cause or contribute to long-term impacts on water quality. The proposed project is within the one designated sole source aquifer in the study area, the Bass Islands Aquifer. The proposed project would require compensatory mitigation under federal Section 404 regulations.
Floodplains	The proposed project is not located in or does not adversely affect floodplains. Or Mitigation measures are used to reduce potential temporary impacts to a minor or moderate level.	The proposed project would have a permanent adverse impact on a floodplain and require the development of mitigation measures not included in the PEA.
Wetlands	The proposed project is not located in or does not adversely affect wetlands. Or Mitigation measures are used to reduce potential temporary impacts to a minor or moderate level.	The proposed project would permanently impact wetlands and the project would require compensatory mitigation.
Coastal Resources	The proposed project is located or partially located in the coastal zone and does not adversely affect coastal resources because mitigation measures are used to reduce impacts to a minor or moderate level. Concurrence that project is consistent with state coastal zone management plan is required.	The proposed project would have a permanent adverse effect on coastal resources.

Area of Evaluation	Project Covered by This PEA	Tiered Supplemental Environmental Assessment Required
Navigation	None or minor impact on navigable waters; Corps permit approval for breakwaters, groins, or jetties has been obtained.	Projects other than breakwaters, groins, or jetties that have long-term impacts on navigation.
Wild and Scenic Rivers	None or minor impact on a wild and scenic river resulting from water quality or water resources impact, visual impacts, vegetation, fish, or wildlife habitat impacts. If the project is within one-quarter mile of a wild and scenic river, concurrence from the managing federal agency that the project would not adversely affect the wild and scenic river values is required.	Moderate impact on a wild and scenic river resulting from water quality or water resources impact, visual impacts, vegetation, fish or wildlife habitat impacts.
Vegetation and Invasive Species	Negligible or minor impacts on native species, their habitats, or the natural processes sustaining them. Population levels of native species would not be affected. Sufficient habitat would remain functional to maintain the viability of all species.	Long-term impact on native vegetation species. Or The proposed project causes the spread of noxious weeds.
Fish and Wildlife	Negligible or minor impacts on native species, their habitats, or the natural processes sustaining them. Population levels of native species would not be affected. Sufficient habitat would remain functional to maintain the viability of all species.	Long-term impact on native species and their habitats. Or The proposed project causes the spread of invasive species.

Area of Evaluation	Project Covered by This PEA	Tiered Supplemental Environmental Assessment Required
Threatened and Endangered Species and Critical Habitat	FEMA can make a *"No Effect"* determination. Or FEMA can make a *"Not Likely to Adversely Affect"* determination along with concurrence from U.S. Fish and Wildlife Service (USFWS). Or Mitigation measures are used to reduce potential impacts to a minor level or to a level where the project is not likely to adversely affect listed species.	The proposed project falls under a *"likely to adversely affect"* determination and USFWS issues a biological opinion and incidental take permit for the project.
Cultural Resources	No historic properties affected. Or FEMA can make a determination of *"No Adverse Effect*" with concurrence from the SHPO (State Historic Preservation Office and/or the Tribal Historic Preservation Office [THPO] as appropriate).	FEMA makes an *Adverse Effect* determination that is resolved through state-specific Programmatic Agreement Treatment Measures or a memorandum of understanding with the SHPO, THPO, or other consulting parties.
Environmental Justice	There would be no disproportionately high and adverse environmental or health effects on low-income and/or minority populations. Or Mitigation measures are used to reduce potential impacts to a negligible level.	The proposed project requires outreach and coordination with low income and/or minority populations to resolve potential adverse impacts.

Area of Evaluation	Project Covered by This PEA	Tiered Supplemental Environmental Assessment Required
Land Use and Zoning	Proposed project causes no adverse impact on existing land uses or zoning within a shoreline community. There may be long-term benefits.	The proposed project or location would not be allowed under the existing land use policies and plans. The proposed project would result in effects such that a community would need to revise its land use plan (e.g., revise the zoning to increase setbacks to account for downdrift erosion).
Noise	Noise levels would not exceed typical noise levels expected from equipment or vehicles, would comply with local noise ordinances, and would not adversely affect sensitive receptors. Noise generated by construction would be temporary or short-term in nature. Or Mitigation measures are used to reduce potential impacts below the levels described above.	The proposed project would generate new long-term sources of noise. If the proposed project requires pile driving, an SEA may be required if the potential impacts on the natural and human environment would be more than minor.
Traffic and Transportation	Proposed project would have only negligible or minor impacts on traffic and transportation. Or Mitigation measures are used to reduce potential impacts to a minor level.	The proposed project would have long-term impacts on traffic and transportation.

Area of Evaluation	Project Covered by This PEA	Tiered Supplemental Environmental Assessment Required
Public Services and Utilities	The proposed project would have only negligible or minor impacts on public services and utilities. Or Mitigation measures are used to reduce potential impacts to a minor level.	The proposed project would have long-term impacts on public services and utilities.
Hazardous Materials	Hazardous or toxic materials or wastes would be safely and adequately managed in accordance with all applicable regulations and policies, with limited exposures or risks. There would be no short- or long-term adverse impacts on public safety. Or Mitigation measures are used to reduce potential impacts such that there would be no short- or long-term adverse impacts on public health and safety.	Phase I or II environmental site assessment indicates that contamination exceeding reporting levels is present and further action is warranted. Or Proposed project involves the release, clean up, or disposal of hazardous materials.
Cumulative Impacts	No past, present, or future actions are near the project area. Or Proposed project in connection with past, present, or future actions would have only negligible or minor cumulative impacts. Or Mitigation measures are used to reduce the potential cumulative impacts to a minor level.	Cumulative impacts would occur as a result of the proposed project in connection with past, present, or future actions.

4.2 Resources Not Affected and Not Considered Further

Based on a preliminary screening of resources and the study area's geographic location, the following resources do not require a detailed assessment.

Seismic Risks

EO 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, does not apply because there is low seismic risk throughout the study area based on seismic hazard maps developed by USGS (2018).

Geology

None of the alternatives would affect geology, as they would not extend deep enough below the ground surface to disturb geologic resources. Rocky shorelines are not generally subject to erosion and slope failure and therefore are not anticipated to be the subject of shoreline stabilization measures. If a project is proposed that would impact a shoreline with exposed bedrock, then an SEA would be required.

4.3 Soils and Topography

Alternatives are evaluated for the potential to cause erosion, sedimentation, and compaction impacts on soils and topography—both short-term during construction and long-term from the alternatives. Potential impacts on soils and topography are assessed qualitatively by comparison with the surrounding environment. Therefore, this section presents existing conditions around the Great Lakes shorelines and within the study area related to soils and topography.

The Farmland Protection Policy Act of 1981, 7 U.S.C. §§ 4201 et seq., was enacted to minimize conversion of prime and unique farmland and farmland of statewide or local importance to nonagricultural uses and to ensure that federal programs are compatible with local, state, and private programs and policies to protect farmland. The Farmland Protection Policy Act does not consider areas already committed to urban uses as farmland (7 C.F.R. § 658.2[a]). If an individual project area is located outside of an urban area, the subapplicant should confirm whether the area contains farmland soils by using NRCS's web soil survey. Projects that would result in the conversion of farmland soils to non-farm uses would need to consult with NRCS.

4.3.1 Affected Environment

Illinois: The study area within Illinois includes 64 miles of Lake Michigan shoreline, extending from the southern part of Lake Michigan to the Wisconsin border on the western shore. The Illinois shoreline is made up of three geomorphic types. The north portion—the Zion Beach-Ridge Plain—is a low lying plain about 10 to 15 feet above lake levels. The middle section—the Bluff Coast—contains bluffs ranging up to 90 feet high; many are near vertical with slopes up to 45 degrees or they have been graded to reduce the slope and erosion. The Chicago Lake Plain includes the southern portion—a relatively flat area of the shoreline, occupied primarily by the City of Chicago (Illinois Department of Natural Resources [DNR] 2011). Underlying this whole area is a compact, gray, silty, and clayey till, with layers of sand and gravel. The till is exposed in coastal bluffs and it also lies beneath the beaches and nearshore sand. Beaches are mostly sand and gravel. The primary source of beach sand was bluff erosion; however, since much of the

shoreline is structurally protected, that source has been substantially reduced. Because of their low gradients, minimal sand is provided by the two primary rivers, the Chicago and Calumet Rivers; essentially, the Illinois coast is not being supplied with new sand. The littoral drift is from the north, but the sand supplies from the Wisconsin shoreline are also being substantially reduced (USACE 2018b).

Indiana: The study area within Indiana includes 50 miles of Lake Michigan shoreline extending from the Illinois border to the Michigan border. Most of the shoreline on the south shore of Lake Michigan consists of sandy beaches and sand dunes with mixed sand and clay lakebed offshore. Much of the shoreline near Gary and East Chicago has been extensively developed. Sand mining of the shoreline in the early 20th century was extensive. The natural supply of sand that maintains the beaches and dunes has been modified dramatically over the years. Historically, bluff and lakebed erosion were the primary sources of sand, but bluffs along the Illinois lakeshore (updrift from Indiana) have been protected with steel, concrete, and stone. The entire shoreline of Chicago has essentially been armored, which has interrupted the littoral movement of sediment from the west to the southern shores of Lake Michigan (USACE 2018b).

Michigan: The study area within the state of Michigan includes 882 miles of shoreline along Lake Michigan, 865 miles of shoreline along Lake Huron, 585 miles of shoreline along Lake Superior, and 86 miles of shoreline along Lake Erie. The study area includes both the lake shorelines and the connections between lakes. Much of the state's Lake Michigan shoreline is characterized by eroding bluffs that consist mostly of glacial deposits and extensive sand dune systems. In most places, the lakebed is also composed of glacial sediments covered by a veneer of sand and gravel. The sand and gravel are of more recent origin and are a result of erosion of the lakebed and shoreline bluffs. Michigan's Lake Huron shoreline ranges from high bluffs of clay, shale, and rock with lower rocky cobblestone shores and sandy beaches, to low, marshy, clay flats. The glacial overburden comprising the shorelines are subject to erosion, except for bedrock outcroppings. The Michigan shoreline of Lake Superior is generally underlain by sedimentary rocks on the eastern shoreline, as evidenced by the Cambrian sandstones of the Pictured Rocks, while the western reaches are characterized by ragged, rocky bluffs, occasional sand beaches, and the collection of outcroppings along the tip of the Keweenaw Peninsula. There are also extensive sand beaches near the mouth of the Huron River in northern Marquette County, along a 13-mile reach east of the city of Marquette, and along a 12-mile continuous reach in the Pictured Rocks area. Other outstanding shoreline features are the 15 shoreline miles of multicolored sandstone cliffs in the Pictured Rocks area and the 5 shoreline miles of the towering Grand Sable sand dunes located west of Grand Marais, Michigan. Overall, the state's shoreline of Lake Erie is artificially armored; the majority of the unarmored land is comprised of sand and coastal wetlands (USACE 2020a, 2020b, 2018a, 2020b).

Minnesota: The study area within Minnesota includes 190 miles of Lake Superior shoreline that extends from the Minnesota-Wisconsin border at Duluth to the Canadian border. The shoreline is characterized by steep, rocky bluffs in the northernmost reaches receding to the low-lying clay and gravel-covered banks near Duluth. Of the 175 miles of shoreline, only 13 miles are beaches, located primarily near Duluth. Except for the sandy beach along Minnesota Point, the remaining beaches on the Minnesota shoreline comprise small, scattered sand and gravel areas located in

small coves and at the mouths of tributary rivers. The St. Louis River and several minor tributaries in the Superior Slope Complex drain this area (USACE 2020b).

Ohio: The study area within Ohio includes approximately 292 miles of Lake Erie shoreline, of which 144 miles (49 percent) are homogeneous or composite bluffs. The majority of those bluffs are composite sand bluffs with 20 to 50 percent sand content. Lake Erie's southern shore is bounded by either glacially derived geomorphic features, such as till bluffs and outwash plains, or by bedrock outcrops that were exposed after glaciers planed off the overburden. In general, the till and clay/sand banks are highly susceptible to weathering and erosion. The bank bases are often situated below existing lake levels, which expose them to the influence of ice, water, and waves (USACE 2018a).

Wisconsin: The study area within Wisconsin includes approximately 458 miles of shoreline along Lake Michigan and 209 shoreline miles along Lake Superior. The Lake Michigan shoreline includes 185 miles from the Illinois border to Sturgeon Bay Canal that are primarily sand beaches and bluffs composed of unconsolidated sediments. Most of the 185 miles is subject to erosion. Erosion is limited to bays and clay banks north of Sturgeon Bay Canal and into Green Bay. The Wisconsin shoreline of Lake Superior has widely differing physical features and extends from the Minnesota-Wisconsin boundary to the Wisconsin-Michigan boundary, about 156 shoreline miles, not counting the islands. About one-half of Wisconsin's Lake Superior shoreline consists of high clay bluffs (the highest of which is 200 feet near Port Wing in Bayfield County) in two major stretches from Iron County to the White River in Ashland County and from Bark Point in Bayfield County to the base of Wisconsin Point in Douglas County. Sandstone bluffs and rocky beaches are found along many of the Apostle Islands, but erosion is a significant problem along the Madeline Island shoreline. Beach widths presently vary from 10 to 20 feet along high bluff areas, and 50 to 100 feet near sand bays, sand points, and river mouths (USACE 2020b, 2018b).

4.3.2 Environmental Consequences

4.3.2.1 No Action

Under the No Action alternative, no FEMA-funded erosion mitigation measures would be implemented on the shorelines and, as a result, there would be long-term, adverse impacts as erosion would continue to erode the bluffs, causing significant instability and potentially impacting structures and infrastructure along the shoreline. If no action is taken by FEMA, communities may implement ad hoc efforts to repair damaged infrastructure and stabilize shorelines; this could have long-term minor to major impacts on soils depending on what actions are taken. Under the no action alternative, it is anticipated that there will be negligible to no impacts on geology and possible minor to moderate impacts on topography relative to site characteristics.

4.3.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

The Proposed and Connected Actions could result in minor to moderate short-term adverse effects from construction-related ground disturbance at a project site. Ground disturbance from construction activities and equipment could increase the probability of localized soil erosion. Ground disturbance and soil erosion may be avoided or minimized by discouraging the use of mechanized equipment in areas with steep slopes (typically greater than a 20 percent slope) or sensitive soils (e.g., soils sensitive to compaction such as clay) to the maximum extent feasible. The Proposed and Connected Actions would have long-term minor to moderate beneficial effects on soils with the reduction of soil loss caused by erosion.

There could also be long-term beneficial effects on topography at localized project areas. The mitigation of erosion and soils loss would stabilize the shoreline and protect topography from any long-term impacts.

Project-Specific Consequences

Hard Stabilization Measures

Hard stabilization measures have the potential to cause shoreline erosion downdrift of where the stabilization structures are installed, both by reflecting wave energy to unarmored areas and by starving downdrift areas of natural sediment inputs necessary to maintain existing beaches and bluff toes, as explained in **Section 3.2.2**. States may require permits to nourish areas affected by this littoral drift and state and local permits should be obtained before implementation of a specific project. Thus, implementation of these measures may have long-term minor to moderate impacts on soils and topography along the shoreline downdrift of the project area.

Best Management Practices

The following conditions would be necessary to avoid and minimize potential impacts:

- Use rubber-tired mechanical equipment and vehicles and avoid the use of tracked equipment.
- Use existing roads for access.
- Use mulch to reduce soil erosion until vegetation becomes established.
- Avoid the use of mechanized equipment on steep slopes or unstable soils.
- In areas with steep slopes or sensitive soils, use hand tools to avoid and minimize potential soil erosion.
- Drive heavy equipment around the project area in a random pattern and avoid repeatedly passing across the same spots.

4.4 Air Quality

Air quality is regulated by the U.S. Environmental Protection Agency (EPA) under the jurisdiction of the Clean Air Act (CAA) of 1970, 42 U.S.C. §§ 7401 *et seq.*, and its amendments. EPA has generally applied a two-pronged approach to controlling air pollution: (1) setting National Ambient Air Quality Standards (NAAQS) that define maximum pollution levels in the air that are still protective of human health and welfare and (2) developing emission standards for sources of air pollutants to reduce pollutant emissions to the atmosphere. NAAQS have been established for specific pollutants, referred to as criteria pollutants, which include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and particulate matter (PM). EPA designates locations that do not meet or persistently exceed one or more of the NAAQS as nonattainment or maintenance areas for each pollutant that does not meet the standards.

Federally funded actions in nonattainment and maintenance areas are subject to EPA conformity regulations, 40 C.F.R. Parts 51 and 93. The air conformity analysis process ensures that emissions of air pollutants from planned federally funded activities would not affect the state's ability to achieve the CAA goal of meeting the NAAQS. Section 176(c) of the CAA requires that federally funded projects must not cause any violations of the NAAQS, increase the frequency or severity of NAAQS violations, or delay timely attainment of the NAAQS or any interim milestone. Activities that would cause an exceedance of the NAAQS or cause an area to fall out of attainment status would be considered a significant impact. The emissions from construction activities are subject to air conformity review.

Under the general conformity regulations, a determination for federal actions is required for each criteria pollutant or precursor in nonattainment or maintenance areas where the action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants at rates equal to or exceeding the prescribed *de minimis* rates for that pollutant. The prescribed annual rates are 50 tons of volatile organic compounds (VOCs) and 100 tons of nitrogen oxides (NO_X) (O_3 precursors) and 100 tons of $PM_{2.5}$, SO_2, or NO_X ($PM_{2.5}$ and precursors).

4.4.1 Affected Environment

The status of nonattainment and maintenance areas are available through EPA's Green Book and are updated periodically (EPA 2020c). **Table 4.3** summarizes counties in nonattainment status within the study area, as well as the state agencies responsible for regulating air quality in each state. Most of the nonattainment counties are not meeting standards for 8-hour O_3, followed by SO_2 (EPA 2020c).

Table 4.3. State Air Quality Regulatory Agencies and Counties in Nonattainment Status in the Study Area

State	State Regulatory Agency (Air Quality)	Counties in Nonattainment Status in the Study Area[1]
Illinois	Illinois Environmental Protection Agency Bureau of Air	Cook, Lake

State	State Regulatory Agency (Air Quality)	Counties in Nonattainment Status in the Study Area[1]
Indiana	Indiana Department of Environmental Management Office of Air Quality	Lake, Porter
Michigan	Michigan Department of Environment, Great Lakes, and Energy	Allegan, Berrien, Macomb, Monroe, Muskegon, St. Clair, Wayne
Minnesota	Minnesota Pollution Control Agency	N/A
Ohio	Ohio Environmental Protection Agency Division of Air Pollution Control	Cuyahoga, Lake, Lorain
Wisconsin	Wisconsin Department of Natural Resources	Kenosha, Manitowoc, Milwaukee, Ozaukee, Sheboygan

[1] EPA 2020c, data is current as of October 31, 2020

4.4.2 Environmental Consequences

4.4.2.1 No Action

Under the No Action alternative, communities may implement some ad hoc efforts to repair damaged infrastructure; this could have short-term minor impacts on air quality from vehicle and equipment emissions at the project site. Shoreline erosion would not be substantially mitigated by these efforts and could impact structures and infrastructure near the shoreline. Construction to repair damaged infrastructure may follow, resulting in minor temporary increases in localized emissions from construction equipment and potential detours. Therefore, short- and long-term impacts on air quality would be minor.

4.4.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

The Proposed and Connected Actions would result in temporary emissions from construction activity and use of vehicles and equipment with diesel and gasoline engines. During the construction phase, exposed soil could temporarily increase airborne particulate matter into the project area from fugitive dust. Emissions from construction equipment could have minor temporary effects on the levels of some pollutants, including CO, VOCs, NO_2, O_3, and PM. Depending on the extent of the equipment and vehicle use, and with implementation of the BMPs described below, there would be short-term negligible to minor impacts on air quality. Generally, activities would be expected to be below *de minimis* thresholds and would not increase emission levels of regulated air pollutants. However, some large projects could involve large numbers of truck trips and long durations of heavy equipment usage. Among other factors, the total volume of emissions is a function of the number and type of vehicles and equipment, the distance they are driven or hours per day they are operated, and the number of trips each makes

or the duration of the project. Prior to applying the PEA to a specific project, consideration should be given to whether completing a conformity analysis is necessary.

No long-term impacts on air quality are anticipated because the Proposed and Connected Actions would not be a source of long-term air emissions. If a Connected Action would result in a new long-term source of air pollutants, then an SEA may need to be prepared.

Best Management Practices
The following conditions would be necessary to avoid and minimize potential impacts:

- To reduce the emission of criteria pollutants, construction equipment engine idling would be minimized to the extent practicable, and engines would be kept properly maintained.
- Open construction areas would be minimized and watered as needed to minimize particulates such as fugitive dust.
- Construction emission control recommendations would be implemented to the extent practicable (see EPA's scoping letter in **Appendix B**).

4.5 Climate

Climate change refers to changes in the Earth's climate caused by a general warming of the atmosphere. Its primary cause is emissions of greenhouse gases, including carbon dioxide and methane. Climate change is capable of affecting species distributions, temperature fluctuations, and weather patterns. CEQ's *Final NEPA Guidance on Consideration of Greenhouse Gas Emissions and the Effects on Climate Change* (CEQ 2016) suggested that quantitative analysis should be done if an action would release more than 25,000 metric tons of greenhouse gases per year. On a regional scale, climate change may cause increased variations in Great Lakes' water levels due to changes in precipitation, water temperature, ice coverage, and evaporation (USACE 2018b).

4.5.1 Affected Environment

The Great Lakes influence weather patterns across the region by moderating temperatures (i.e., creating cooler summers and warmer winters); increasing cloud cover and precipitation over and downwind of the lakes during winter, and increasing summertime cloud cover and rainfall over the lakes. These effects can be moderate (e.g., mild cooling breezes that help lakeshore orchards and vineyards grow) to extreme (e.g., lake effect snow and ice storms along the shorelines) (Environmental Law and Policy Center 2019).

The Great Lakes region has experienced increases in the annual mean temperature over the past century. From 1901 through 2016, the Great Lakes basin increased 1.8 degrees Fahrenheit (°F) in annual mean temperature. Global average temperatures are expected to rise an additional 2.7 to 7.2°F, with similar changes in the Great Lakes region. Precipitation events are also increasing in frequency and intensity in the region. Between 1901 and 2015, the Great Lakes region experienced an almost 10-percent increase in annual precipitation. In the future, it is anticipated

that precipitation will increase in the winters and springs and will decrease in the summers (Environmental Law and Policy Center 2019).

4.5.2 Environmental Consequences

4.5.2.1 No Action

Under the No Action alternative, communities may implement some ad hoc efforts to repair damaged infrastructure; this could result in minor greenhouse gas emissions from vehicles and equipment used to implement the project. However, construction activities would be minor and temporary and would not be expected to increase greenhouse gases to the extent that they would contribute to regional climate change.

Climate change is expected to increase the frequency and intensity of precipitation events in the Great Lakes region, resulting in increased episodic erosion events from storms and wave and wind action. Thus, shoreline erosion would be expected to increase as the ad hoc shoreline stabilization activities under the No Action alternative would not effectively protect against the effects of climate change.

4.5.2.2 Proposed and Connected Actions

General Consequences

The Proposed and Connected Actions would result in temporary greenhouse gas emissions from construction activity and use of vehicles and equipment with diesel and gasoline engines. Emissions from construction equipment would be temporary and would not be expected to increase greenhouse gases to the extent that they would contribute to regional climate change. However, some large projects could involve large numbers of truck trips and long durations of heavy equipment usage. Among other factors, the total volume of emissions is a function of the number and type of vehicles and equipment, the distance they are driven or hours per day they are operated, and the number of trips each makes or the duration of the project. Prior to applying the PEA to a specific project, consideration should be given to whether the project may result in a level of greenhouse gas emissions that could exceed the threshold.

No long-term impacts on climate change are anticipated because the Proposed Action and Connected Actions would not be a source of long-term greenhouse gas emissions. If a Connected Action would result in a new long-term source of air pollutants, then an SEA may need to be prepared.

Best Management Practices

The following condition would be necessary to avoid and minimize potential impacts:

- To reduce greenhouse gas emissions, construction equipment engine idling would be minimized to the extent practicable, and engines would be kept properly maintained.

4.6 Visual Resources

While there is no overarching federal law or regulation related to visual resources, several federal statutes do address visual resources, including NEPA (42 U.S.C. §§ 4321 *et seq.*), the Federal Lands Policy and Management Act of 1976 (43 U.S.C. § 1701, *et seq.*), the National Forest Management Act of 1976 (16 U.S.C. §§ 1600 *et seq.*), the Wild and Scenic Rivers Act (16 U.S.C. §§ § 1271 *et seq.*), the National Trails Systems Act (16 U.S.C. §§ 1241 *et seq.*), the American Antiquities Act of 1906 (16 U.S.C. §§ 431 – 433), NHPA of 1966 (16 U.S.C. §§ 470 *et seq.)*, and the Wilderness Act of 1964 (16 U.S.C. §§ 1131 – 1136). FEMA does not have specific guidance for assessing impacts on visual resources. Visual resource study methodologies have been developed by some federal agencies and these may be applied to specific projects if potential impacts on aesthetic quality is a concern. Aesthetic impacts of a project are generally related to whether the project would obstruct desirable views (e.g., views of the water or of a historic structure such as a lighthouse) and the degree of contrast the project may introduce to a view (e.g., a hard engineered metal sheet pile wall in a natural landscape with no other man-made elements visible).

4.6.1 Affected Environment

The existing visual quality for a specific shoreline stabilization project would include views of the shoreline from the water and the potential for views of the water from the land. The type of view (e.g., urban, natural, obstructed, partially obstructed) will vary widely depending on the location of the project and the condition of existing structures and access along the shoreline. The study area along the Great Lakes is expected to have high-quality viewsheds and greater aesthetic appeal because of its location along the shoreline and potential for views of the Great Lakes. Individual project areas may be more likely to contain parks, recreation areas, and historic structures owing to their proximity to the shoreline.

4.6.2 Environmental Consequences

4.6.2.1 No Action

Shoreline communities may implement ad hoc efforts to repair damaged shoreline infrastructure. These ad hoc efforts would have short-term construction impacts on visual resources. These ad hoc efforts may involve methods, such as placing concrete rubble, that would not be visually appealing and could detract from surrounding viewsheds, thus resulting in minor to moderate long-term impacts on visual resources. Under this alternative, shoreline erosion would not be substantially mitigated and could result in a loss of beaches and existing vegetation cover, damage to structures and infrastructure, and deposition of plants, sediment, and debris into the lakes. Chronic and episodic erosion could increase turbidity in the water, leading to perceptions of poor water quality and adverse visual impacts. Therefore, continued erosion would result in a long-term, minor to major adverse impact on visual resources, depending on the extent of the damage from erosion.

4.6.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Because of the contrast between the existing features and the temporary construction activities, the Proposed and Connected Actions would have short-term minor to moderate impacts on visual resources during construction. Long-term effects would vary depending on the shoreline stabilization method selected and how it is designed, as explained below. All shoreline stabilization measures would have the potential for minor to moderate benefits because the shoreline erosion and potential for failure would be mitigated.

Project-Specific Consequences

Bioengineered Stabilization Measures

The use of vegetation and natural materials in bioengineered measures would present low contrast to natural shoreline environments and a beneficial contrast in highly urbanized ones.

Bank Regrading/Stabilization

Bank regrading and stabilization would have long-term minor to moderate benefits on visual resources from the creation of a more natural-looking project site and stable-looking slope. The use of vegetation to stabilize the slopes (following reshaping) would present low contrast in natural shoreline environments and a beneficial contrast in those that are highly urbanized.

Marsh and Wetlands Creations, Restoration, or Enhancement

Marsh and wetlands creation would result in long-term minor to moderate benefits on visual resources from the use of native vegetation. Marsh and wetlands restoration or enhancement would have long-term minor to moderate benefits from the restoration of a degraded wetland or enhancement of existing wetland functions. Wetland creation, restoration, or enhancement would result in beneficial effects on visual quality through the expansion of native vegetation species (e.g., through wetland creation or replacement of invasive species) and, potentially, through beneficial changes in water quality as a result of the improved wetland functions.

Beach/Dune Nourishment

Beach/dune nourishment would result in long-term minor to moderate benefits on visual resources by widening beaches and planting native vegetation. There is the potential for dune nourishment (e.g., placement of sand) to block individual viewsheds of the lake, which could result in long-term adverse impacts on those view.

Hard Stabilization Measures

Hard stabilization measures that use man-made materials, such as concrete or sheet pile, or that result in changes in topography, such as walls that contrast with the natural shoreline slopes, would result in more visible changes and a greater potential for adverse impacts. In heavily urbanized environments, the visual contrast with hard stabilization methods would be much lower and may be harmonious with surrounding visual elements, thus leading to beneficial effects. Additionally, these measures have the potential to cause downdrift erosion of the shoreline where they are installed, as explained in **Section 3.2.2**. Thus, implementation of these measures may have long-term minor impacts on visual resources downdrift of the project area.

Revetments
Revetments may result in long-term minor impacts on visual resources due to the high contrast of rock riprap or other hard materials against the sandy/clayey soils of beaches and bluffs. Some revetment designs result in changes in topography, such as the installation of walls, which contrast with natural shoreline slopes and would result in more apparent changes and a greater potential for minor to moderate adverse impacts. Revetment designs that follow the shoreline contours would be less likely to result in these adverse impacts.

Bulkheads and Seawalls
Bulkheads and seawalls may result in long-term minor impacts on visual resources due to the high contrast of concrete, steel, or aluminum sheet piling walls with the more natural-looking shoreline. In urban areas, the visual contrast of bulkheads and seawalls with the shoreline may not be as pronounced and could even be compatible with the surrounding environment, resulting in minor beneficial effects on visual resources.

Breakwaters
Breakwaters may have long-term minor impacts on visual resources owing to the contrast between on- or offshore rock or concrete structures with the water, and the possibility of the measure inhibiting views of the water.

Groins and Jetties
Groins or jetties may have long-term minor impacts on visual resources because of the contrast between the perpendicular features of the groin or jetty and the water and shoreline.

Connected Actions

Infrastructure Relocation or Repair
Infrastructure relocation may move infrastructure, such as a road, to an area where it could be more easily seen, resulting in long-term minor to moderate impacts on visual resources. Alternatively, infrastructure may be moved to an area where it is not easily seen, which could result in long-term minor to moderate benefits on visual resources. Infrastructure repair would restore damaged infrastructure to its original state, resulting in minor benefits on visual resources.

Piers and Boardwalks
Piers and boardwalks would have minor long-term benefits on visual resources because walkways facilitate recreation and protect the surrounding landscape.

Rain Gardens and Bioswales
Installing rain gardens and bioswales and planting vegetation would have minor long-term benefits on visual resources.

Structure Acquisition and Demolition or Relocation
Structure acquisition and demolition or relocation would have minor long-term benefits from the creation of open space where structures originally existed.

4.7 Water Quality

This section analyzes potential impacts on water resources and water quality for surface water and groundwater resources. Actions are evaluated for the potential to degrade existing water quality conditions or impact water resources regulated by the Clean Water Act (CWA) of 1977, 33 U.S.C. § 1344, and other federal, state, and international water quality laws.

Section 401 of the CWA gives states the authority to grant, deny, or waive certification of proposed federal licenses or permits for projects that result in discharges into waters of the United States unless a Section 401 Water Quality Certification is issued. Further, this section also requires that, before a Section 404 permit (as discussed below) can be issued for an activity, the activity must not exceed state-specific water quality standards. EPA administers water quality regulations for federally recognized tribes similar to states (EPA 2017).

Section 402 of the CWA regulates the discharge of pollutants or contaminants from point sources as well as stormwater runoff into waterways through National Pollutant Discharge Elimination System permits. These permits limit what can be discharged into waterways and further provides project-specific monitoring and reporting requirements. Construction activities that have the potential to disturb soils that could lead to erosion and sedimentation must obtain and comply with a general construction NPDES permit.

Section 404 of the CWA regulates the placement of dredged or fill material into wetlands, lakes, streams, rivers, and other waterways. The goal of Section 404 is to avoid and minimize losses to wetlands and other water resources and to compensate for unavoidable loss through mitigation, restoration, enhancement, and creation. Section 404 is jointly implemented by EPA and USACE in most states. In 1984, the state of Michigan received authorization from the federal government to administer Section 404 of the federal Clean Water Act in most areas of the state. The state-administered 404 program is consistent with the requirements of the federal Clean Water Act and associated regulations in the Section 404(b)(1) guidelines. Through the state's memorandum of agreement with the EPA, the majority of applications are waived from federal review with the exception of projects that impact critical environmental areas or have major discharges as defined in the memorandum of agreement (EGLE 2021).

USACE is comprises several Divisions, under which, specific Districts were created to hold regulatory jurisdiction over specified areas. The overall study area is overseen by the Great Lakes and Ohio River Division of USACE and, depending upon the location of any proposed project, a specific District within this Division will manage the permits on behalf of USACE as follows:

- Lake Superior projects are managed by the Detroit District
- Lake Huron projects are managed by the Buffalo District
- Lake Erie projects are managed by either the Detroit or Buffalo District, depending on the project location

- Lake Michigan projects are managed by either the Detroit or Chicago District, depending on the project location

The CWA further requires states to identify waters that do not or are not expected to meet applicable water quality standards with current pollution control technologies alone. On an annual basis, states issue a water quality report under Section 305(b) and 303(d) of the CWA (referred to as the *Integrated Water Quality Report*). Section 303(d) authorizes EPA to assist states, territories, and authorized tribes in listing impaired waters and developing Total Maximum Daily Loads (TMDLs) for impaired waterbodies. A TMDL establishes the maximum amount of a pollutant or contaminant allowed in a waterbody and serves as the starting point or planning tool for restoring water quality.

The Rivers and Harbors Act of 1899, 33 U.S.C. § 403, regulates the development and use of the nation's navigable waterways. If proposed construction activities would occur in the water, Sections 9, 10, and 13 of the Rivers and Harbors Act may apply.

Section 9 of the Rivers and Harbors Act prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waterways of the United States without Congressional approval. While administration of Section 9 has been delegated to the U.S. Coast Guard, structures authorized by state legislatures may be built if the affected navigable waters are within one state, provided that the plan is approved by USACE. Similarly, under Section 10 of the Rivers and Harbors Act, the building of any wharfs, piers, jetties, and other structures is prohibited without approval of USACE. In addition, while USACE has the authority to issue permits for discharges into navigable waters, under Section 13 of the Rivers and Harbors Act, USFWS has the authority to review and comment on the potential effects on fish and wildlife from activities proposed or permitted by USACE.

The Safe Drinking Water Act of 1974, 42 U.S.C. § 300f *et seq.* (amended in 1986 and 1996), was established to protect the quality of drinking water of all above or underground resources. This act authorizes EPA to establish water quality standards to protect drinking water and requires all owners or operators of public water systems to comply with those set criteria. Section 1424(e) of the Safe Drinking Water Act of 1974 authorizes EPA to designate an aquifer for special protection under the sole source aquifer program, if the aquifer is the sole or principal drinking water resource for an area (i.e., it supplies 50 percent or more of the drinking water in a particular area) and if its contamination would create a significant hazard to public health.

In an effort to improve the coordination of the various federal agencies that work jointly in regulating the Great Lakes regions, they have formed a partnership, the Great Lakes Restoration Initiative (GLRI), to accelerate efforts to protect and restore the Great Lakes (GLRI 2020). The GLRI developed action plans that set goals every five years regarding specific focus areas (EPA 2019b).

The United States and Canada, recognizing the widespread deterioration of water quality in the Great Lakes on both sides of the border, signed the International 1972 Great Lakes Water Quality Agreement (GLWQA) (revised 1978, amended 1983, 1987, and 2012) to restore and protect the waters of the Great Lakes. The GLWQA provides a framework for identifying

priorities and implementing actions that improve water quality. Many of the federal agencies mentioned above are engaged in this international effort to protect water quality in the Great Lakes.

In addition to the federal agencies and their associated acts/regulations described above, water quality is also regulated by the applicable state-specific environmental agency that sets their own water quality standards. These state governing bodies regulate construction along their respective shorelines and oversee their state's coastal management programs, which provide policy-based standards to prevent littoral processes, beaches, dunes, and bluffs from being impacted by human development (USACE 2020a). Subapplicants should coordinate with the appropriate state-specific governing agency for shoreline projects, as listed below in **Table 4.4**, to determine the applicable project-specific regulations and conditions. State-specific Section 401 Water Quality Certification Programs, the most recent Integrated Water Quality Report, and Section 303(d) List for each state are also summarized in **Table 4.4**.

