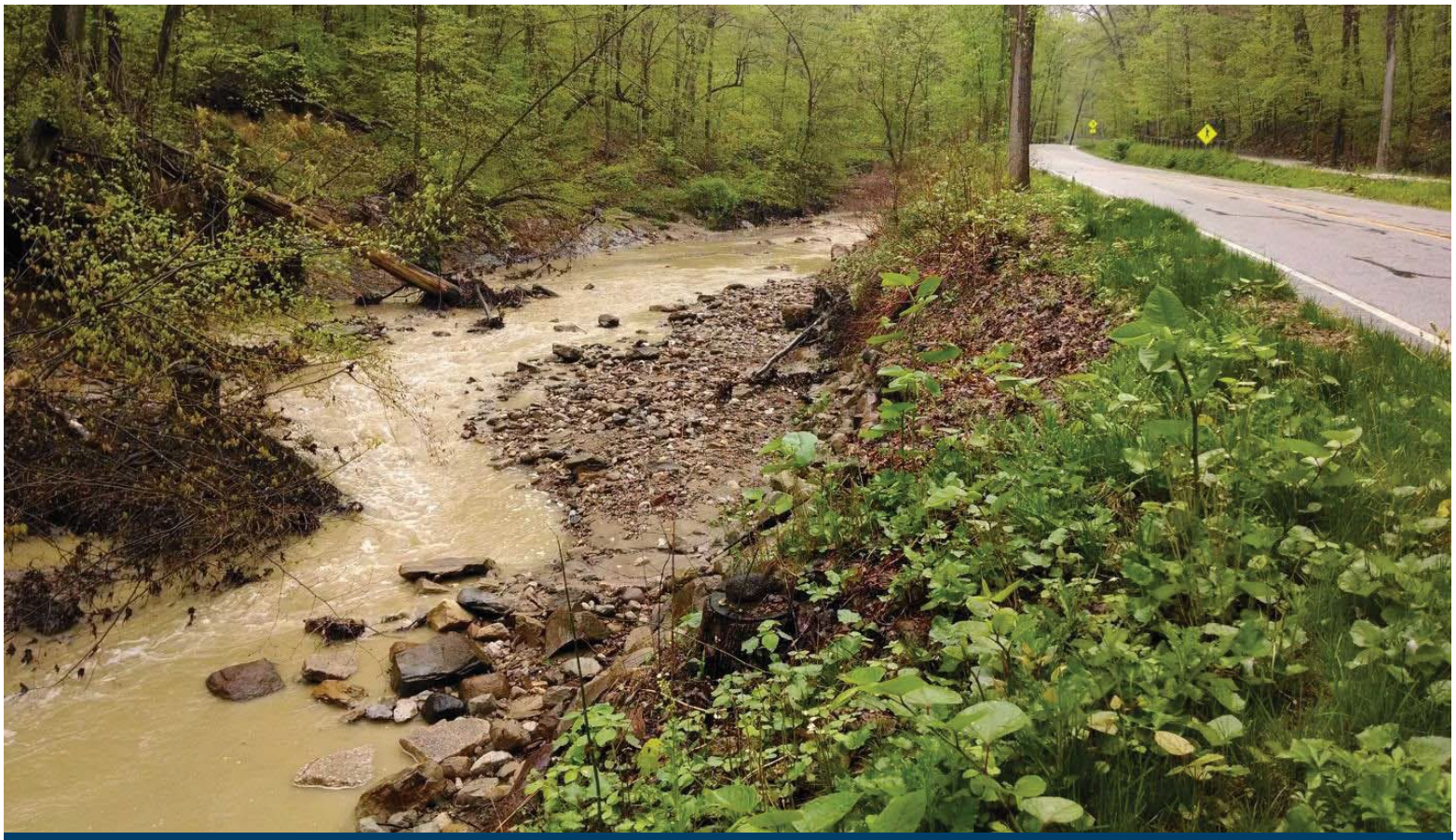

Draft Programmatic Environmental Assessment

Stream Stabilization and Naturalization Projects

Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin

August 2024

FEMA

Federal Emergency Management Agency
Region 5
Department of Homeland Security
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Acronyms and Abbreviations

APE	Area of Potential Effects
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
CAA	Clean Air Act
CATEX	Categorically Excluded
CBRS	Coastal Barrier Resources System
CELCP	Coastal and Estuarine Land Conservation Program
CEQ	Council of Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DNL	Day-night averaged sound level
DNR	Department of Natural Resources
EA	Environmental Assessment
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FPPA	Farmland Protection Policy Act
FRA	Federal Railroad Administration
GHG	Greenhouse Gases
GLRI	Great Lakes Restoration Initiative
HMA	Hazard Mitigation Assistance
IDEM	Indiana Department of Environmental Management
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
INDOT	Indiana Department of Transportation
IPaC	Information for Planning and Consultation
MBTA	Migratory Bird Treaty Act
MDOT	Michigan Department of Transportation
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFIA	National Flood Insurance Act

NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREPA	Natural Resources and Environmental Protection Act
NRHP	National Register of Historic Places
NWP	Nationwide Permit
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
OHWM	Ordinary High-Water Mark
PA	Public Assistance
PEA	Programmatic Environmental Assessment
PM	Particulate matter
PR&G	Principles, Requirements, and Guidelines
RCRA	Resource Conservation and Recovery Act
SEA	Supplemental Environmental Assessment
SHPO	State Historic Preservation Offices
SWPPP	Stormwater Pollution Prevention Plan
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Loads
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Services
USGS	U.S. Geological Survey
WDNR	Wisconsin Department of Natural Resources
WisDOT	Wisconsin Department of Transportation

SECTION 1. Introduction

The mission of the Federal Emergency Management Agency (FEMA) is to serve our country before, during, and after disasters while instilling the core values of compassion, fairness, integrity, and respect. FEMA programs strive to reduce the loss of life and property, and to protect 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 on life and property.

Stream stabilization and naturalization projects may be funded under FEMA's Hazard Mitigation Assistance (HMA) programs, as authorized by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, 42 U.S.C. §§ 5121 – 5207. HMA offers multiple funding programs, including the Hazard Mitigation Grant Program, the Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, and the Building Resilient Infrastructure and Communities Program. Stream mitigation measures that are eligible for HMA funding must meet the individual program requirements as set forth by FEMA. The requirements for hazard mitigation activities are described in the *HMA Program and Policy Guide* (FEMA 2023a). See Section 9 for references listed by author or agency and year of publication.

Funding also may be requested from FEMA's Public Assistance (PA) Program for emergency protective measures and debris removal (emergency work) and for permanent restoration of damaged facilities, including cost-effective hazard mitigation to protect the facilities from future damage. To receive PA funding, the proposed work must be an eligible activity, required as a result of a declared incident, located within the designated area, and be proposed by a legal applicant. PA-funded actions are generally statutorily excluded from National Environmental Policy Act (NEPA) review because they are actions taken to provide assistance under Sections 402 (General Federal Assistance), 403 (Essential Assistance), 407 (Debris Removal), or 502 (Federal Emergency Assistance) of the Stafford Act, as well as actions taken or assistance provided under the Stafford Act that has the effect of restoring facilities as they existed before a major disaster or emergency (FEMA 2024a). Stream stabilization and naturalization projects would not be eligible under the PA Program unless the current stream is a threat to life, to public health and safety, or unless the proposed work receives Section 406 mitigation funding that is related to an eligible disaster-damaged facility. Emergency protective measures to stabilize and restore streams beyond current conditions may be eligible for PA funding. Work to repair scour or erosion damage to a channel or stream bank would be eligible if the repair is necessary to restore the structural integrity of an eligible road, culvert, or bridge. If the proposed work is related to an eligible facility that was damaged because of a disaster, then stream work may be eligible as permanent work (FEMA 2020).

The purpose of this Programmatic Environmental Assessment (PEA) is to identify, at a programmatic level, the potential adverse and beneficial effects associated with certain hazard mitigation activities in streams within the states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin; these states comprise FEMA Region 5. This PEA captures and builds upon FEMA's knowledge and

experience—via prior environmental planning and historic preservation reviews—to evaluate the potential effects of FEMA funding for eligible stream mitigation and naturalization measures. The PEA also identifies specific stream mitigation measures that may not require additional NEPA review, as well as those actions that would require site-specific reviews and that could be tiered under this PEA. Some projects or classes of activities may continue to require full-project-specific NEPA compliance reviews. Users of this PEA should note that FEMA grant programs are subject to change and this PEA would potentially cover changes in eligibility and programs.

FEMA prepared this PEA in accordance with NEPA, the Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [C.F.R.] Parts 1500-1508), and agency guidance for implementing NEPA (Department of Homeland Security Instruction 023-01-001 and FEMA Instruction 108-1-1). FEMA is required to consider potential environmental impacts on the human and natural environment before funding or approving actions and projects. The purpose of the PEA is to analyze the potential environmental impacts of the proposed activities.