Table 4.4. Water Quality Regulations by State

State	State Regulatory Agency (Water Quality)	State Water Quality Regulation Reference and Documentation
Illinois	Illinois Environmental Protection Agency, Bureau of Water	Title 40, Chapter I, Subchapter D, Part 132 Water Quality Guidance for the Great Lakes System Title 5, Chapter 415 Illinois Compiled Statutes: Environmental Protect Act (The Act) 17 Illinois Admin Code (Ill. Adm. Code) Part 3704: "Regulation of Public Waters Rules" 35 Ill. Adm. Code Part 302: Water Quality Standards 35 Ill. Adm. Code Part 395: Procedures and Criteria for Certification Illinois Integrated Water Quality Report and Section 303(d) List, 2018 – DRAFT (Illinois EPA Bureau of Water, 11/12/2018)
Indiana	Indiana Department of Environmental Management	Title 327 of the Indiana Administrative Code (Ind. Admin. Code); under Article 2 Lake Erie and Lake Michigan Drainage Basins: Designated Uses: 327 Ind. Admin. Code 2-1.5-5

State	State Regulatory Agency (Water Quality)	State Water Quality Regulation Reference and Documentation
		Water Quality Criteria: 327 Ind. Admin. Code 2-1.5-8 and 2-1.5-16 WQBEL Development: 327 Ind. Admin. Code 5-2-11.4 through 11.6 Indiana Integrated Water Monitoring and Assessment Report to the U.S. EPA, 2020 (Indiana Department of Environmental Management, June 25, 2020)
Michigan	Michigan Department of Environment, Great Lakes, and Energy	Sections 3103 and 3106 of 1994 Pub. Act 451, Michigan Compiled Laws (Mich. Comp. Laws) §§ 324.3103 and 324.3106 Michigan Administrative Code (Mich. Admin. Code) r. 323.1000 Water Quality and Pollution Control in Michigan, 2020 Sections 303(d), 305(b), and 314 Integrated Report (Michigan Department of Environment, Great Lakes, and Energy, Water Resources Division, September 2020) Lake Superior is considered a water of the state and is regulated under the Michigan Natural Resources Environmental Protection Act (NREPA) (Mich. Comp. Laws § 324.3101(aa)).
Minnesota	Minnesota Pollution Control Agency	Minnesota Statues (Minn. Stat.) Chapters (Chs.) 115 and 116 and Minnesota Administrative Rules (Minn. R.) §§ 7001.1400-7001.1470, and Chs. 7050, 7052, and 7053. 2020 Minnesota Water Quality: Surface Water Section (Minnesota Pollution Control Agency, March 2020)
Ohio	Ohio Environmental Protection Agency	Ohio's water quality standards, set forth in Chapter 3745-1 of the Ohio Administrative Code (Ohio Admin. Code) Ohio 2020 Integrated Water Quality Monitoring and Assessment Report (Ohio Environmental Protection Agency, Division of Surface Water Final Report, May 2020) (Ohio Revised Code [Ohio Rev. Code] § 1501.30).

State	State Regulatory Agency (Water Quality)	State Water Quality Regulation Reference and Documentation
Wisconsin	Wisconsin Environmental Management Division	Wisconsin Statutes (Wis. Stat.) § 35.93 Chapter NR 102 Water Quality Standards for Wisconsin Surface Waters Wisconsin Water Quality Report to Congress, 2020 (Wisconsin Department of Natural Resources, Water Quality Bureau, Division of Environmental Management)

4.7.1 Affected Environment

The study area is located along the shorelines of Lake Superior, Lake Michigan, Lake Huron, and Lake Erie.

Lake Superior is the largest of the Great Lakes, with a volume of 2,900 cubic miles, an average depth of approximately 483 feet, and a surface area comprising 31,700 square miles (EPA 2020e). The Lake Superior watershed serves approximately 673,000 people and is largely forested, with little agriculture owing to the cool climate (NOAA 2020c). The 2015–2019 Lake Superior Lakewide Action and Management Plan states that Lake Superior is in the best overall environmental condition of all the Great Lakes, with many of its aquatic habitats, watersheds, and coastal wetlands in good condition (Environment and Climate Change Canada (ECCC) and EPA 2019b).

Lake Michigan is the second-largest of the Great Lakes by volume (1,180 cubic miles), the third-largest by surface area (22,300 square miles) and has an average depth of 279 feet (EPA 2020e). The watershed serves approximately 11 million people, approximately 20 percent of the total population of the Great Lakes basin. The climate and land uses are variable as the northern portion of the watershed is colder and less developed, while the southern portion of the basin is more temperate and considerably more urbanized (EPA 2020e, NOAA 2016). According to the 2018 Lakewide Action Management Plan for Lake Michigan, wind, waves, storms, and fluctuating lake levels combine to create an ever-changing littoral system (ECCC and EPA 2018b). The basin's many highly urbanized areas and existing hardened shore protection structures, such as revetments and jetties, add to the system's complexity. Some areas of Lake Michigan lose dozens of feet of sandy beaches and coastal habitat, including critical wetlands, every year; while other areas accumulate sand that can clog harbors and bury wetlands.

Lake Huron is the third-largest of the Great Lakes by volume (850 cubic miles), contains a surface area of 23,000 square miles, and has an average depth of 59 feet. The basin serves approximately 1.5 million people; the watershed contains boreal and mixed hardwood forests and supports expansive agricultural lands (EPA 2018, EPA 2020e, NOAA 2016). Overall, the environmental health of Lake Huron, as reported in the 2017–2021 Lake Huron Lakewide Action and Management Plan, is fair to good with the major stressors contributing to the less than ideal

health of the lake being loss of wetlands and habitat, contaminated sediments and toxic chemicals and nutrients, and invasive species (ECCC and EPA 2018a).

Lake Erie is the smallest and shallowest of the Great Lakes, with an average depth of approximately 62 feet and a surface area comprising 9,900 square miles (EPA 2020e). The Lake Erie watershed serves approximately 12.4 million people, approximately one-third of the total population within the entire Great Lakes basin (NOAA 2020c). The watershed is largely agricultural, industrial, and urbanized and receives a large amount of effluent from sewage treatment plants and sediment loading from surrounding land uses (EPA 2016). According to the 2019–2023 Lakewide Action and Management Plan for Lake Erie, although it continues to be a good source of high-quality drinking water and it's beaches and nearshore areas continue to provide recreational opportunities, Lake Erie's ecosystem is in poor condition and the trend is unchanging based on recent assessments (ECCC and EPA 2019a).

While the Great Lakes themselves do not have state-specific TMDLs developed, individual states have created their own TMDLs for the various tributaries and waterways that feed into and influence the Great Lakes. However, the water quality contaminates of concern for these tributaries vary depending upon the location and state-specific TMDLs that have been developed. Generally, the open waters of the upper Great Lakes have excellent water quality; however, exceptions include Lake Erie and a few impaired locations restricted to nearshore zones influenced by large, densely populated, and heavily industrialized areas.

The Great Lakes have been shown to have problems with selected persistent bioaccumulative toxic chemicals. In 2016, Canada and the United States designated the following eight chemicals as the first set of Chemicals of Mutual Concern (CMC) under the 2012 GLWQA for the Great Lakes:

- Hexabromocyclododecane (HBCD)
- Long-chain perfluorinated carboxylic acids (LC-PFCAs)
- Mercury
- Perfluorooctanoic acid (PFOA)
- Perfluorooctane sulfonate (PFOS)
- Polybrominated diphenyl ethers (PBDEs)
- Polychlorinated biphenyls (PCBs)
- Short-chain chlorinated paraffins (SCCPs)

While the GLWQA deems these chemicals to be of high concern, chemical compounds are not the only items regulated from entering waterways. Sediment, total suspended solids, and other items resulting from erosion are also of concern. These items can enter waterways from activities that create ground disturbance (e.g., construction activities) if proper erosion and sediment

controls are not in place. More specifically, erosion along the shorelines is also a serious problem for local residents and commercial/industrial facilities, with some areas experiencing steady rates of erosion and others experiencing episodic events (USACE 2020a). Erosion and releasing of sediment can result in releases of detrimental compounds, such as PCBs and other analytes that are trapped within soils and sediments.

Shoreline erosion of contaminated soils can release contaminants into the water. Locations near known contaminated sites or industrial facilities (both historical and current) are more likely to be of concern. As shown in **Figure 4-1** and summarized in **Table 4.5**, the GLWQA identifies several areas of concern in U.S. locations within the Great Lakes that are impacted by many of the contaminates previously discussed. While these areas and chemicals are of high concern, chemical compounds are not the only items that may impair water quality. For example, sediment or total suspended solids released as a result of erosion are also of concern. Nutrients such as phosphorus and nitrogen that are found naturally in soils are released into the water when soils are disturbed through development and erosion. Excess nutrients can lead to algal blooms that impact water quality in nearshore environments, affecting fish and wildlife, recreation, drinking water sources, and dissolved oxygen levels.

Table 4.5. Applicable Great Lakes Water Quality Agreement Areas of Concern

Great Lake	U.S. Area of Concern
Lake Superior	St. Louis Bay/River Torch Lake Deer Lake (delisted)
Lake Michigan	Manistique River Menominee River Fox River Southern Green Bay Milwaukee Estuary Waukegan Harbor Grand Calumet River Kalamazoo River Muskegon Lake White Lake (delisted)
Lake Huron	Saginaw River/Saginaw Bay Clinton River
Lake Erie	Rouge River River Raisin Maumee River Black River Cuyahoga River Ashatabula River

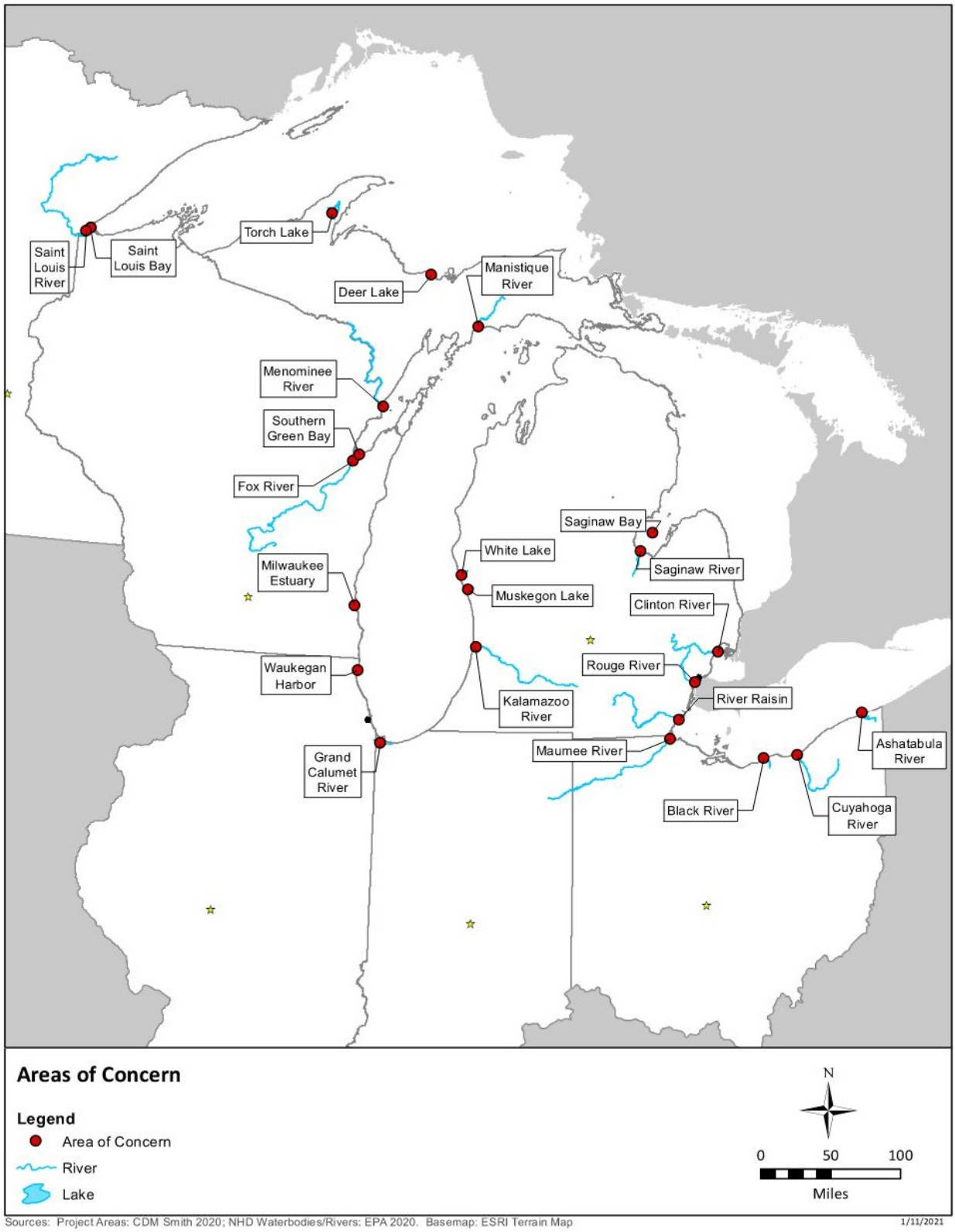


Figure 4-1. Applicable Great Lakes Water Quality Agreement Areas of Concern

Although the GLWQA designated areas of concern, it is important to note that connecting waterways between the lakes do not necessarily fall within the GLWQA and, instead, oftentimes have their own state-specific TMDLs developed to further designate water quality impairment. These connecting waterways include the St. Mary's River that drains Lake Superior into Lake Huron, the St. Clair and Detroit Rivers that drain Lake Huron into Lake Erie, and the Niagara River that drains Lake Erie into Lake Ontario before the entire system flows to the Atlantic Ocean via the St. Lawrence River.

There is one designated sole source aquifer located within the study area—the Bass Islands Aquifer, which is within the Jurisdiction of the Ohio EPA and is located under Catawba Island in Lake Erie. If a project is proposed in this location, an additional SEA analysis would need to be conducted.

4.7.2 Environmental Consequences

4.7.2.1 No Action

Under the No Action alternative, bluff erosion and sedimentation would continue, causing long-term, adverse impacts on water quality as a result of the release of sediments, nutrients, and pollutants into the water. No impact on, or withdrawal of, groundwater would be anticipated under the No Action alternative. Under this alternative, it is assumed that communities would implement some ad hoc efforts to repair damaged shoreline infrastructure, but erosion would not be substantially mitigated and would continue to have impacts. Although ad hoc efforts would have some mitigative effects, these effects would not be substantial because they would not be coordinated, engineered, or designed to an appropriate design storm or design life, and would not result in meaningful hazard reduction.

4.7.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Minor, short-term impacts on water quality may occur as a result of construction. During construction, exposed soils are highly vulnerable to erosion by wind and water and eroded soils endanger water resources by reducing water quality and causing the sedimentation and degradation of aquatic habitats. Clearing and grading during construction would also result in the temporary loss of native vegetation and exposure of soils to the elements.

Projects resulting in permanent long-term impacts, such as permanent adverse impacts from fill and loss of waters of the United States, may require compensatory mitigation (projects that require compensatory mitigation would need to prepare an SEA). If mitigation measures for a specific project would be required, the project would likely also require authorization from USACE. However, erosion mitigation would have long-term minor to moderate beneficial effects including the reduction of sediment, nutrients, and other pollutants in the waterways as a result of the shoreline stabilization measures analyzed by this PEA. For projects that impact waters of the United States, mitigation measures consistent with USACE regulations should be developed, which may include the restoration or enhancement of surface waters and riparian areas impacted by project activities (40 C.F.R. Part 230).

Project-Specific Consequences

Bioengineered Stabilization Measures

Although minor short-term impacts are likely to occur as a result of general construction activities, long-term beneficial changes resulting from bioengineered stabilization measures are also anticipated.

Bank Regrading/Stabilization

Vegetated shoreline buffers containing native plant species would help reduce pollutant runoff and provide long-term minor to moderate benefits to water quality.

Marsh and Wetlands Creation, Restoration, or Enhancement

The creation, restoration, or enhancement of marshes and wetlands would result in long-term minor to moderate benefits on water quality. Similar to vegetated banks and shorelines, enhanced or newly created wetland habitats would help reduce pollutant runoff.

Hard Stabilization Measures

As previously discussed, short-term temporary impacts would occur as a result of general construction activities. However, hard stabilization measures that use man-made materials (e.g., concrete or sheet pile) or that result in changes in topography (e.g., walls in contrast to the natural shoreline slopes) would have a greater potential for adverse impacts.

Revetments

Shoreline armoring (e.g., revetments, sea walls, riprap, jetties, breakwaters, groins, and piers) has the potential to cause minor to moderate long-term impacts on water quality, as it has been shown to alter sediment dynamics, accelerate shoreline and lakebed erosion, and cause loss of habitat. Areas located around revetments may become subject to increased erosion due to the effects of waves breaking against the structure, accelerated currents, and reduced sediment availability within the littoral cell (USACE 2020a).

Bulkheads and Seawalls

The construction of bulkheads and seawalls may result in the scouring of the beach in front of the structure, especially on chronically eroded shorelines, resulting in minor to moderate impacts on water quality due to released sediment. The extent of this effect is dependent upon the width of the beach, the wave energy reaching the beach and seawall, and the sediment supply. Like revetments, seawalls must be sited and designed carefully and consider the potential for increased erosion of neighboring shorelines (USACE 2020a).

Breakwaters

Breakwaters can disrupt longshore sediment transport and adversely affect downdrift beaches resulting in long-term minor impacts to water quality as a result of impacts to sediment transport. However, because breakwaters are constructed parallel to the shore, it is likely that the construction of this type of structure would result in less of an impact than groins and jetties, as discussed below.

Groins and Jetties

Groins and jetties affect the littoral drift of sediment along the shoreline, and alteration of the lateral movement of sediment may affect erosion and depositional areas, further impacting additional downdrift areas. As a result, the construction of groins and jetties may have long-term minor to moderate adverse impacts on water quality if excessive sand and sediment enters the waterway, increasing turbidity and total suspended solids.

Connected Actions

Infrastructure Relocation or Repair

The relocation or repair of infrastructure such as roadways has the potential to result in short-term minor impacts due to construction activities that disturb soils and have the potential for erosion and sedimentation of waters. However, moving infrastructure away from a shoreline erosion zone would have long-term beneficial effects because the infrastructure would no longer be subject to repeated damage and repairs that can cause soils and other contaminants to be mobilized into the water. Construction that results in permanent fill of waters of the United States and requires compensatory mitigation would not be covered by this PEA and would require the preparation of an SEA.

Piers and Boardwalks

The construction/installation of overwater structures such as piers may result in short-term minor to moderate adverse impacts on aquatic resources and water quality through the potential disruption and release of contaminated sediments. However, long-term minor to moderate benefits may occur if the construction of these structures protects the shoreline from erosion, such as a boardwalk that provides pedestrian access across a dune while protecting the dune's natural function of shoreline protection.

Rain Gardens and Bioswales

The construction of rain gardens and bioswales would provide long-term minor benefits to water quality through the reduction of pollutants in stormwater runoff.

Structure Acquisition and Demolition or Relocation

Structure acquisition and demolition or relocation would have minor short-term impacts on water quality by releasing contaminated sediment during construction. These activities would also have minor long-term benefits through the creation of new habitat and planting of native vegetation where structures existed, which would reduce contaminants in stormwater runoff.

Best Management Practices

The following conditions would be necessary to avoid and minimize potential impacts:

- Materials used for fill or bank protection should be clean, meet standard engineering criteria, and be composed of materials that are free from contaminants in other than trace quantities. Further, broken asphalt, recycled riprap, or other construction debris should be excluded from use as fill or bank protection.

- Do not discharge water from dewatering operations directly into any live or intermittent stream, river, channel, wetlands, surface water, or any storm sewer.

- Chemically treated lumber, including chromated copper arsenate- and creosote-treated lumber, should not be used in structures that come into contact with water.
- At the completion of construction activities, all temporary fill material should be removed to an area that has no water and is outside of wetlands and floodplains.
- All dredged material not determined suitable for reuse as base material or backfill should be placed within an upland area, and all return water should be contained to prevent reentry into waterways. Only upland disposal areas that are permitted and compliant with applicable laws, such as the NHPA and ESA, should be used.
- All beach sand and gravel that is excavated or that would be covered by structures should be sidecast lakeward prior to construction to prevent its removal from the littoral system, except when such materials are contaminated.

4.8 Floodplains

Floodplains provide a variety of ecological benefits, including flood storage, reduction in flood velocities, filtration of stormwater, habitat for plants and wildlife, and supporting biodiversity (University of Tennessee 2007). EO 11988, Floodplain Management, requires federal agencies to take actions to minimize occupancy of and modifications to floodplains. FEMA regulations in 44 C.F.R. Part 9, Floodplain Management and Protection of Wetlands, set forth the policy, procedures, and responsibilities to implement and enforce EO 11988 and prohibit FEMA from funding improvements in the 100-year floodplain unless no practicable alternative is available. In addition, under the National Flood Insurance Act, 42 U.S.C. § 4001 et seq. and its implementing regulations, 44 C.F.R. Part 60, communities must meet certain floodplain development standards to participate in the National Flood Insurance Program (NFIP). **Table 4.6** shows the number of NFIP participating communities within each state as well as the state-specific NFIP implementing agency. Subapplicants may need to coordinate with their state or local floodplain management agency to acquire any necessary approval for construction within the floodplain.

Table 4.6. NFIP Participating Communities and State Implementing Agency

State	Number of NFIP Participating Communities	State NFIP Implementing Agency
Illinois	893	Illinois Department of Natural Resources/Office of Water Resources
Indiana	451	Indiana Department of Natural Resources
Michigan	1,056	Michigan Department of Environment, Great Lakes, and Energy
Minnesota	623	Minnesota Department of Natural Resources
Ohio	754	Ohio Department of Natural Resources
Wisconsin	558	Wisconsin Department of Natural Resources

Source: FEMA 2020b

Illinois: In accordance with the Illinois Administrative Code (Ill. Admin. Code), 17 Ill. Admin. Code § 3700, all construction activities that occur in the floodways of streams, defined as the channel and the adjacent portion of the floodplain that is needed to safely convey and store floodwaters, must obtain permits from the Illinois DNR Division of Water Resource Management prior to construction. Similarly, in urban areas where the stream drainage area is one square mile or more, or in rural areas where the stream drainage area is 10 square miles or more, all construction activities require a permit from Illinois DNR's Division of Water Resource Management prior to construction.

Indiana: The Indiana Flood Control Act (Indiana Code [Ind. Code] 14-28-1) requires that any person proposing to construct a structure, place fill, or excavate material at a site located within the floodway of any river or stream, unless that activity is exempted, must obtain the written approval of the Indiana DNR prior to initiating the activity.

Michigan: The State of Michigan's Floodplain Regulatory Authority, found in Part 31, Water Resources Protection, of the NREPA, 1994, Public Act 451, as amended, requires that a floodplain permit be obtained prior to any alteration or occupation of the 100-year floodplain of a river, stream, or drain. The applicable regulation is Floodways and Floodplains, Michigan Administrative Code (Mich. Admin. Code) r 323.1311–323.1329.

Minnesota: The Minnesota floodplain ordinance is contained in Minnesota statutes, Minn. Stat. § 103F; Minnesota administrative rules, Minn. R. 6120.5000 – 6120.6200; the rules and regulations of the National Flood Insurance Program codified as 44 C.F.R. Parts 59–78; and the planning and zoning enabling legislation. In addition, The Minnesota Shoreland Management Act authorized the Shoreland Rules that regulate all land within 1,000 feet of classified public waterbodies, or 300 feet of classified public water rivers or streams, or the landward extent of their floodplains.

Ohio: In Ohio, a Shore Structure Permit (Ohio Revised [Rev.] Code § 1506.40) may be required from the Ohio Department of Natural Resources (Ohio DNR) to construct a groin, revetment, seawall, pier, breakwater, jetty, or other similar along or near the Lake Erie shoreline. A Submerged Lands Lease (Ohio Rev. Code §§ 1506.10 - 1506.11) must be entered into with the State of Ohio to place improvements on Lake Erie submerged lands. A Submerged Lands Lease is required for an improvement, or portion thereof, that occupies land lakeward of the water's edge prior to placement of any fill, including structures. A Coastal Erosion Area Permit (Ohio Rev. Code § 1506.07) may be required from the ODNR Director. A Coastal Erosion Area permit is required to erect, construct, or redevelop a permanent structure if the structure, or portion thereof, is located within Ohio's Lake Erie Coastal Erosion Area.

Wisconsin: The Wisconsin Shoreline Management Program also has established shoreline zoning rules that apply to any land within 1,000 feet of a navigable lake, or the landward side of a floodplain as identified in the Wisconsin Administrative Code (Wis. Adm. Code), Department of Natural Resources, Chapter 115. Furthermore, shoreland areas in unincorporated (town) areas are regulated by county shoreland zoning ordinances, which are required to adopt and administer shoreland zoning ordinances that meet or exceed the minimum requirements set forth by the

Wisconsin Shoreline Management Program. Following these ordinances, a floodplain development permit is required for any development occurring within the regulatory floodplain.

4.8.1 Affected Environment

Although the study area extends up to one-quarter mile inland, because the study area follows the shoreline of the great lakes, it is expected that most of the study area is (at least partially) located within the 100-year floodplain. In addition, the majority of the floodplain along the Great Lakes shoreline is mapped as AE zones with many of the areas also mapped as V zones, indicating floodplains with additional hazards from storm-induced waves such as flooding and damage from wave action. Shorelines with low relief may have wider floodplains, while areas of steep bluffs may only have the toe of the bluff within the 100-year floodplain. Portions of a specific shoreline stabilization project may be within the floodplain while other portions may extend outside of the floodplain. Projects that are located in close association with the confluence of streams or rivers and the lake may also be within wider floodplain areas.

The Great Lakes Flood Hazard Mapping project is a 5-year program currently underway to remap the entire U.S. coastline of the Great Lakes, including Lake St. Clair. FEMA Region V is the lead agency for the flood mapping project. The project is evaluating Great Lakes shorelines for the applicability of the V zone designation.

4.8.2 Environmental Consequences

4.8.2.1 No Action

Under the No Action alternative there would be some construction associated with ad hoc measures, but they would not constitute the same level of duration or organization as the proposed actions described in this PEA. The No Action alternative would not achieve any substantial flood protection benefits. However, there is the potential for long-term, adverse impacts from nonauthorized fill with inappropriate materials and continued erosion that degrades the condition and functions of the floodplain.

4.8.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

The Proposed and Connected Actions would result in minor short-term adverse effects from construction-related ground disturbance and fill. However, shoreline stabilization efforts that reduce erosion would help prevent the continued expansion of the floodplain into currently non-floodplain areas.

Project-Specific Consequences

Bioengineered Stabilization Measures

The bioengineered stabilization measures discussed in this PEA have the potential to be constructed more inland than the other stabilization measures. Because these measures can be constructed further from the 100-year floodplain that extends along the shoreline, actions such as regrading the top of the bank to reduce the slope or creating wetlands or dunes may occur

without impacting floodplains. In addition, bioengineered stabilization measures are designed to work with the natural functions of the floodplain rather than creating a hard edge to the floodplain. The use of vegetation and natural slopes and features would benefit natural floodplain functions while protecting structures and infrastructure further inland from the effects of flooding. Therefore, bioengineered stabilization measures would result in no to minor short-term impacts and minor to moderate long-term benefits on floodplains.

Hard Stabilization Measures
The hard stabilization measures discussed in this PEA would result in minor short-term adverse floodplain effects from construction-related ground disturbance within the floodplain. Fill in the floodplain that is improperly secured may enter the lakes, resulting in impacts on the aquatic environment of the nearshore floodplain. Fill along the shoreline would not affect the base flood elevation of the Great Lakes. Hard stabilization measures, including revetments, sea walls, riprap, jetties, breakwaters, and groins, which prevent the continued expansion of the floodplain into currently non-floodplain areas, could affect the natural function and evolution of the floodplain; although, the reduction in erosion would have a beneficial effect on floodplain functions.

Connected Actions
Connected actions that result in the relocation of structures and infrastructure should avoid relocation into floodplains that may occur inland from the shoreline. If a connection action would result in fill in or relocation of structures or infrastructure into a floodplain, then an SEA would be required to evaluate the potential impacts on floodplains.

Best Management Practices
The following conditions would be necessary to avoid and minimize potential impacts:

- Adhere to all local floodplain development ordinances and acquire all necessary local floodplain approvals.
- Store equipment, fuel, or other regulated materials outside of designated floodplain areas.
- Construction staging and access for the Proposed Actions should occur outside the mapped floodplain to the extent practical.
- All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

4.9 Wetlands

EO 11990, Protection of Wetlands, requires federal agencies to consider alternatives to work in wetlands and limits potential impacts on wetlands if there are no alternatives. FEMA regulation 44 C.F.R. Part 9, Floodplain Management and Protection of Wetlands, sets forth the policy, procedures, and responsibilities to implement and enforce EO 11990 and prohibits FEMA from funding activities in a wetland unless no practicable alternatives are available.

If wetland impacts are necessary to complete a project, federal, state, and local permits and mitigation may be required. Wetland impacts may require a Section 404 permit from USACE. State and local permits may be required even if a federal permit is not. If wetland impacts are unavoidable, compensatory mitigation may be required by federal and state authorities. If compensatory mitigation is likely to be required for a specific project, then an SEA would need to be prepared to address wetland impacts and provide for proper public review.

Illinois: The Illinois Environmental Protection Agency (Illinois EPA) issues 401 Water Quality Certifications for projects that require a Section 404 permit from USACE. Illinois DNR also reviews all applications for USACE authorization for impacts on existing environmental conditions, including fish and wildlife habitat, floodplain and wetland functions, and other environmental effects. The Illinois DNR Office of Water Resources receives most of its authority from the Interagency Wetlands Policy Act of 1989 and peripheral authority through the state's Rivers, Lakes, and Streams Act (615 Illinois Compiled Statutes [Ill. Comp. Stat.] § 1994). Illinois DNR also issues permits for construction and other activities in the public waters of the state, which include the commercially navigable lakes and streams of the state and the backwater areas of those streams. Lake Michigan is a water of the state and this permit authority would cover activities in the shoreline areas.

Indiana: The Indiana Department of Environmental Management (IDEM) issues 401 Water Quality Certifications for projects that require a Section 404 permit from USACE. If isolated wetlands (not regulated by USACE) are encountered, one of two Isolated Wetland Permits must be obtained through IDEM, the Isolated Wetland General Permit or the Isolated Wetland Individual Permit. Isolated Wetland Permits are required under Indiana's Isolated Wetlands Law (Ind. Code § 13-18-22) and the rule implementing the law (327 Indiana Admin Code [Ind. Admin. Code] 17). Impacts to non-exempt Class I isolated wetlands, regardless of the acreage of impact, are commonly regulated by the Isolated Wetlands General Permit. An impact of 0.1 acre or less to a nonexempt Class II isolated wetland is also usually regulated under an isolated wetland permit.

Michigan: In Michigan, EGLE administers its own 404 program as explained in **Section 4.7**. EGLE has adopted administrative rules that provide clarification and guidance on interpreting the 1979 NREPA, as amended in 1994, Public Act 451, Part 303 for Wetlands Protection. In accordance with Part 303, wetlands are regulated if they are any of the following:

- Connected to one of the Great Lakes or Lake St. Clair
- Located within 1,000 feet of one of the Great Lakes or Lake St. Clair
- Connected to an inland lake, pond, river, or stream
- Located within 500 feet of an inland lake, pond, river or stream
- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, but are more than 5 acres in size

- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, and less than 5 acres in size, but EGLE has determined that these wetlands are essential to the preservation of the state's natural resources and has notified the property owner

A permit from the Michigan EGLE is required before beginning any of the following activities:

- Deposit or permit the placing of fill material in a wetland
- Dredge, remove, or permit the removal of soil or minerals from a wetland
- Construct, operate, or maintain any use or development in a wetland
- Drain surface water from a wetland

Although a federal review is not required for the majority of applications in areas under Michigan's 404 jurisdiction, federal agencies (USACE and USFWS) must review projects that impact critical environmental areas, or that involve major discharges. Projects that may require federal review include the following:

- Major Discharges:
    - Projects affecting one or more acre of wetland
    - New construction of breakwaters or seawalls with a total length of more than 1,000 feet
    - Enclosure of more than 300 feet of a stream in one or more segments
    - Relocation or channelization of more than 1,000 feet of a stream in one or more segments
- Projects with potential to affect endangered or threatened species as determined by the US Fish and Wildlife Service
- Discharges to waters of another state, suspected to contain toxic pollutants or hazardous substances, located in proximity of a public water supply intake, or within defined state or federal critical areas

In addition, some wetlands in coastal areas (called *environmental areas*) are given further protection under Part 323 of the NREPA. Any dredging, filling, grading, or other alteration of the soil, natural drainage, or vegetation used by fish or wildlife, or placement of permanent structures in an environmental area requires a permit. Part 323 of the NREPA designates environmental areas up to 1,000 feet landward of the ordinary high-water mark of a Great Lake or of waters affected by levels of the Great Lakes.

Minnesota: The Minnesota Pollution Control Agency issues 401 Water Quality Certifications for projects that require a Section 404 permit from USACE. The Minnesota DNR regulates

activities in public waters, which includes most lakes, rivers, streams and "public waters wetlands." Public waters wetlands generally include wetlands ten or more acres in size in unincorporated areas or 2.5 or more acres in incorporated areas. Public waters are defined as all water basins and watercourses that meet the criteria set forth in Minnesota Statutes, Section 103G.005.

In addition, the Wetland Conservation Act regulates wetlands in Minnesota that are not public waters and is administered by local governments with oversight by the Minnesota Board of Water and Soil Resources. Some local governments and watershed districts have adopted their own wetland and wetland buffer ordinances. Specific projects would need to check with the city, county, or watershed district that encompasses the project area for local permitting requirements or ordinances.

Ohio: The Ohio EPA issues 401 Water Quality Certifications for projects that require a Section 404 permit from USACE. The state also regulates isolated wetlands and issues Isolated Wetland Permits through the Ohio Rev. Code §§ 6111.02 through 6111.028.

Wisconsin: The Wisconsin DNR issues 401 Water Quality Certifications for projects that require a Section 404 permit from USACE. In addition, the Wisconsin DNR also implements a three-tier system of authorization based on the projected level of environmental impact, which includes exemptions, general permits, and individual permits. The Wisconsin DNR determines compliance with the requirements of Section 281.36, Wisconsin Statutes (Wis. Stat.), and DNR 299 and DNR 103, Wis. Adm. Code. State regulations require avoidance and/or minimization of wetland fill and has exemptions for nonfederal (nonjurisdictional) wetlands as well as wetlands created artificially prior to August 1, 1991, and that have been modified by human activity that changed the landscape, with some exceptions.

Wisconsin DNR has issued general permits for projects that have minimal adverse environmental impacts including the following:

- The project purpose is to build, reconstruct or maintain a recreational structure or facility.
- The project discharge does not affect more than 10,000 square feet (0.23 acre) of wetland.
- The discharge will not occur in Great Lakes ridge and swale complexes, interdunal wetlands, coastal plain marshes, emergent marshes containing wild rice, southern sphagnum bogs, boreal rich fens, or calcareous fens.
- The project will be constructed in a manner that will maintain wetland hydrology in the remaining wetland complex.
- The project meets or exceeds the stormwater management technical standards of ss. NR 151.11 and 151.12, Wisc. Adm. Code for stormwater discharges.

- The activity shall not result in significant adverse impacts to fishery spawning habitat including obstruction of fish passage, to bird breeding areas, or to the movement of species that normally migrate from open water to upland or vice versa.
- The activity will not result in adverse impacts to historical or cultural resources and will comply with s. 44.40, Wis. Stat.

For those projects that do not meet the standards to be eligible for an exemption or general permit, individual permits are available. Wetland compensatory mitigation is also required for all wetland individual permits.

4.9.1 Affected Environment

Along the shorelines of the Great Lakes, freshwater emergent, forested, and shrub/scrub wetlands, as well as marshes and bogs, are present. Although the majority of the soils throughout the study area are sandy, clay and other soil types exist that have the potential to be hydric and support wetland habitats. According to data provided by the USFWS's National Wetlands Inventory, the states bordering the Great Lakes contain the wetland acreages within the study area as shown in **Table 4.7**:

Table 4.7. Wetlands Within the Study Area by State

State	Freshwater Emergent Wetland (acres)	Freshwater Forested/Shrub Wetland (acres)	Total (acres)
Illinois	247	129	376
Indiana	86	88	174
Michigan	23,841	52,695	76,536
Minnesota	381	1,663	2,043
Ohio	4,869	1,025	5,893
Wisconsin	5,136	15,085	20,228
Total	**34,559**	**70,684**	**105,250**

Source: USFWS 2020d

The variations in wetland acreage between the states are based on the length of the shoreline within the study area as well as geophysical characteristics that may or may not support wetlands.

4.9.2 Environmental Consequences

4.9.2.1 No Action

Under the No Action alternative, the current detrimental impacts occurring from erosion and accretion, which promote a loss of wetland habitat along shorelines, would continue. Under this alternative, it is assumed that communities would implement some ad hoc efforts to repair damaged shoreline infrastructure, but erosion would not be substantially mitigated and would

continue to have impacts. Although ad hoc efforts would have some mitigative effects, these effects would not be substantial because they would not be coordinated, engineered, designed to an appropriate design storm or design life, and would not result in meaningful hazard reduction. Ad hoc measures are more likely to result in impacts on wetlands through inappropriate placement of fill materials or use of inappropriate materials that could introduce contaminants into the environment. Potential impacts on wetlands would be minor to moderate under the No Action alternative.

4.9.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Construction has the potential to result in short-term temporary impacts if wetland habitats are directly disturbed or impacted by fill or other construction activities, such as the use of temporary access routes. Short-term detrimental impacts may also occur if the water that supports the wetland is impacted by construction activities, such as through increased sedimentation.

This PEA presumes that projects and any connected actions can be designed to avoid permanent impacts on wetlands, with the exception of marsh/wetland creation measures. If a project or a measure would adversely affect wetlands in such a way that a regulatory agency would require compensatory mitigation, then an SEA must be prepared that addresses these additional impacts on wetlands that are not otherwise evaluated.

In general, long-term positive benefits would occur to wetland habitats through any shoreline stabilization activities that result in the protection of wetlands, such as the planting of native wetland vegetation, as well as the creation, restoration, or enhancement of habitat.

Project-Specific Consequences

Bioengineered Stabilization Measures

The use of native vegetation and natural materials in bioengineered measures would, overall, result in positive minor to moderate long-term benefits to wetland habitats throughout the study area. The use of sills or toe protection may have beneficial effects by reducing erosion and allowing native wetland plants to become established, in turn allowing the natural wetland vegetation root systems to provide erosion protection. However, there may be adverse impacts if these measures fill a portion of the adjacent wetland. Impacts may range from beneficial effects to minor adverse effects.

Bank Regrading/Stabilization

Bank regrading and stabilization with native vegetation would have minor to moderate long-term benefits on wetlands by helping to protect existing wetlands against erosion. If the regrading would result in slopes that would support wetland hydrology and wetland plant species, the project may result increased wetland area and minor to moderate wetland benefits.

Marsh and Wetlands Creations, Restoration, or Enhancement

The creation, restoration, or enhancement of marshes and wetlands would result in long-term beneficial impacts as a result of increased acreage and/or function throughout the shoreline environment. In addition, wetland and marsh enhancement projects can also result in long-term minor to moderate improvements to fish habitat, diversity within a wetland complex, and improved water circulation.

Furthermore, certain wetland services, and the associated benefits that flow to neighboring human communities (e.g., shoreline stabilization, nursery for fisheries) may depend on water level variation. Wetlands can adjust with decreases and increases of lake levels, depending upon the type of substrate and shoreline change and, in many cases, wetland species are more diverse with variable water levels.

Hard Stabilization Measures

Hard stabilization measures have the potential to permanently fill existing wetlands and result in minor to moderate long-term impacts. As previously noted, a project that would permanently fill wetlands and require compensatory mitigation would also require further analysis in an SEA. Hard stabilization measures such as bulkheads and seawalls have the potential to separate existing wetlands from lake influences. This separation could adversely affect wetland hydrology even if there is no direct fill of the wetland. In addition, if the littoral transport of shoreline sediments is interrupted by shoreline hardening or by breakwaters, jetties, or groins, erosion or accretion can occur and result in the loss of downdrift wetlands. Because a wetland permit and associated compensatory mitigation would not be required if there is no direct wetland fill, care should be taken to evaluate potential effects on wetland hydrology from hard stabilization measures. The installation of hard stabilization measures could result in long-term minor to moderate adverse impacts on wetlands.

If hard stabilization measures would be constructed in an area where an existing wetland is present, some vegetation loss may occur; however, it is likely that these areas would have already lost substantial amounts of vegetation due to the shoreline erosion and that some vegetation could be replanted to enhance existing wetlands. Therefore, hard stabilization measures could result in long-term minor benefits on wetland habitats.

Best Management Practices

If there would be permanent impacts on wetlands from a specific project that may require compensatory mitigation under federal, state, or local regulations, an SEA would need to be prepared to address these additional wetland impacts. This PEA presumes that projects will avoid impacts or only result in temporary impacts that would be restored on-site and in kind at the end of construction.

While many of the BMPs listed in **Section 4.7** would also be applicable for wetlands, the following conditions would also be necessary to avoid and minimize potential impacts to these habitats:

- Ensure that beach compatible sediments or sediments compatible with marsh or wetland enhancement are used. The project must meet state standards for use of clean fill. In addition, any state-specific sediment/fill guidelines must be followed.
- Dredged material intended for use in a beneficial manner, such as for beach nourishment, building of sand dunes, or wetlands enhancement, must meet all federal, state, and local sediment testing and quality requirements.
- All construction staging areas must be located outside of wetlands.
- Prevent wastes, fuels, oils, lubricants, or other hazardous substances from equipment from entering the ground, drainage areas, or local bodies of water that would impact wetlands through appropriate staging and operation of equipment and by using appropriate erosion and sediment controls.
- All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.
- Do not operate equipment in wetlands other than as minimally necessary.
- If wetlands are impacted, restore all wetland areas that were temporarily altered by construction activities, including excavation, clearing, and trenching of wetlands during the course of construction to a condition equal to or better than the condition that existed previous to construction.

4.10 Coastal Resources

This section analyzes the impacts of the alternatives on coastal resources, which continue to experience challenges in terms of growth and development. Recognizing these challenges, Congress passed the Coastal Zone Management Act (CZMA) in 1972 (16 U.S.C. §§ 1451–1464, Chapter 33). The CZMA was established to preserve, protect, develop, and, where possible, restore or enhance the resources of the nation's coastal zone. Section 307 of the CZMA requires federal actions, within or outside of the coastal zone, to be consistent with the enforceable policies of a state's federally approved coastal zone management program (NOAA 2020c).

The CZMA outlines three national programs, including the National Coastal Zone Management Program, the National Estuarine Research Reserve System, and the Coastal and Estuarine Land Conservation Program (CELCP). The National Coastal Zone Management Program works to balance issues of competing land and water use through state coastal management programs, the Reserve System is a series of field laboratories researching the overall function of estuaries and how humans are impacting them, and CELCP provides matching funds to state and local governments to purchase threatened coastal and estuarine lands or obtain conservation easements (NOAA 2020b). Federal lands within the Reserve System or funded by CELCP would not be eligible for FEMA shoreline stabilization funding.

The CZMA provides a partnership between states and NOAA to implement state-specific Coastal Zone Management Programs. The CZM programs provide technical assistance and

strategic grant funding to assist coastal communities in understanding risks and to mitigate coastal hazards, as well as create and support resilient and sustainable coastal economies.

The Coastal Barrier Resources Act (16 U.S.C. §§ 3501-3510) of 1982, and the associated Coastal Barrier Improvement Act of 1990 (Pub. L. 101-591, 104 Stat. 2931) encourage conservation of biologically rich coastal barriers by restricting federal expenditures that support development within the Coastal Barrier Resources System (CBRS). Therefore, areas within the CBRS would not be eligible for FEMA grant funding intended to protect and reduce hazards to structures and infrastructure. Areas within the CBRS can be developed, but at the full cost of the private developer or other nonfederal party (USFWS 2020a).

The states bordering the Great Lakes each have federally approved coastal management programs, with missions to protect property and ecologically important habitats along the shoreline, and to minimize the dangers of erosion to human life and development. The programs may include setback regulations for building along the shoreline that account for local erosion rates. Each state's coastal management program is described below.

Illinois: The Illinois DNR manages the Illinois Coastal Management Program (CMP), which is dedicated to protecting and enhancing the environmental, economic, and social values of Illinois' Great Lakes coastal region. The program fosters healthy ecosystems and resilient communities by providing funding and guidance (Illinois DNR 2020). The Illinois coastal zone starts at the state boundary line for Illinois within Lake Michigan and extends landward. The landward boundary is landscape-based and generally follows watershed boundaries, but also utilizes regional transportation networks (roads, streets, highways, and railroad rights-of-way) that provide an easily recognizable boundary. The boundary includes areas that would be expected and anticipated to be included so as to address the goals of the CMP. The zone includes, among other features, navigable segments of immediate inland waterways and public parks. The Illinois CMP has four priority goal areas:

- Habitats and species: Protect and improve coastal habitats, with an emphasis on areas and species considered priorities.
- Economic Development and Recreation: Support and facilitate resource-related coastal economic development, including recreation, public access, and tourism.
- Coastal Communities: Help coastal communities improve their capacity to protect natural resources.
- Program Development: Improve, refine, and administer the CMP.

Indiana: The Indiana DNR is responsible for managing the Indiana Lake Michigan Coastal Program, which protects and enhances coastal resources by providing technical and financial assistance and coordination to current and future partners. The goals and objectives of the program include informing coastal decision-makers about coastal resources, issues, and values, ensuring that Coastal Program resources are used for planning and implementation of projects that will restore and protect coastal areas, and helping partners take action by sharing information and providing guidance. The lakeward boundary of the coastal zone is the jurisdictional border shared with Illinois and Michigan. The Indiana inland boundary of the coastal zone is generally based on watershed boundaries and can vary from as little as two miles

from shore to 17 miles from shore. To create a boundary that is easily definable, the program utilized practical landmarks such as the U.S. Public Land System, Township Sections, and major roads to modify the boundary practically. The inland boundary is described via USGS Quadrangle Maps and major roads and extends to the northern portion of Lake, Porter, and LaPorte Counties. The Indiana Lake Michigan Coastal Program has nine areas of concentration:

- Coastal Hazards
- Water Quality
- Water Quantity
- Natural Areas, Fisheries, Wildlife, and Native and Exotic Species
- Recreation, Access, and Cultural Resources
- Economic Development
- Pollution Prevention, Recycling, Reuse, and Waste Management
- Air Quality
- Property Rights

Michigan: The EGLE Office of Coastal Management is responsible for managing the Michigan Coastal Management Program (MCMP). In Michigan, the coastal zone includes the shorelines of Lake Superior, Huron, Michigan, and Erie, up to 500 feet inland in most areas. The MCMP has five areas of concentration and provides policy-based standards to avoid impacts to littoral processes, beaches, dunes, and bluffs from human development and uses (EGLE 1978):

- Natural Hazard to Development: Includes erosion and flood-prone areas.
- Sensitive to Alteration or Disturbance: Includes ecologically sensitive areas (wetlands), natural areas, sand dunes, and islands.
- Fulfilling Recreational or Cultural Needs: Includes areas recognized for recreational, historic, or archaeological values.
- Natural Economic Potential: Includes water transportation, mineral and energy, prime industrial, and agricultural areas.
- Intensive or Conflicting Use: These encompass coastal lakes, river mouths, bays, and urban areas.

Minnesota: The Minnesota DNR oversees the operation of the Lake Superior Coastal Program. The Minnesota coastal boundary follows the nearest legal coastal township along the shore, or approximately six miles inland. In the metropolitan area around Duluth, it includes the entire

cities of Duluth, Hermantown, Proctor, Carlton, Wrenshall, and Cloquet, and all or parts of the adjacent townships. The program's goal is to preserve, protect, develop and, where possible, restore or enhance coastal resources along the Minnesota Lake Superior coastline. The CMP focuses on the following policies:

- Coastal Land Management
- Coastal Water Management Standards
- Air and Water Quality
- Fish and Wildlife Management
- Forest Management
- Mineral Resources
- Energy
- Environmental Review

Ohio: The Ohio Coastal Management Program, administered by the Ohio DNR Office of Coastal Management, enacts policies for Ohio's portion of Lake Erie, the shore, and adjacent watersheds to preserve, protect, develop, restore, and enhance natural and cultural coastal resources. The CMP coastal zone extends from the international boundary line in Lake Erie between the United States and Canada landward only to the extent necessary to include shorelands and the uses that have a direct and significant impact on coastal waters as determined by the Director of Natural Resources (Ohio Rev. Code § 1506.01(A)). The CMP focuses on nine policies:

- Coastal Erosion and Flooding
- Water Quality
- Ecologically Sensitive Resources
- Ports and Shore Area Development
- Recreation and Cultural Resources
- Fish and Wildlife Management
- Environmental Quality
- Energy and Mineral Resources
- Water Quantity

Wisconsin: The Wisconsin Coastal Management Program, administered by the Department of Administration, preserves, protects, develops, and restores or enhances the coastal resources of Wisconsin. The coastal zone in Wisconsin is defined as the state boundary landward to the inland boundary of the 15 counties with frontage on Lake Superior, Lake Michigan, and Green Bay. The CMP focuses on seven coastal policies:

- Coastal Water Quality and quantity and Coastal Air Quality
- Coastal Natural Areas, Wildlife habitat and Fisheries
- Coastal Erosion and Flood Hazard Areas
- Community Development
- Economic Development
- Governmental Interrelationships
- Public Involvement

4.10.1 Affected Environment

The existing coastal resources of the study area include the shoreline and a certain distance inland depending on the state. Within Illinois, Indiana, Minnesota, and Wisconsin, the entire study area is likely contained in the coastal zone. In Michigan, only half of the study area would be within the coastal zone and in Ohio the coastal zone may only encompass a proposed shoreline stabilization measure, but not any connected project elements. The condition and quality of the resource within any particular project area will vary greatly depending on where the project is located. The study area includes the full range of coastal conditions from natural, undisturbed coastal resources to previously armored landscapes in urban settings. The various natural resources that can be found within the coastal zone (e.g., wetlands, soils, surface waters, vegetation) are described in other sections of this document. In general, coastal resources will vary greatly by state and by lake. For instance, coastal resources on Lake Superior are likely to be remote and undisturbed, whereas Lake Erie and Lake Michigan are likely to be more urbanized with residential and commercial development close to or right up to the shore.

Illinois: The study area within Illinois includes 64 miles of Lake Michigan shoreline, extending from the southern part of Lake Michigan to the Wisconsin border on the western shore. The northernmost portion of the shoreline includes several miles of recreational beaches, marinas, and preserved parkland before yielding to more developed land at the outer suburbs of Chicago. From approximately Waukegan southward, the coastal area is more developed toward the shoreline, and the shoreline begins to be more consistently armored when approaching Chicago. Chicago and the regions directly surrounding it are almost entirely armored and continue to be heavily armored until the border with Indiana.

Indiana: The study area within Indiana includes 50 miles of Lake Michigan shoreline, spanning from the Illinois border to the Michigan border. Much of the shoreline near Gary has been

extensively developed with residential, commercial, and industrial development. There is a nominal number of miles north of Portage where recreational beaches and parkland are present. Much of the eastern portion of the shoreline from Michigan City to the border with Michigan is armored or heavily developed close to the shoreline.

Michigan: The study area within the state of Michigan includes 882 miles of shoreline along Lake Michigan, 865 miles of shoreline along Lake Huron, 585 miles of shoreline along Lake Superior, and 86 miles of shoreline along Lake Erie. Michigan's Lake Superior shoreline consists almost exclusively of undeveloped natural shore ranging from tall eroding bluffs, vegetated shores, and narrow sandy beaches. There are small regions of residential or more urbanized areas, particularly in Ontonagon and Marquette, but the majority of this section is undeveloped natural area. The Lake Michigan shoreline on the southern border of the Upper Peninsula continues to be predominantly undeveloped naturally occurring shoreline with the exception of several smaller areas of urbanized development. The Lake Michigan shoreline along the western border of mainland Michigan varies greatly from heavily urbanized areas such as Petosky, Charlevoix, and Muskegon, to naturally occurring shorelines. Much of the northern portion of this region is undeveloped, with more residential and urbanized development increasing as you continue southward towards the border with Indiana and, in general, is much more likely to have commercial and residential development closer to the shore. Michigan's shoreline along Lake Huron displays the largest swath of agricultural use in the study area, with large expanses of agricultural land present. Some of these areas have agricultural fields directly adjacent to the shore, specifically from the southeastern shoreline at Michigan's border with Ontario, Canada northward to Tawas City.

Minnesota: The study area within Minnesota includes 190 miles of Lake Superior coastal resources that extend from the Minnesota-Wisconsin border at Duluth to the Canadian border. This area remains a largely undisturbed remote coastline with the Duluth area primarily being the only heavily developed region.

Ohio: The study area within Ohio includes approximately 292 miles of Lake Erie coastal resources. The Ohio coast encompasses Cleveland and its associated outer suburbs; therefore, it is heavily developed directly adjacent to the shoreline in many areas. Cleveland is located almost in the center of Ohio's coastal region, with suburbs sprawling to the east and the west of this metropolitan area. Therefore, the easternmost and westernmost areas of the Ohio coast tend to be the only regions where more naturally occurring coastal resources may be found. There is a small region of agricultural development on the easternmost end of the Ohio shoreline.

Wisconsin: The study area within Wisconsin includes approximately 458 miles of coastal resources along Lake Michigan and 209 shoreline miles of coastal resources along Lake Superior. The southern limit of Wisconsin's Lake Michigan coastline is the midpoint between Chicago and Milwaukee. This area encompasses the suburbs of both of those cities and is therefore moderately to heavily developed right to the shore. The Milwaukee shoreline is almost exclusively armored and heavily developed northward to the Fox Point area. Residential development continues northward along the shoreline, with intermittent areas of undeveloped coastline until reaching the heavily armored shoreline of Port Washington. The coastal region northward of Port Washington has large swaths of agricultural fields adjacent to the coastline,

with residential properties also directly abutting the shore. There are several more heavily developed areas such as Manitowoc, Kewaunee, and Green Bay, where the shoreline is almost exclusively armored. North of Green Bay, the coastline becomes more natural again, with some residential development but remote natural shorelines are more common. Wisconsin's Lake Superior coast is predominantly developed in residential uses with areas of remote, undeveloped shore. There is more urbanized development in areas such as Ashland and Washburn, but the majority of this section of coast has minor to moderate development. The western end of this shoreline includes areas of recreational beaches and more sizeable stretches of undeveloped coast.

There are two sites within the study area that are designated as part of the National Estuarine Research Reserve System. The Old Woman Creek Reserve is located in Huron Ohio; 16,000 acres adjacent to Lake Superior in northwest Wisconsin hold this designation. Additionally, there are 13 locations throughout the Michigan, Ohio, and Wisconsin study area that were awarded funding through the CELCP for land acquisition and conservation. CBRS units are found in four of the six states within the study area. Illinois and Indiana do not have any units. There are 40 CBRS units in Michigan, 1 unit in Minnesota, 10 units in Ohio, and 4 units in Wisconsin. These units are shown in **Figure 4-2**.

4.10.2 Environmental Consequences

4.10.2.1 No Action

Under the No Action alternative, some ad hoc efforts to construct shoreline stabilization measures would be implemented, but erosion would not be substantially mitigated. Subsequently, there would be long-term adverse impacts because erosion would continue to affect the existing bluffs, beaches, and shoreline features, causing significant instability and potentially impacting structures and infrastructure along the shoreline. The state's CMPs outline several priorities, including coastal hazards, economic development, recreation, water quality, and wildlife habitat. This alternative would not be consistent with state coastal management plans, as there would be no protection, restoration, or creation of coastal resources within the study area. Continued erosion would result in the loss of coastal resources, impacting coastal water quality, wildlife habitat and fisheries, recreational access and opportunities, and community and economic development.

4.10.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

The Proposed and Connected Actions could result in temporary minor to moderate impacts on coastal resources due to construction activities; however, many of the temporary short-term construction impacts related to ground disturbance are discussed within other sections of this document. Temporary minor impacts on resources, such as water quality, disturbance of existing wildlife habitat, loss of access to recreational areas, and economic impacts from construction detours both on land and in the water (e.g., ferry service), could occur during construction. However, long-term beneficial effects are anticipated at localized project areas. Protecting

resources from continued erosion would potentially provide project areas with protection against some coastal hazards, improved water quality, healthier wildlife habitat and fisheries, creation of new and increased access to existing recreational areas, and beneficial effects on economic and community development.

Project-Specific Consequences

Bioengineered Stabilization Measures

Bank Regrading/Stabilization

Bank regrading and stabilization would result in long-term moderate benefits on coastal resources because resources and structures landward of the shore would be protected. Benefits of protection would include coastal hazard protection, continued public access to recreational areas, and opportunities for economic development in appropriate areas. Additionally, stabilization projects would provide benefits to water quality, as stabilizing the shore with vegetation would decrease erosion rates and provide filtering of stormwater contaminants prior to reaching the lake. The planting of native vegetation would also benefit coastal resources as a result of ecosystem enhancement and habitat creation. The benefits that would be provided by the Proposed Action would support the goals and priorities outlined in many CMPs and would be consistent with the CZMA.

Marsh and Wetlands Creations, Restoration, or Enhancement

The use of a hard toe protection or sill for marsh and wetlands creation would result in minor adverse impacts on coastal resources because the hard, stabilizing features represent permanent fill of a water resource, removing existing habitat and prohibiting the growth of natural vegetation. Alternatively, long-term moderate benefits to coastal resources as a result of planting native vegetation and marsh and wetland ecosystem creation would be anticipated. Marsh and wetlands restoration or enhancement would have long-term minor to moderate benefits from the restoration of a degraded wetland or enhancement of existing wetland functions. Additional benefits would include opportunities for increased recreational use, improved water quality, and wildlife and fisheries habitat. Creating additional opportunities for public access and recreation may also have a positive impact on economic development. The benefits that would be provided by the Proposed Action would support the goals and priorities outlined in many CMPs and would be consistent with the CZMA.

Beach/Dune Nourishment

Beach/dune nourishment would result in long-term minor to moderate benefits on coastal resources by widening beaches and planting native vegetation, which would encourage coastal hazard reduction, increased recreational activity, and local economic development. The addition of new vegetation would also improve water quality, as vegetation would decrease erosion rates and slow the rate of runoff and allow for contaminant settling prior to reaching nearby surface waters. Benefits would also include habitat and ecosystem creation. The benefits that would be provided by the Proposed Action would support the goals and priorities outlined in many CMPs and would be consistent with the CZMA.

Hard Stabilization Measures

Revetments

Revetments would result in long-term minor to moderate benefits from reconstructing the slope, planting new vegetation, and stabilizing the shoreline. New vegetation would create new wildlife habitat and increase water quality, as described above. Minor adverse impacts may occur due to the placement of hard revetment materials at the shoreline, potentially disturbing or removing any existing habitat. The adverse impacts would be minor because it is likely that habitat values would have already been compromised due to shoreline erosion severe enough to warrant a hard stabilization measure. The benefits that would be provided by the Proposed Action may support the goals and priorities outlined in many CMPs and would be consistent with the CZMA.

Bulkheads and Seawalls

Bulkheads and seawalls may result in adverse impacts on coastal resources caused by the loss of existing wildlife habitat from the placement of the structure. Bulkheads and seawalls can result in minor to moderate long-term adverse impacts on areas downdrift of the structure where erosion can be exacerbated. Increased erosion issues would impact water quality and wildlife habitat and fisheries outside of the immediate project area. Bulkheads and seawalls would result in long-term minor to moderate benefits because of the potential for protection against coastal hazards, pollution prevention, increased water quality, and increased opportunities for economic and shore area development. The benefits that would be provided by the Proposed Action would support the goals and priorities outlined in many CMPs and would be consistent with the CZMA.

Breakwaters

Installation of breakwaters can result in long-term benefits by encouraging the deposition of sediments (carried by longshore currents) between the structure and the shoreline. This accumulation would provide beach sand to an eroding shoreline, increase habitat, and decrease the potential for damage from coastal hazards. Larger, more expansive beaches would provide opportunities for better public access, recreational opportunities, and, in turn, economic development. The benefits that would be provided by the Proposed Action would support the goals and priorities outlined in many CMPs and would be consistent with the CZMA.

Groins and Jetties

Groins and jetties can result in minor to moderate long-term adverse impacts to downdrift areas due to sediment loss. This could result in loss of wildlife and fisheries habitat and water quality concerns. Conversely, these structures provide benefits by increasing sediment nearshore and slowing erosion and, over time, protecting beaches. Additional benefits would include opportunity for increased recreational use, improved water quality and water quantity, and wildlife and fisheries habitat. Creating additional opportunities for public access and recreation may also have a positive impact on economic development. Jetties, in particular, are intended to protect navigational channels into ports and harbors from sedimentation resulting from erosion, which would have long-term benefits on economic development. The benefits that would be provided by the Proposed Action would support the goals and priorities outlined in many CMPs and would be consistent with the CZMA.

Connected Actions

Infrastructure Relocation or Repair
Relocation or repair of infrastructure would result in short-term minor construction-related impacts on soils, air quality, water quality, floodplains, wetlands, vegetation, fish and wildlife habitat, socioeconomic resources, and recreation and public access, as described in other sections of this PEA. These Connected Actions may provide long-term minor to moderate benefits to coastal resources due to an increase in water quality, pollution prevention, coastal hazard reduction, public access, recreational use, and economic development.

Piers and Boardwalks
The installation of boardwalks and piers would have short-term adverse impacts on coastal resources due to construction of the feature. Long-term moderate benefits include protection from human-caused erosion due to foot traffic and pedestrian activities. Additionally, piers and boardwalks provide public access to recreational areas, and promote economic and community development within the surrounding area.

Rain Gardens and Bioswales
Construction of rain gardens and bioswales would result in long-term minor benefits to individual project areas because they decrease stormwater runoff and improve surface water quality. Additionally, these features may promote public recreational use and provide wildlife habitat, thus increasing environmental quality.

Structure Acquisition and Demolition or Relocation
Structure acquisition and demolition or relocation would have minor long-term benefits from the creation of new wildlife habitat and public recreational open space where structures existed. Removal of existing structures would provide areas for new vegetation growth, improve water quality of adjacent surface waters, and allow for more effective pollution prevention. Removal of structures would increase recreational value of the area, increasing public access and recreation.

Best Management Practices
In addition to the BMPs from other resource sections, the following conditions would be necessary to avoid and minimize potential impacts:

- Ensure construction activities do not impede access to local businesses.
- All beach and sand gravel excavated or that would be covered will be sidecast lakeward prior to construction to prevent its removal from the littoral system, where appropriate.

4.11 Navigation

This section analyzes the impacts of the alternatives on regulated navigable waters. The Rivers and Harbors Act of 1899 (33 U.S.C. § 403 *et seq.,* ch. 425, Mar. 3, 1899; 30 Stat. 1151) protects navigable waters of the United States. Administration of this Act has been delegated to the Coast Guard and USACE. The Coast Guard regulates activities that may affect bridges over navigable waters while USACE regulates the construction of structures and projects proposed below the mean high tide line of navigable waters of the United States. USACE is also responsible for

regulating the maintenance of navigation channels, generally through dredging, while the Coast Guard is responsible for maintenance of navigational aids, such as buoys and channel markers. Projects may not obstruct navigation channels or navigational aids. For instance, no anchor buoys or floats or related riggings are allowed on the surface of the water or to a depth of 125 feet from the surface within fairways (33 CRF Ch. 11).

4.11.1 Affected Environment

The Great Lakes navigation system is a continuous waterway that is a minimum of 27 feet deep and extends from the western end of Lake Superior in Duluth, Minnesota, to the Gulf of the Saint Lawrence on the Atlantic Ocean. This navigation system comprises 2,400 miles and connects all of the Great Lakes, approximately 2,000 miles of the system are located within the study area. The study area portion of this system includes 119 harbors—53 commercial and 66 recreational. The overall system also includes two operational locks, 104 miles of breakwaters and jetties, and over 600 miles of maintained navigation channels (Great Lakes Navigation System). Over 52 million tons of cargo were transported by ship through Lake Michigan in 2014, which represents a decline of over 60 percent since 1970 (Smith 2017). Large, deep, draft vessels that use the navigation channels include cargo freighters, tankers, large pleasure crafts, and other working vessels such as ferries and tugboats. Over 30 ferry services travel through the Great Lakes study area throughout the year.

4.11.2 Environmental Consequences

4.11.2.1 No Action

Under the No Action alternative, construction of locally sponsored shoreline stabilization measures may include the use of offshore barges. This equipment would be operated close to the shore and would not interfere with navigation of any of the vessels described above. Local ad hoc efforts to reduce shoreline erosion would be unlikely to include projects that require a higher degree of engineering such as offshore breakwaters or jetties that could potentially interfere with navigation channels. Under the No Action alternative, it is assumed that erosion would not be substantially mitigated and, as a result, existing bluffs, beaches, and shoreline features would continue to erode, thus contributing sediment to the lakebed. The continued addition of excess sediment to the lake system has the potential to silt in navigation channels close to shore, requiring additional dredging. The 2021 USACE Detroit District budget proposes $37.5 million to dredge approximately 3.12 million cubic yards of material from harbors and waterways in the District's jurisdiction, which is insufficient to address all the backlog of dredging needs (USACE 2021). In addition to the economic costs associated with disruptions in navigation, dredging may have adverse impacts on other resources, as described in sections pertaining to water quality, cultural resources and fish and wildlife. Under the No Action alternative, there would be negligible to minor impacts on navigation.

4.11.2.2 Proposed and Connected Actions

Nautical vessel traffic, including private, commercial, port, and ferry service, could be impacted by some type of shoreline stabilization measure. Excluding breakwaters, groins, and jetties, the

majority of the stabilization measures would occur on, directly adjacent to, or parallel to the shore. Owing to their proximity to the shore, it is not anticipated that projects would have adverse impacts on the navigable waters of the Great Lakes system. By reducing shoreline erosion, the stabilization measures would reduce sediment inputs to the lakebed and thus potentially reduce the need for dredging navigational channels. This benefit would likely be negligible because rivers and tributaries to the lakes are likely the greater source of sediment inputs, but localized effects may be measurable. Breakwaters, groins, and jetties, because they extend out into the lake, may impact navigation channels and are discussed further below.

Project-Specific Consequences

Hard Stabilization Measures

Breakwaters

Breakwaters may result in long-term moderate impacts on navigable waters if they are constructed too close to or within a navigation channel. Because construction of breakwaters would require a permit from USACE, this adverse effect is unlikely to occur. Therefore, if breakwaters are designed and constructed in compliance with USACE permits, there would be no effect on navigation.

Groins and Jetties

Groins and jetties may result in long-term moderate adverse impacts on navigable waters because of their perpendicular design. These structures have the potential to encroach on navigable channels, which would prohibit travel of vessels through the area. Because construction of breakwaters would require a permit from USACE, this adverse effect is unlikely to occur. Therefore, if groins and jetties are designed and constructed in compliance with USACE permits, there would be no effect on navigation. Groins and jetties have the greatest effect on littoral drift of sediments and the effects of a particular project are harder to predict. Alterations in the lateral movement of sediment may alter both erosion and deposition areas, which may have unintended effects on downdrift areas that could affect navigational channels that are close to the shore. Therefore, the placement of groins and jetties may have minor adverse impacts on navigation.

Best Management Practices

The following conditions would be necessary to avoid and minimize potential impacts:

- Ensure all construction barges or associated vessels have appropriate U.S. Coast Guard permits prior to commencing work.
- Any projects proposing features that extend into navigable waters must have required federal, state, and local permits and approvals prior to commencement of work.

4.12 Wild and Scenic Rivers

The Wild and Scenic Rivers Act, 16 U.S.C. §§ 1271 et seq., was enacted in 1968 to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act is notable for

safeguarding the unique character of these designated wild and scenic rivers while recognizing the potential for their appropriate use and development. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection. The outstandingly remarkable values that qualify a river for designation include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Federally designated rivers are classified as wild, scenic, or recreational. Wild river areas are rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines that are essentially primitive and unpolluted waters. These represent the vestiges of primitive America. Scenic river areas are rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but which are accessible in places by roads. Recreational river areas are rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

4.12.1 Affected Environment

The U.S. Congress has designated 29 river segments as wild and scenic rivers in Illinois, Michigan, Minnesota, Ohio, and Wisconsin. Within the study area, three areas that have been designated as wild and scenic rivers, including portions of the Black River, Carp River, and Sturgeon River, all in Michigan (**Table 4.8**).

Table 4.8. Wild and Scenic Rivers in the Study Area

Name	Designation in Study Area	River Managing Agency	Location	Description	Total Length (Miles)
Black River	Scenic	U.S. Forest Service, Ottawa National Forest	Gogebic County, Michigan	From the Ottawa National Forest Boundary to Lake Superior	14
Carp River	Recreational	U.S. Forest Service, Hiawatha National Forest	Mackinac County, Michigan	From the west section line of Section 30, T43N, R5W to Lake Huron	27.8
Sturgeon River	Recreational	U.S. Forest Service, Hiawatha National Forest	Delta County, Michigan	From the north line of Section 26, T43N, R19W, to Lake Michigan	43.9

Source: National Wild and Scenic Rivers Systems 2020

4.12.2 Environmental Consequences

4.12.2.1 No Action

Under the No Action alternative, communities may implement some ad hoc efforts to repair damaged infrastructure or stabilize shorelines; this could result in short and long-term minor to major adverse impacts on wild and scenic rivers, depending on the scale and intensity of the stabilization activities. Any modification to designated rivers could affect the values that the river was designated to protect. If no mitigation activities were implemented, erosion of the shoreline would continue. This could be viewed as a natural process on a wild and scenic designated river and thus would not represent an adverse impact. However, if the continued erosion results in loss of fish and wildlife habitat, recreational access, or other wild and scenic river values, the No Action alternative could result in minor to major adverse impacts.

4.12.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

If the Proposed or Connected Action is located near a designated wild and scenic river or a study river, FEMA would consult with the river managing agency to make a formal determination of effect under Section 7 of the Wild and Scenic Rivers Act. Typically, activities within approximately one-quarter mile of a designated river segment are considered to have the potential to affect the river and its values; however, specific projects and their connected actions may have effects that extend farther. The determination would evaluate the effects of the Proposed and Connected Actions on the values of the river that are the basis for its designation or potential designation. Depending on which values would be affected by the Proposed Action or Connected Action, the potential impacts and BMPs would be similar to those described in each section pertaining to the relevant values (i.e., **Section 4.6**, Visual Resources; **Section 4.7**, Water Quality; **Section 4.14**, Fish and Wildlife; and **Section 4.16** Cultural Resources).

Best Management Practices

The following conditions would be necessary to avoid and minimize potential impacts:

- Consult with the appropriate river management agency to develop mitigation for impacts on federally designated wild and scenic rivers (16 U.S.C. § 1283).
- See Visual Resources, Water Quality, Fish and Wildlife, and Cultural Resources sections for additional BMPs.

4.13 Vegetation and Invasive Species

This section evaluates effects on vegetation from shoreline stabilization projects. Vegetation provides habitat for an array of wildlife species, contributes to water quality by trapping sediments and taking up nutrients and other pollutants, and plays a major role in reducing erosion by stabilizing soil, absorbing wave energy, and slowing stormwater runoff.

EO 13112, Invasive Species, requires federal agencies to prevent the introduction of invasive species and provide for their control to minimize the economic, ecological, and human health impacts that invasive species cause. EO 13112 defines invasive species as an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health, including noxious weed plant species. Invasive species often outcompete the species that historically occurred in a particular ecosystem, altering the species composition of the plant community and its functions.

Each state designates invasive species and has adopted regulations regarding the sale, spread, and control of invasive species. Specific measures vary by state and by species, but rules typically require invasive species to be removed or controlled when found.

4.13.1 Affected Environment

EPA developed a system of ecoregions to structure and implement ecosystem management strategies across federal agencies, state agencies, and nongovernmental organizations (EPA 2020d). Ecoregions are ecosystems that have similar characteristics, environmental conditions, ecosystem types, functions, and qualities. EPA characterizes ecoregions using geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology. These ecoregions provide a high-level view of vegetation characteristics within their footprint. The study area contains seven EPA-designated Level III ecoregions, as listed in **Table 4.9** and shown in **Figure 4-2**.

Table 4.9. Ecoregions in the Study Area

Ecoregion	EPA ID	Shoreline Miles (miles)	Percent of Total (%)
Northern Lakes and Forests	50	2,093	55.1
North Central Hardwood Forests	51	502	13.2
Southeastern Wisconsin Till Plains	53	165	4.3
Central Corn Belt Plains	54	109	2.9
Southern Michigan/Northern Indiana Drift Plains	56	223	5.9
Huron/Erie Lake Plains	57	578	15.2
Eastern Great Lakes Lowlands	83	125	3.3
Total	**–**	**3,795**	**100.0**

Source: USDA 2020

The Northern Lakes and Forests ecoregion encompasses over half of the study area. This ecoregion contains mixed broadleaf-coniferous forests that include the common tree species jack pine (*Pinus banksiana*), balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), quaking aspen (*Populus tremuloides*), sugar maple (*Acer saccharum*), and paper birch (*Betula papyrifera*).

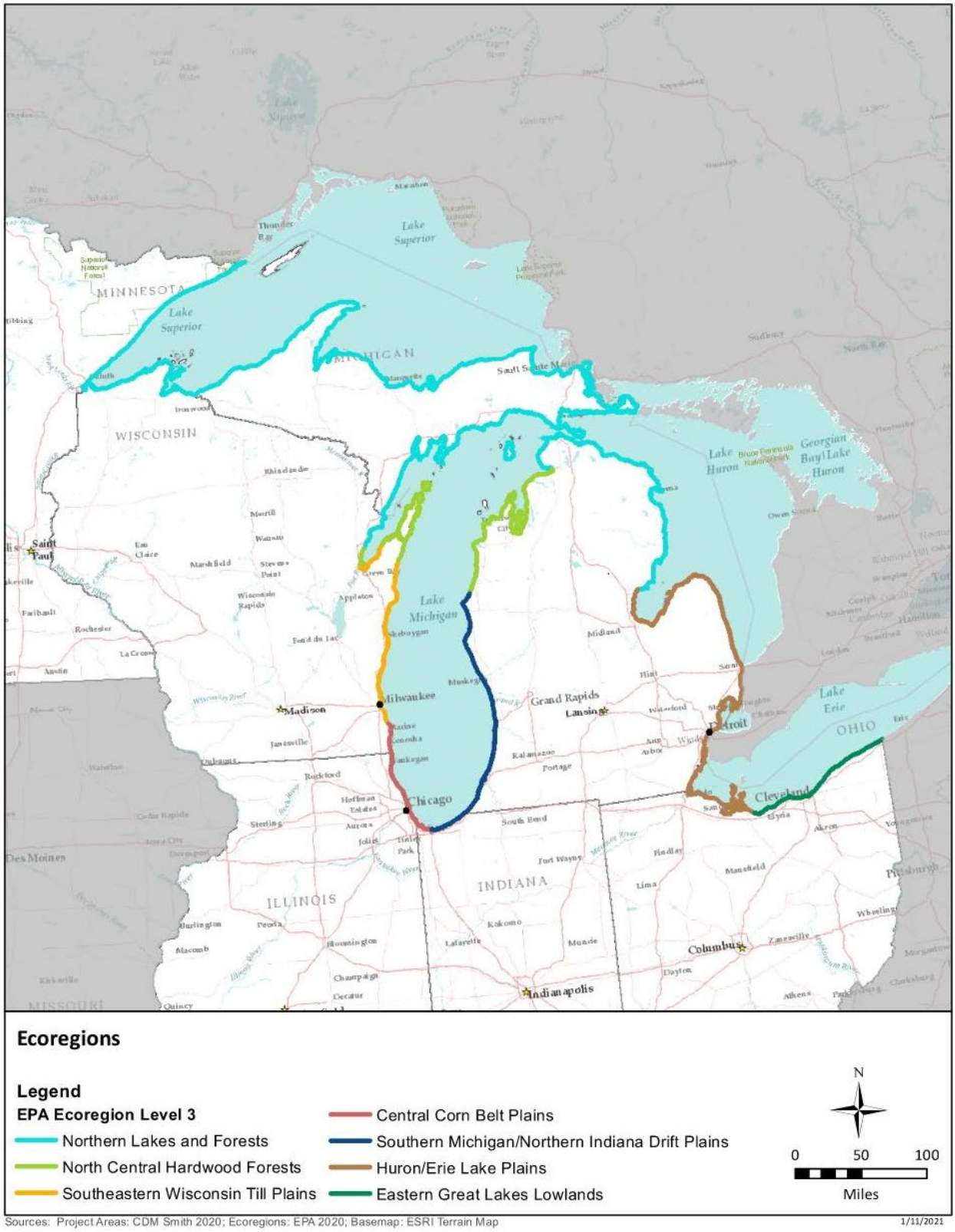


Figure 4-2. Ecoregions in the Study Area

The Huron/Erie Lake Plains ecoregion is characterized as a broad, fertile, nearly flat plain punctuated by the remnants of beach ridges, sand dunes, and end moraines with a humid continental climate. Sandy soils support mixed oak (*Quercus sp.*) and American beech forests, while American elm (*Ulmus americana*) and ash (*Fraxinus sp.*) swamps can be found in wetter areas. Currently, most of the ecoregion is intensively farmed with row crops including corn, soybeans, and wheat.