In addition, FEMA has prepared a Principles, Requirements, and Guidelines for Federal Investments in Water Resources (PR&G) analysis, which is included in **Appendix A** and incorporated into this document. The PR&G analysis applies to federal investments that—by purpose, directly or indirectly—alter water resources by affecting water quality or quantity and have at least $10 million in project costs. The PR&G analysis provides a framework for federal agencies to evaluate proposed water resources projects while considering economic, social, and environmental objectives. The PR&G analysis follows FEMA-specific procedures, as described in FEMA Instruction 108-1-1

1.1. Stream Stabilization and Naturalization Measures

During high-precipitation events, peak stream flows and higher stream power can lead to erosion, scour of stream channels and banks, and flooding. Varying forms of turbulence interact with the stream bed and banks, contributing to deepened channel beds, increased bank height, and eventual instability and slumping, as well as scouring that causes slab failures and undercutting of stream banks (Ohio Department of Natural Resources 2012). Historical land use and development have resulted in modified streams and floodplains and increased impermeable surfaces that contribute to flood risks. Stream stabilization and naturalization measures are intended to combat the degradation of stream channels and banks, to reduce bank overtopping, and to increase, maintain, and/or restore the functionality of the stream or stream banks. Measures may include maintenance of riparian vegetation, improvement of embankments, improved streamflow, stabilization of stream banks, erosion prevention, and channel naturalization. Benefits include flood risk reduction, erosion and scour control, increased infrastructure resilience, and improved floodplain functions, such as improved water quality, fish and wildlife habitat, and recreational opportunities. Typical goals and objectives of stream stabilization and naturalization include (FEMA 2017a):

- Reduce peak velocities and stream bank erosion.
- Protect bridge abutments, bridges, road crossings and other infrastructure.

- Protect land and structures.
- Reduce peak flood elevations.
- Increase or improve water supply and capacity.
- Restore ecological habitats for plants, aquatic species like fish, and other wildlife.
- Restore or improve water quality.

Stream stabilization and naturalization measures that meet these objectives might include installing nature-based or bioengineered solutions (e.g., stream stabilization using natural materials), channel naturalization, and constructing hard engineered solutions (e.g., in-stream structures, armoring, and riprap). Mitigation projects may include some repair to pre-disaster conditions that normally would be statutorily excluded from NEPA review if done on their own. However, as part of a mitigation project, repair work would be considered a connected action and would require further NEPA review that may be eligible for coverage under this PEA. For this PEA, streams are defined as any flowing waterway and tributaries regulated by the U.S. Army Corps of Engineers (USACE), including streams, creeks, rivers, and brooks and channels that empty into the regulated waterways. Projects on smaller waterways that are not under USACE jurisdiction are also covered under this PEA. Work along the Mississippi River and Ohio River is not eligible for NEPA coverage under this PEA and would require a separate NEPA review.

1.2. Background

Precipitation and storm events have become more frequent and intense in the past 30 to 40 years, increasing stream flows and incidents of erosion and flooding, and impacting lives, property, and infrastructure in the Midwest. Annual precipitation has increased 5 percent to 15 percent from the first half of the last century (1901 to 1960) compared to the present day (1986 to 2015). Winter and spring precipitation is projected to increase by up to 30 percent by the end of this century. Heavy precipitation events have increased in frequency and intensity since 1901 and are projected to increase throughout this century (Easterling et al. 2017). As a result, annual average streamflow has increased in the Midwest. From 1940 to 2018, 7-day low-stream flows have generally increased, which means that on the days of the lowest flows, streams are carrying more water than recorded in the past. With increased precipitation, higher than average streamflow is expected in some places, with heavier storms leading to larger peak flows. Larger peak flows can lead to erosion and overtopping of streambanks, causing flooding (U.S. Environmental Protection Agency [EPA] 2023a).

Heavy rainstorms can result in the temporary closure of roadways because of riverine flooding, and faster stream flows caused by increased precipitation can erode the bases of bridges or road embankments resulting in long-term closures (Angel et al. 2018). Other impacts on infrastructure from stream flooding and erosion include damage to utilities such as power, water, sewer, and gas, as well as overflow and damage of stormwater management systems. Changes in precipitation accounted for 36 percent of the actual flooding costs that occurred in the United States from

1988 to 2017 (Davenport et al. 2021). With climate change there will be an increased risk of inland flooding in the Midwest region, which will subsequently result in increased damage and costs (National Oceanic and Atmospheric Administration [NOAA] 2019). Over the past decade, Region 5 has recorded multiple major disaster declarations for severe storms and flooding that have triggered recovery and mitigation actions (FEMA 2023b).

1.3. Study Area for This Programmatic Environmental Assessment

The area of analysis for this PEA encompasses streams and the ground adjacent to streams within Region 5 (i.e., Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin). The area of analysis included in this PEA encompasses the stream channel and the area within 500 feet of the stream to account for work access, staging areas, and the area needed for the project beyond the stream channel. Channel rerouting would be limited to within 100 feet of the existing channel alignment. The area of analysis for this PEA excludes designated rivers protected under the Wild and Scenic Rivers Act; projects near such rivers would require the preparation of a stand-alone environmental assessment (EA).

To limit the extent of the study area, this PEA only covers projects with the primary purpose of addressing stream erosion or streambank overtopping and associated hazards and damage. The projects covered by this PEA include stream stabilization and naturalization activities and connected actions that are commonly associated with stream mitigation measures. These project types, in certain cases, would also have flood reduction benefits. FEMA assistance is generally limited to nonfederal and tribal lands in areas eligible for funding under FEMA's HMA and PA programs.

1.4. Process for Using This Programmatic Environmental Assessment

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 and to allow for site-specific reviews focused on a narrower scope specific to the subsequent action. A PEA addresses a group of projects that are similar in scope, scale, magnitude, and nature of impact. In addition, CEQ regulations at 40 C.F.R. § 1501.5 allow agencies to prepare an EA on any action at any time to assist agency planning and decision-making. FEMA developed this PEA under these CEQ authorities. Consistent with the 2023 Fiscal Responsibility Act's revisions to NEPA, if actions that may fall within the scope of this PEA are considered beyond the 5-year anniversary of the final PEA, then the PEA's analysis and underlying assumptions must be reevaluated to ensure they are still valid for the actions under review (Public Law 118-5).

For a project to qualify under this PEA, the scope of the project and the nature of impact must be evaluated within this PEA. A finding that the project conforms to the PEA must be documented using a Record of Environmental Consideration. Additional project-specific analyses may be required if the context and intensity of a proposed project substantively differ from those described in this PEA. All projects using this PEA must undergo standard compliance procedures regarding other federal laws

(e.g., Endangered Species Act [ESA], National Historic Preservation Act [NHPA], Executive Orders [EOs] for Floodplain Management, Protection of Wetlands, and Environmental Justice).

Stream stabilization and naturalization projects that are less complex may be eligible for a categorical exclusion (CATEX) 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. CATEXs commonly used for projects that involve work in streams include N4 Federal Assistance for Actions Involving Stream Work and Modification and Floodways, and N9 Federal Assistance for Flood Hazard Reduction Actions (Section 3.3.3 contains additional details) (FEMA Instruction 108-1-1). 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.

Some stream mitigation projects are expected to 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 require a more detailed or broader environmental review may warrant 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 stream mitigation 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 (for Floodplain Management) and 11990 (for Protection of Wetlands), and others. This PEA provides a framework for integrating these requirements with NEPA compliance for stream mitigation 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:

- To determine whether the effects of the Proposed Action are significant, agencies will analyze the potentially affected environment and the degree of the effects of the action. Agencies should consider connected actions consistent with 40 C.F.R. § 1501.9(e)(1).

- When reviewing 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 ESA or historic properties that would require review under the NHPA. Significance varies with the setting of the Proposed Action. For

instance, in the case of a site-specific action, the significance would usually depend only upon the effects within 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

The purpose of FEMA's HMA program is to promote disaster resilience by providing assistance to state, local, tribal, and territorial governments for sustainable actions that reduce or eliminate long-term risk to people and property from future disasters. Uniform and efficient provision of assistance is an essential goal of the HMA and PA programs. The purpose of stream stabilization and naturalization is to reduce risks associated with erosion, scouring, and flood hazards that affect people, structures, and infrastructure. These projects are needed because of repetitive and increased levels of stream erosion and flooding resulting from the increasing frequency and intensity of storms and stream flows, as discussed in Section 1.2.

SECTION 3. Alternatives

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

3.1. Alternative 1 – No Action

Under the No Action alternative, FEMA would not undertake or fund any stream mitigation action outside of existing CATEX thresholds. There could be a range of possible outcomes if FEMA does not provide funding, depending on the amount of alternative funding available and priorities established by a community. Because there is a broad range in the size and capabilities of communities along streambanks within Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, it is impossible to predict each community's actions, time frame, and standards by which 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 facilities would remain in their current state (e.g., damaged facilities would not be repaired or replaced and hazardous conditions would not be mitigated) or local and state governments and private property owners might construct some non-FEMA-funded minor projects that could include repairs, minor mitigation, and stream restoration projects. These projects would be properly engineered and permitted but may not provide the same level of protection as the Proposed Action and would not necessarily be connected or constructed in a coordinated fashion to provide protection across property boundaries or jurisdictional lines. Because of the time needed to gather enough funding for construction, specific actions may take longer to implement under the No Action alternative. The project area would still be subject to erosion, scouring, and flooding for the planning horizon of the PEA because of the unmitigated effects of flowing water and storm and flood events. The No Action alternative would not result in long-term resilience or coordinated hazard mitigation.