The North Central Hardwoods Forest ecoregion is a transitional region between the broadly forested Northern Lakes and Forests ecoregion to the agricultural ecoregions to the south. This ecoregion is mostly flat and consists of a mixture of forest and agricultural lands that include dairy farms. In 2000, the ecoregion's land cover was about 49.8 percent agriculture, 27.1 percent forest, 8.5 percent water, and 8.3 percent wetland.

The Southern Michigan/Northern Indiana Drift Plains ecoregion has a humid continental climate and is situated between large expanses of forests, lakes, and wetlands to the north and highly productive agricultural land to the south. The topography is defined by glacial landforms including kettles, paleo-beach ridges, and relict dunes. Agriculture dominates the ecoregion with row crops and livestock production. Deciduous forests make up about 25 percent of the ecoregion and include oak, hickory, American elm, and ash, while white pine (*Pinus strobus*) is common among conifers.

The Southeastern Wisconsin Till Plains ecoregion is characterized by rolling hills and lowland plains created by the Wisconsin-age glaciation. The humid continental climate supports an array of agricultural land-use practices, while some forests remain on steeper terrain. Dairy farming is the main agricultural activity and corn, soybeans, and wheat are typical row crops.

The Eastern Great Lakes Lowlands ecoregion topography was shaped by glacial lakes and episodic glacial flooding and most of the region has been cleared for agriculture or urban development. The primary agricultural use is dairy farming, but orchards, vineyards, and vegetable farming are found near the Great Lakes. Within the study area, the primary land use is urban/developed.

The Central Corn Belt Plains ecoregion is dominated by row crop farming, predominantly corn and soybeans. The portion of this ecoregion that falls within the study area is primarily within the densely populated Chicago metropolitan area.

The Landscape Fire and Resource Management Planning Tool (LANDFIRE) is a vegetation, fire, and fuel characteristics mapping and modeling system sponsored by the USGS (USGS 2016). The LANDFIRE Vegetation Type spatial dataset was used to evaluate existing vegetation cover in the study area. This tool offers a more detailed look into vegetation characteristics than that of the EPA ecoregions.

The Vegetation Type dataset is based on the current distribution of the U.S. National Vegetation Classification (NVC) system circa 2016. The NVC is an eight-level hierarchy that is used to describe vegetation throughout the United States. **Table 4.10** summarizes the vegetation in the study area by the NVC subclass category. A subclass is the second level of the NVC hierarchy characterized by combinations of general dominant and diagnostic growth forms that vary by

latitude and continental position, or that reflect overriding substrate/aquatic conditions. LANDFIRE data indicate that the study area contains 20 NVC subclasses.

Table 4.10. Existing Vegetation Types in the Study Area (LANDFIRE)

NVC Vegetation Subclass	Area (Acres)	Percentage of Total (%)
Non-vegetated	294,427	35.9
Developed	114,160	13.9
Deciduous closed tree canopy	82,975	10.1
Mixed evergreen-deciduous shrubland	68,121	8.3
Evergreen closed tree canopy	56,364	6.9
Mixed evergreen-deciduous open tree canopy	46,377	5.6
Perennial graminoid grassland	38,884	4.7
Deciduous open tree canopy	30,094	3.7
Herbaceous-grassland	24,595	3.0
Evergreen open tree canopy	17,575	2.1
Annual Graminoid/Forb	16,525	2.0
Mixed evergreen-deciduous closed tree canopy	12,401	1.5
Evergreen sparse tree canopy	9,775	1.2
Sparsely vegetated	5,859	0.7
No Data	1,447	0.2
Deciduous shrubland	645	0.1
Deciduous sparse tree canopy	390	0.0
Perennial graminoid steppe	103	0.0
Mixed evergreen-deciduous sparse tree canopy	80	0.0
Perennial graminoid	71	0.0
Total	**820,869**	**100.0**

Source: USGS 2016

Approximately 42 percent of all vegetation within the study area is represented by seven vegetation subclasses and almost 50 percent is either non-vegetated or developed. Vegetation subclasses that represent 3 percent or more of the study area include:

- Deciduous closed tree canopy
- Mixed evergreen-deciduous shrubland
- Evergreen closed tree canopy

- Mixed evergreen-deciduous open tree canopy
- Perennial graminoid grassland
- Deciduous open tree canopy
- Herbaceous-grassland

Non-vegetated and *Developed* are vegetation subclasses where there is typically less than 1 percent vegetative cover. These lands have limited capacity to support life and include urban, industrial areas, extraction areas, and transportation and energy features. Developed areas may contain landscape vegetation, which is expected to contain a high proportion of non-native species.

Deciduous closed tree canopy is a vegetation subclass where there are closed tree canopy conditions dominated by deciduous tree species contributing to more than 75 percent of the total tree cover.

Mixed evergreen-deciduous shrubland is a subclass of vegetation defined by areas dominated by shrubs with individuals or clumps not touching to interlocking. This subclass includes vegetation types where trees (for forests and woodlands) or shrubs (for shrublands) are the dominant life form, and neither deciduous nor evergreen species represent more than 75 percent of the cover present (U.S. Bureau of Land Management 2013).

Evergreen closed tree canopy is a vegetation subclass where there are closed tree canopy conditions dominated by evergreen tree species contributing to more than 75 percent of the total tree cover.

Mixed evergreen-deciduous open tree canopy is a subclass of vegetation with open tree canopy conditions where trees are the dominant life form and neither deciduous nor evergreen species represent more than 75 percent of cover present.

Perennial graminoid grassland subclass is made up of perennial grasslands that include both native and non-native species. The subclass also may contain some forb vegetation such as flowering plants and spore-bearing ferns, horsetails, lycopods, and whisk-ferns.

Deciduous open tree canopy is a vegetation subclass with open tree canopy conditions dominated by deciduous tree species. Seventy-five percent of the total tree cover is composed of deciduous tree species.

Herbaceous-grassland subclass includes lands where herbs (mostly graminoids, forbs, and ferns) form at least 25 percent cover, and woody vegetation comprise less than 25 percent cover, or areas dominated by graminoid vegetation encompass greater than 50 percent of total herbaceous canopy cover.

Invasive Species

The Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS) is a comprehensive tracking system for aquatic nonindigenous species within the Great Lakes, managed by the National Oceanic and Atmospheric Administration (NOAA). This system reports the cumulative results of all Great Lakes monitoring activities and provides up-to-date information on the current status of non-native species throughout the Great Lakes basin. **Table 4.11** summarizes aquatic nonindigenous plants that may be present within the study area as identified by GLANSIS.

Table 4.11. Aquatic Nonindigenous Plant Species of the Great Lakes (GLANSIS)

Common Name	*Scientific Name*	Status	Continent of Origin
Redtop	*Agrostis gigantea*	Nonindigenous	Eurasia
Black alder	*Alnus glutinosa*	Nonindigenous	Eurasia
Water foxtail	*Alopecurus geniculatus*	Nonindigenous	Eurasia
Flowering rush	*Butomus umbellatus*	Nonindigenous	Eurasia
Lesser pond sedge	*Carex acutiformis*	Nonindigenous	Eurasia
Tworank sedge	*Carex disticha*	Nonindigenous	Eurasia
Oakleaf goosefoot	*Chenopodium glaucum*	Nonindigenous	Eurasia
Marsh thistle	*Cirsium palustre*	Nonindigenous	Eurasia
Poison-hemlock	*Conium maculatum*	Nonindigenous	Eurasia
Barnyardgrass	*Echinochloa crus-galli*	Nonindigenous	Eurasia
Hairy willow herb	*Epilobium hirsutum*	Nonindigenous	Eurasia
Glossy buckthorn	*Frangula alnus*	Nonindigenous	Eurasia
European frogbit	*Hydrocharis morsus-ranae*	Nonindigenous	Europe
Ornamental jewelweed	*Impatiens glandulifera*	Nonindigenous	Asia
Yellow iris	*Iris pseudacorus*	Nonindigenous	Europe and Africa
Roundfruit rush	*Juncus compressus*	Nonindigenous	Eurasia
Saltmarsh rush	*Juncus gerardii*	Nonindigenous	North America
Rough water-horehound	*Lycopus asper*	Nonindigenous	North America
Gypsywort	*Lycopus europaeus*	Nonindigenous	Eurasia
Creeping jenny	*Lysimachia nummularia*	Nonindigenous	Eurasia
Purple loosestrife	*Lythrum salicaria*	Nonindigenous	Eurasia
European water-clover	*Marsilea quadrifolia*	Nonindigenous	Eurasia
Water mint	*Mentha aquatica*	Nonindigenous	Eurasia
Spearmint	*Mentha spicata*	Nonindigenous	Eurasia
Forget-me-not	*Myosotis scorpioides*	Nonindigenous	Eurasia
Giant chickweed	*Myosoton aquaticum*	Nonindigenous	Eurasia
Eurasian watermilfoil	*Myriophyllum spicatum*	Nonindigenous	Eurasia

Common Name	*Scientific Name*	Status	Continent of Origin
Spiny waternymph	*Najas marina*	Nonindigenous	North and Central America
Brittle waternymph	*Najas minor*	Nonindigenous	Eurasia
Water-cress	*Nasturtium officinale*	Nonindigenous	Eurasia
Starry stonewort	*Nitellopsis obtusa*	Nonindigenous	Eurasia
Yellow floating-heart	*Nymphoides peltata*	Nonindigenous	Eurasia
Spotted ladysthumb	*Persicaria maculosa*	Nonindigenous	Eurasia
Reed canarygrass	*Phalaris arundinacea*	Nonindigenous	North America
Common reed	*Phragmites australis australis*	Nonindigenous	Europe
Sweetscent	*Pluchea odorata*	Nonindigenous	North America
Rough bluegrass	*Poa trivialis*	Nonindigenous	Eurasia
Curly-leaf pondweed	*Potamogeton crispus*	Nonindigenous	Eurasia
Weeping alkaligrass	*Puccinellia distans*	Nonindigenous	Eurasia
Keek	*Rorippa sylvestris*	Nonindigenous	Eurasia
Door-yard dock	*Rumex longifolius*	Nonindigenous	Eurasia
Bluntleaf dock	*Rumex obtusifolius*	Nonindigenous	Eurasia
Golden willow	*Salix alba*	Nonindigenous	Eurasia
Goat willow	*Salix caprea*	Nonindigenous	Eurasia
Crack willow	*Salix fragilis*	Nonindigenous	Eurasia
Purple osier	*Salix purpurea*	Nonindigenous	Eurasia
Bitter nightshade	*Solanum dulcamara*	Nonindigenous	Eurasia
Seaside goldenrod	*Solidago sempervirens*	Nonindigenous	North America
Northern bur-reed	*Sparganium glomeratum*	Nonindigenous	North America
Narrow-leaved cattail	*Typha angustifolia*	Nonindigenous	Eurasia
European speedwell	*Veronica beccabunga*	Nonindigenous	Europe

Source: NOAA 2020d

Prohibited noxious weeds are annual, biennial, or perennial plants that are designated by each state as having the potential or are known to be detrimental to human or animal health, the environment, public roads, crops, livestock, or other property. Noxious weeds that are especially problematic around the Great Lakes shorelines include common reed, reed canary grass, purple loosestrife, curly pondweed, Eurasian milfoil, and non-native cattails. **Table 4.12** lists the number of noxious weeds in each state and their governing agency (USDA 2020).

Table 4.12. Governing Agency for Noxious Weeds by State

State	Number of Noxious Weed Species	Governing Agency
Illinois	9	Illinois Department of Agriculture, all Counties
Indiana	7	Indiana Department of Natural Resources, Division of Entomology and Plant Pathology
Michigan	15	Michigan Department of Agriculture and Rural Development, Pesticide and Plant Pest Management Division
Minnesota	95	Minnesota Department of Agriculture, Agronomy Services Division
Ohio	15	Ohio Department of Agriculture, Plant Industry Division
Wisconsin	5	University of Wisconsin Cooperative Extension Programs

4.13.2 Environmental Consequences

4.13.2.1 No Action

Under the No Action alternative, communities may implement ad hoc actions to repair damaged infrastructure. These ad hoc actions would have short-term construction impacts on vegetation and, in the long term, may leave the shoreline more suspectable to invasive species where existing vegetation is disturbed or removed. Under this alternative, shoreline erosion would not be substantially mitigated, and the continued loss of shoreline soils would result in further loss of vegetation. The loss of shoreline vegetation, and its function for holding soils in place, could worsen the problem of shoreline erosion over time. Thus, continued erosion and vegetation loss would cause long-term, minor to moderate adverse impacts on vegetation, depending on the extent of erosion, vegetation loss, and spread of invasive species.

4.13.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

The Proposed and Connected Actions would have short-term minor to moderate impacts on vegetation during and directly after construction. Construction equipment would remove vegetation and may disturb and compact soils. Disturbed land would be reseeded or replanted with native vegetation, thus mitigating long-term effects. However, the Proposed Action would result in long-term minor to moderate benefits on vegetation because shoreline erosion would be mitigated, which would decrease vegetation loss and reduce the amount of disturbed areas that invite invasive species.

Project-Specific Consequences

Bioengineered Stabilization Measures

Bioengineered stabilization measures would have long-term minor to moderate beneficial effects by replacing existing invasive species with native species.

Hard Stabilization Measures
Hard stabilization measures would generally result in some vegetation loss; however, areas identified for hard stabilization installation would likely have already lost substantial amounts of vegetation due to shoreline erosion, though some vegetation could be replanted in or around structures on the shore. Therefore, hard stabilization measures would have long-term minor to moderate impacts on vegetation.

Best Management Practices
The following conditions would be necessary to avoid and minimize potential impacts:

- Vehicles and equipment should access project areas via existing roads to the maximum extent feasible.
- Rubber-tired machinery should be used to reduce soil disturbance and compaction.
- Spray/rinse aquatic equipment with high-pressure hot water to clean off mud and kill aquatic invasive species before leaving water access points.
- Drain motor, bilge, livewell, and other water-containing devices before leaving water access points.
- After cleaning, dry all aquatic equipment for five days or more or wipe with a towel before reentering any waters.

4.14 Fish and Wildlife

Fish and wildlife include any species that occupies, breeds, forages, rears, rests, hibernates, or migrates through the study area. Regulations relevant to fish and wildlife include EO 13112 Invasive Species, Bald and Golden Eagle Protection Act (BGEPA), and the Migratory Bird Treaty Act (MBTA). Threatened and endangered wildlife species are evaluated separately in **Section 4.14**.

EO 13112, Invasive Species, requires federal agencies to prevent the introduction of invasive plant and animal species and provide for their control to minimize the economic, ecological, and human health impacts that invasive species cause.

The BGEPA as amended, 16 U.S.C. § 668 *et seq.*, provides for the protection of bald and golden eagles by prohibiting the take, possession, sale, purchase, barter, transport, export, or import of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. This Act requires consultation with the USFWS to ensure that proposed federal actions do not adversely affect bald or golden eagles. Project activities may be required to avoid certain seasons or buffer areas around nesting eagles.

The MBTA of 1918, as amended, 16 U.S.C. §§ 703 – 712, provides protection for migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions, except under the terms of a valid permit issued pursuant to federal regulations. Under the MBTA, the purposeful taking, killing, or possession of migratory birds is unlawful. Projects that are likely to

result in the purposeful taking of birds protected under the MBTA would require the issuance of taking permits from the USFWS. Nearly all native North American bird species are protected by the MBTA. The nesting season for migratory birds in the Great Lakes Region is generally March 1 through August 31.

4.14.1 Affected Environment

Although almost half of the study area is unvegetated or developed (see **Section 4.13**), much of the shoreline supports important fish and wildlife habitats. The shoreline environment that spans both aquatic and terrestrial habitats may be more diverse and support a greater variety of species than other areas. While some erosion is an important component of shoreline environments (e.g., bluff erosion provides a supply of sand that builds beaches and other important habitat types), excess erosion may also be a contributor to adverse effects on the health of Great Lake's ecosystems. Excess erosion can degrade habitats and cause declines in species abundance and diversity. Erosion may expose or create hardened lakebeds that are an ideal habitat for zebra and quagga mussels, invasive species that impact native fish and wildlife and human structures and vessels.

4.14.1.1 Fish and Wildlife Habitat

As described in **Section 4.13**, ecoregions are ecosystems that have similar characteristics, environmental conditions, ecosystem types, functions, and qualities. Each ecoregion would support a characteristic diversity of fish and wildlife species and thus are a useful tool for describing the ecological communities that may occur within a large area such as a state. The study area contains seven EPA-designated Level III ecoregions, as listed in **Table 4.9**.

Most streams in the Northern Lakes and Forests ecoregion are perennial, commonly originating in lakes or wetlands. Some of this ecoregion is used for timber production and recreation, but most remains ungrazed forests. Characteristic mammals of the ecoregion include black bears (*Ursus americanus*), river otters (*Lontra canadensis*), fishers (*Pekania pennanti*), and snowshoe hares (*Lepus americanus*). Reptiles and amphibians that can be found in this ecoregion include northern water snakes (*Nerodia sipedon*), painted turtles (*Chrysemys picta*), and northern leopard frogs (*Lithobates pipiens*).

The Huron/Erie Lake Plains ecoregion offers wildlife habitat to many species including insects. Monarch butterflies (*Danaus plexippus*), eastern giant swallowtails (*Papilio cresphontes*), and red-spotted admirals (*Limenitis arthemis*) can be found throughout the ecoregion. Typical birds include wild turkeys (*Meleagris gallopavo*), ring-billed gulls (*Larus delawarensis*), and Canada geese (*Branta canadensis*).

The North Central Hardwood is a transitional region between the heavily forested ecoregions to the north and the agricultural ecoregions to the south. The ecoregion offers a variety of wildlife habitats. Common mammal species include raccoons (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), badgers (*Meles meles*), and beavers (*Castor canadensis*). Bird species that can be found in this ecoregion include crows (*Corvus brachyrhynchos*) and house finches (*Haemorhous mexicanus*).

The Southern Michigan/Northern Indiana Drift Plains ecoregion has a humid continental climate and is situated between large expanses of forests, lakes, and wetlands to the north and highly productive agricultural land to the south, offering an array of wildlife habitat. Common small mammals include fox squirrels (*Sciurus niger*), thirteen-lined ground squirrels (*Ictidomys tridecemlineatus*), eastern chipmunks (*Tamias striatus*), and eastern cottontails (*Sylvilagus floridanus*). Typical fish species include bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus salmoides*).

The Southeastern Wisconsin Till Plains ecoregion is characterized by rolling hills and lowland plains that offer habitat for a variety of mammals including groundhogs (*Marmota monax*), muskrat (*Ondatra zibethicus*), gray fox (*Urocyon cinereoargenteus*), and American mink (*Neovison vison*). Common bird species include mourning dove (*Zenaida macroura*), northern cardinal (*Cardinalis cardinalis*), and red-winged blackbirds (*Agelaius phoeniceus*).

The Eastern Great Lakes Lowlands ecoregion has been mostly cleared for agriculture or urban development but still offers ample habitat for common wildlife such as Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), eastern mole (*Scalopus aquaticus*), blue jay (*Cyanocitta cristata*), and great blue heron (*Ardea herodias*).

The Central Corn Belt Plains ecoregion is dominated by row crop farming, with predominant crops of corn and soybeans. Common bird species of the ecoregion include American robin (*Turdus migratorius*), house sparrow (*Passer domesticus*), wood duck (*Aix sponsa*), and downy woodpecker (*Dryobates pubescens*). Typical mammal species include eastern gray squirrel (*Sciurus carolinensis*), coyote (*Canis latrans*), and deer mice (*Peromyscus maniculatus*).

4.14.1.2 Bald and Golden Eagles

Bald eagles and golden eagles are found throughout the Great Lakes region. Breeding and wintering habitats may be different, and activities that would affect nesting areas or winter roosts could result in significant impacts.

Bald eagles live near rivers, lakes, and marshes where they can find fish, their staple food. Bald eagles also feed on waterfowl, turtles, rabbits, snakes, and other small animals and carrion. Bald eagles require a good food base, perching areas, and nesting sites. Their habitat includes large lakes, reservoirs, and rivers. In winter, the birds congregate near open water in tall trees for spotting prey and night roosts for sheltering (USFWS 2017).

Golden eagles build nests on cliffs or in the largest trees of forested stands that often afford an unobstructed view of the surrounding habitat. Their nests are usually made of sticks and soft material added to existing nests or new nests that are constructed to create strong, flat or bowl-shaped platforms. Golden eagles avoid nesting near urban areas and do not generally nest in densely forested habitat. Individuals will occasionally nest near semi-urban areas where housing density is low and in farmland habitat; however, golden eagles have been noted to be sensitive to some forms of human presence (USFWS 2017).

4.14.1.3 Migratory Birds

Over 1,000 native bird species, including common species such as American robin (*Turdus migratorius*) and American crow (*Corvus brachyrhynchos)* are protected by the MBTA. The Great Lakes Region is located in the Mississippi Flyway, which is used to manage migratory birds. This flyway extends from the Canadian provinces of Saskatchewan, Manitoba, and Ontario to the Gulf of Mexico and is the most heavily used flyway for waterfowl. USFWS and its partners establish the flyway areas based on the routes different bird species follow as they migrate between nesting and wintering areas in North America (USFWS 2020c).

4.14.1.4 Invasive Species

An invasive species is an animal that is foreign to an ecosystem. The Great Lakes ecosystem has significantly changed over the past two centuries because of the introduction and spread of invasive species. These changes have greatly affected the health and habitats of native species throughout the Great Lakes. Once an invasive species is established, controlling their spread is extremely difficult. The Great Lakes shorelines play host to terrestrial invasive species, including the emerald ash borer (*Agrilus planipennis*) as well as several aquatic species. **Table 4.13** summarizes common aquatic invasive animal species in the study area but is not exhaustive.

Table 4.13. Examples of Aquatic Invasive Animal Species by State

EPA Listed Species	Scientific Name	IL	IN	MI	MN	OH	WI
alewife	*Alosa pseudoharengus*	x	x			x	
Asian carp[1]	*Cyprinus carpio*			X		x	
round goby	*Neogobius melanostomus*	x	x	x	x	x	x
sea lamprey	*Petromyzon marinus*	x	x	x	x	x	
Eurasian ruffe	*Gymnocephalus cernuus*	x		x	x	x	x
Quagga mussel	*Dreissena bugensis*	X	X	X	X	X	X
zebra mussel	*Dreissena polymorpha*	x	x	x	x	x	x
spiny water flea	*Bythotrephes cederstroemi*	x	x	x	x	x	x

Source: EPA 2020a, Michigan Office of the Great Lakes 2002, Illinois Department of Natural Resources 2003, Aquatic Nuisance Species Task Force 1991, Minnesota Invasive Species Advisory Council 2009, Ohio Department of Natural Resources 2014; Wisconsin Department of Natural Resources 2003
[1]- Asian carp occur in the interior waterways of all six states but have only been confirmed in Lake Erie.

4.14.2 Environmental Consequences

4.14.2.1 No Action

The No Action alternative would cause minor to moderate short- and long-term effects on common fish and wildlife species, bald and golden eagles, and migratory birds. Shoreline communities may implement ad hoc efforts to repair damaged shoreline infrastructure and install shoreline stabilization measures, which may not include suitable engineering or a focus on long-term resilience and hazard mitigation. During these ad hoc efforts, there would be short-term adverse impacts from construction activities. Under the No Action alternative, it is assumed that erosion would not be substantially mitigated and, as a result, existing bluffs, beaches, and shoreline features would continue to erode, causing loss of habitat for shoreline species and an increase in sedimentation and impaired water quality for aquatic species. Continued erosion can also contribute to the enhancement of invasive species habitat, particularly for zebra mussels and quagga mussels, which prefer hard-bottom habitats. Continued shoreline erosion that creates conditions favorable to invasive species would result in long-term moderate adverse impacts.

4.14.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Construction of the Proposed and Connected Actions would have the potential to temporarily alter wildlife behavior from equipment-generated noise and project-related activity (human presence and use of equipment). These impacts can result in altered behavior, disruption of foraging, breeding, or resting behaviors affecting the health of species and populations. However, because the duration of the activity in any one location would be limited, impacts are unlikely to be greater than minor.

FEMA projects are generally associated with developed areas because their purpose is to protect structures and infrastructure. It is unlikely that a FEMA project would be proposed or approved in very remote areas with completely undisturbed habitats with no associated development nearby.

If construction of a project would involve any in-water work, it should adhere to the respective project's state invasive species management plan. Impacts on aquatic life may be minimized or mitigated from seasonal restrictions for in-water work as well as other construction-related measures, including silt fences or coffer dams to decrease runoff and turbidity and bubble curtains to restrict underwater noise levels.

Projects that involve the removal of vegetation would result in long-term impacts through the loss of habitat for wildlife species. Bioengineered stabilization measures and hard stabilization measures, including both removal and replanting of vegetation, would result in a loss of habitat until the replacement vegetation becomes established and matures, which could take more than 10 years. In many cases, the project would replace non-native or invasive vegetation with native plant species that have higher value as wildlife habitat in the long term. However, the total vegetated area is likely to be reduced. Overall, removal and subsequent replanting would have minor impacts on wildlife.

The use of motorized vehicles and equipment during a project could have minor impacts on nesting birds protected by the MBTA. To minimize impact, vehicles and equipment should access project areas using existing roads. Impacts may be avoided by timing project activities for the non-breeding season. Projects that involve the removal of vegetation have a greater potential to adversely affect nesting migratory birds. Nesting seasons vary slightly by region, but generally, if vegetation removal is avoided between March and August, a project would have negligible to minor impacts on migratory birds and other wildlife.

If a project must be constructed during the breeding season, preconstruction surveys are recommended to determine whether nests are present and, if so, a buffer area with a specified radius around the nest would be established so that no disturbance or intrusion would be allowed until the young had fledged and left the nest. The size of the buffer area would vary depending on species and local conditions (e.g., the presence of busy roads) and would be based on the professional judgment of a monitoring biologist. Subapplicants would be responsible for consulting with USFWS on MBTA compliance and for obtaining any necessary take permits.

If bald and golden eagle nests are identified in a project area, consultation with USFWS would be required to establish appropriate buffers and actions to protect nest sites. Typical mitigation measures include seasonal limits on clearing activities, retention of nest trees, the establishment of buffers around nest trees, and implementation of the USFWS Bald Eagle Management Guidelines.

With the implementation of these mitigation measures, potential impacts on fish and wildlife habitat, migratory birds, and bald and golden eagles would be minor.

Project-Specific Consequences

Bioengineered Stabilization Measures

Marsh and Wetlands Creations, Restoration, or Enhancement

Creation, restoration, or enhancement of marshes and wetlands would have long-term beneficial effects by saving or creating wetland habitats, which provide important and scarce habitats for a wide diversity of fish and wildlife species.

Hard Stabilization Measures

Hard stabilization measures that alter the characteristics of a shoreline could directly degrade and destroy habitat, disrupt natural forces acting on the lakebed and shoreline, change flow and littoral circulatory patterns, alter nutrient cycles and sediment transport, decrease native plant and animal populations, and impact other coastal processes and pathways, such as decreased habitat connectivity (USACE 2018a). The littoral transport of shoreline sediments may be interrupted by shoreline hardening or by breakwaters, jetties, or groins, which can then result in erosion or accretion and loss of the habitat of shorelines and coastal wetlands. Some plant and animal communities are dependent upon the transport of sediments along the shoreline, and they would be adversely impacted by the changes in the shore habitats as a result of these changes in littoral transport. Shoreline alterations may severely reduce littoral sediment, which diminishes beaches and can result in downcutting of the nearshore bed. Changes in the substrate may adversely affect some species or create habitat for invasive species such as zebra and quagga mussels,

which are easily spread by attaching to boats and in-water equipment. Hard stabilization measures that place hard substrates in the water such as sheet pile, concrete, and riprap would promote the spread of invasive mussels.

Best Management Practices
The following conditions would be necessary to avoid and minimize potential impacts:

- Vehicles and equipment would access project areas using existing roads.
- When possible, avoid clearing of vegetation from March through August to avoid impacts on nesting migratory birds. If vegetation removal has to take place during this time period, the subapplicant would need to consult with USFWS and obtain any required approvals and follow any required measures.
- As appropriate, if bald or golden eagles are present in the project area, consult with USFWS to develop mitigation measures (16 U.S.C. § 668).
- Establish buffers for eagle nesting sites.
- Spray/rinse aquatic equipment with high-pressure hot water to clean off mud and kill aquatic invasive species before leaving water access points.
- Drain motor, bilge, livewell, and other water-containing devices before leaving water access points.
- After cleaning, dry all aquatic equipment for five days or more or wipe with a towel before reentering any waters.

4.15 Threatened and Endangered Species and Critical Habitat

The Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544, directs federal agencies to protect threatened and endangered species in consultation with the USFWS and the National Marine Fisheries Service. This protection includes a prohibition against direct take (e.g., killing, harassing) and indirect take (e.g., destruction of habitat). Section 7 of the ESA requires federal agencies to aid in the conservation of listed species and to ensure the activities of federal agencies will not jeopardize the continued existence of listed species or adversely modify designated critical habitat.

4.15.1 Affected Environment

As of February 2019, USFWS lists 27 threatened or endangered plant and animal species that may be found within the study area, as summarized in **Table 4.14**. There are no species under the jurisdiction of the National Marine Fisheries Service in the Great Lakes.

Table 4.14. Federally Threatened and Endangered Species in the Study Area by State

Common Name	Scientific Name	Federal Status	Critical Habitat	IL	IN	MI	MN	OH	WI	Preferred Habitat
Mammals										
Canada Lynx	*Lynx canadensis*	T	Yes			x	x		x	Moist, cool, boreal, spruce-fir forests
Indiana Bat	*Myotis sodalis*	E	No	x	x	x		x		Summer habitat includes small to medium river and stream corridors with well-developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula.
Northern Long-eared bat	*Myotis septentrionalis*	T	No	x	x	x	x	x	x	Summer habitat includes both live and dead trees with exfoliating bark, cavities, or crevices. Caves and mines as hibernacula.
Birds										
Piping Plover	*Charadrius melodus*	E	Yes	x	x	x	x	x	x	Wide, flat, open, sandy beaches with very little grass or other vegetation. Nesting territories often include small creeks or wetlands.
Red Knot	*Calidris canutus rufa*	T	No	x	x	x	x	x	x	Marine habitats including sandy beaches, saltmarshes, lagoons, and mudflats of estuaries and bays.
Whooping crane	*Grus americana*	E	No		x	x			x	Wetlands, marshes, mudflats, wet prairies and fields for summer foraging.
Reptiles										
Eastern Massasauga	*Sistrurus catenatus*	T	No	x	x	x		x	x	Wet areas including wet prairies, marshes, and low areas along rivers and lakes as well as adjacent uplands during part of the year.

Common Name	Scientific Name	Federal Status	Critical Habitat	IL	IN	MI	MN	OH	WI	Preferred Habitat
Insects										
Hine's emerald dragonfly	*Somatochlora hineana*	E	Yes	x	x	x			x	Calcareous spring-fed marshes and sedge meadows overlaying dolomite bedrock.
Hungerford's crawling water beetle	*Brychius hungerfordi*	E	No			x				Found in the cool riffles of clean, slightly alkaline streams with moderate to fast flow, good stream aeration, and an inorganic substrate.
Karner blue butterfly	*Lycaeides melissa samuelis*	E	No	x	x	x		x	x	Oak savannas and pine barren ecosystems that contain herbaceous plants and grasses with scattered small groves of trees and shrubs.
Mitchell's satyr butterfly	*Neonympha mitchellii mitchellii*	E	No		x	x				Restricted to fens which are low nutrient wetlands that receive carbonate-rich ground water from seeps and springs.
Rusty patched bumble bee	*Bombus affinis*	E	No	x					x	Grasslands and tallgrass prairies that provide nectar and pollen from flowers, underground and abandoned rodent cavities or clumps of grass for nesting and undisturbed soil for hibernating queens.
Flowering Plants										
Dwarf lake iris	*Iris lacustris*	T	No			x			x	Along beach ridges or behind open dunes in sand or thin soil over limestone-rich gravel or bedrock.
Eastern Prairie Fringed Orchid	*Platanthera leucophaea*	T	No	x	x	x		x	x	Mesic prairie to wetlands such as sedge meadows, marsh edges and bogs with little or no woody encroachment and full sun exposure.

Common Name	Scientific Name	Federal Status	Critical Habitat	IL	IN	MI	MN	OH	WI	Preferred Habitat
Fassett's locoweed	*Oxytropis campestris var. chartacea*	T	No				x		x	Gentle, sand-gravel shoreline slopes around shallow lakes fed by groundwater seepage.
Houghton's goldenrod	*Solidago houghtonii*	T	No			x				Moist sandy beaches and shallow depressions between low sand ridges along shorelines.
Lakeside daisy	*Hymenoxys herbacea*	T	No			x		x		Dry, rocky prairie underlain by limestone or in cliff and alvar crevices of exposed limestone rock outcrops with full sun exposure.
Leafy prairie-clover	*Dalea foliosa*	E	No	x	x					Prairie remnants in thin soils over limestone substrate.
Mead's milkweed	*Asclepias meadii*	E	No	x	x					Moderately wet to moderately dry upland tallgrass prairie or glad/barren habitat characterized by vegetation adapted for drought and fire.
Michigan monkey-flower	*Mimulus michiganensis*	E	No			x				Alkaline habitats in marly springs and seepages, cold groundwater-fed streams in cedar swarms and alkaline shorelines at the mouth of small drainages.
Pitcher's thistle	*Cirsium pitcheri*	E	No	x	x	x			x	Open sand dunes and low open beach ridges.
Prairie bush-clover	*Lespedeza leptostachya*	E	No	x	x					Bedrock outcrop prairie or north facing mesic to dry prairie slopes.
Small whorled pagonia	*Isotria medeoloides*	T	No		x	x				Upland, mid-successional, wooded habitats, usually mixed-deciduous or mixed-deciduous/coniferous forest that are in second or third-growth successional stages.

Common Name	Scientific Name	Federal Status	Critical Habitat	IL	IN	MI	MN	OH	WI	Preferred Habitat
Mussels										
Northern riffleshell	*Epioblasma torulosa rangiana*	E	No			x		x		A wide variety of streams from small to large with firmly packed sand or gravel.
Rayed bean	*Villosa fabalis*	E	No			x		x		Smaller headwater creeks, but sometimes large rivers and wave-washed areas of glacial lakes with gravel or sand substrates.
Snuffbox mussel	*Epioblasma triquetra*	E	No			x		x		Small to medium sized creeks with a swift current, but also found in Lake Erie and some larger rivers with sand, gravel or cobble substrates.
Ferns										
American hart's-tongue fern	*Asplenium scolopendrium var. americanum*	T	No			x				Outcrops of dolomitic limestone, in coulees, gorges and in cool limestone sinkholes in mature hardwood forests with high humidity and deep shade in magnesium rich soils.

Source: USFWS 2020c

Key:

Endangered (E) – Any species that is in danger of extinction throughout all or a significant portion of its range.

Threatened (T) – Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Three ESA-listed species have designated critical habitat within the study area, as shown in **Table 4.15**. The designated critical habitat is described below.

Table 4.15. Critical Habitat in the Study Area by State

Common Name	Scientific Name	Federal Status	IL	IN	MI	MN	OH	WI
Canada Lynx	*Lynx canadensis*	T				x		
Hine's emerald dragonfly	*Somatochlora hineana*	E	x		x			x
Piping Plover	*Charadrius melodus*	E	x	x	x	x	x	x

Source: USFWS 2020c

Key:

Endangered (E) – Any species that is in danger of extinction throughout all or a significant portion of its range.