3.2. Alternative 2 – Proposed Action

The Proposed Action includes stream stabilization, minor channel and bank modifications, and naturalization measures that are eligible for FEMA funding. Projects covered under the PEA would be limited to no more than 1 mile of stream length and no more than 5 acres of ground disturbance. Work would be limited to within 500 feet of the stream bank and any channel rerouting would not exceed 100 feet from the existing alignment of the stream. Projects that exceed these limits would require a separate evaluation. FEMA will review each project to determine whether coverage by this PEA or another level of evaluation would be more suitable, such as an SEA, a project-specific EA, or an environmental impact statement. The project types and activities associated with stream stabilization and naturalization covered under this PEA are described in the following subsections.

3.2.1. COMMON SCOPE OF WORK

Both alternatives would entail some of the same activities or scope of work, and both would involve work in or along streams to address issues related to erosion and flooding. Stream restoration and

mitigation may take place where there is ongoing erosion, damage from storm events, or where no damage has occurred but improvements would mitigate future damage. All projects would be designed by a hydraulic engineer to ensure proper sizing of materials and placement. A hydrologic and hydraulic study would be conducted to confirm no adverse effect on the Base Flood Elevation (BFE) up or downstream. Construction activities that may be associated with either alternative include:

- Demolition or modification of existing facility or structure
- Tree and vegetation cutting, clearing, and removal
- Excavation in upland, bank, and stream bed areas
- Grading
- Creation and use of staging areas and site access routes
- Installation of erosion and sediment control measures
- Placement of fill materials such as riprap into stream channels
- Dewatering and temporary stream diversion
- Traffic disruptions, lane closures, and possible detours for projects adjacent to roadways
- Site closure and stabilization

3.2.2. IN-STREAM STRUCTURES

This alternative encompasses projects that use structures that extend into or fully cross a stream channel to limit bank erosion and stabilize channel gradients. These measures can be constructed of rock or woody plant materials and can be used in projects alone or in conjunction with other bank stabilization methods. This is considered an indirect method of channel stabilization because it functions by deflecting channel flows away from the bank or by reducing flow velocity to non-erosive levels (EPA 2007). In-stream structures may emulate naturally occurring features found in stable streambeds. Depending on the hydraulic and hydrologic characteristics of a site, they may reduce or eliminate the need for stream bank armoring. In-stream structures are used to control and direct the streamflow away from the outer bank of a river bend to the center of the stream or the inner bank, thereby reducing risks to adjacent parallel linear facilities like roads or utility lines, or perpendicular facilities such as bridges and other stream crossings. These structures may be permanent or semipermanent and would be designed to permit the channel to approximate a state of dynamic equilibrium where the stream bed and bank would continue to change but would be contained within a prescribed corridor (Miller and Kochel 2013). The vegetation associated with these structures that either naturally regrows or is intentionally planted on adjacent banks would also contribute to reduced erosion. These structures may be used for grade control on unstable streams that are

aggrading (i.e., increasing in elevation from sediment deposition), degrading (i.e., lowering of the riverbed from sedimentation removal), or undergoing head cutting (i.e., creating an abrupt step in channel profile that tends to migrate upstream).

Examples of this type of work include stone structures such as cross-vanes, J-hooks, rock vanes, bendway weirs, stream barbs, and W-weirs. Cross-vanes and W-weirs are structures that span an entire channel and are keyed into both stream banks. Rock vanes, J-hooks, and bendway weirs are single-arm structures that extend into the channel flow and are keyed into only one side of the stream bank (National Academies of Sciences, Engineering, and Medicine [National Academies] 2014). Cross-vanes are V-shaped or U-shaped stone structures that point upstream and direct water away from the stream banks and into a scour pool just downstream of the weir. W-weirs, or double cross-vanes, are made up of two adjacent cross-vanes that form a “W” shape. Rock vanes are redirective structures, angled upstream 20 to 30 degrees, that are placed along the outer bank of a bend to direct flows near the bank toward the center of the channel. J-hooks are added to the end of rock vanes to create a scour pool (National Academies 2005), as shown in **Figure 3-1**. Bendway weirs are stone structures angled upstream 60 to 85 degrees that capture and direct flows through a bend (Iowa Department of Natural Resources 2018; National Academies 2005). Wood structures include log weirs or combinations of stone structures with root wads, engineered log jams, and other vegetative bioengineering methods. Log weirs are low dams made up of one or more logs placed across the stream that create pool habitat. A root wad, shown in **Figure 3-2**, is a stabilization technique where a tree trunk with intact roots is buried in the bank with the roots exposed, providing toe support and fish habitat. Engineered log jams are made up of crisscrossed trees and logs that allow aggradation of sediment and vegetation establishment (U.S. Department of the Interior Bureau of Reclamation 2015). Some of these features would remain completely submerged under low-water conditions, while others would have variable profiles that may not be submerged under most conditions. During construction, the use of geotextile fabrics or anchoring, such as pinning or grouting, in high-velocity conditions, may be associated with this type of work.