Threatened (T) – Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Canada lynx: The Canada lynx is a mid-sized boreal forest carnivore that occurs across most of northern North America. The lynx is highly adapted to hunting its primary prey, the snowshoe hare (*Lepus americanus*). Both species' primary habitat is moist, cool, boreal, spruce-fir forests. Designated critical habitat within the study area is along the Lake Superior shoreline in northeast Minnesota from Duluth to the Canadian border (USFWS 2014).

Designated critical habitat includes boreal forest landscapes supporting a mosaic of differing successional forest stages and contains the following primary constituent elements (79 FR 54781):

- Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs, or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the surface of the snow.
- Deep and fluffy winter snow conditions for extended periods of time.
- Sites for denning that have abundant coarse woody debris, such as root wads and downed trees.

Matrix habitat (e.g., hardwood forest, dry forest, nonforest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range which is typically between 12 and 83 square miles) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

Hine's emerald dragonfly: Critical habitat for the Hine's emerald dragonfly intersects with the study area in several locations on Lake Huron and Lake Michigan in northeast Wisconsin and northern Michigan, but also has critical habitat outside of the study area in Illinois and Missouri.

Designated critical habitat includes calcareous spring-fed marshes and sedge meadows overlaying dolomite bedrock and contains the following primary constituent elements (FR 75 21429).

- Organic soils (histosols, or with organic surface horizon) overlaying calcareous substrate (predominantly dolomite and limestone bedrock).
- Calcareous water from intermittent seeps and springs associated with shallow, small, slow-flowing streamlet channels, rivulets, and/or sheet flow within fens.
- Emergent herbaceous and woody vegetation for emergence facilitation and refugia.
- Occupied burrows maintained by crayfish as refugia.
- Prey base of aquatic macroinvertebrates, including mayflies, aquatic isopods, caddisflies, midge larvae, and aquatic worms.
- Natural plant communities near the breeding/larval habitat which may include fen, marsh, sedge meadow, dolomite prairie, and a border fringe of shrubby and forested areas with open corridors for movement and dispersal.
- Prey base of small, flying insect species (e.g., dipterans).

Piping plover: Critical habitat for the Piping plover intersects with the study area along the shorelines of Lake Erie, Lake Michigan, and Lake Superior in the states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

For the Great Lakes breeding population, designated critical habitat includes the following physical primary constituent elements or physical and biological features that are essential to conservation of the species (66 Federal Register [FR] 22938):

- Shorelines that support open, sparsely vegetated sandy habitats, such as sand spits or sand beaches, that are associated with wide, unforested systems of dunes and interdunal wetlands.
- Shorelines must be at least 50 meters in length and more than 7 meters wide, with a distance to the tree line of more than 50 meters.
- Shorelines must provide protective cover for nests and chicks consisting of herbaceous vegetation, cobble, gravel, or debris such as driftwood, wrack, root masses, or dead shrubs with a low level of disturbance from human activities or domestic animals.

4.15.2 Environmental Consequences

4.15.2.1 No Action

Under the No Action alternative, ad hoc efforts undertaken by local communities could have adverse effects on listed species and their habitat. Construction activities may not be conducted with appropriate consideration for the presence of listed species and potential avoidance and minimization measures may not be fully implemented. In addition, ad hoc measures may use inappropriate materials that result in long-term impacts on the environment such as the use of asphalt, which may introduce contaminants to adjacent soils and waters over time.

Under this alternative continued erosion could result in habitat loss, for listed species. The continued erosion may also prevent the development of forested land that could provide suitable habitat for those listed species. Under this alternative, continued erosion and bluff recession could result in habitat loss, including the continued loss of forests, wetlands, and beaches, which may provide habitat for listed species. The continued shoreline erosion may also prevent the development of forested or other habitats that could support those listed species. The populations of listed species are often small or isolated. If continued shoreline erosion eliminates all of the habitat for a particular species in an area, that species may be extirpated from the area. Therefore, under this alternative, continued erosion could have long-term moderate to major and irreversible adverse effects on threatened and endangered species and critical habitat.

4.15.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Shoreline stabilization activities and Connected Actions have the potential to result in no effect to moderate effects on listed species. If a project would have the potential to affect a listed species, FEMA would prepare a biological assessment to evaluate the effects. FEMA would then consult with USFWS under ESA Section 7(a)(2) and seek concurrence with findings of *may affect, not likely to adversely affect* or conduct a formal consultation for findings of *likely to adversely affect*. If a proposed project is determined to *likely to adversely affect* and requires the issuance of a biological opinion and incidental take permit, a tiered SEA would need to be developed.

Shoreline erosion mitigation activities could affect both terrestrial and aquatic habitats. All of the Proposed and Connected Actions would involve some construction that would have the potential for short-term direct impacts from noise and human activity disturbances from equipment and vehicle use and loss of habitat through vegetation removal and excavation. Bioengineered measures have a greater potential for long-term benefits from the potential from increases in suitable habitat. Hard stabilization measures are more likely to result in long-term impacts through permanent loss of habitat within the project footprint and changes in littoral movement of sediments downdrift. Potential effects would be similar to those described for fish and wildlife in **Section 4.14**, except that the consequences could be more severe due to the vulnerability of populations of listed species to disturbance and loss of habitat. Potential impacts on threatened and endangered species need to be reviewed on a project-specific basis. If a project is determined

to have no effect on ESA-listed species, then there would be no impacts from project-related activities. If a project would have a not likely to adversely affect determination, then there would be minor adverse effects on listed species. If a project would be likely to adversely affect a listed species, then there would be a moderate effect on listed species and an SEA would need to be prepared in addition to consultation with USFWS.

Best Management Practices
The following condition would be necessary to avoid and minimize potential impacts:

- Consultation with USFWS to identify newly listed or delisted species for a particular project area. If there are species in a project area that are not covered in this PEA, then an SEA would need to be prepared.
- As needed, develop avoidance and minimization measures in consultation with USFWS in accordance with Section 7 of the ESA.
- BMPs related to the protection of water quality, wetlands, vegetation and fish and wildlife habitat as presented in **Sections 4.7, 4.9, 4.13, and 4.14** would also provide protection for habitats for ESA listed species.

4.16 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. §§ 300101-307108, and its implementing regulations, 36 C.F.R. Part 800, require federal agencies to consider the effects of their undertakings on historic properties and give the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), Tribal Historic Preservation Officers (THPOs), federally recognized Native American tribes, and other interested parties an opportunity to comment on such undertakings. A *historic property* (or historic resource) is defined in the NHPA as any "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such a property or resource." Cultural resources include the physical evidence or place of past human activity and may include a site, object, landscape, structure, or natural feature of significance to a group of people traditionally associated with it.

The NRHP is the nation's official list of cultural resources worthy of preservation and is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our cultural resources. For an historic property to be listed on the NRHP, it must meet one of four criteria and have sufficient integrity. Integrity is the ability of the property to convey its significance through physical features and context. Significant historic properties include districts, structures, objects, or sites that are at least 50 years of age and meet at least one National Register criterion. Criteria used in the evaluation process are specified in the National Register of Historic Places (36 C.F.R. § 60.4). National Historic Landmarks are historic places that hold national significance. The Secretary of the Interior designates these places as exceptional because of their ability to illustrate U.S. heritage.

Under Section 101(d)(6)(A) of the NHPA, properties of traditional religious and cultural significance to an Indian tribe may be deemed eligible for listing on the NRHP. Historic resources that are eligible for or listed on the NRHP are treated equally. In addition to the NHPA, the Native American Graves Protection and Repatriation Act, 25 U.S.C. §§ 3001–3013, establishes the rights of Native American lineal descendants, Indian tribes, and Native Hawaiian Organizations for the treatment, repatriation, and disposition of Native American human remains funerary objects, sacred objects, and other Traditional Cultural Property. A Traditional Cultural Property (TCP) is a property that is eligible for inclusion on the NRHP based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community.

The ACHP is an independent federal agency established by the NHPA. The ACHP mission focuses on the preservation of cultural resources and the development of federal policy related to historic preservation. The NHPA established SHPOs in each state and territory and THPOs have been designated for many federally recognized Native American tribes. The SHPOs reflect the interests of the state and its citizens in the preservation of their cultural heritage and the THPOs do the same for their tribe.

SHPO and THPO activities can include identifying, nominating, or administering applications for historic properties deemed eligible for listing on the NRHP, maintaining data on historic properties that have been identified but not yet nominated, and providing technical information. Federal agencies consult with the SHPO or THPO about proposed federal actions, and the SHPO/THPO either concurs with or objects to the federal agency's findings.

4.16.1 Consultation Protocols

FEMA has established NHPA Programmatic Agreements with SHPOs, state emergency management agencies, and interested tribes in Indiana (2005), Illinois (2011), Minnesota (2014), Michigan (2015), and Wisconsin (2017). The programmatic approach in each of these documents stipulates roles and responsibilities, exempts certain Undertakings from Section 106 review, establishes protocols for consultation, facilitates identification and evaluation of historic properties, and streamlines the assessment and resolution of adverse effects to historic properties.

For a tribe that has assumed the responsibilities of the SHPO for activities on tribal land, the THPO is the official representative to ensure a project complies with Section 106 of the NHPA. Therefore, FEMA consults with the THPO instead of the SHPO regarding undertakings occurring on or affecting historic properties on tribal lands. Nonfederally recognized tribes can participate in the Section 106 processes as interested parties.

To acknowledge and honor the sovereignty of tribal nations, FEMA regularly consults with tribal governments to ensure that FEMA policies and programs address tribal needs. As stated in the 2019 FEMA Consultation Policy, "FEMA tribal consultation is the process for communicating and collaborating with federally recognized Indian tribal governments and Alaska Native Corporations (… collectively referred to as "tribal governments") to exchange information, receive input, and consider their views on actions that have tribal implications" (FEMA 2019a).

Consultation would be conducted for each project reviewed under this PEA and would follow the regulations and guidance that are in place at that time.

FEMA Region V regularly consults with all federally recognized Native American tribes with jurisdictional lands in Region V. In addition, FEMA consults with federally recognized tribes that reside outside of Region V but have properties of ancestral interest within the region. For example, when preparing to negotiate the 2014 FEMA Region V Programmatic Agreement for Section 106 undertakings in Minnesota, FEMA invited 12 tribes with lands in Minnesota along with 38 tribes from outside the state, including native communities in Nebraska, North Dakota, and South Dakota, who were understood to have ancestral interests in the state.

For each project, FEMA updates the list of interested parties and contacts to be consulted to assure that notice of an undertaking and requests for comment under Section 106 are appropriately addressed to all federally recognized Indian Tribes believed to have current or ancestral interest in each undertaking's location. FEMA consults resources such as the tribal nations' web sites and NPS- and BLM-maintained tribal directories for this information. In addition, each notification lists the federally recognized tribes contacted and requests notice of any other tribes that may have an interest in the undertaking. In this way, Region V continuously improves its outreach to federally recognized tribes with potential interests within the six-state region.

4.16.2 Affected Environment

The Great Lakes coastal, shoreline, and nearshore submerged region holds a remarkable record of Native American and EuroAmerican prehistoric and historic archaeological sites, buildings, historic districts, docks, ports, aids to navigation, lifesaving stations, and shipwrecks. Streams and rivers are often associated with historic and prehistoric settlements, estates, mills, mining, transportation, and other human activities. Infrastructure features like canals, ornamental masonry retaining walls, canals, bridges, and dams may be NRHP-eligible individually or can contribute to a historic district or landscape. Coastlines and lakeshores may be associated with Native American settlements, military, trade, and navigation activities. NRHP-eligible or contributing resources may include shipwrecks, seawalls, and lighthouses. Shorelines and stream banks and the upland areas around them are often archeologically sensitive, with a high likelihood of prehistoric resources in undisturbed soil.

Under the Abandoned Shipwrecks Act of 1987, 43 U.S.C. §§ 2101-2106, the United States asserts title to any abandoned shipwreck that is embedded in submerged lands of a state, embedded in coralline formations protected by a state on its submerged lands, or on submerged lands of a state when a shipwreck is included or eligible for inclusion on the NRHP. Any title to an abandoned shipwreck under these conditions is transferred to the state in or on whose submerged lands the shipwreck is located.

The 2017 National Park Service Historic Context, Great Lakes Navigation and Navigation Aids (Karamanski 2017) provides a detailed history of the nature of ships that used the waters of the Great Lakes and the complex weather conditions, physical constraints, and mechanical disasters that resulted in large numbers of submerged shipwrecks through the region. Many of these

resources are located in nearshore coastal waters where shoreline stabilization actions may be proposed. Each of the SHPOs in the six study area states promotes, through different state-level programs, the recordation, evaluation, inventory, and preservation of these important cultural resources.

4.16.2.1 Great Lakes Shoreline Historic Properties

Five of the six FEMA Region V SHPOs have organized digital databases with cultural resource information that researchers who meet the Secretary of the Interior's Qualification Standards can apply to access or request a records search. The Michigan SHPO requires an appointment and physical examination of their cultural resources records. The following includes a summary by state of historic properties eligible for or listed on the NRHP as of November 2020, with a summary of the types of properties in shoreline counties (NPS 2020).

Illinois: As of April 2020, there are 1,906 historic properties listed on the NRHP in the State of Illinois. Most of the historic properties are aboveground buildings (1,356), districts (351), or structures (79) (NPS 2020). Only 108 archaeological sites are listed on the NRHP, and there are four unknown historic properties. Of the 1,906 historic properties, 12 districts, 56 buildings, 6 structures, 1 object, and 12 archaeological sites are designated National Historic Landmarks. In Illinois, the two counties that border Lake Michigan contain 669 historic properties, of which many are concentrated within Cook County, where the City of Chicago is located. Most historic properties along the shoreline consist of buildings and structures, including piers, wharfs, and lighthouses.

Indiana: As of April 2020, there are 1,977 historic properties listed on the NRHP in the State of Indiana. Most of the historic properties are aboveground buildings (1,308), districts (446), or structures (123) (NPS 2020). Only 75 archaeological sites are listed on the NRHP, and there are five unknown historic properties. Of the 1,977 historic properties, 7 districts, 29 buildings, 4 structures, and 2 archaeological sites are designated National Historic Landmarks. In Indiana, the three counties that border Lake Michigan contain 149 historic properties. These historic properties are loosely scattered throughout the three counties along the lakeshore, with concentrations within the cities of Gary, East Chicago, and Michigan City.

Michigan: As of April 2020, there are 1,949 historic properties listed on the NRHP in the State of Michigan. Most of the historic properties are aboveground buildings (1,288), districts (363), or structures (189) (NPS 2020). Only 102 archaeological sites are listed on the NRHP and there are seven objects. Of the 1,949 historic properties, 10 districts, 19 buildings, 1 structure, 1 object, and 3 archaeological sites are designated National Historic Landmarks. In Michigan, the 41 counties that border four of the Great Lakes (Lake Superior, Lake Huron, Lake Michigan, and Lake Erie) contain 997 historic properties. Many of the historic properties are located within the Detroit area in Wayne County. Historic properties along the shoreline consist primarily of buildings and structures, including piers, wharfs, and lighthouses.

Minnesota: As of April 2020, there are 1,717 historic properties listed on the NRHP in the State of Minnesota. Most of the historic properties are aboveground buildings (1,261), districts (209), or archaeological sites (127) (NPS 2020). Of the 1,717 historic properties, 8 districts, 13

buildings, 2 structures, and 4 archaeological sites are designated National Historic Landmarks. In Minnesota, the three counties that border Lake Superior contain 166 historic properties. Almost 80 percent (131) are concentrated within St. Louis County where the City of Duluth is located. Most historic properties along the shoreline consist of buildings and structures, including piers, wharfs, and lighthouses.

Ohio: As of April 2020, there are 4,066 historic properties listed on the NRHP in the State of Ohio. Most of the historic properties are aboveground buildings (3,054), districts (595), or structures (233) (NPS 2020). Only 179 archaeological sites are listed on the NRHP, and there are 13 unknown historic properties. Of the 4,066 historic properties, 8 districts, 44 buildings, 9 structures, and 12 archaeological sites are designated National Historic Landmarks. In Ohio, the seven counties that border Lake Erie contain 958 historic properties. Almost half, (414) are concentrated within Cuyahoga County, where the City of Cleveland is located. Historic properties along the shoreline primarily consist of buildings and structures, including piers, wharfs, and lighthouses.

Wisconsin: As of April 2020, there are 2,494 historic properties listed on the NRHP in the State of Wisconsin. Most of the historic properties are aboveground buildings (1,730), districts (390), or archaeological sites (283) (NPS 2020). Only 86 structures are listed on the NRHP. Of the 2,494 historic properties, 6 districts, 28 buildings, 1 structure, and 9 archaeological sites are designated National Historic Landmarks. In Wisconsin, the 15 counties that border Lake Superior and Lake Michigan contain 721 historic properties. Many of the historic properties are located within the Milwaukee area, in the southeastern portion of the state. Historic properties along the shoreline primarily consist of buildings and structures, including piers, wharfs, and lighthouses. Numerous shipwrecks are also listed throughout the Wisconsin portion of Lake Michigan.

4.16.3 Environmental Consequences

4.16.3.1 No Action

Under the No Action alternative, there would be no FEMA action; therefore, there would be no effect on cultural resources from FEMA-funded grant activities. However, under the No Action alternative, lake level rise in combination with coastal erosion during storm events would continue to adversely affect cultural resources along the Great Lakes shoreline and nearshore submerged environment. Cultural resources that could be at risk include historic standing structures, prehistoric and historic archaeological sites, and shipwrecks. The nature and severity of the process is exemplified in this statement from the Michigan SHPO website (Michigan Economic Development Corporation, SHPO 2020): "*The shorelines of the Great Lakes around Michigan are considerably more eroded than in recent decades because of record high lake water levels. Consequently, cultural materials including shipwrecks, parts of historic vessels, artifacts, abandoned docks, pilings, maritime landscapes, and prehistoric objects that had been buried in sediments or located in shallow water, are now exposed."* The exposure of these objects would be potentially detrimental due to human activities or natural erosion.

Historic structures along the Great Lakes shoreline gradually become undermined by erosion as embankments recede. Buried archaeological sites erode out of the embankments into lake waters, and shipwrecks can deteriorate as their individual elements disperse. The No Action alternative would result in the continuation of adverse effects to historic properties as a result of wind, ice, wave action, and storm events in Great Lakes shorelines settings.

Ad hoc shoreline stabilization measures implemented by communities would have the potential to damage, destroy, or expose historic properties along the shoreline through construction and excavation activities. In addition, shoreline stabilization measures may be constructed with materials that are incompatible with existing or adjacent historic resources and could compromise the integrity of those resources. The No Action alternative would have a minor to major impact on historic resources.

4.16.3.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Project-specific consultation with the SHPO or THPO would be necessary for all shoreline stabilization activities covered by the Proposed Action. FEMA would conduct an individual Section 106 consultation for each project application in accordance with the NHPA before the grant award. FEMA would identify the Area of Potential Effect (APE) for each project and whether there were any historic or cultural resources potentially present in the APE, in consultation with the SHPO and the THPO, as appropriate, and interested parties including tribes. The APE would consider the horizontal and vertical area of disturbance to account for any excavation and to encompass any access and staging areas required to implement the project. Pedestrian surveys or architectural assessments may be needed to determine if resources are present, particularly if there are eroded embankments or compromised structures. Nearshore marine archaeological reconnaissance surveys may also be required, given the density of shipwrecks along the shorelines, and the potential for projects to occur in or adjacent to National Marine Sanctuaries.

If resources are potentially present, then FEMA would determine whether the resource could be affected and consult with the SHPO or THPO, as appropriate, and other potentially interested parties on potential effects and avoidance or mitigation measures. If any adverse effects are identified, FEMA would consult on mitigation measures as appropriate.

Additional archaeological surveys may be required before any coastal or nearshore submerged activities occur, depending on the results of consultation with the SHPO or THPO and any identified interested parties. Inadvertent discovery protocols would be applied as a mitigation measure to any projects that propose ground-disturbing activities regardless of how minor the disturbance may appear. Inadvertent discovery protocols specify that if archeological deposits, including any Native American properties, stone tools, bones, or human remains, are uncovered, all work in the vicinity of the discovery must be halted immediately, and all reasonable measures must be taken to avoid or minimize harm to the finds. All archeological findings would be secured, and the subrecipient would restrict access to the sensitive area. The subrecipient would inform FEMA immediately of such findings, and FEMA would consult with the SHPO or THPO, as appropriate. Work in sensitive areas would not resume until consultation is completed

and until FEMA determines that the appropriate measures have been taken to ensure complete project compliance with the NHPA.

Through Section 106 consultation with the SHPO and THPO and the application of project-specific mitigation measures developed through the consultation process, potential effects to above and belowground historic properties and submerged cultural resources would be reduced to none or minor impacts.

A tiered SEA would be required for a project for which FEMA makes an Adverse Effect determination that must be resolved through state specific Programmatic Agreement Treatment Measures or a memorandum of understanding with the SHPO, THPO, or other consulting parties.

Project-Specific Consequences

Bioengineered Stabilization Measures:
Although this group of actions is generally viewed as having fewer impacts, these measures generally involve excavation of soils. The implementation of bioengineered projects may require excavators and other heavy equipment to install structural components and place sediment but would not typically require heavy equipment to plant vegetation.

Bank Regrading/Stabilization
Bank regrading has the potential to impact buried archaeological resources, depending on the degree to which undisturbed sections of the slope are cut, the depth and extent of plantings, and the depth of any drain or drywell installation. Temporary erosion controls such as coir rolls and natural fiber blankets would not be likely to impact archaeological resources. The introduction of plantings into the viewshed of a NRHP eligible or listed structure could be considered an adverse effect, if the integrity of the historic setting was a key factor in determining eligibility.

Marsh and Wetlands Creation, Restoration, or Enhancement
When this activity includes use of heavy machinery for regrading of unstable slopes and there are cuts into the natural soil profile, the action has the potential to impact buried archaeological resources or properties of religious and cultural interest such as areas used to cultivate wild rice. Filling drainage channels or removal of fill and installing plantings on newly placed sediment to reestablish marshland is unlikely to impact buried archaeological resources. The installation of sills and breakwaters has the potential to impact submerged shipwrecks; historic, commercial, and industrial structures (remains of piers and wharves); historic canals, and prehistoric archaeological resources in the nearshore lake bottom, depending on the setting.

Beach/Dune Nourishment
The practice of adding sediment to coastal beaches and dunes and planting beach grasses as a shoreline stabilization action may impact archaeological resources if substantial shoreline erosion has occurred and is unlikely to impact aboveground historic properties. If an eroding bank has exposed a site, then the site would be identified, documented, and evaluated before the project occurs. If it is determined to be a historic property, then the potential effects would include the action to add sand and soil to the site and the potential for future erosion post-project

to affect the site. If there is a concern about post-project erosion, mitigation for the site may be required. If mitigation is required, this would be reviewed and disclosed through an SEA.

Hard Stabilization Measures

Hard stabilization measures, including the installation of revetments, bulkheads, and seawalls, would require excavators and other heavy equipment and vehicles (see Section 3.2.2) that could affect buried resources through excavation and compaction. Hard stabilization measures may affect the patterns of sediment erosion and accretion downdrift of the project area—with the potential to expose buried archaeological resources and shipwrecks (resulting in damage) or to bury and protect them.

Revetments

The installation of revetments such as rock (or riprap), concrete, cellular blocks, or other materials to fit the shape of the graded shoreline slope is unlikely to affect certain types of archaeological resources, such as buried prehistoric lithic scatters or camp sites, if there are no excavation cuts into the natural strata during regrading. However, even if grading is limited, the weight of certain revetments could have an adverse effect on fragile archaeological sites, such as unmarked human burials. Given the nature of the materials used, including concrete blocks and rocks, and the potential size and height of revetments, these structures could also impact viewsheds and require analyses to determine if there could be adverse effects to nearby aboveground historic properties.

Bulkheads and Seawalls

Similar to other hard stabilization measures, excavation of the shoreline could affect cultural resources. The construction of concrete, steel, or aluminum sheet piling bulkheads and seawalls parallel to the shoreline has the potential to impact submerged shipwrecks, historic commercial and industrial structures (remains of piers and wharves), historic canals, and prehistoric archaeological resources in the nearshore lake bottom, depending on the setting. These structures could also result in preservation of submerged shoreline historic resources including shipwrecks, by reducing the intensity of wave action on the particular resource. Given the potential size and height of bulkheads and seawalls, these structures could also trigger viewshed analyses to determine if there could be adverse effects to nearby aboveground historic properties.

Groins, Jetties, and Breakwaters

Groins, jetties, and breakwaters that extend out into the lakebed have a greater potential to impact shipwrecks if not carefully sited.

Best Management Practices

The following conditions would be necessary to avoid and minimize potential impacts:

- Minimize deep cuts into natural cultural-bearing strata during the process of regrading, if possible.
- Existing roads and access points should be used to the maximum extent possible, and the creation of new access roads minimized. If new access roads or staging areas are

required, those areas would be surveyed for the presence of cultural resources before construction begins.

- Low-impact equipment should be used to cross intact landscapes to access shoreline stabilization projects to the extent practicable (e.g., rubber-tired vehicles and equipment).
- If appropriate, planting plans should be designed in keeping with the historic context.
- If appropriate, shoreline stabilization structures would be constructed with materials that are context sensitive.
- Inadvertent discovery protocols would be implemented and tailored to specific site types as needed before project implementation and in consultation with the SHPO and THPO.

4.17 Environmental Justice

Environmental justice compliance is guided by EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority or low-income populations to the greatest extent practicable and permitted by law. CEQ defines the term minority as persons from any of the following groups: Black, Asian or Pacific Islander, American Indian or Alaskan Native, and Hispanic (CEQ 1997). Low-income or poverty populations are defined using the statistical poverty threshold from the U.S. Census Bureau, which is based on income and family size. CEQ considers a census tract to be minority or low-income when at least 50 percent or more of its residents are minority, 25 percent or more of its residents are low-income, or when the population in the census tract has a meaningfully greater number of minority and low-income persons when compared to larger geographic areas such as a county or state (CEQ 1997). Meaningfully greater is typically defined as at least 10 percent greater than the next larger surrounding geopolitical unit.

The environmental justice analysis is focused at the local (i.e., census tract or block group) level. The local area in the analysis should be where project-related impacts would occur, potentially causing an adverse and disproportionately high effect on neighboring minority and low-income populations. Project area demographics are compared to a reference community, often the city or county in which the project area is located, to determine if the project area population could be considered low-income or minority based on the CEQ definition. Resources such as EPA's EJScreen website can also be used to identify potential communities of concern within project areas (EPA 2019).

FEMA follows EPA's guidelines to assess disproportionate impacts on minority and low-income populations. Where there is a potential for disproportionately high or adverse impacts, FEMA consults with EPA and the affected community and incorporates recommendations for mitigating those impacts.

4.17.1 Affected Environment

A summary of the minority and low-income populations within each state covered by this analysis is shown in **Table 4.16**. Specific project areas may have much higher percentages of minority or low-income persons representing EJ populations in or near a project. For each proposed project, the demographic characteristics of the adjacent populations would need to be investigated and the potential for disproportionately high and adverse impacts would need to be evaluated.

Table 4.16. Minority and Low-Income Populations by State

State	Percentage Minority Population (%)	Percentage Low-Income Population (%)
Illinois	38	30
Indiana	20	33
Michigan	25	33
Minnesota	19	25
Ohio	20	33
Wisconsin	18	29

Source: EPA 2019

4.17.2 Environmental Consequences

4.17.2.1 No Action

Under the No Action alternative, there would be no FEMA-funded action; therefore, there would be no disproportionately high and adverse human health or environmental effect on low-income or minority populations resulting from a federal action. Communities may implement some ad hoc efforts to repair damaged infrastructure or stabilize shorelines, which would be unlikely to have disproportionate effects on low-income or minority populations owing to the small scale and temporal and spatial separation between these projects. However, shoreline erosion would not be substantially mitigated by these efforts and all populations within a project area would continue to be at risk of erosion hazards.

4.17.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Generally, the Proposed and Connected Actions would not be expected to have disproportionately high or adverse effects on minority and low-income populations. Minor short-term impacts on these populations from construction could include noise, traffic, and air quality impacts. In some cases, the Proposed and Connected Actions may block public access to shorelines, which could affect minority or low income populations who may rely on the Great Lakes for food sources (although, a project may also improve access). Thus, an individual

project analysis for the presence of minority and low income populations and the potential for adverse impacts on these populations should always be conducted.

All populations within a project area would see a reduction in the risk of shoreline erosion and degradation from implementation of the Proposed Action, regardless of their race, nationality, or income level. There would be no long-term adverse effects related to traffic, noise, or air quality from the Proposed Action. Project locations would be selected based on risk of structure and infrastructure damage from shoreline erosion rather than on demographic characteristics.

Project-Specific Consequences

Hard Stabilization Measures
Hard engineering measures have the potential to cause shoreline erosion downdrift of where the stabilization structures are installed, as described in **Section 3.2.2**. Thus, implementation of these measures could have long-term minor impacts on shoreline communities, including minority and low-income populations, downdrift of the project area due to increased erosion and degradation of the shoreline. Revetments, bulkheads, and seawalls have the greatest potential to adversely affect shoreline access and care should be taken in design to avoid impacting public access to the lakes. Groins and jetties may provide enhanced access to deeper water, which could benefit subsistence fishing activities.

Connected Actions

Infrastructure Relocation or Repair
If a roadway is relocated closer to minority or low-income populations, there is the potential for disproportionate and adverse long-term traffic, noise, and air quality impacts on these populations.

Structure Acquisition and Demolition or Relocation
If structural acquisition and demolition or relocation occurs as a connected action to a shoreline stabilization project, there could be impacts on minority and low-income populations through changes in community cohesion. Communities would purchase structures from willing sellers and pay the sellers agreed-upon prices. Structures would be chosen based on their risk of damage from shoreline erosion rather than on demographic characteristics. Thus, structure acquisition likely would not result in disproportionately high or adverse impacts on minority and low-income populations. Because the erosion hazard would be likely to remove structures over time, a coordinated acquisition project may provide some opportunities for relocation that maintains some community characteristics that may not exist under the No Action alternative.

Best Management Practices
The following conditions would be necessary to avoid and minimize potential impacts:

- Ensure accessibility across the full range of clients and/or customers that need to use the services being provided by these facilities, including elements of the population with less capacity or mobility.

- If minority and/or low income populations are present in a project area, the subapplicant would develop public outreach efforts and engagement strategies to effectively engage these populations about the proposed project.

4.18 Land Use and Zoning

The States of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin have implemented land-use planning laws that allow but do not require local governments to engage in long-term land-use planning. Proposed shoreline stabilization projects should be consistent with local land-use policies and regulations.

Illinois allows every planning commission and planning department to prepare comprehensive plans for the present and future development of the municipality. The plans may include reasonable requirements relating to rights-of-way, public grounds, and other improvements. 65 Ill. Comp. Stat. § 5/11-12-5.

Indiana Code empowers local governments to adopt comprehensive plans that contain at least the three following elements: objectives for future development of the jurisdiction, policies for land uses, and policies for development of public ways, places, lands, structures, and utilities. Additional comprehensive plan contents are outlined in Indiana Code § 36-7-4-503. Ind. Code § 36-7-4.

Michigan Planning Enabling Act (Act 33 of 2008) allows a local government to adopt, amend, and implement a master plan to guide and accomplish development that meets the criteria outlined in Section 125.3807, including development that is economical, harmonious, and efficient, and promotes public health, safety, and general welfare. Mich. Comp. Laws § 25.3807.

Minnesota has granted county commissioner boards with the authority to prepare and adopt comprehensive plans by ordinance. Minn. Stat. § 394.23. Counties located outside of a metropolitan area, with less than 80 percent of their pre-settlement wetland acreage intact, must consider adopting goals and objectives for the preservation of agricultural, forest, wildlife, and open space land, and minimize development in sensitive shoreline areas. Minn. Stat. § 394.231.

Ohio regional or county planning commissions may make plans, studies, maps, recommendations, and reports concerning the physical, environmental, social, economic, and governmental characteristics, functions, services, and other aspects of the region or county, respectively. Ohio Rev. Code § 712.23.

Wisconsin's Comprehensive Planning Law requires local public participation in deciding a vision for a community's future. Wisc. Stat. § 66.1001. The law requires communities to include certain elements in their plans and update their plans no less than once every 10 years. The law also provides flexibility for communities to address statutory requirements and drive the planning process.

The States of Michigan and Wisconsin have also established shoreline setback regulations to control new shoreline development (USACE 2018b). In Michigan, zoning setbacks, or High-Risk Erosion Area regulations, are administered by EGLE. In Wisconsin, zoning setbacks are

administered by the WDNR. These regulations are important in addressing eroding shorelines, hazards to private and public property, and the effects of climate change.

4.18.1 Affected Environment

The study area encompasses a wide variety of land uses, including urban, residential, open space, recreational, agricultural, recreational, and wilderness areas such as forests and wetlands (USGS 2016). The study area within each state varies with respect to shoreline land uses. The majority of land along the Illinois, Indiana, and Ohio Great Lakes shoreline is developed, whereas the shorelines of Michigan, Minnesota, and Wisconsin are less developed and have a greater percentage of forested areas and wetlands. There is limited agriculture in the study area (**Table 4.17**).

Table 4.17. Land Uses within the Study Area

State	Agricultural	Barren Land	Developed[1]	Forested	Vegetated[2]	Wetlands
IL	1%	12%	73%	4%	1%	9%
IN	0%	20%	58%	17%	3%	1%
MI	3%	12%	21%	32%	2%	30%
MN	1%	2%	21%	71%	4%	2%
OH	5%	3%	60%	9%	4%	20%
WI	9%	6%	27%	28%	1%	29%
Total	**4%**	**10%**	**26%**	**32%**	**2%**	**27%**

Source: USGS 2016

[1]Developed land uses include all developed areas from low to high intensity and developed open spaces such as playing fields.

[2]Vegetated areas encompass areas that are primarily grasslands and shrub/scrub.

4.18.2 Environmental Consequences

4.18.2.1 No Action

Under the No Action alternative, communities may implement ad hoc actions to repair damaged infrastructure or stabilize shorelines. These actions would not likely affect existing zoning or land uses in the short or long term and would not substantially mitigate erosion along the Great Lakes shorelines. Structures and infrastructure near the shoreline could be impacted as shorelines continue to erode resulting in impacts on shoreline land uses (e.g., residential or business displacement). Local governments may implement zoning setbacks from the shoreline or other land-use regulations to protect public safety. If the project area community has developed long-term plans and policies, such as comprehensive or master plans, it is unlikely that continued shoreline erosion and degradation would be consistent with the land-use goals in those documents. Thus, the No Action alternative could have long-term minor to moderate impacts on land use and zoning within shoreline communities.

4.18.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Construction-related effects of the Proposed and Connected Actions would not adversely impact existing zoning or land use within a given project area in the short term. Efforts to stabilize shorelines, promote long-term resilience to changing climatic conditions, and protect public health and safety would likely be consistent with long-term planning efforts described in community comprehensive and master plans. If the proposed shoreline stabilization measure or the proposed location are not allowed under the existing land-use policies and plans, then there would be an adverse impact on land use and an SEA would need to be prepared.

Additional zoning setbacks or changes in land-use plans to protect residents and infrastructure may not be necessary if shorelines are effectively protected from erosion and wave action. In the long term, implementation of the Proposed Action may inhibit or enhance public access to the shoreline depending on the design of the shoreline stabilization measures. Thus, there could be long-term minor to moderate benefits on land use and zoning from implementation of the Proposed Action, especially if the Proposed Action is consistent with long-term land-use plans.

If the project area community has not implemented a long-term planning document, such as a comprehensive plan, the Proposed Action may not be designed with future land-use development goals in mind, resulting in minor impacts on land use and zoning in the long term.

Project-Specific Consequences

Bioengineered Stabilization Measures

Bioengineered stabilization measures would enhance greenspace within the project area through actions such as planting native vegetation, creating or restoring ecosystems, or widening beaches. Generally, bioengineering measures would occupy more land area than hard stabilization measures, resulting in development being set back further from the shoreline. Depending on whether the given project area community prioritizes green space or development along the shoreline, these measures could result in long-term minor benefits or minor impacts on land use, respectively.

Hard Stabilization Measures

Hard stabilization measures have the potential to cause shoreline erosion downdrift of the where the stabilization structures are installed, as explained in **Section 3.2.2**. Revetments, bulkheads, and seawalls have the greatest potential to adversely affect shoreline access, which is more likely to result in inconsistencies with local land-use policies and plans. Thus, implementation of hard stabilization measures may have long-term minor impacts on land use within shoreline communities. If a specific project would result in effects such that a community would need to revise its land-use plan (e.g., revise the zoning to increase setbacks to account for downdrift erosion), then an SEA would need to be prepared.

Connected Actions

Infrastructure Relocation or Repair
Infrastructure relocation has the potential to affect land uses in the new location. Activities covered under this PEA would include relocation for relatively short distances with the intent to move vulnerable infrastructure back from the shoreline only as far as necessary to provide protection from shoreline erosion and resilience against future hazards. Therefore, the connected action of infrastructure relocation could result in minor to moderate impacts on land use.

Structure Acquisition and Demolition or Relocation
Actions to acquire and demolish or relocate structures would change existing land uses and may result in changes to zoning because acquired structures would be converted into open space. However, conversion to open space may be consistent with future land-use plans that promote resilience and discourage development in hazardous areas; therefore, this connected action could have long-term minor benefits on land use and zoning.