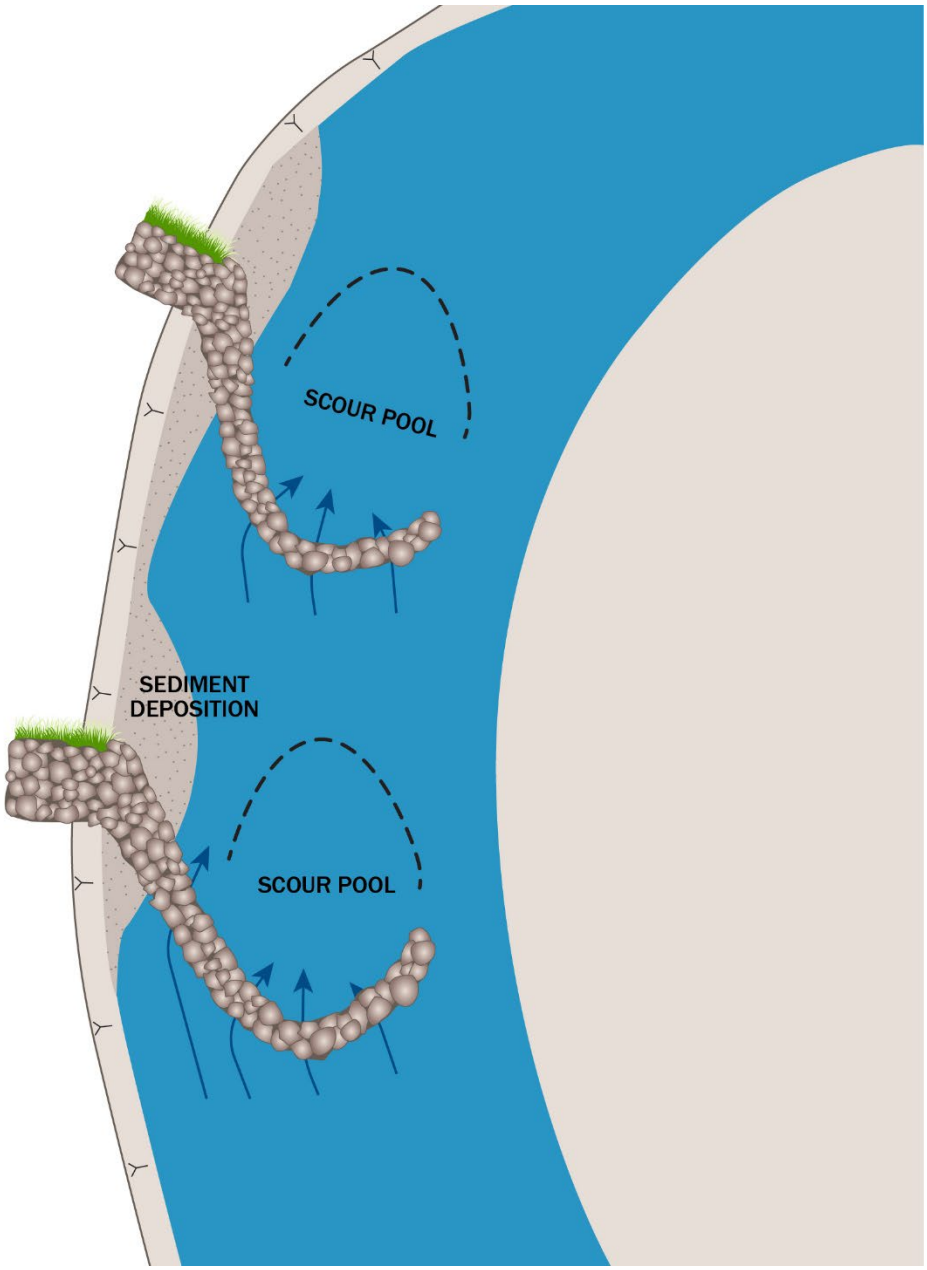
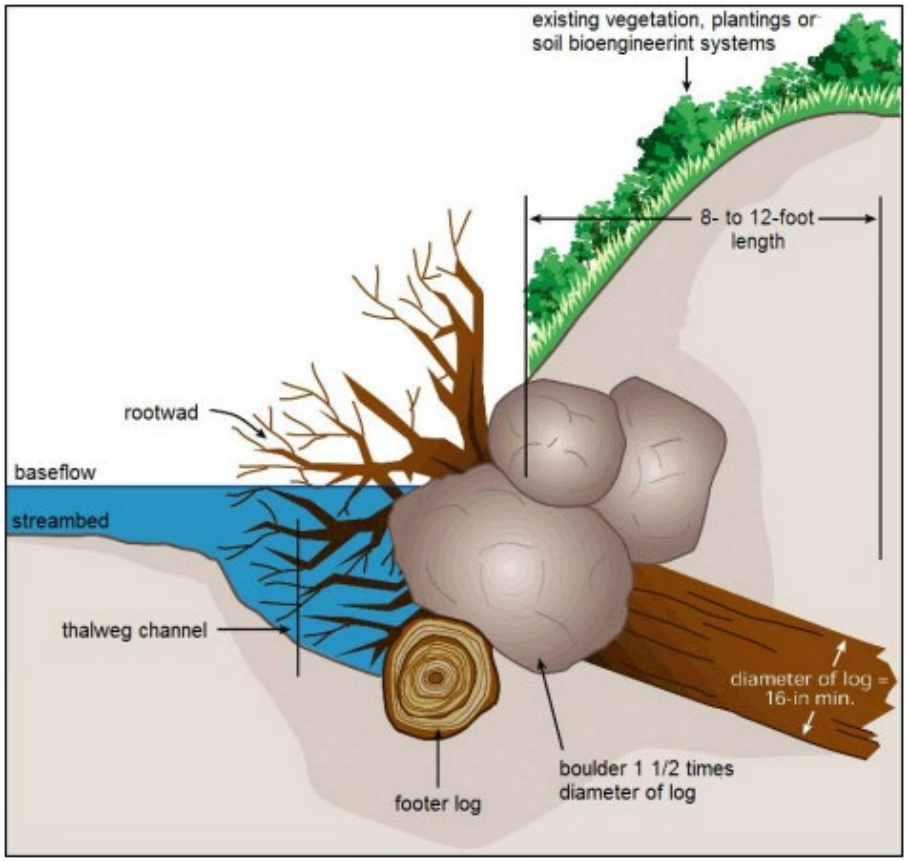


Figure 3-1. Typical Vane With J-Hook



[1] *Dimensions would be determined on a case-by-case basis by a hydraulic engineer during design of the project*
Source: United States Department of the Interior Bureau of Reclamation 2015

Figure 3-2. Typical Root Wad Installation

3.2.3. LOOSE STONE AND RIPRAP

This alternative encompasses projects that repair or replace damage associated with streams; riprap or stone would be used for toe protection and bank stabilization without anchoring, grouting, interlocking, or employing another method of joining units together or to a substrate. Stone toe protection and riprap stabilization are common components of projects intended to mitigate damage or to restore pre-disaster function to washed out roads, utilities, and other facilities that are adjacent to or run parallel along stream banks.

Loose stone and riprap measures include longitudinal stone toe, riprap armoring (National Academies 2005), stone fill trenching, and riprap blankets. Riprap can also be used to create benches on high banks that lack soil cohesiveness (U.S. Department of the Interior Bureau of Reclamation 2015). A longitudinal stone toe, shown in **Figure 3-3**, provides continuous bank protection via a stone dike placed along or slightly streamward of the toe of an eroding bank. Over time, the stones self-adjust to fill any scour holes along the stream side of the revetment.

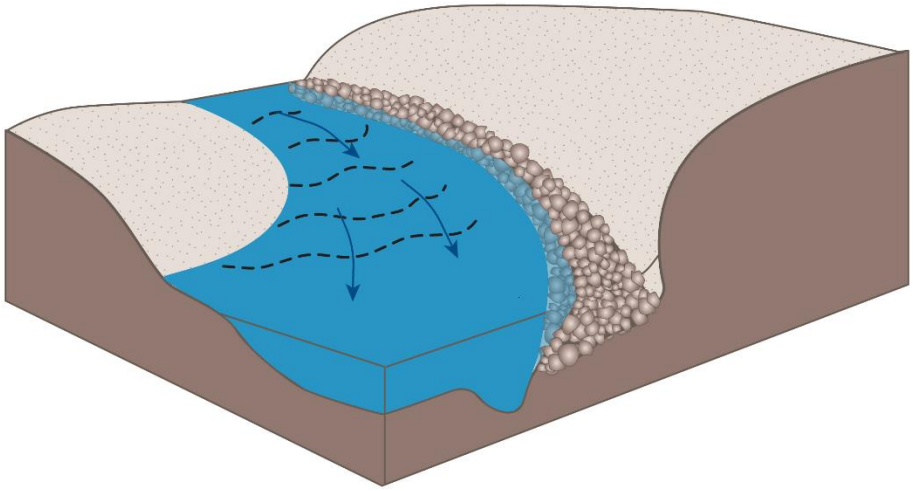


Figure 3-3. Longitudinal Stone Toe

Stone fill trenches, as shown in **Figure 3-4**, are rock-filled trenches at the base of a streambank. The trenches are excavated perpendicular to the stream, backfilled with stone and then covered with earthen fill to reconstruct the slope of the bank. The trenches are then protected along the stream side by a longitudinal plug or stone dike (National Academies 2005).