4.19 Noise

Noise is regulated at the federal level by the Noise Control Act of 1972, 42 U.S.C. §§ 4901, et seq., and is defined as an undesirable sound. Noise standards developed by EPA (1974) provide a basis for state and local governments' judgments in setting local noise standards. Local governments often implement noise ordinances that limit excessive noise, such as time limits on construction work.

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are considered noise. Noise events that occur during the night (e.g., 10 p.m. to 7 a.m.) are more annoying than those that occur during regular waking hours (e.g., 7 a.m. to 10 p.m.). Assessment of noise impacts includes consideration of the proximity of the noise sources to sensitive receptors. A sensitive receptor is defined as an area of frequent human use that would benefit from a lowered noise level.

Typical sensitive receptors in developed areas include residences, schools, churches, hospitals, and libraries. In more sparsely developed areas, noise-sensitive receptors would include recreational developments such as parks, campgrounds, water access sites, trails, and Tribal Nation properties of religious and cultural significance. Recreational areas are areas that rely on quiet settings as an essential part of their character. Typical noise sources in residential or recreational areas are associated with climatic conditions (wind, rain), transportation (traffic on roads, airplanes), and life sounds (people talking, children playing, yard maintenance).

4.19.1 Affected Environment

The following noise-sensitive environments occur within the study area and may occur within individual project areas.

National and state parks generally have lower average noise levels owing to their location in wilderness areas away from human infrastructure. Noise levels for national and state parks can be as low as 10 A-weighted decibels (dBA) (NPS 2016).

Community parks are more likely than national and state parks to be located near developed areas. Thus, background noise levels may be higher than national or state parks.

Residential areas generally have lower average noise levels than other developed land uses. Suburban areas typically have noise levels between 50 and 60 dBA (Federal Railroad Administration 2016).

Specific land uses such as libraries, hospitals, and schools that require quieter environments may also be considered noise-sensitive receptors when they are close to a proposed project area.

The following environments are not considered noise-sensitive environments and create sources of noise. The background noise environment is considered in determining whether there is a noise impact from a proposed project. Projects that occur in noisy contexts are less likely to produce noise impacts that are noticeable to sensitive receptors. The following noise environments occur within the study area and may occur within individual project areas.

Urban environments are likely to have high noise levels from vehicular traffic and construction. Typical highways produce noise levels that range from 80 to 100 dBA, and construction can produce noise levels between 93 and 108 dBA (U.S. Department of the Interior 2008).

Port activity, such as terminal operations, vessel operation, truck and rail traffic, and construction may generate a variety of noise levels ranging from approximately 50 to 100 dBA (Port of Vancouver 2017).

Highways produce noise levels ranging from 80 to 100 dBA, even outside of urban areas (U.S. Department of the Interior 2008).

Railways can produce high noise levels that range from 70 to 115 dBA (Federal Railroad Administration 2016).

Airports generate high levels of noise from aircraft operations that increase ambient noise levels in nearby communities. Commercial aircraft generally emit between 70 to 100 dBA (Federal Aviation Administration 2012).

4.19.2 Environmental Consequences

4.19.2.1 No Action

Under the No Action alternative, communities may implement some ad hoc efforts to repair damaged shoreline infrastructure, which may have short-term, minor, and localized noise impacts from construction. Shoreline erosion would not be substantially mitigated by these efforts and could impact structures and infrastructure near the shoreline. Construction to repair damaged infrastructure and structures may follow, resulting in minor increases in noise levels on sensitive receptors from equipment use and potential detours. Therefore, short- and long-term noise impacts would be minor.

4.19.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

The Proposed and Connected Actions would cause short-term, temporary changes in the ambient noise levels in the project area associated with construction activities and the use of heavy equipment used to construct a project. Common equipment would include excavators, dump trucks, and dozers, and other heavy equipment as needed. In areas of steep bluffs, the project materials and heavy equipment may be delivered from the water via a tug and barge or surplus navy landing craft, and construction could also take place with heavy equipment located on a spud barge. Because sound travels farther across water before attenuating, construction activities based on the water may produce noise impacts farther from the project site than expected for land-based activities. Minor traffic noise would also be produced by construction vehicles and trucks arriving and departing from the project area. Construction activities would conform with the BMPs listed below.

No long-term impacts from noise are anticipated from the Proposed Action and most of the Connected Actions because the project types would not be a source of long-term noise.

Project-Specific Consequences

Hard Stabilization Measures

Bulkheads and Seawalls

If the construction of bulkheads or seawalls involves the placement of sheet piles or other piles with pile driving equipment, noise levels may be quite high and impact fish and wildlife as well as people. Noise from an impact hammer can travel very long distances even over land. Therefore, if pile driving is proposed, an SEA may be required if the potential impacts on the natural and human environment would be more than minor.

Connected Actions

Infrastructure Relocation or Repair

As a Connected Action, transportation infrastructure may be relocated farther from the shoreline, increasing its proximity to sensitive receptors. Thus, there could be long-term minor to moderate noise impacts depending on the noise levels produced by the infrastructure and its proximity to sensitive receptors. Other types of utilities that may be relocated away from shorelines are unlikely to produce noise (e.g., water and sewer lines, power lines), but consideration should be given in the use of the PEA to unusual situations.

Best Management Practices

The following conditions would be necessary to avoid and minimize potential impacts:

- Construction activities would be limited to allowable construction noise hours consistent with local noise ordinances.
- Equipment run-times would be minimized.

- Equipment and machinery that meet applicable local, state, and federal noise control regulations would be used.

4.20 Traffic and Transportation

4.20.1 Affected Environment

A variety of transportation infrastructure exists within the study area, including commercial ports, private marinas, ferry terminals, interstates, highways, arterials, railways, and airports and heliports.

There are many ports in the study area, especially in the states of Michigan and Wisconsin, that have longer shorelines (**Table 4.18**). Marinas and ferry terminals are also found along the shoreline and may be within or near individual project areas.

Interstates (I) that intersect the study area include I-55 in Illinois; I-90 in Indiana; I-69, I-375, and I-75 in Michigan; I-535 and I-35 in Minnesota, I-90 in Ohio; and I-43, I-94, I-535, and I-745 in Wisconsin. **Table 4.18** shows the miles of interstate within the study area by state. Roads with lower functional classifications (e.g., arterials) are more likely to be located in individual project areas along shorelines than interstates or highways. Arterial roads may be the primary roads supporting automobile and bus service for shoreline communities and may also serve other forms of transportation, such as ferry service.

A variety of rail companies operate railways in the study area, including Amtrak, BNSF, Canadian Pacific Railway, Lake State Railway, and Union Pacific. **Table 4.18** shows total miles of railroad within the study area by state.

The study area primarily contains heliports and smaller airports that serve island communities and/or provide emergency services. **Table 4.18** shows the number of airports and heliports within the study area by state.

Table 4.18. Transportation Infrastructure within the Study Area by State

State	Number of Commercial Ports	Miles of Interstates	Miles of Railroads	Number of Airports and Heliports
Illinois	22	0.06	11	2
Indiana	17	0.21	28	3
Michigan	109	3.05	182	3
Minnesota	27	7.35	61	2
Ohio	63	2.56	35	5
Wisconsin	106	3.00	74	2

Sources: U.S. Department of Transportation 2019; ESRI 2019; Great Lakes Commission 2019

4.20.2 Environmental Consequences

4.20.2.1 No Action

Under the No Action alternative, communities may implement ad hoc efforts to repair damaged shoreline facilities. These efforts would have negligible to minor impacts on traffic if road closures or detours occur while the repairs are being constructed. These ad hoc efforts would not substantially mitigate shoreline erosion, and transportation infrastructure near the shoreline would continue to be at risk for erosion-induced damage. Road and rail closures and traffic diversions may be required if shorelines fail and impact transportation infrastructure. Closures of roads that support transit service and serve ferry terminals, marinas, or airports and heliports would have additional impacts on transportation service and access. Runways or airport facilities may also be damaged by erosion. Island communities that rely on ferry service, marinas, or heliports and airports for access to the mainland may experience major impacts if this infrastructure is damaged or closed. **Section 4.11** discusses impacts on navigation, port and commercial marine traffic, and ferry service. Depending on the extent of damage, and the importance of infrastructure to the community, the No Action alternative could have minor to major long-term impacts on traffic and transportation.

4.20.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

During construction, the Proposed and Connected Actions would result in minor to moderate temporary increases in traffic as materials and equipment are mobilized to project sites. Temporary road closures or detours may be required during construction. However, there would be minor to major long-term benefits to traffic and transportation because the Proposed Action would mitigate shoreline erosion and the associated damage and closure of transportation infrastructure.

Project-Specific Consequences

Hard Stabilization Measures

Hard stabilization measures have the potential to cause shoreline erosion downdrift of where the stabilization structures are installed, as described in **Section 3.2.2**. Thus, implementation of these measures could have long-term minor impacts on transportation infrastructure located near the downdrift areas because of increased shoreline erosion.

Connected Actions

Infrastructure Relocation or Repair

Infrastructure relocation or repair may be more likely than other measures covered under this PEA to require road closures to relocate roadways and utilities. This may result in moderate short-term impacts on traffic and transportation. However, relocating road infrastructure to less hazardous areas would have minor to moderate long-term benefits on traffic and transportation within communities.

Best Management Practices

The following conditions would be necessary to avoid and minimize potential impacts:

- Maintenance of traffic plan to minimize the impact of temporary lane closures or detours would be developed.
- If road closures and detours are required during construction, traffic mitigation measures, such as the installation of clear detour signage or flaggers, would be required.

4.21 Public Services and Utilities

This section evaluates the potential impacts of the proposed fire mitigation program on public utilities such as sewer, water, gas, and electricity; emergency services such as fire and police; and public facilities such as schools, hospitals, parks, and recreational facilities.

4.21.1 Affected Environment

Utility infrastructure in the study area may include natural gas and electricity infrastructure, telecommunications, and potable water, wastewater, and stormwater utilities. Electricity and telecommunications are often provided to communities by private suppliers. Water and wastewater facilities are generally managed, owned, and operated at the local level. Rural project areas are often serviced by private wells and septic systems instead of public utilities. The state agencies that regulate access to adequate, safe, and reliable utility services and oversee local water authorities are listed in **Table 4.19**. These state agencies oversee the public and private utility companies in their respective states.

Table 4.19. State Agencies that Oversee Local Water Authorities

State	State Regulatory Agency (Utilities)	State Regulatory Agency (Water Authorities)
Illinois	Illinois Commerce Commission	Illinois Environmental Protection Agency Bureau of Water
Indiana	Indiana Utility Regulatory Commission	Indiana Department of Environmental Management
Michigan	Michigan Public Service Commission	Michigan Department of Environment, Great Lakes, and Energy
Minnesota	Minnesota Public Utilities Commission	Minnesota Pollution Control Agency
Ohio	Ohio Public Utilities Commission	Ohio Environmental Protection
Wisconsin	Wisconsin Public Utilities Commission	Wisconsin Department of Natural Resources

Public safety services include local law enforcement agencies, fire departments, and emergency medical services. Emergency response time standards frequently exist in contractual obligations between communities and emergency service organizations. As a result, there may be variation in the standards between one community and another. Most emergency response teams use roads

and sometimes air transportation to reach affected people and communities. Public facilities such as schools, hospitals, and parks exist within the study area and may be in the vicinity of some project areas. Schools and hospitals are more likely to be located within developed areas rather than undeveloped areas.

4.21.2 Environmental Consequences

4.21.2.1 No Action

Under the No Action alternative, communities may implement ad hoc efforts to stabilize shorelines. These efforts are not likely to have short-term impacts on utilities and public services. Shoreline erosion would not be substantially mitigated under the No Action alternative, putting utilities, including those that are overhead or currently buried, at higher risk of damage or failure. This could result in power outages, the loss of water and sewer, heating and cooling, and telecommunication services. If utility infrastructure is damaged due to shoreline erosion, outages could be extensive and long term while the utility works to repair or replace the lost facilities. Shoreline erosion would also threaten public facilities near the shoreline, increasing the risk of failure of critical facilities such as schools and hospitals. Road closures from shoreline erosion would impact emergency response times. Infrastructure that is currently along the shoreline would continue to require repairs from storm and erosion damage, creating a burden on local and state governments. Therefore, under the No Action alternative, there would be long-term moderate to major impacts on public services and utilities from continued shoreline erosion.

4.21.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

Utilities may be temporarily shut off during construction of the Proposed and Connected Actions and work may require temporary road closures and detours. Thus, there may be minor, short-term impacts on utilities and emergency services with implementation of the BMPs below.

In the long term, the Proposed Action would have minor to moderate benefits on public services and utilities by mitigating shoreline erosion and avoiding the loss of utility infrastructure. The Proposed Action would provide minor long-term benefits on public services by reducing the potential for future road closures due to shoreline erosion, which would provide a more reliable route for emergency vehicle access.

Project-Specific Consequences

Hard Stabilization Measures

Hard stabilization measures have the potential to cause shoreline erosion downdrift of where the stabilization structures are installed, as described in **Section 3.2.2**. Thus, increased erosion may cause damage or closures of public services and utilities that are located near the shoreline downdrift area, resulting in minor long-term impacts.

Infrastructure Relocation or Repair
Infrastructure relocation or repair would have moderate to major benefits on utility infrastructure by repairing infrastructure that was damaged and/or relocating infrastructure to a less hazardous area. A less hazardous location should experience fewer service disruptions. Emergency services would benefit from the relocation of roads away from damaging shoreline erosion zones, which would improve overall emergency response times.

Structure Acquisition and Demolition or Relocation
Structure acquisition and demolition or relocation would require the removal or abandonment in place of utilities within or leading to the acquired property. Utilities that are abandoned in place would be decommissioned to state and local standards and would not result in impacts on natural or human resources.

Best Management Practices
The following conditions would be necessary to avoid and minimize potential impacts:

- If utilities need to be temporarily shut off during construction, the subrecipient would follow local ordinances regarding shutdown procedures and notification.
- Utilities that are abandoned in place would be decommissioned to state and local standards.
- Subrecipient would develop a maintenance of traffic plan to determine detours and methods to accommodate emergency response vehicles during construction.

4.22 Hazardous Materials

Hazardous materials and hazardous wastes include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present a substantial danger to public health or the environment when released or otherwise improperly managed. Hazardous materials are regulated by state and federal law, including the following:

- Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. Ch. 103, commonly referred to as the Superfund Program. Superfund Sites are contaminated because of hazardous waste being dumped, left out in the open, or otherwise improperly managed. These sites include manufacturing facilities, processing plants, landfills, and mining sites.
- Brownfields Utilization, Investment, and Local Development Act (EPA Brownfields Program), 132 Stat. 1052 – 1059 (amending 42 U.S.C. § 9601). The EPA Brownfields Program provides grants and technical assistance to communities, states, tribes, and others to assess, safely clean up, and sustainably reuse contaminated properties.
- Toxics Release Inventory (TRI) Program established by the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001-11050. The TRI maintains data on industrial facilities that use, manage, and store potentially toxic chemicals into the environment, including Pb, polycyclic aromatic, and zinc compounds.

- Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 *et seq.,* regulates hazardous and nonhazardous wastes and provides a system for managing hazardous waste from the time it is generated until its disposal. Sites designated for RCRA Corrective Action are involved with the cleanup of current environmental problems caused by the mismanagement of waste.

4.22.1 Affected Environment

Table 4.20 provides information about the number of Superfund Sites, Brownfield sites, TRI sites, and RCRA sites located within the study area. The number of hazardous sites within each state partially depends on the length of shoreline (i.e., study area) within each state, with Indiana being the shortest and Michigan being the longest. Users of this PEA should confirm whether hazardous sites are present in or near their proposed project area using databases provided by government agencies, such as EPA's Envirofacts database.

Table 4.20. Hazardous Materials Sites within the Study Area by State

State	State Regulatory Agency	National Priorities List (Superfund Program)	Brownfield Sites	Toxic Release Inventory Sites	RCRA Corrective Action Sites
Illinois	Illinois Environmental Protection Agency	2	9	7	148
Indiana	Indiana Department of Homeland Security	0	5	7	14
Michigan	Michigan Department of Environment, Great Lakes, and Energy	5 (one deleted from final NPL)	151	46	469
Minnesota	Minnesota Pollution Control Agency	0	22	6	134
Ohio	Ohio Environmental Protection Agency	0	39	17	82
Wisconsin	Wisconsin Department of Natural Resources	1	15	48	217

Source: EPA 2020b

4.22.2 Environmental Consequences

4.22.2.1 No Action

Under the No Action alternative, there would be no impacts from FEMA-funded actions. Some ad hoc efforts to stabilize shorelines may occur and there could be short-term negligible to minor impacts from equipment use and the associated risk of oil and fuel leaks, and the potential use of contaminated fill and materials (e.g., asphalt or concrete rubble). Shoreline erosion would not be substantially mitigated and would continue to threaten hazardous materials sites near the shore. If there are any contaminated materials along the shoreline, they may be exposed as shoreline erosion continues, leading to contamination of the soil and water in the project area and vicinity. Thus, under this alternative, there could be moderate to major long-term impacts from hazardous materials.

4.22.2.2 Proposed and Connected Actions

General Consequences of the Proposed Action

During construction, the Proposed Action would involve the use of construction equipment, and there would be a minor risk of leaks of oils, fuels, and lubricants from the use of such equipment. The Proposed Action may involve placement of fill either from the project site or from an external source but would not involve the addition of any hazardous materials or chemicals to the site. There is also a potential for construction to expose unknown contaminated materials as a result of excavation and removal of soil and construction debris from the project area. With the implementation of the BMPs listed below, the Proposed Action would have negligible, short-term effects related to hazardous materials.

The Proposed Action would not cause long-term, adverse impacts through the addition of hazardous facilities, operations, or chemicals to the project area or increase the risk of hazardous materials-related impacts on the environment. The Proposed Action would have long-term beneficial effects by protecting hazardous sites along the shoreline from erosion damage.

Project-Specific Consequences

Hard Stabilization Measures

Hard stabilization measures have the potential to cause shoreline erosion downdrift of where stabilization structures are installed, as described in **Section 3.2.2**. Increased erosion and degradation may occur downdrift of the project area and threaten hazardous materials sites in those impacted downdrift areas. Therefore, implementation of hard stabilization measures could have long-term minor impacts on hazardous material sites.

Generally, excavation for hard stabilization measures is deeper than bioengineering stabilization measures; thus, there is a higher potential for exposure to contaminated soils during implementation of hard engineering measures.

Connected Actions

Piers and Boardwalks
Sediments in urban areas are often contaminated with hazardous materials. Reconstruction of overwater structures, such as piers and boardwalks, can stir up contaminated sediments, which could have minor to moderate impacts on human health and water quality.

Structure Acquisition and Demolition or Relocation
Structures may contain asbestos or other hazardous materials that could have moderate impacts on human health and environmental quality. If a project involves acquiring and demolishing a structure, a Phase One Environmental Site Assessment or other hazardous materials assessment may be required to assess for contaminated materials. BMPs would be implemented to minimize potential impacts from hazardous materials during demolition.

Best Management Practices
The following conditions would be necessary to avoid and minimize potential impacts:

- Any hazardous and contaminated materials discovered, generated, or used during construction of the Proposed or Connected Actions would be disposed of and handled by the subrecipient in accordance with applicable federal, state, and local regulations.
- A Health and Safety Plan may be required for work within or near known contaminated sites to protect construction workers and the public.
- Construction equipment would be kept in proper working order. Any equipment to be used over, in, or within 100 feet of water would be inspected daily for fuel and fluid leaks. Any leaks would be promptly contained and cleaned up, and the equipment would be repaired.
- Any fill used at the project site would be obtained from a state-licensed source.
- In the event of an inadvertent spill, the subrecipient must immediately contact the appropriate regulatory agency (see **Table 4.20)**, or other contact listed on the subrecipient's permits, if applicable.

4.23 Cumulative Impacts

CEQ regulations require that NEPA documents evaluate "changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives, including those effects that occur at the same time and place as the proposed action or alternatives and may include effects that are later in time or farther removed in distance from the proposed action or alternatives" (40 C.F.R. § 1508.1(g)). The impacts to be evaluated include cumulative impacts. Cumulative impacts are impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or nonfederal) or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Through this PEA, FEMA evaluates the potential environmental consequences of providing grant funding for future shoreline stabilization measures and connected actions on the Great Lakes in FEMA Region V. These activities are described in **Section 3** and include the creation of bioengineered and hard measures to stabilize and reduce erosion along a shoreline, as well as certain connected actions. Connected Actions would include infrastructure relocation or repair, the repair of existing piers or boardwalks, construction of rain gardens and swales, and structure acquisition and demolition or relocation.

Because the Proposed Action would result from future grant assistance, the specific locations of the actions are unknown at the time of this assessment. Individual projects resulting from the Proposed Action could result in cumulative impacts depending on what other past, present, or future actions have been undertaken near the individual project area. Individual projects proposed for coverage under this PEA are not anticipated to cause significant impacts, even when combined with other actions. Projects that could result in significant impacts can generally be reduced below the level of significance by implementing the BMPs and mitigation measures described in **Section 5**. An SEA will be completed for any project that is anticipated to result in impacts that cannot be addressed by mitigation measures discussed in **Section 5**, Best Management Practices. **Table 4.2** provides the specific thresholds for determining whether a project may be covered under this PEA or would require an SEA.

4.23.1 Shoreline Protection Initiatives

There are a variety of past, present, and reasonably foreseeable shoreline protection initiatives within the Great Lakes Basin. These initiatives are helping, or will help, communities identify, design, and fund the implementation of shoreline protection solutions. The initiatives may lead to the design and funding of larger and more complex shoreline stabilization solutions. Major initiatives from federal agencies are described in more detail below.

In consultation with USACE Detroit District and the Engineer Research and Development Center, FEMA conducted a comprehensive analysis of storm and high water events within the Great Lakes Basin. This study, which encompassed eight states on the Great Lakes, depicts flood hazards along the lakeshore and resulted in the introduction of VE Zones to the Great Lakes Region. The VE Zone is a high risk area subject to flood hazards associated with a 1-percent-annual-chance flood and subject to strong wave hazards. In particular, the VE Zone is mapped for areas that meet one or more of the following criteria: wave runup depth exceeds 3 feet relative to the (eroded) ground, wave overtopping rate exceeds 1 cubic foot per second per foot, wave heights exceed 3 feet in areas of overland wave propagation, and the landward limit of the primary frontal dune when present (FEMA 2019b, 2018c). To date, FEMA has completed VE risk mapping for 63 of the 72 Great Lakes shoreline counties. Areas designated as VE Zones might be areas more susceptible to erosion and thus stronger candidates for erosion control and shoreline stabilization solutions.

The Great Lakes Restoration Initiative (GLRI) is a nonregulatory program that aims to protect and restore the Great Lakes and provide resources to make progress towards achieving long-term goals. A number of federal agencies, including EPA, U.S. Department of State, U.S. Department of the Interior, U.S. Department of Housing and Urban Development (HUD), USDA, U.S.

Department of Commerce, U.S. Department of Transportation, DHS, USACE, CEQ, and U.S. Department of Health and Human Services are members of the task force. The GLRI developed action plans that set goals every five years with specific focus areas. The current plan, Action Plan III, has five areas of focus, including toxic substances and areas of concern, invasive species, nonpoint source pollution impacts on nearshore health, habitats and species, and foundations for future restoration actions. The plan establishes long-term goals for the Great Lakes ecosystem to make progress in all five areas of concern (Great Lakes Restoration Initiative 2019).

USACE, EPA, USGS, FEMA, and Great Lakes states are conducting the Great Lakes Coastal Resiliency Study. The study would identify areas vulnerable to hydrologic uncertainty and would recommend measures to bolster the coastline's ability to withstand and adapt to future lake level conditions and increased severity of storms. The plan would cover the entire Great Lakes watershed and includes a risk-based framework to help prioritize future projects for funding (USACE 2019b). Additionally, USGS, NOAA and USACE are studying Great Lakes coastal erosion through a geomorphic study, which is expected to be completed in 2021. A Geomorphic Index will be available for Lake Michigan in 2021, and in subsequent years for other lakes. There is an opportunity for other agencies to collaborate with USACE on updating and maintaining baseline databases.

USACE is committed to ensuring public safety and providing technical expertise and assistance during this period of high water levels. The USACE Detroit District conducts forecasts of water levels for all of the Great Lakes. Rising lake levels create backwaters into river confluences, resulting in river flooding as well as shoreline flooding and contributes to the failure of older structures along the shoreline. USACE helps address emerging shoreline and bank protection needs, provides beach protection, conducts small ecosystem restoration projects, and provides emergency operations to protect life and property during natural disasters such as floods.

Section 14 of the Flood Control Act of 1946 (July 24, 1946, Ch. 596, 60 Stat. 641) provides USACE the authority to construct emergency shoreline and streambank protection works to protect public facilities (e.g., bridges, roads, public buildings, sewage treatment plants, and wells) and non-profit public facilities (e.g., churches, hospitals, and schools) (USACE 2019a). In 2019, USACE completed 53 emergency projects along the Great Lakes shoreline. However, since this is a national program, there is limited funding for Great Lakes projects.

USACE is currently conducting a project along the Chicago shoreline that would provide protection to the Lake Michigan shoreline and Lake Shore Drive, a major transportation artery. Project features include the construction of revetments, beach nourishment, and installation/reconstruction of breakwaters. One segment of the project has been completed and the remaining segments will be completed by the City of Chicago and the Chicago Park District. The completion schedule is not known at this time (USACE no date).

In January 2020, HUD signed an MOU with FEMA to use HUD funds to help communities provide the cost-share portion for FEMA's PA grants. HUD has also worked with Michigan communities on identifying shoreline stabilization solutions to protect people and homes.

The implementation of the Proposed and Connected Actions and initiatives described above may result in short-term cumulative impacts on a variety of resources. However, it is unlikely that there would be significant cumulative impacts because in most cases there would be temporal and spatial separation between activities. Past, present, and future shoreline stabilization initiatives occurring along the Great Lakes shoreline would result in long-term net beneficial effects and would complement the Proposed Action by reducing the risk of shoreline erosion and increasing community resilience. Therefore, there would be long-term beneficial cumulative effects from the combination of these initiatives and the Proposed Action.

4.23.2 Potential Cumulative Impacts and Benefits

4.23.2.1 Soils and Topography

Implementation of a FEMA-funded stabilization project along with other shoreline stabilization projects, in the same watershed or subwatershed could create a more effective shoreline erosion mitigation system. A group of stabilization projects that used hard engineering measures would reduce soil erosion from storm and wave action but also cumulatively increase the potential of adverse downdrift effects from multiple project locations. Implementation of a bioengineered measures along with other similar measures, could cumulatively reduce soil erosion without the impact of downdrift effects.

4.23.2.2 Water Resources and Water Quality

When a shoreline stabilization project would be combined with the other mitigation and restoration projects along a shoreline within the same watershed or subwatershed, a larger natural coastal habitat buffer could be created that would buffer a larger length of shoreline. This buffer would reduce pollution and stormwater runoff from entering the lakes by providing for natural filtering and infiltration, resulting in a cumulative benefit on water quality.

4.23.2.3 Coastal Resources

When a shoreline stabilization project is combined with other mitigation and restoration projects along a shoreline within the same watershed or subwatershed, there is a higher potential to meet the objectives of each state's coastal management program by reducing erosion, conserving natural resources, and enhancing public access to the shoreline.

4.23.2.4 Terrestrial and Aquatic Habitat

Multiple shoreline stabilization projects in the same watershed or subwatershed, could create larger interconnected natural areas of higher quality habitat. Extended natural areas would provide additional habitat and habitat connectivity that would allow for greater movement of terrestrial and aquatic species in the area. Larger habitat areas provide enhanced habitat benefits that are greater than the sum of the parts. The cumulative effect would provide a moderate beneficial effect on the biological environment.

Implementation of a FEMA-funded project along with other shoreline stabilization measures would remove and replace existing invasive vegetation with native trees and grasses in

accordance with state regulations described in **Section 4.13**. Removal and replacement of invasive plant species with native species would provide a cumulative benefit on terrestrial and aquatic habitats.

4.23.2.5 Land Use and Development

Shoreline stabilization projects may be part of larger land-use plans initiated to redevelop a community's shoreline for recreational, conservation, or economic development purposes. Implementation of the plans could be dependent on construction of the FEMA-funded project. FEMA would identify any land-use plans or development proposals that have a close causal relationship to an individual project proposed for funding and that are reasonably foreseeable. These projects could have a range of minor to moderate cumulative effects depending on the type of plan proposed. A coordinated conservation or recreational plan within the same watershed could provide cumulative benefits on habitat, soils, water quality, and public access. A land-use development plan could have minor to moderate adverse effects from an increase in impervious surface and stormwater runoff and traffic but could also provide economic development benefits to a community.

SECTION 5. BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

Section 4 described the affected environment and potential environmental consequences (beneficial or adverse) of the alternatives. With the implementation of the BMPs and mitigation measures described under each resource category, none of the potential impacts of the Proposed or Connected Actions would be significant based on the significance criteria previously defined in **Section 4**. The BMPs and mitigation measures are summarized in this section. An SEA should be prepared for a proposed project if a subrecipient is unable to comply with these BMPs, or if there would still be substantive impacts with implementation of the BMPs. **Table 5.1** summarizes BMPs and mitigation measures that are required by regulation, law, or statute, or that are generally applied in compliance with federal, state, and local regulations.

Table 5.1 BMPs and Mitigation Measures

Resource Area	Required BMPs or Mitigation Measures
Geology, Soils, and Topography	• Use rubber-tired mechanical equipment and vehicles. • Use existing roads for access. • Use mulch to prevent soils erosion. • Avoid the use of mechanized equipment on steep slopes or unstable soils. • In areas with steep slopes or sensitive soils, use hand tools to avoid and minimize potential soil erosion. • Drive heavy equipment around the project area in a random pattern and avoid repeatedly passing across the same spots.
Air Quality	• To reduce the emission of criteria pollutants, construction equipment engine idling would be minimized to the extent practicable and engines would be kept properly maintained. • Open construction areas would be minimized and watered as needed to minimize particulates such as fugitive dust. • Construction and emission control recommendations would be implemented to the extent practicable (see EPA scoping letter in **Appendix B**).
Climate	• To reduce the emission of greenhouse gases, construction equipment engine idling would be minimized to the extent practicable, and engines would be kept properly maintained.
Visual Resources	• None.

Resource Area	Required BMPs or Mitigation Measures
Water Quality	• Materials used for fill or bank protection should be clean, meet standard engineering criteria, and be comprised of materials that are free from contaminants in other than trace quantities. Furthermore, broken asphalt should be excluded from use as fill or bank protection. • Do not discharge water from dewatering operations directly into any live or intermittent stream, river, channel, wetlands, surface water or any storm sewer • Chemically treated lumber, which may include, but is not limited to, chromated copper arsenate- and creosote-treated lumber should not be used in structures that come into contact with water. • All temporary fill material should be removed to an area that has no water and is outside of wetlands and floodplains at the completion of construction activities. • All dredged material not determined suitable for reuse as base material or backfill should be placed within an upland area, and all return water should be contained to prevent reentry into waterways. • All beach sand and gravel that is excavated or which would be covered by structures should be sidecast lakeward prior to construction to prevent its removal from the littoral system, except when such materials are contaminated.
Floodplains	• Adhere to all local floodplain development ordinances and acquire all necessary local floodplain approvals. • Store equipment, fuel or other regulated materials outside of designated floodplain areas. • Construction staging and access for the Proposed Actions should occur outside the mapped floodplain to the extent practical. • All debris and excess material will be disposed of outside of wetland or floodplain areas in an environmentally sound manner.

Resource Area	Required BMPs or Mitigation Measures
Wetlands	• Ensure that beach compatible sediment or sediments compatible with marsh or wetland enhancement are used. The project must meet state standards for use of clean fill, or it is not covered under this PEA. In addition, follow any state-specific sediment/fill guidelines. • Dredged material intended for use in a beneficial manner must meet all federal, state, and local sediment testing and quality requirements. • All construction staging areas must be located outside of wetlands. • Prevent wastes, fuels, oils, lubricants, or other hazardous substances from equipment from entering the ground, drainage areas, or local bodies of water that would impact wetlands through appropriate staging and operation of equipment and by using appropriate erosion and sediment controls. • All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner. • Do not operate equipment in wetlands other than as minimally necessary. • Restore all wetland areas which are temporarily altered by construction activities to a condition equal or better than the condition that existed previous to construction.
Coastal Resources	• Ensure that construction activities do not impede access to local businesses. • All beach and sand gravel excavated or that would be covered will be sidecast lakeward prior to construction to prevent its removal from the littoral system, where appropriate.
Navigation	• Ensure all construction barges or associated vessels have appropriate USACE permits prior to commencing work. • Any projects that propose features which extend into navigable waters must have required permits and approvals prior to commencement of work.
Wild and Scenic Rivers	• Consult with the appropriate river management agency to develop mitigation for impacts on federally designated wild and scenic rivers (16 U.S.C. § 1283). • See Water Quality and Visual Quality and Aesthetics.

Resource Area	Required BMPs or Mitigation Measures
Vegetation and Invasive Species	• Ensure vehicles and equipment access project areas via existing roads. • Use rubber-tired machinery to reduce potential soil disturbance. • Spray/rinse aquatic equipment with high pressure hot water to clean off mud and kill aquatic invasive species before leaving water access. • Drain motor, bilge, livewell, and other water containing devices before leaving water access. • Dry all aquatic equipment for five days or more or wipe with a towel before use.
Fish and Wildlife	• Vehicles and equipment would access project areas using existing roads (40 C.F.R. 230 Subpart H). • When possible, avoid clearing of vegetation from March through August to avoid impacts on nesting migratory birds. • As appropriate, if bald or golden eagles are present in the project area, consult with USFWS to develop mitigation measures (16 U.S.C. § 668). • Establish buffers for eagle nesting sites. • Spray/rinse aquatic equipment with high pressure hot water to clean off mud and kill aquatic invasive species before leaving water access. • Drain motor, bilge, livewell, and other water containing devices before leaving water access. • Dry all aquatic equipment for five days or more or wipe with a towel before use.
Threatened and Endangered Species	• Consultation with USFWS to identify newly listed or delisted species for a particular project area. If there are species in a project area that are not covered in this PEA, then an SEA would need to be prepared. • As needed, develop avoidance and minimization measures in consultation with USFWS in accordance with Section 7 of the ESA (50 C.F.R. Part 402). • BMPs related to the protection of water quality, wetlands, vegetation and fish and wildlife habitat would also provide protections for habitats for ESA listed species.
Cultural Resources	• Through Section 106 consultation with the SHPO or THPO and the application of project-specific mitigation measures developed through the consultation process, potential effects to above- and belowground historic properties and submerged cultural resources would be reduced to none or minor impacts. BMPs listed in Section 4.16 would be implemented.

Resource Area	Required BMPs or Mitigation Measures
Environmental Justice	• Ensure accessibility across the full range of clients and/or customers that need to use the services being provided by these facilities, including elements of the population with less capacity or mobility. • If minority and/or low income populations are present in s project area, the subapplicant would develop public outreach efforts and engagement strategies to effectively engage these populations about the proposed project.
Land Use	• None
Noise	• Construction activities would be limited to allowable construction noise hours consistent with local noise ordinances; • Equipment run-times would be minimized. • Equipment and machinery that meet applicable local, state, and federal noise control regulations would be used.
Traffic and Transportation	• Maintenance of traffic plan to minimize the impact of temporary lane closures or detours would be developed. • If road closures and detours are required during construction, traffic mitigation measures, such as the installation of clear detour signage or flaggers, would be required.
Public Services and Utilities	• If utilities need to be temporarily shut off during construction, the subrecipient would follow local ordinances regarding shut down procedures and notification. • Utilities that are abandoned in place would be decommissioned to state and local standards. • The subrecipient would develop a maintenance of traffic plan to determine detours and methods to accommodate emergency response vehicles during construction.

Resource Area	Required BMPs or Mitigation Measures
Hazardous Materials	• Any hazardous and contaminated materials discovered, generated, or used during construction of the Proposed and Connected Actions will be disposed of and handled by the subrecipient in accordance with applicable federal, state, and local regulations. • A Health and Safety Plan may be required for work within or near known contaminated sites to protect construction workers and the public. • Construction equipment would be kept in good working order. Any equipment to be used over, in, or within 100 feet of water would be inspected daily for fuel and fluid leaks. Any leaks would be promptly contained and cleaned up, and the equipment will be repaired. • Any fill used at the project site would be obtained from a state-licensed source. • In the event of an inadvertent spill, the subrecipient must immediately contact the hazardous water regulating agency described in Table 4.20, or other contact listed on the subrecipient's permits, if applicable.

SECTION 6. SUMMARY OF IMPACTS

Table 6.1 summarizes the potential impacts of each alternative on the resource areas based on the analysis in **Section 4**. The table is organized by resource area for each alternative.

Table 6.1 Summary of Impacts

Resource Area	No Action	Proposed and Connected Actions
Soils and Topography	Long-term minor to major adverse impacts from construction of ad-hoc mitigation efforts. Long-term major adverse impacts as erosion would continue to erode shorelines, potentially impacting structures and infrastructure along the shoreline.	Short-term minor to moderate impacts on soils from construction activities. Long-term minor to moderate beneficial effects on soils with the reduction of soil loss caused by erosion. Long-term beneficial effects on topography at localized project areas. *Project-Specific Consequences:* Hard stabilization measures may have long-term minor to moderate adverse impacts in downdrift areas.
Air Quality	Minor short- and long-term impacts on air quality from vehicle and equipment use for construction.	Short-term negligible to minor impacts on air quality from construction equipment and exposed soils. However, some larger projects with long durations may reach or exceed the *de minimis* threshold. A conformity analysis may need to be conducted for larger projects. No long-term impact on air quality.

Resource Area	No Action	Proposed and Connected Actions
Climate	Short-term minor emissions from construction equipment and vehicles; no impact on regional climate. Shoreline erosion would increase as shorelines would not be effectively protected from the effects of climate change.	Short-term increases in greenhouse gas emissions, but no impacts on regional climate change. However, some larger projects with long durations may reach or exceed greenhouse gas thresholds. An emissions analysis may need to be conducted for larger projects. No long-term impact on climate.
Visual Resources	Short-term minor impacts from construction; long-term minor to moderate impacts from the appearance of ad hoc methods. Minor to major impacts on visual resources from ad hoc infrastructure repair and continued shoreline erosion.	Short-term minor to moderate impacts from construction. Long-term minor to moderate benefits from reduced shoreline erosion and potential for bank failure. *Project-Specific Consequences:* Long-term minor to moderate benefits from implementation of bioengineered measures. Long-term minor impacts from implementation of hard engineering measures unless in urbanized environments where effects may be beneficial. Long-term minor benefits from implementation of most Connected Actions. Relocation of roads or other infrastructure may have long-term minor to moderate impacts on visual resources if moved to more visible areas.

Resource Area	No Action	Proposed and Connected Actions
Water Quality and Water Resources	Long-term adverse impacts on water quality as a result of the release of sediments and pollutants into the water from continued erosion. No impact on or withdrawal of groundwater.	Minor, short-term impacts on water quality as a result of soil disturbance and removal of vegetation during construction. Long-term minor to moderate benefits from shoreline stabilization including the reduction in sediment, nutrients, and other pollutants. *Project-Specific Consequences* Bioengineered stabilization measures would have long-term beneficial effects on water quality by creating vegetated shoreline buffers which would reduce sediment, nutrients, and other pollutant runoff. Hard stabilization measures may result in long-term minor to moderate adverse impacts from the alteration of lateral movement of sediments along the shoreline that may affect downdrift erosion and depositional areas.
Floodplains	Short-term minor adverse effects from construction related ground disturbance and fill.	None to minor short- and long-term impacts from bioengineered measures. Minor to moderate long-term benefits from bioengineered measures. Hard stabilization measures may have short-term minor adverse effects from construction-related ground disturbance and interruption of natural floodplain connectivity. Minor beneficial effect from reduction in shoreline erosion.

Resource Area	No Action	Proposed and Connected Actions
Wetlands	Minor to moderate adverse impacts from inappropriate placement of fill materials or use of inappropriate materials for fill that could introduce contaminants into the environment.	Short-term minor to moderate adverse impacts if wetland habitats are directly impacted by fill or other construction activities. Long-term minor beneficial effects from shoreline stabilization activities that result in the protection of wetlands. Projects that result in permanent long-term impacts and require compensatory mitigation would also require the preparation of an SEA. *Project-Specific Consequences* Bioengineered stabilization measures would have long-term minor to moderate beneficial impacts from the use of native vegetation and expansion or enhancement of wetlands. Hard stabilization measures could result in long-term minor to moderate impacts by dredging or filling wetlands. Impacts may occur from changes in downdrift erosion or accretion patterns. Hard stabilization measures could result in long-term minor beneficial impacts if shoreline erosion is mitigated, and wetland vegetation is re-established after construction.

Resource Area	No Action	Proposed and Connected Actions
Coastal Resources	Long-term, adverse impacts as erosion would continue, impacting CZMP priorities including coastal hazards, economic development, recreation, water quality, and wildlife habitat.	Temporary, minor impacts on coastal resources from construction. However, long-term beneficial effects are anticipated at localized project areas. Benefits to coastal resources from both bioengineered and hard stabilization measures would include increased wildlife and fisheries habitat, public access to recreational areas, increased protection against coastal hazards, and economic development opportunities. Hard stabilization features of some projects may result in minor to moderate impacts due to placement of fill, which may result in impacts to recreational access, water quality, wildlife habitat and fisheries, and coastal processes.
Navigation	No effect.	Most project types would have none to negligible effects on navigation. *Project-Specific Consequences:* Breakwaters may result in long-term moderate impacts if they are constructed close to or within a navigation channel. Groins and jetties may result in long-term moderate impacts on navigable waters due to their perpendicular design. Jetties may have long-term moderate benefits on navigation by protecting navigation channels into harbors.

Resource Area	No Action	Proposed and Connected Actions
Wild and Scenic Rivers	Short- and long-term minor to major adverse impacts depending on scale and intensity of shoreline erosion and ad hoc activities.	If the Proposed or Connected Action is located near a designated wild and scenic river or a study river, FEMA and the river managing agency would make a formal determination of effect under Section 7 of the Wild and Scenic Rivers Act.
Vegetation and Invasive Species	Short- to long-term minor to moderate adverse impacts from ad hoc construction efforts causing loss of vegetation and ground disturbance which makes the shoreline more suspectable to invasive species.	Short-term minor to moderate impacts on vegetation during and directly after construction from ground disturbance and vegetation removal. Long-term minor to moderate benefits on vegetation because shoreline erosion would be mitigated, which would decrease vegetation loss and reduce the amount of disturbed area for invasive species to spread. *Project-Specific Consequences:* Bioengineered stabilization measures would have long-term minor to moderate beneficial effects by replacing invasive species with native species. Hard stabilization measures would have long-term minor to moderate impacts from vegetation loss.

Resource Area	No Action	Proposed and Connected Actions
Fish and Wildlife	Short-term adverse impacts from ad hoc construction activities which would cause noise and ground disturbance. Long-term adverse effects from shoreline deterioration would continue, causing loss of habitat for shoreline species and an increase in sedimentation and impaired water quality for aquatic species. Continued shoreline erosion would create conditions favorable to invasive species resulting in long-term moderate adverse impacts.	Short-term minor impacts from construction related activities including noise and ground disturbance. Long-term minor benefits from all measures by reducing erosion that damages habitats. *Project-Specific Consequences:* Short-term minor impacts from vegetation removal for bioengineered measures. Long-term minor to moderate impacts from vegetation removal for hard stabilization measures. Long-term minor to moderate beneficial effects from bioengineered measures that increase or enhance habitat area. Long-term minor to moderate adverse impacts from measures that affect littoral transport processes and patterns.

Resource Area	No Action	Proposed and Connected Actions
Threatened and Endangered Species	Short-term minor adverse effects due to construction activities and disturbance. Long-term adverse effects from ad hoc measures that may use inappropriate materials, which may introduce contaminants to adjacent soils and waters over time. Long-term major and adverse effects on threatened and endangered species and critical habitat due to continued erosion and loss of habitat.	None to moderate adverse effects on threatened and endangered species and critical habitat depending on the project scope and location.
Cultural Resources	No effect on historic properties from FEMA-funded grant activities. Coastal erosion would continue to adversely affect historic standing structures and archaeological sites along the shoreline, as well as submerged cultural resources in nearshore shallow waters.	None to minor effects on historic properties depending on the scope and location of specific projects. FEMA would initiate consultation with the SHPO and/or THPOs as appropriate, for each project in accordance with Section 106 of the NHPA.

Resource Area	No Action	Proposed and Connected Actions
Environmental Justice	No disproportionately high or adverse effects. All populations would be at risk from shoreline erosion, which would not be substantially mitigated.	No disproportionately high or adverse effects are expected; an analysis for the presence of minority and low income populations and potential impacts should always be conducted. In the long term, all populations within a project area would benefit from the reduced risk of shoreline erosion from the Proposed Action. *Project-Specific Consequences:* Hard engineering measures may have minor long-term impacts on downdrift shoreline communities including minority or low income populations. Groins and jetties may provide enhanced access to deeper water which could benefit subsistence fishing activities. Potential disproportionate and adverse long-term impacts from road relocation if the road is moved closer to minority and low income populations. No disproportionately high or adverse impacts form structure acquisition. Communities would purchase structures from willing sellers.

Resource Area	No Action	Proposed and Connected Actions
Land Use and Zoning	No short- or long-term impact from ad hoc efforts to repair damaged shoreline infrastructure. Long-term minor to moderate impacts from shoreline erosion, which would not be substantially mitigated.	No short-term construction impacts. The Proposed Action could have long-term minor to moderate benefits by mitigating shoreline erosion. Possible long-term minor impacts if there is no planning document guiding the design of the Proposed Action. *Project-Specific Consequences:* Bioengineering stabilization measures could have long-term minor benefits or impacts depending on whether the community prioritizes greenspace or development near the shoreline. Hard stabilization measures may have long-term minor impacts on land use in downdrift communities from increased erosion. Revetments, bulkheads, and seawalls have the greatest potential to adversely affect shoreline access. Infrastructure relocation or repair could result in minor to moderate impacts on land use in the new location. Structure acquisition and demolish and relocation could have long-term minor benefits from the creation of open space in hazardous areas.

Resource Area	No Action	Proposed and Connected Actions
Noise	Short-term and long-term minor impacts from vehicle and equipment use to repair damaged infrastructure and structures from unmitigated shoreline erosion.	Minor short-term impact from the use of construction vehicles and equipment. No new sources of noise and no long-term impact from the Proposed Action and most Connected Actions. *Project-Specific Consequences:* Installation of bulkheads and seawalls may create high noise levels from use of pile driving equipment. Possible long-term minor to moderate noise impacts from infrastructure relocation.

Resource Area	No Action	Proposed and Connected Actions
Traffic and Transportation	Short-term negligible to minor impacts from construction to repair damaged infrastructure. Long-term minor to major impacts as a result damage and/or closures of transportation infrastructure and services from largely unmitigated shoreline erosion.	Short-term minor to moderate impact from mobilization and possible temporary road closures or detours during construction. The Proposed Action would have minor to major long-term benefits by mitigating shoreline erosion and the associated damage and closure of transportation infrastructure. *Project-Specific Consequences:* Hard stabilization measures may have long-term minor impacts on transportation infrastructure in downdrift communities from increased erosion. Infrastructure relocation may have moderate short-term impacts from construction and long-term minor to moderate benefits from relocating roads to less hazardous areas.

Resource Area	No Action	Proposed and Connected Actions
Public Services and Utilities	No short-term impacts. Long-term moderate to major impact from damaged infrastructure as a result of a shoreline erosion, which would not be substantially mitigated.	Minor short-term impact from temporary utility shutoff or road closures or detours. The Proposed Action would have minor to moderate long-term benefits by mitigating shoreline erosion and wave action. *Project-Specific Consequences:* Hard stabilization measures may have long-term minor impacts on utilities and public services in downdrift communities from increased erosion. Infrastructure relocation and repair would have moderate to major benefits on utility and road infrastructure. Structure acquisition and demolition and relocation would not result in impacts if BMPs are followed.

Resource Area	No Action	Proposed and Connected Actions
Hazardous Materials	Short-term negligible to minor contamination threat from the use of construction equipment and potentially contaminated materials to repair damaged infrastructure. Long-term moderate to major impact from shoreline erosion damaging hazardous materials sites and utilities.	Short-term minor impact from leaks and spills caused by vehicles and equipment use. Potential for exposure to contaminated materials that had not been previously identified in the course of project implementation. The Proposed Action would have long-term beneficial effects by protecting hazardous sites along the shoreline from erosion damage. *Project-Specific Consequences:* Hard stabilization measures may have long-term minor impacts on hazardous material sites in downdrift communities from increased erosion. They would have a higher potential for exposure to contaminated sediments due to deeper excavation. Installation of piers and boardwalks could create additional contamination risks by stirring up contaminated sediment in urban waters. Structure acquisition and demolition or relocation may increase risk of exposure to asbestos or other hazardous materials.

SECTION 7. PUBLIC INVOLVEMENT

7.1 Scoping Notice of Intent

FEMA published a notice of intent to initiate scoping and solicit input on the proposed PEA from other federal and state agencies, tribes, and the public. Because of the large geographic area covered, the NOI was published in multiple locations on multiple dates (**Table 7.1**). The comment period to solicit input on the scope of the analysis was held open for 30 days following the latest publication date. Scoping closed on November 11, 2020. Agencies, tribes, and interested persons were requested to comment on the purpose and need of the Proposed Action, alternatives, potential environmental impacts, and measures to reduce those impacts.

7.1.1 NOI Distribution

FEMA published the above NOI in several newspapers of municipalities in the study area. These newspapers are outlined in **Table 7.1**. The NOI was sent directly to federal and state agencies and tribes for comment as shown in **Table 7.2**.

Table 7.1 NOI Newspaper Publication

State	Municipality	Newspaper	Date Published
Illinois	Chicago	*The Chicago Tribune*	10/10/2020
Indiana	Gary	*The Gary Crusader*	10/10/2020
Indiana	Gary	*The Times of Northwest Indiana*	10/10/2020
Indiana	Michigan City	*LaPorte County Herald-Dispatch* / *The News Dispatch*	10/10/2020
Michigan	Cheboygan	*Cheboygan Daily Tribune*	10/10/2020
Michigan	Bangor Township/Bay City	*The Bay City Times*	10/11/2020
Michigan	Sault Saint Marie	*The Sault News*	10/10/2020
Michigan	Detroit	*The Detroit Free Press*	10/10/2020
Michigan	Marquette	*The Mining Journal*	10/10/2020
Michigan	Muskegon	*Muskegon Chronicle*	10/11/2020
Michigan	St. Joseph	*The Herald Palladium*	10/10/2020
Michigan	Traverse City	*Record Eagle*	10/11/2020

State	Municipality	Newspaper	Date Published
Minnesota	Duluth	*Duluth News Tribune*	10/10/2020
Ohio	Toledo	*The Blade*	10/11/2020
Ohio	Cleveland	*The Plain Dealer*	10/11/2020
Wisconsin	Green Bay	*Green Bay Press Gazette*	10/10/2020 and 10/11/2020
Wisconsin	Milwaukee	*The Milwaukee Journal Sentinel*	10/10/2020

Table 7.2 NOI Agency and Tribal Distribution

Federal	State	Tribal
Bureau of Indian Affairs	Illinois Coastal Management Program	Bad River Band of Lake Superior Tribe of Chippewa Indians
National Oceanic and Atmospheric Administration (NOAA)	Illinois Department of Natural Resources – Office of Water Resources	Bay Mills Indian Community, Michigan
U.S. Army Corps of Engineers:	Illinois National Flood Insurance Program State Coordinator	Bois Forte Band of Chippewa Indians
Chicago Regulatory Branch	Illinois State Hazard Mitigation Officer	Chippewa Cree Tribe of the Rocky Boy's Reservation of Montana
Detroit Regulatory Branch	Illinois State Historic Preservation Office	Citizen Potawatomi Nation
Buffalo Regulatory Branch	Indiana Coastal Management Program	Delaware Tribe of Indians
St. Paul Regulatory Branch – Minnesota	Indiana Department of Natural Resources – Water	Delaware Nation
St. Paul Regulatory Branch – Wisconsin	Indiana Department of Environmental Management	Fond du Lac Band of Lake Superior Chippewa
U.S. Department of Agriculture:	Indiana National Flood Insurance Program	Forest County Potawatomi Community of Wisconsin
Rural Development	Indiana State Hazard Mitigation Officer	Fort Peck Assiniboine and Sioux Tribes
Natural Resource Conservation Service	Indiana State Historic Preservation Office	Grand Portage Band of Lake Superior Chippewa
U.S. Department of Interior	State Coordinator	Grand Traverse Band of Ottawa and Chippewa Indians
U.S. Environmental Protection Agency, Region V	Michigan Coastal Management Program	Hannahville Indian Community
U.S. Fish and Wildlife Service:	Michigan Environment, Great Lakes & Energy – Water Resources	Ho–Chunk Nation
Illinois Field Office, Chicago	Michigan Environment, Great Lakes & Energy – Office of the Great Lakes	Keweenaw Bay Indian Community
Indiana Field Office, Chesterton	Michigan National Flood Insurance Program	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
Michigan Field Office	Michigan State Hazard Mitigation Officer	Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin
Minnesota Field Office	Michigan State Historic Preservation Office	Lac Vieux Desert Band of Lake Superior Chippewa Indians
Ohio Field Office	Minnesota DNR, Division of Water	Leech Lake Band of Ojibwe
Wisconsin Field Office	Minnesota Coastal Management Program	Little River Band of Ottawa Indians
U.S. Forest Service	Minnesota State Historic Preservation Office	Little Traverse Bay Bands of Odawa Indians
	Minnesota National Flood Insurance Program	Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians of Michigan
	Minnesota State Hazard Mitigation Officer	Menominee Indian Tribe of Wisconsin
	Ohio Coastal Zone Management Program	Miami Tribe of Oklahoma
	Ohio Environmental Protection Agency	Mille Lacs Band of Ojibwe Indians
	Ohio National Flood Insurance Program State Coordinator	Minnesota Chippewa Tribe
		Oneida Nation of Wisconsin
		Ottawa Tribe of Oklahoma

Federal	State	Tribal
U.S. Geological Survey U.S. Housing and Urban Development, Region V	Ohio State Hazard Mitigation Officer Ohio State Historic Preservation Office Wisconsin Coastal Management Program Wisconsin Department of Natural Resources – Secretary Director's Wisconsin National Flood Insurance Program State Coordinator Wisconsin State Historic Preservation Office State Coordinator Wisconsin State Hazard Mitigation Officer State Coordinator Great Lakes and St. Lawrence Cities Initiative	Peoria Tribe of Indians of Oklahoma Pokagon Band of Potawatomi Indians Prairie Band Potawatomi Nation Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin Red Lake Band of Chippewa Indians of Minnesota Sac and Fox Tribe of the Mississippi in Iowa Saginaw Chippewa Indian Tribe of Michigan Sault Ste. Marie Tribe of Chippewa Indians of Michigan Seneca Nation of Indians Shawnee Tribe Sokaogon Chippewa Community St. Croix Chippewa Indians of Wisconsin Turtle Mountain Band of Chippewa White Earth Band of Ojibwe Wyandotte Nation

7.1.2 Scoping Comments

Ten responses to the scoping notice were received from the following federal and state agencies: USACE Chicago District, USACE Great Lakes and Ohio River Division, EPA Region V, Illinois Coastal Management Program, Illinois Department of Natural Resources – Office of Water Resources, Indiana SHPO, EGLE Water Resources, Minnesota DNR Ecological and Water Resources Division, Ohio SHPO, and the City of Chicago. Two tribal responses were received from the Forest County Potawatomi Community THPO and the Miami Tribe of Oklahoma THPO. Eight responses from members of the public were received.

Substantive comments included those from the USACE Chicago District, EPA Region V, the Indiana SHPO, the Forest County Potawatomi Community, and the Miami Tribe of Oklahoma. In their response letter, USACE asked FEMA to include all USACE District offices in future communications about the PEA, requested that site-specific designs and impacts of littoral drift be considered in the PEA, and that FEMA coordinate with USACE for any potential impacts on USACE structures and projects. USACE also recommended that FEMA arrange a meeting with agencies focused on the Great Lakes; this meeting was held on December 15, 2020. EPA provided a number of recommendations about the NEPA processes for PEA development, coordination related to other restoration projects and initiatives, potential aquatic resource impacts and BMPs, coastal resiliency, contamination, community and environmental justice impacts, cultural resources, species and ecosystem health, air quality and traffic safety, and construction emissions. The Indiana SHPO expressed concern about the potential of projects to impact shipwrecks offshore and onshore along Lake Michigan. The Forest County Potawatomi Community expressed interest in reviewing the draft PEA and the Miami Tribe of Oklahoma accepted the invitation to serve as a consulting party to the PEA due to the potential for discovery of human remains and Native American cultural items in the study area.

7.2 Notice of Availability

In accordance with NEPA, this draft PEA will be released to the public, resource agencies, and tribes for a 30-day public review and comment period. The public information process will include a Notice of Availability (NOA) with information about the Proposed Action in the newspapers listed in **Table 7.1**. The NOA will be sent directly to the federal and state agencies and tribes as outlined in **Table 7.2**, and any other parties that commented on the draft PEA during the scoping period. The draft PEA will also be made available for download from FEMA's website. Alternatively, a paper copy may be requested from Duane Castaldi using the contact information below. Interested parties may submit comments during the 30-day public review and comment period by contacting:

Duane D. Castaldi, Regional Environmental Officer
U.S. Department of Homeland Security, FEMA Region V
536 South Clark Street, 6th Floor
Chicago, IL 60605
Email: Duane.Castaldi@fema.dhs.gov

Please include "Shoreline PEA" in the subject line.

Comments on this draft PEA will be incorporated into the final PEA, as appropriate. This draft PEA reflects the evaluation and assessment of the federal government, the decision maker for the federal action; however, FEMA will take into consideration any substantive comments received during the public review period to inform the final decision regarding adoption of the PEA. Following the public comment period, the draft PEA will be updated and revised if necessary, a final PEA will be published, and a FONSI will be issued by FEMA. The PEA and Finding of No Significant Impact will be available to the public through the life of the document.

In addition to the circulation of the Draft PEA, any SEAs that are tiered off of the PEA would go through an appropriate level of public review before FEMA makes a NEPA compliance determination. When an action evaluated in an SEA could result in impacts to the environment beyond those described in this PEA and require mitigation in addition to that included in this document, or has the potential for public controversy, FEMA would circulate the SEA for public and agency review and comment. For these types of activities, FEMA could prepare a separate findings document (i.e., a FONSI or a Notice of Intent to prepare an EIS).

FEMA would comply with the public notification process required for compliance with EO 11988 and 11990 and 40 CFR §9, when applicable for an action. Additionally, a Cumulative Public Notice will be published at the time of the Presidential Declaration of each future disaster subject to this PEA.

SECTION 8. LIST OF PREPARERS

The following is a list of preparers who contributed to the development of the Great Lakes Shoreline Stabilization Projects Programmatic Environmental Assessment for FEMA. The individuals listed below had principal roles in the preparation of this document.

CDM Smith

Preparers	Degree	Experience and Expertise	Role in Preparation
Emma Argiroff	Master of Urban Planning	Environmental Planning	Introduction, Purpose and Need, Alternatives, Air Quality, Visual Quality, Environmental Justice, Land Use, Noise, Traffic and Transportation, Public Services and Utilities, Public Health and Safety, Hazardous Materials
Brian Caufield	Master of Science in Civil Engineering	Coastal Resources Engineer	Coastal Engineering, Introduction, Purpose and Need, Alternatives
Wilson Fogler	Bachelor of Science, Forestry (Wildlife Habitat Management and Conservation)	Environmental Science	Soils and Topography, Wild and Scenic Rivers, Vegetation, Fish and Wildlife, Threatened and Endangered Species
Malena Foster	Masters in GIS	GIS	Spatial Analyses
Danielle Gallant	Bachelor of Arts, Environmental Science	Environmental Science	Coastal Resources, Navigation, and assistance with Water Quality, and Soils and Topography
Alan Hachey	Master of Regional Planning	NEPA Compliance	Technical Lead, Cumulative Effects
Mary Lynne Rainey[1]	Master of Arts, Anthropology	Section 106 Compliance	Cultural Resources

Preparers	Degree	Experience and Expertise	Role in Preparation
Nick Revetta	Master of Science in Biology	NEPA Compliance, Environmental Science	Water Quality, Floodplains, Wetlands, and assistance with Soils and Topography, Vegetation, Fish and Wildlife, and Threatened and Endangered Species
Kate Stenberg	PhD, Wildlife and Fisheries Science and Regional Planning	NEPA Compliance	Quality Control

1- Richard Grubb & Associates, Inc.

Federal Emergency Management Agency

Reviewers	Experience and Expertise	Role in Preparation
Duane Castaldi	Regional Environmental Officer	Project Monitor
Maureen Cunningham	Regional Counsel	Legal Review
Karen Poulson	Environmental Protection Specialist	Technical Monitor
Nicholas Dorochoff	Deputy REO	Region V Staff

SECTION 9. REFERENCES

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Appendix A Compliance Checklist

Part I

Great Lakes Shoreline Stabilization Projects in the States of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin	Date:	Project Code:
Assessment under the Great Lakes Shoreline Stabilization Projects Programmatic Environmental Assessment (PEA) and Finding of No Significant Impact (FONSI) ***FEMA will review each project to determine if it should be covered by this PEA or whether another level of evaluation would be more suitable, including an SEA, a stand-alone EA, or an environmental impact statement.***		
Disaster Description and Date:		
Project Name, Project Number, and Location (include address and coordinates):		
Name and Contact Information of Project Primary Point of Contact:		
Project Description:		

PEA Alternative Used (Check all that apply)

- ☐ Alternative 1 – No Action Alternative
- ☐ Alternative 2 – Proposed Action

  Bioengineered Stabilization Measures
  - ☐ Bank Regrading/Stabilization
  - ☐ Marsh and Wetlands Creation, Restoration, or Enhancement
  - ☐ Beach/Dune Nourishment

  Hard Stabilization Measures
  - ☐ Revetments
  - ☐ Bulkheads and Seawalls
  - ☐ Breakwaters
  - ☐ Groins and Jetties
- ☐ Connected Actions
  - ☐ Infrastructure Relocation or Repair
  - ☐ Piers and Boardwalks
  - ☐ Rain Gardens and Bioswales
  - ☐ Structure Acquisition and Demolition or Relocation

I. Evaluation

ENVIRONMENTAL IMPACT ASSESSMENT:
Document impacts on the human, socioeconomic, and natural environment for the project-specific environmental setting or circumstances.

Setting/Resource/Circumstance	Are Impacts Consistent with Descriptions in PEA? (Yes/No)	*Are There Additional Impacts? (Yes/No)	Date Reviewed	Are Site Specific Study Documents Attached? (Yes/No)
Soils and Topography				
Air Quality				
Climate				
Visual Resources				
Water Quality				
Floodplains				
Wetlands				

Setting/Resource/Circumstance	Are Impacts Consistent with Descriptions in PEA? (Yes/No)	*Are There Additional Impacts? (Yes/No)	Date Reviewed	Are Site Specific Study Documents Attached? (Yes/No)
Coastal Resources				
Navigation				
Wild and Scenic Rivers				
Vegetation and Invasive Species				
Fish and Wildlife				
Threatened and Endangered Species				
Cultural Resources				
Environmental Justice				
Land Use and Zoning				
Noise				
Traffic and Transportation				
Public services and Utilities				
Hazardous Materials				

***Additional Impact Notes:**
See Table 4-2 for impacts that would require a tiered SEA.

Cross-jurisdictional impact thresholds – cross-jurisdictional impacts from downdrift erosion may occur in cases where a jurisdictional boundary is located downstream from the proposed project area at a distance of less than four times the length of the proposed shore-parallel structure (if a seawall, bulkhead, or revetment) or five times the length of a proposed shore-perpendicular structure (if a groin, jetty, or breakwater).

Air quality thresholds – Confirm whether the proposed project is in a nonattainment or maintenance area using the latest EPA Greenbook status. If the proposed project is large and would involve many truck trips or a long duration of heavy equipment operation, a determination on whether the proposed project would exceed *de minimis* thresholds should be performed. The prescribed annual rates are 50 tons of volatile organic compounds (VOCs), 100 tons of nitrogen oxides (NOX) (O3 precursors), and 100 tons of PM2.5, SO2, or NOX (PM2.5 and precursors).

Climate thresholds – Quantitative analysis should be done if an action is large and would involve many truck trips or a long duration with heavy equipment operation. If the proposed project would release more than 25,000 metric tons of greenhouse gases per year, additional adverse impacts would occur.

Water quality thresholds – The proposed project would be expected to have additional adverse impacts on water quality if it would impact water quality in such a way that TMDLs would be exceeded.

Navigation thresholds – The proposed project would be expected to have additional adverse impacts on navigation if it would obstruct navigational channels or navigational aids.

Fish and wildlife thresholds – The proposed project would have additional adverse impacts on bald and golden eagles if activities would affect nesting areas or winter roosts. There may be additional impacts

on migratory birds if vegetation removal during the breeding season cannot be avoided.

Environmental justice thresholds – The proposed project area would contain a minority or low-income when at least 50 percent or more of its residents are minority, 25 percent or more of its residents are low-income, or when the population in the census tract has a meaningfully greater number of minority and/or low-income persons when compared to larger geographic areas such as the surrounding city or county.

Land use thresholds – Confirm whether the proposed project is consistent with local land-use policies and plans. If the proposed project is inconsistent with local land-use policies and plans, then an adverse impact may occur.

REGULATORY CHANGES: Document changes to laws, regulations, and/or guidelines since signature of PEA FONSI:
IMPACT ASSESSMENT: For items checked as having additional impacts: assess the affected natural and socioeconomic environment, impacts and new issues/concerns that may now exist. Include a review of potential cumulative impacts.
MITIGATION: List specific mitigation measures for each resource impacted (both for impacts from PEA and any additional impacts):

II. Public/Agency Involvement (if any)

Has there been an opportunity for public involvement? Document any public meetings, notices, and websites, and/or document agency coordination. For each, provide dates and coordination. What agencies are involved?

III. Permits

List required permits and status of each permit:

IV. Attachments Listed

List maps, studies, background data, permits, etc.

V. Conclusion and Recommendation

☐ Project is consistent with the alternatives and impacts as described in the PEA.

☐ Project generally is consistent with the alternatives and impacts as described in the PEA, but includes some minor impacts not described in the PEA that are documented in this checklist.

☐ Project requires a Supplemental Environmental Assessment or Environmental Impact Statement because it (1) creates impacts not described in the PEA, (2) creates impacts greater in magnitude, extent, or duration than those described in the PEA, or (3) requires additional mitigation measures that are not described in the PEA to keep impacts below significant levels.

Applicant or Responsible Entity Signature Date

Funding Agency Date

Upon completion, submit this checklist and all attachments to fema-r5-environmental@fema.dhs.gov, for the purpose of tracking cumulative impacts.

Appendix B

Notice of Intent and Scoping

NOTICE OF INTENT

The Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA) announces its intent to prepare a Programmatic Environmental Assessment (PEA) for shoreline stabilization measures (proposed action) on the Great Lakes in the States of Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio. The PEA will evaluate shoreline stabilization measures eligible for FEMA grant funding. The notice is being published pursuant to the National Environmental Policy Act (NEPA), FEMA Instruction 108-1-1, and other applicable environmental laws, including the National Historic Preservation Act, Executive Orders 12898 (Environmental Justice), 11990 (Protection of Wetlands), and 11988 (Floodplain Management), since the proposed action has the potential to affect historic, cultural and archaeological resources, low-income and minority populations, floodplains, wetlands, and threatened and endangered species.

Shoreline erosion can have substantial consequences on nearby structures and environmental resources. Fluctuations in water levels on the Great Lakes have resulted in increased rates of bluff recession and beach loss, associated risks to nearby structures, as well as the loss of wetlands and habitat. The purpose of shoreline stabilization measures is to mitigate erosion hazards in nearshore areas. FEMA will evaluate the proposed action to ensure that it meets all applicable federal, tribal, state, and local requirements for these activities.

The PEA will address the purpose and need of the proposed action, project alternatives considered (including the No Action alternative), affected environment, environmental consequences, and impact mitigation measures. The proposed actions include the installation of stone revetments, groins, offshore breakwaters, beach nourishment projects, and implementation of bioengineering techniques. Bioengineering techniques use native vegetation and other suitable plant species with structural components to stabilize and reduce erosion along a shoreline.

A comment period to solicit input on the scope of the analysis including the purpose and need, alternatives, and potential impacts will remain open for 30 days following publication of this notice. Once completed, the draft PEA will be available for public review and comment. FEMA will announce a final comment period through a notice of availability for the Draft PEA.

Interested persons may provide comments or obtain more detailed information about the PEA by contacting Duane Castaldi, Regional Environmental Officer, FEMA Region V, 536 South Clark Street, 6th Floor, Chicago, IL 60605-1521; or by email at Duane.Castaldi@fema.dhs.gov. The public; local, state, tribal, and federal agencies; and other interested parties are invited to provide comments on the purpose and need of the proposed action, alternatives, potential environmental impacts, and measures to reduce those impacts.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, CHICAGO DISTRICT
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

November 10, 2020

Planning, Programs, &
Project Management Division
Planning Branch

Duane D. Castaldi
Regional Environmental Officer
Federal Emergency Management Agency, Region 5
536 South Clark Street, 6th Floor
Chicago, Illinois 60605-1521

Dear Mr. Castaldi:

The U.S. Army Corps of Engineers (USACE), Chicago District has reviewed the Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA) Notice of Intent (NOI) to prepare a Programmatic Environmental Assessment (PEA) for the Great Lakes Shoreline Stabilization Project, States of Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio. We have reviewed and concur with the comments made by USEPA, Region 5 (Letter dated 2 November 2020) and offer the following additional comments:

Include all USACE District offices in future communications and Notices of Availability for the Draft EA review using the addresses contained in the USEPA letter.

It is unclear if the alternatives that will be considered will be generalized conceptual alternative design types or site-specific designs for the proposed actions listed in your notice. We recommend that the level of design be site specific in the PEA and when not possible FEMA commit to the development of site specific supplemental environmental assessments when a proposed action moves forward for implementation. The PEA should include a site-specific assessment of the potential impact on aquatic and adjacent impacted terrestrial species, both flora and fauna, for each proposed action.

The evaluation of proposed actions should include an evaluation of the impact on littoral drift, particularly for proposed actions, but especially structures such as breakwaters or groins. Since littoral drift is variable within each of the Great Lakes, subsequent environmental analyses might be needed to fully address impacts to the movement of sand within a specific portion of the Great Lakes shoreline.

For proposed alternatives in the vicinity of Corps of Engineers structures and projects, FEMA should coordinate with the appropriate Corps of Engineers District for potential impacts to these structures and projects. This would include, but not necessarily be limited to potential impacts to navigation, littoral drift, dredging, and wave environment. As many of the Corps of Engineers structures are historic structures, we concur with

recommendation from USEPA for close coordination with the State Historic Preservation Officers for any proposed actions that could affect these structures.

Modifications of Corps of Engineers structures and projects may require a Section 408 permit evaluation. This includes Corps of Engineers owned structures as well as projects that were constructed by the Corps of Engineers and turned over to non-Federal entities for long term operation and maintenance. For additional information, see USACE Engineer Circular 1165-2-220.

There is significant ongoing multi agency coordination and potential watershed study to address current and future issues on the Great Lakes. We recommend that FEMA arrange a meeting with these agencies early in the PEA development to ensure better awareness and consistency of the response to ongoing challenges within the Great Lakes basin.

If you have any questions, please contact me at: susanne.j.davis@usace.army.mil or (312) 846-5580.

Sincerely,

DAVIS.SUSANNE.J.1230432313 Digitally signed by DAVIS.SUSANNE.J.1230432313 Date: 2020.11.10 16:23:33 -06'00'

Susanne J. Davis, P.E.
Chief, Planning Branch
Chicago District

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

November 2, 2020

REPLY TO THE ATTENTION OF:
Mail Code RM-19J

Duane D. Castaldi
Regional Environmental Officer
Federal Emergency Management Agency, Region 5
536 South Clark Street, 6th Floor
Chicago, Illinois 60605-1521

Re: Scoping Comments for the Great Lakes Shoreline Stabilization Project, States of Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio

Dear Mr. Castaldi:

The U.S. Environmental Protection Agency has reviewed the Notice of Intent (NOI) to prepare a Programmatic Environmental Assessment (PEA) for the project referenced above. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementing Regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The NOI explains that the project purpose is to mitigate erosion hazards in nearshore areas. The PEA would evaluate shoreline stabilization measures eligible for FEMA grant funding. Measures may include stone revetments, groins, offshore breakwaters, beach nourishment projects, and implementation of bioengineering techniques. The project has potential to affect historic, cultural and archaeological resources, low-income and minority populations, floodplains, wetlands, and threatened and endangered species, among other impact categories. EPA recognizes that effective shoreline stabilization has the potential to result in environmental and community benefits, including water quality and habitat protection and flood prevention. To assist FEMA in meeting the project purpose in a manner that best protects human health and the environment, EPA offers the enclosed: (1) Detailed Scoping Comments and (2) Construction Emission Control Checklist.

Thank you for the opportunity to review this project. When the subsequent NEPA document becomes available, please send an electronic copy to Jen Tyler, the lead reviewer for this project, at tyler.jennifer@epa.gov. Ms. Tyler is also available at 312-886-6394.

Sincerely,

KENNETH WESTLAKE
Digitally signed by KENNETH WESTLAKE
Date: 2020.11.02 14:40:55 -06'00'

Kenneth A. Westlake
Deputy Director, Tribal and Multimedia Programs Office
Office of the Regional Administrator

Enclosures: (1) Detailed Scoping Comments, (2) Construction Emission Control Checklist

Cc Via Email:

Charles Uhlarik, U.S. Army Corps of Engineers, Detroit District

Susanne Davis, U.S. Army Corps of Engineers, Chicago District

Martin Wargo, U.S. Army Corps of Engineers, Buffalo District

Christine Deloria-Sheffield, Great Lakes Coastal Coordinator
U.S. Fish and Wildlife Service, Marquette, MI

Joelle Gore, Coastal Zone Management Program, National Oceanic and Atmospheric Administration

Diane Tecic, Coastal Program, Illinois Department of Natural Resources, Chicago, IL

Jenny Orsburn, Manager, Lake Michigan Coastal Program, Indiana Department of Natural Resources, Chesterton, IN

Ronda Wuycheck, Coastal Program, Michigan Department of Environment, Great Lakes, and Energy, Lansing, MI

Amber Westerbur, Coastal Program, Minnesota Department of Natural Resources, Two Harbors, MN

Scudder Mackey, Ph. D. Director, Office of Coastal Management, Ohio Department of Natural Resources, Sandusky, OH

Steve Galarneau, Director, Office of Great Waters, Wisconsin Department of Natural Resources, Madison, WI

ENCLOSURE 1: EPA'S SCOPING COMMENTS FOR THE GREAT LAKES SHORELINE STABILIZATION PROJECT, STATES OF MINNESOTA, WISCONSIN, ILLINOIS, INDIANA, MICHIGAN, AND OHIO

NEPA Process, Project Description, and Affected Environment

EPA understands that FEMA is developing a programmatic NEPA document, which will take a broad look at shoreline stabilization needs and opportunities across six states boarding the Great Lakes. EPA applauds this approach and recognizes environmental benefits that can result from early, comprehensive planning. While we offer scoping comments based on the limited information available, EPA is unclear on which decisions FEMA plans to make based on the PEA process and which decision would be made in subsequent project-level work. As a result, some of our scoping comments may be more relevant to future stages of this project.

Recommendations for the PEA:

- Describe the scope of decisions that FEMA will make through this programmatic NEPA process, and separately list which decisions FEMA will make through future project-level NEPA processes.
- Include a Purpose and Need statement that meets the requirements of the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR § 1502.13).
- Evaluate all reasonable alternatives, in line with the CEQ NEPA Regulations (40 CFR § 1502.14).
- Describe resources and communities that may be impacted by the proposed project. Include photos, figures, and maps.
- For each alternative, describe actions that would be taken, activities that would occur in-water vs. out of the water, and materials that may be used.
- To the extent possible at this stage of the NEPA process, visually depict project alternatives. Consider staging areas and access roads, among other features.

Coordination Related to Other Restoration Projects & Initiatives

Restoration plans, projects, and funding initiatives, some of which EPA and FEMA collaborate on, are currently underway to restore and protect the Great Lakes. It is important for the PEA to explain how a proposed project aligns with such efforts, especially the Great Lakes Restoration Initiative (GLRI). Federal agencies use GLRI resources to strategically target the biggest threats to the Great Lakes ecosystem and to accelerate progress toward long-term goals.[1] The PEA may also consider alignment with Lakewide Action and Management Plans (LAMPs), which are ecosystem-based management strategies for protecting and restoring Great Lakes' water quality.[2]

Recommendations for the PEA:

Evaluate how the programmatic decisions made through this PEA process would support (1) the objectives, commitments and measures of the Great Lakes Restoration Initiative Action Plan III[3]; and (2) the goals, objectives, priority projects and actions of the Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, and Lake Superior LAMPs.

Aquatic resources

[1] GLRI information is available at: https://www.epa.gov/great-lakes-funding/great-lakes-restoration-initiative-glri

[2] Great Lakes LAMPs are available at: https://www.epa.gov/greatlakes/lakewide-action-and-management-plans-great-lakes

[3] The Great Lakes Restoration Plan Action Plan III is available at: https://www.epa.gov/sites/production/files/2019-10/documents/glri-action-plan-3-201910-30pp.pdf

It is important for the PEA to consider potential impacts to aquatic resources, disclose such impacts to the public, and identify plans for avoidance, minimization, and mitigation measures.

Recommendations for the PEA:

- Describe the existing water quality in the project areas, including all impairments under Section 303(d) of the Clean Water Act (CWA).
- Analyze and disclose potential permanent, temporary, direct, indirect and cumulative impacts to aquatic resources at a programmatic level.
- Discuss how the project would fulfill the requirements of (1) the CWA Section 404(b)(1) Guidelines, including alternatives and mitigation sequencing requirements (first avoid, then minimize, and finally compensate for those impacts that cannot be avoided or minimized), and the (2) CWA Section 401 Water Quality Certification.
- Make programmatic-level commitments for best practices to protect water quality and nearshore aquatic habitats during future project implementation, such as establishing criteria for use of coffer dams.

Coastal Resiliency

The PEA would address damages to coastal properties and infrastructure that have resulted, and continue to result, from fluctuations in water levels and increased frequency and intensity of storms. Such changes are in line with current findings and modeled trends prepared by the U.S. Global Change Research Program (USGCRP). USGCRP reports that, across the Midwestern U.S., statistically significant increases in flood risk and severity are well documented. Extreme heat, heavy downpours, and flooding will continue to affect infrastructure.[4]

Recommendations for the PEA:

- Document trends in occurances of severe storm events in the project area.
- Include a discussion of reasonably foreseeable effects that changes in climate may have on the proposed project area and proposed shoreline stabilization measures.
- Provide a rationale to support the selection of the storm design-year that would be used.
- Describe how the proposed project would incorporate or align with the coastal resiliency efforts of other agencies (including U.S. Army Corps of Engineers, U.S. Geological Survey, National Oceanic and Atmospheric Administration, and EPA) to ensure that shoreline stabilization projects are as resilient as possible to future stressors (e.g. water levels).
- Consider resiliency and adaptation measures or plans to promote high performance of project elements under changing temperature and precipitation conditions. Describe how such information is being incorporated into the project. Use EPA's Climate Change Adaptation Resource Center[5] to view case studies and identify appropriate mitigation strategies.

Contamination

Unknown contamination could potentially be discovered during future, project-specific earth-moving activities.

Recommendations for the PEA:

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[4] U.S. Global Change Research Program, 2017 Climate Science Special Report: Fourth National Climate Assessment (NCA4), Volume 1, page 241.

[5] EPA's Climate Change Adaptation Resource Center is available at https://www.epa.gov/arc-x.

Discuss potential environmental impacts associated with contaminated waters and soils that could be encountered during project implementation. Identify programmatic-level screening and preparedness measures that would be applied to all shoreline stabilization measures associated with this project. Consider general procedures for contractors to safely identify, manage, and dispose of contamination if any should be found.

Community and Environmental Justice Impacts

The programmatic NEPA document and subsequent decision document have the potential to impact communities by making decisions about types and locations of shoreline stabilization projects that may be funded, as well as decisions about how such projects could be implemented.

Executive Order 12898 directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations. EPA's EJSCREEN[6] is a publicly available mapping tool designed to screen for potential impacts to communities living with or vulnerable to EJ concerns.

Recommendations for the PEA:

- Describe existing community characteristics and potential community impacts at a programmatic level.
- Describe community outreach efforts aimed at gaining local input. Specify targeted activities to reach low income and/or minority residents. Describe how community input would be used to inform project development.
- Identify how low income and/or minority populations may be impacted by the proposed project. Assess whether adverse impacts on low income and/or minority populations could be disproportionately high and adverse.
- Provide specific measures to avoid, minimize, and mitigate any anticipated adverse impacts and promote benefits to communities.
- Per Executive Order 13045 on Children's Health[7], EPA recommends that FEMA make a programmatic commitment to pay particular attention to future worksite proximity to places where children live, learn, and play, such as homes, schools, and playgrounds. Construction emission reduction measures should be strictly implemented near these locations to protect children's health.
- Specify how impacts to sensitive receptors, such as children, elderly, and the infirm would be minimized. For example, commit to locate construction equipment and staging zones away from sensitive receptors and fresh air intakes to buildings and air conditioners during future project implementation.

Tribal Cultural Resources and National Historic Preservation Act (NHPA)

NHPA Section 106 is concerned with impacts to historic properties, defined as properties that are listed, or may be eligible for listing, on the National Register of Historic Places (National Register). These may include prehistoric or historic districts, sites, buildings, structures, objects, or properties of traditional religious and cultural importance to a tribe.

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[6] EPA's EJSCREEN Environmental Justice and Mapping Tool, available at: https://www.epa.gov/ejscreen

[7] Children may be more highly exposed to contaminants because they generally eat more food, drink more water, and have higher inhalation rates relative to their size. Also, children's normal activities, such as putting their hands in their mouths or playing on the ground, can result in higher exposures to contaminants as compared with adults. Children may be more vulnerable to the toxic effects of contaminants because their bodies and systems are not fully developed and their growing organs are more easily harmed.

Recommendations for the PEA:

- Consult with appropriate tribal governments and indigenous organizations to identify potential project impacts and programmatic commitments to protective measures. Document this consultation in the PEA.
- Coordinate with the State Historic Preservation Officer from each impacted state and any applicable Tribal Historic Preservation Officers and/or appropriate tribal representatives.
- In the PEA, explain how the project would comply with Section 106 of NHPA.

Species and Ecosystem Health

Section 7 of the Endangered Species Act (ESA) directs all federal agencies to ensure that any action they authorize, fund, or carry-out does not jeopardize the continued existence of a threatened or endangered species or proposed or designated critical habitat. Implementing regulations found at 50 CFR Part 402 specify how federal agencies are to fulfill their ESA Section 7 consultation requirements.

Shoreline stabilization measures could introduce non-native invasive species, and they may degrade important aquatic habitats by disrupting the littoral transport system in the Great Lakes. Early recognition and control of infestations is essential to stopping the spread of invasive plants and insects without widespread chemical use, which may have adverse impacts on biodiversity and water quality.

Recommendations for the PEA:

- Use the U.S. Fish and Wildlife Service (FWS) "Information for Planning and Conservation" tool to obtain a list of trust resources in the project area. The list would include species that are threatened or endangered under ESA, candidate species for listing, critical habitat, and migratory birds protected under the Migratory Bird Treaty Act.[8]
- Determine whether the proposed action may affect trust resources. If trust resources may be affected, engage in consultation with U.S. Fish and Wildlife Service. Document coordination and formal consultation in the PEA, with the goal of aligning NEPA and ESA Section 7 consultation processes.
- Determine whether any state-listed species could be impacted by the proposed project, and document any coordination with the appropriate state agency in the PEA.
- Discuss consideration of wildlife crossings in the design of any culverts.
- Describe how the project would meet the requirements of Executive Order 13112 on invasive species.
- Consider program-wide protective measures, such as requiring all construction contractors to wash equipment prior to contact with waters and unpaved areas to reduce the likelihood of spreading invasive species.
- Revegetate all disturbed green spaces, including staging areas, after the project is complete. Use native species and pollinator friendly plants whenever feasible.
- Commit to planting trees to offset tree loss at a ratio of 1:1 or greater.

Air Quality and Traffic Safety

Construction of shoreline stabilization measures would result in emissions from construction equipment and hauling. Temporary construction emissions have the potential to impact human

[8] FWS Information for Planning and Conservation (IPaC) tool is available at: https://ecos.fws.gov/ipac/

health, especially in sensitive populations, such as elderly people, children, and those with impaired respiratory systems.

Recommendations for the PEA:

- Discuss potential emissions sources from activities proposed within the PEA. Consider: truck trips, demolition, and use of construction equipment.
- Discuss whether construction emissions could impact nearby people. Consider potential local health effects from construction emissions, including childhood asthma and other respiratory illnesses that could be triggered by short-term elevated emission levels.
- At a programmatic level, identify specific measures that would be used, to the extent possible, to reduce construction emissions in future site-specific projects. Options include: (1) requiring dust suppressant strategies, such as use of tarps, (2) limiting idling time for construction trucks and heavy equipment, and (3) soliciting bids that require zero-emission technologies or advanced emission control systems. See additional best practices in the enclosed Construction Emission Control Checklist.
- At a programmatic level, consider requiring a construction traffic management plan for future site-specific work. This could help ensure trucks hauling materials and heavy machinery (1) avoid areas where children congregate, such as schools, daycares and parks when possible, and (2) use crossing guards when such areas cannot be avoided.

ENCLOSURE 2

U.S. Environmental Protection Agency
Construction Emission Control Checklist

Consider making a programmatic commitment to consider the following measures for project-level implementation of shoreline stabilization measures.

Mobile and Stationary Source Diesel Controls

Purchase or solicit bids that require the use of vehicles that are equipped with zero-emission technologies or the most advanced emission control systems available. Commit to the best available emissions control technologies for project equipment in order to meet the following standards.

- On-Highway Vehicles: On-highway vehicles should meet, or exceed, the EPA exhaust emissions standards for model year 2010 and newer heavy-duty, on-highway compression-ignition engines (e.g., long-haul trucks, refuse haulers, shuttle buses, etc.).[9]
- Non-road Vehicles and Equipment: Non-road vehicles and equipment should meet, or exceed, the EPA Tier 4 exhaust emissions standards for heavy-duty, non-road compression-ignition engines (e.g., construction equipment, non-road trucks, etc.).[10]
- Locomotives: Locomotives servicing infrastructure sites should meet, or exceed, the EPA Tier 4 exhaust emissions standards for line-haul and switch locomotive engines where possible.

[9] http://www.epa.gov/otaq/standards/heavy-duty/hdci-exhaust.htm
[10] https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-nonroad-engines-and-vehicles

- Marine Vessels: Marine vessels hauling materials for infrastructure projects should meet, or exceed, the latest EPA exhaust emissions standards for marine compression-ignition engines (e.g., Tier 4 for Category 1 & 2 vessels, and Tier 3 for Category 3 vessels).[11]
- Low Emission Equipment Exemptions: The equipment specifications outlined above should be met unless: 1) a piece of specialized equipment is not available for purchase or lease within the United States; or 2) the relevant project contractor has been awarded funds to retrofit existing equipment, or purchase/lease new equipment, but the funds are not yet available.

Consider requiring the following best practices through the construction contracting or oversight process:

- Establish and enforce a clear anti-idling policy for the construction site.
- Use onsite renewable electricity generation and/or grid-based electricity rather than diesel-powered generators or other equipment.
- Use electric starting aids such as block heaters with older vehicles to warm the engine.
- Regularly maintain diesel engines to keep exhaust emissions low. Follow the manufacturer's recommended maintenance schedule and procedures. Smoke color can signal the need for maintenance (e.g., blue/black smoke indicates that an engine requires servicing or tuning).
- Where possible, retrofit older-tier or Tier 0 nonroad engines with an exhaust filtration device before it enters the construction site to capture diesel particulate matter.
- Replace the engines of older vehicles and/or equipment with diesel- or alternatively-fueled engines certified to meet newer, more stringent emissions standards (e.g., plug-in hybrid-electric vehicles, battery-electric vehicles, fuel cell electric vehicles, advanced technology locomotives, etc.), or with zero emissions electric systems. Retire older vehicles, given the significant contribution of vehicle emissions to the poor air quality conditions. Implement programs to encourage the voluntary removal from use and the marketplace of pre-2010 model year on-highway vehicles (e.g., scrappage rebates) and replace them with newer vehicles that meet or exceed the latest EPA exhaust emissions standards, or with zero emissions electric vehicles and/or equipment.

Fugitive Dust Source Controls

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative, where appropriate. This applies to both inactive and active sites, during workdays, weekends, holidays, and windy conditions.
- Install wind fencing and phase grading operations where appropriate, and operate water trucks for stabilization of surfaces under windy conditions.
- When hauling material and operating non-earthmoving equipment, prevent spillage and limit speeds to 15 miles per hour (mph). Limit speed of earth-moving equipment to 10 mph.

Occupational Health

- Reduce exposure through work practices and training, such as maintaining filtration devices and training diesel-equipment operators to perform routine inspections.
- Position the exhaust pipe so that diesel fumes are directed away from the operator and nearby workers, reducing the fume concentration to which personnel are exposed.

[11] https://www.epa.gov/emission-standards-reference-guide/all-epa-emission-standards

- Use enclosed, climate-controlled cabs pressurized and equipped with high-efficiency particulate air (HEPA) filters to reduce the operators' exposure to diesel fumes. Pressurization ensures that air moves from inside to outside. HEPA filters ensure that any incoming air is filtered first.
- Use respirators, which are only an interim measure to control exposure to diesel emissions. In most cases, an N95 respirator is adequate. Workers must be trained and fit-tested before they wear respirators. Depending on the type of work being conducted, and if oil is present, concentrations of particulates present will determine the efficiency and type of mask and respirator. Personnel familiar with the selection, care, and use of respirators must perform the fit testing. Respirators must bear a NIOSH approval number.

DNR Indiana Department of Natural Resources

Eric Holcomb, Governor
Daniel W. Bortner, Director

Division of Historic Preservation & Archaeology·402 W. Washington Street, W274·Indianapolis, IN 46204-2739
Phone 317-232-1646·Fax 317-232-0693·dhpa@dnr.IN.gov

HISTORIC PRESERVATION AND ARCHAEOLOGY

October 29, 2020

Duane Castaldi
FEMA Region V
536 South Clark Street, 6th Floor
Chicago, Illinois 60605

Federal Agency: Federal Emergency Management Agency (FEMA)

Re: Information concerning FEMA's Notice of Intent to develop a Programmatic Environmental Assessment for Shoreline Stabilization projects that address erosion along the shores of the Great Lakes (DHPA #26514)

Dear Mr. Castaldi:

Pursuant to Section 106 of the National Historic Preservation Act (54 U.S.C. § 306108) and 36 C.F.R. Part 800, the staff of the Indiana State Historic Preservation Officer ("Indiana SHPO") has conducted an analysis of the materials received on October 2, 2020, for the above indicated project along Lake Michigan in Lake, Porter, and LaPorte counties, Indiana.

Thank you for the notice of intent for the PEA. In terms of archaeological resources, we have a concern on the potential impact to shipwrecks offshore and onshore along Lake Michigan. We look forward to receiving the draft document once it is ready.

If you have questions about archaeological issues please contact Cathy Draeger-Williams at (317) 234-3791 or cdraeger-williams@dnr.IN.gov. If you have questions about buildings or structures please contact Chad Slider at (317) 234-5366 or cslider@dnr.IN.gov. Additionally, in all future correspondence regarding the above indicated project, please refer to DHPA #26514.

Very truly yours,

Beth K. McCord
Deputy State Historic Preservation Officer

BKM:CDW:CWS:cws

emc: Duane Castaldi, FEMA

Castaldi, Duane

From: Michael LaRonge <Michael.LaRonge@fcpotawatomi-nsn.gov>
Sent: Wednesday, October 21, 2020 11:51 PM
To: Castaldi, Duane
Subject: RE: FEMA Great Lakes Shoreline Stabilization Programmatic Environmental Assessment

Mr. Castaldi,

Please include the Tribal Historic Preservation Office of the Forest County Potawatomi Community as a party interested in reviewing the PEA. Thank you.

Sincerely,

Michael LaRonge
Tribal Historic Preservation Officer
Cultural Preservation Division
Forest County Potawatomi Community
8130 Mish ko Swen Drive
P.O. Box 340
Crandon, Wisconsin 54520
Phone: 715-478-7354
Email: Michael.LaRonge@FCPotawatomi-nsn.gov

From: Castaldi, Duane <Duane.Castaldi@fema.dhs.gov>
Sent: Friday, October 2, 2020 8:25 AM
To: Castaldi, Duane <Duane.Castaldi@fema.dhs.gov>
Cc: Dorochoff, Nicholas <Nicholas.Dorochoff@fema.dhs.gov>
Subject: FEMA Great Lakes Shoreline Stabilization Programmatic Environmental Assessment

Good Morning.

Attached please find FEMA's Notice of Intent to develop a Programmatic Environmental Assessment (PEA) for Shoreline Stabilization projects that address erosion and related issues along the shores of the Great Lakes within the States of Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio. FEMA has posted the Notice of Intent online at the following location, in the Public Notice section:

https://www.fema.gov/emergency-managers/practitioners/environmental-historic/region/5

In addition, to provide notice to the public, this NOI will run in newspapers across the Great Lakes region.

FEMA requests your input on the scope of the PEA and potential impacts by COB Monday November 2, 2020. FEMA will likewise notify you when the draft document is ready for review and comment.

The distribution of the NOI is noted below.

Duane D. Castaldi
Regional Environmental Officer
U.S. Department of Homeland Security
FEMA Region V

536 South Clark Street, 6th Floor
Chicago, IL 60605
O: 312-408-5549
E: duane.castaldi@fema.dhs.gov

Notice of Intent -- Electronic Distribution

Fort Peck Assiniboine and Sioux Tribes
Bad River Band of Lake Superior Tribe of Chippewa Indians
Bay Mills Indian Community, Michigan
Bois Forte Band of Chippewa Indians
Citizen Potawatomi Nation
Delaware Tribe of Indians
Delaware Nation
Fond du Lac Band of Lake Superior Chippewa
Forest County Potawatomi Community of Wisconsin
Grand Portage Band of Lake Superior Chippewa
Grand Traverse Band of Ottawa and Chippewa Indians
Hannahville Indian Community
Ho–Chunk Nation
Keweenaw Bay Indian Community
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin
Lac Vieux Desert Band of Lake Superior Chippewa Indians
Leech Lake Band of Ojibwe
Little River Band of Ottawa Indians
Little Traverse Bay Bands of Odawa Indians
Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians of Michigan
Menominee Indian Tribe of Wisconsin
Miami Tribe of Oklahoma
Mille Lacs Band of Ojibwe Indians
Minnesota Chippewa Tribe
Oneida Nation of Wisconsin
Ottawa Tribe of Oklahoma
Peoria Tribe of Indians of Oklahoma
Pokagon Band of Potawatomi Indians
Prairie Band Potawatomi Nation
Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
Red Lake Band of Chippewa Indians of Minnesota
Sac and Fox Tribe of the Mississippi in Iowa
Saginaw Chippewa Indian Tribe of Michigan
Sault Ste. Marie Tribe of Chippewa Indians of Michigan
Seneca Nation of Indians
Shawnee Tribe
Sokaogon Chippewa Community
St. Croix Chippewa Indians of Wisconsin
Turtle Mountain Band of Chippewa
White Earth Band of Ojibwe
Wyandotte Nation

Chippewa Cree Tribe of the Rocky Boy's Reservation of Montana
Wisconsin Coastal Management Program
Minnesota Coastal Management Program
Michigan Coastal Management Program
Illinois Coastal Management Program
Indiana Coastal Management Program
Ohio Coastal Management Program
Minnesota and Wisconsin USFWS Field Office
Illinois USFWS Field Office, Chicago
Indiana USFWS Field Office, Chesterton
Michigan USFWS Field Office
Ohio USFWS Field Office
Chicago USACE Regulatory Branch
Detroit USACE Regulatory Branch
Buffalo USACE Regulatory Branch
St. Paul USACE Regulatory Branch - Minnesota
St. Paul USACE Regulatory Branch - Wisconsin
Hosuing and Urban Development, Region V
Environmental Protection Agency, Region V
US Environmental Protection Agency
Department of Interior
Forest Service
National Resource Conservation Service
USDA Rural Development
National Oceanic and Atmospheric Administration
Bureau of Indiana Affairs
US Fish and Wildlife Service
United States Geological Survey
Michigan EGLE, Water Resources
Michigan EGLE, Office of the Great Lakes
Ohio Environmental Protection Agency
Indiana DNR, Water
Indiana Department of Environmental Management
Illinois DNR, Water Resources
Wisconsin DNR, Secretary Director's
Minnesota DNR, Division of Water
Illinois State Historic Preservation Office
Indiana State Historic Preservation Office
Wisconsin State Historic Preservation Office
Minnesota State Historic Preservation Office
Ohio State Historic Preservation Office
Michigan State Historic Preservation Office
Illinois National Flood Insurance Program State Coordinator
Illinois State Hazard Mitigation Officer
Indiana National Flood Insurance Program State Coordinator
Indiana State Hazard Mitigation Officer
Michigan National Flood Insurance Program State Coordinator
Michigan State Hazard Mitigation Officer
Ohio National Flood Insurance Program State Coordinator
Ohio State Hazard Mitigation Officer
Wisconsin National Flood Insurance Program State Coordinator
Wisconsin State Hazard Mitigation Officer

Minnesota National Flood Insurance Program State Coordinator
Minnesota State Hazard Mitigation Officer
Great Lakes and St. Lawrence Cities Initiative

Miami Tribe of Oklahoma

3410 P St. NW, Miami, OK 74354 ● P.O. Box 1326, Miami, OK 74355
Ph: (918) 541-1300 ● Fax: (918) 542-7260
www.miamination.com

Via email: duane.castaldi@fema.dhs.gov

October 31, 2020

Duane D. Castaldi
Regional Environmental Officer
U.S. Department of Homeland Security
FEMA Region V
536 South Clark Street, 6th Floor
Chicago, IL 60605, P.O. Box 19276

Re: Notice of Intent to Prepare a Programmatic Environmental Assessment (PEA) for Shoreline Stabilization Projects – Comments of the Miami Tribe of Oklahoma

Dear Mr. Castaldi:

Aya, kikwehsitoole – I show you respect. The Miami Tribe of Oklahoma, a federally recognized Indian tribe with a Constitution ratified in 1939 under the Oklahoma Indian Welfare Act of 1936, respectfully submits the following comments regarding the Notice of Intent to Prepare a Programmatic Environmental Assessment (PEA) for Shoreline Stabilization Projects.

Given the Miami Tribe's deep and enduring relationship to its historic lands and cultural property within present-day Wisconsin, Illinois, Indiana, Michigan, and Ohio, there exists the potential for the discovery of human remains or Native American cultural items falling under the Native American Graves Protection and Repatriation Act (NAGPRA) or archaeological evidence along the shorelines of these states.

The Miami Tribe accepts the invitation to serve as a consulting party to the proposed Programmatic Environmental Assessment. Please contact me at 918-541-8966 or by email at dhunter@miamination.com to initiate consultation.

Respectfully,

Diane Hunter

Diane Hunter
Tribal Historic Preservation Officer

Appendix C

State and Tribal Contact Information and Databases

Contact Information

Table 1 provides the contact information for the State Historic Preservation Officers (SHPOs) in Region V. This information was compiled from the SHPO websites.

Table 3. State Historic Preservation Officers in the Study Area

State	State Historic Preservation Office	Website
Illinois	Illinois Department of Natural Resources Historic Preservation Division State Historic Preservation Office (Preservation Services) IDNR-One Natural Resources Way Springfield, IL 62702-1271	https://www2.illinois.gov/dnrhistoric
Indiana	Indiana Department of Natural Resources Division of Historic Preservation and Archaeology 402 West Washington Street Indiana Government Center South Room W256 Indianapolis, IN 46204	https://www.in.gov/dnr/historic
Michigan	Michigan Economic Development Corporation State Historic Preservation Office 300 N. Washington Square Lansing, MI 48913	https://www.miplace.org/historic-preservation
Minnesota	Minnesota Department of Administration State Historic Preservation Office 50 Sherburne Avenue, Suite 203 St. Paul, MN 55155	https://mn.gov/admin/shpo
Ohio	Ohio History Connection State Historic Preservation Office 800 E. 17th Avenue Columbus, OH 43211-2474	http://www.ohiohistory.org
Wisconsin	Wisconsin Historical Society State Historic Preservation Office 816 State Street Madison WI 53706	http://www.wisconsinhistory.org

1 – SHPOs contacts are subject to change; users should confirm contact information before submitting consultation requests.

Table 2 provides a list of the federally recognized Indian Tribes that reside in or have an ancestral interest in lands in Region V. This information was compiled from the Region V Tribal Nation websites and cross-checked with the National Park Service Tribal Preservation Program

website. (https://grantsdev.cr.nps.gov/THPO_Review/index.cfm). Information would be updated and confirmed prior to each project review as described in the PEA Section 4.16.

Table 4. FEMA Region V Tribal Historic Preservation Officers

Tribe	Address/Contact Info	Website
Bois Forte Band of Chippewa Indians	1500 Bois Forte Road Tower, MN 55790 Office: (218) 753-6017	https://boisforte.com
Fond du Lac Band of Lake Superior Chippewa	1720 Big Lake Road Cloquet, MN 55720 Office: (218) 878-7129	http://www.fdlrez.com
Leech Lake Band of Chippewa (Ojibwe)	Division of Resource Management - THPO 15756 State 371 NW Cass Lake, MN 56633 Office: (218) 335-2940	http://www.llojibwe.com
Lower Sioux Indian Community	39527 Reservation Highway 1 Morton, MN 56270 THPO/Historic Site Manager Office: (507) 697-6321	https://lowersioux.com
Mille Lacs Band of Ojibwe	43408 Oodena Drive Onamia, MN 56349 Office: (320) 532-7450 Fax: (320) 532-7514	https://millelacsband.com
Prairie Island Indian Community	5636 Sturgeon Lake Road Welch, MN 55089 Office: (651) 385-4175 Fax: (651) 385-4180	http://prairieisland.org
Red Lake Nation of Chippewa Indians	PO Box 274 Red Lake, MN 56671 Office: (218) 679-1691	https://www.redlakenation.org
Shakopee Mdewakanton Sioux Community	2330 Sioux Trail NW Prior Lake, MN 55372 Office: (952) 496-6120	https://shakopeedakota.org
Upper Sioux Community	PO Box 147 Granite Falls, MN 56241 Office: (320) 564-6334	http://www.uppersiouxcommunity-nsn.gov

Tribe	Address/Contact Info	Website
White Earth Nation, White Earth Band of Minnesota Chippewa	PO Box 418 White Earth, MN 56591 Office: Office: (218) 983-3285 X 5807 Fax: (218) 983-3253	https://whiteearth.com/home
Grand Portage Band of Lake Superior Chippewa	P.O. Box 428 Grand Portage, MN 55605 Office: (218) 475-0111 Fax: (218) 475-2292	https://www.grandportage.com https://www.mnchippewatribe.org
Bad River Band of Lake Superior Tribe of Chippewa Indians	Chief Blackbird Center Odanah, WI 54861 Office: (715) 682-7103 Fax: (715) 682-7118	https://www.badriver-nsn.gov
Lac Courte Oreilles Band of Lake Superior Chippewa Indians	13394 West Trepania Road Hayward, WI 54543 Office: (715) 634-8934 X 7408 Fax: (715) 634-4797	https://www.lcotribe.com
Lac du Flambeau Band of Lake Superior Chippewa Indians	P.O. Box 67 Lac du Flambeau, WI 54538 Office: (715) 588-2139 or 715-588-2270 Fax (715) 588-2419	https://www.ldftribe.com
Red Cliff Band of Lake Superior Chippewa	88455 Pike Road Bayfield, WI 54814 Office: (715) 779-3700 X 4244 Fax: (715) 779-3704	https://www.redcliff-nsn.gov
Forest County Potawatomi Community	Natural Resources Department 5320 Wensaut Lane P.O. Box 340 Crandon, Wisconsin 54520 Office: (715) 478-7354 Fax: (715) 478-7225	https://www.fcpotawatomi.com
The Ho-Chunk Nation	W 9814 Airport Road Black River Falls, WI 54615 Office: (715) 284-7181 X 1121 Fax: (715) 284-7449	https://ho-chunknation.com
Menominee Indian Tribe of Wisconsin	P.O. Box 910 Keshena, WI 54135 Office: (715) 799-5258 Fax: (715) 799-3757	https://www.menominee-nsn.gov

Tribe	Address/Contact Info	Website
Oneida Nation of Wisconsin	1250 Packerland Drive Cottage 3, Side B Green Bay, WI 54304 Office: (920) 490-3929	https://oneida-nsn.gov
Stockbridge-Munsee Community Band of Mohican Indians	N8476 Moh-He-Con-Nuck Road Bowler, WI 54416 Office: (518) 244-3164 Fax: (715) 793-4437	http://www.mohican.com
Sokaogon Chippewa Community	3051 Sand Lake Road Crandon, WI 54520 Office: (715) 478-6435	http://sokaogonchippewa.com
St Croix Band of Lake Superior Chippewa	24663 Angeline Avenue Webster, WI 54893 Office: (800) 236-2195	http://www.stcciw.com
Bay Mills Indian Community	12140 West Lakeshore Dr. Brimley, MI 49715 Office: (906) 248-8759	http://www.baymills.org
Grand Traverse Band of Ottawa & Chippewa Indians	Eyaawing Museum & Cultural Center 2605 North West Bay Shore Dr. Suttons Bay, MI 49682 Office: (231) 534-7764	http://www.gtbindians.org
Hannahville Indian Community	N-14911 Hannahville B1 Rd. Wilson, MI 49896 Office: (906) 466-2932	http://www.hannahville.net
Keweenaw Bay Indian Community of the Lake Superior Band of Chippewa Indians	16429 Bear Town Rd. Baraga, MI 49908 Office: (906) 353-6623 x 4178	http://ojibwa.com
Lac Vieux Desert Band of Lake Superior Chippewa Indians	P.O. Box 249 Watersmeet, MI 49969 Office: (906) 358-0137	http://www.lvd-nsn.gov
Little River Band of Ottawa Indians	2608 Government Center Dr. Manistee, MI 49660 Office: (231) 398-6893	https://lrboi-nsn.gov
Little Traverse Bay Bands of Odawa Indians	7500 Odawa Cir. Harbor Springs, MI 49740 Office: (231) 242-1408	https://www.ltbbodawa-nsn.gov

Tribe	Address/Contact Info	Website
Match-E-Be-Nash-She-Wish (Gun Lake) Band of Pottawatomi Indians/	Gun Lake Tribe Administration 2872 Mission Dr. Shelbyville, MI 49344 Office: (269) 397-1780	https://gunlaketribe-nsn.gov
Nottawaseppi Huron Band of the Potawatomi	1485 Mno-Bmadzewen Way Fulton, MI 49052 Office: (269) 704-8347	https://nhbpi.org
Pokagon Band of Potawatomi Indians	Department of Language and Culture 59291 Indian Lake Road P.O. Box 180 Dowagiac, MI 49047 Office: (269) 462-4316	http://www.pokagonband-nsn.gov
Saginaw Chippewa Indian Tribe of Michigan	Ziibiwing Center of Anishinabe Culture and Lifeways 6650 East Broadway Mt. Pleasant, MI 48858 Office: (989) 775-4751	http://www.sagchip.org
Sault Ste. Marie Tribe of Chippewa Indians	523 Ashmun St. Sault Ste Marie, MI 49783 Office: (906) 635-6050 x26140	https://www.saulttribe.com

State Cultural Resource Databases

Within Region V, access to information pertaining to cultural resources registered with the six State Historic Preservation Offices varies depending on the type of resource, the owner of the land it is located on (federal, state, or private), and whether it is eligible for or listed on the National Register of Historic Places. This section includes a summary of the cultural resource databases and associated websites for each SHPO in Region V. Access to sensitive cultural resources data is restricted by all six state SHPO offices to individuals who meet the Secretary of the Interior's (SOI) Professional Qualifications Standards for archaeology and historic preservation (36 CFR 61). Access to sensitive cultural resources data within Indian Reservations may be restricted to tribal members, depending on the Tribal Nation.

Section 304 of the National Historic Preservation Act (NHPA) protects certain sensitive information about historic properties from disclosure to the public when such disclosure could result in a significant invasion of privacy, damage to the historic property, or impede the use of a traditional religious site by practitioners. Section 800.11(c) of the regulations implementing Section 106 of the NHPA, "Protection of Historic Properties" (36 CFR part 800) reiterates the

statutory language of Section 304 and sets the process by which the ACHP is engaged in consultation on Section 304 matters. In addition, Section 9 of the Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. 470aa-470mm) provides for the protection of archaeological resources and sites that are on public lands and Indian lands, and fosters increased cooperation and the exchange of information between governmental authorities, the professional archaeological community, and private individuals (www.achp.gov).

Illinois: The Illinois Department of Natural Resources has a public access historic architectural resources GIS system called HARGIS which is available at: http://gis.hpa.state.il.us/hargis/. The Illinois State Museum and the SHPO maintain a statewide file of known archaeological and paleontological sites, the Illinois Inventory of Archaeological Sites, which can be accessed by professionals with the proper credentials.

Indiana: The Indiana Division of Historic Preservation and Archaeology maintains a cultural resource database: the State Historic Architectural and Archaeological Research Database (SHAARD), and the SHAARD Archaeology and Structures Map Web App. Secretary of Interior qualified specialists can access it on request.

Michigan: Research involving the State Archaeological Site File at the Michigan SHPO for Compliance and Due Diligence Projects must be completed by federally qualified archaeologists. Architectural site information is publicly available but for Section 106 submissions, identification work must be completed by a federally qualified architectural historian.

Minnesota: The Minnesota Statewide Database is a database of basic historical and geographic information related to inventoried properties. Requests for searches of the inventory and reports databases should be sent via email to the Survey and Inventory Coordinator, datarequestshpo@state.mn.us. The Minnesota Department of Administration Office of the State Archaeologist (OSA) provides access to the archaeological site inventory and Minnesota Indian Affairs Council's archaeological & cultural sites for all of Minnesota and the Minnesota Statewide Archaeological Predictive Model (MnModel). In accordance with Section 304 of the National Historic Preservation Act, Minnesota Statute § 307.08, subd. 11 and Minnesota Statute § 13.37, full access to detailed records is reserved for qualified archaeologists and historic preservation professionals, tribal historic preservation officers, and the Minnesota Indian Affairs Council.

Ohio: The Ohio SHPO Online Mapping System is a GIS web application designed to provide qualified professionals with instant access to State Historic Preservation Office data. Access to the system is through an application and fee to the Ohio History Connection. The site allows users to query and view maps of SHPO inventory data, create maps, and export tabular data. The intention of this site is to promote the utility of GIS and spatial data as decision support tools for federal undertakings subject to Section 106 of the NHPA and for scholarly research on Ohio history, architecture, and archaeology. When you register, you have the right to view and obtain information about cultural resources in Ohio and the responsibility to protect spatial information on sensitive archaeological and historic resources.

Wisconsin: The Wisconsin Historical Society maintains the Wisconsin Historic Preservation Database with three databases, including archaeological sites and burials, historic buildings and structures, and reports, available by annual license for a fee, or you can purchase the GIS data for a region. In addition, there is public access to The Wisconsin Architecture and History Inventory—a digital source of information on more than 151,000 historic buildings, structures and objects throughout Wisconsin (https://www.wisconsinhistory.org/Records/Article/CS4091).