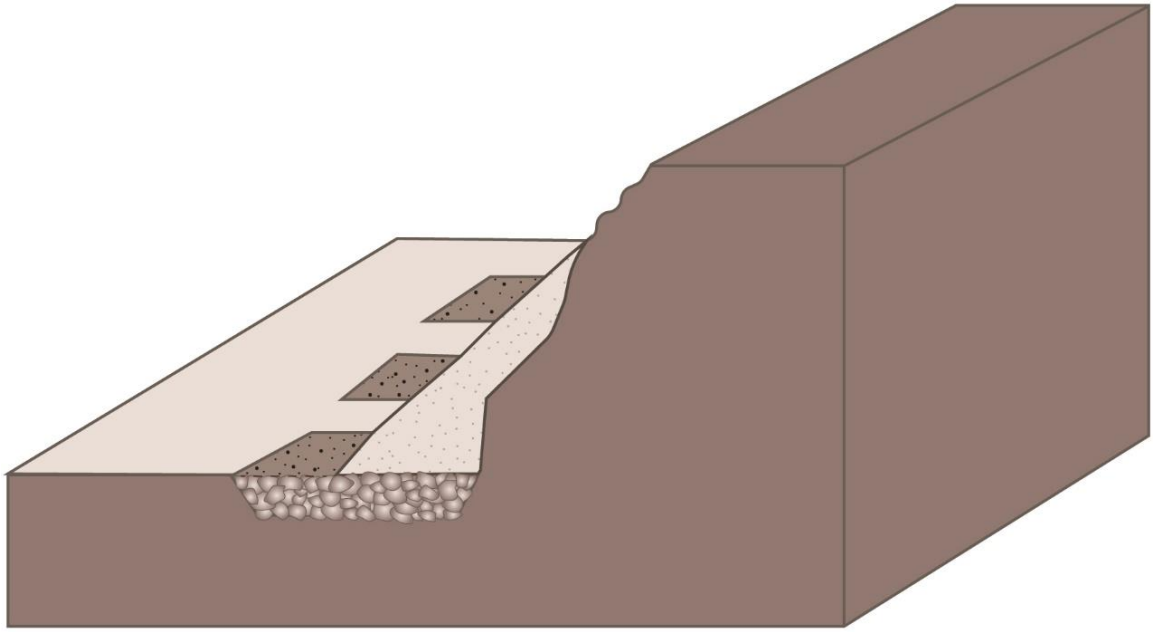


Figure 3-4. Stone Fill Trenches

Typically, processed angular stone is used, and stone size and gradation is specified according to design objectives and site conditions. These factors include flow velocity and bank slope. Native stone or precast units may be used in lieu of processed stone, depending on design considerations, permit conditions, and availability of materials. Loose or randomly placed stone is appropriate for banks with slopes no steeper than 50 percent. Slopes that exceed 50 percent usually require structural treatments to achieve stabilization.

3.2.4. RIGID AND SEMIRIGID ARMORING

This alternative encompasses projects that repair, replace, or install bank armoring using structural methods such as stone, concrete, or metal that is stacked, anchored, pinned, fastened, placed, or driven to form a semirigid to rigid structure. It captures a range of streambank stabilization measures—from sloping masonry stacked stone revetments built from cut stone, to vertical bulkheads. These may be combined with other measures for an integrated approach to streambank stabilization.

This action alternative includes methods such as articulated revetment mats made of concrete blocks or other materials, gabions and gabion mattresses, geocellular containment systems, pinned or grouted riprap, stacked stone, sheet piles, and precast concrete or shotcrete (sprayable concrete) retaining walls and bulkheads. Articulated revetment mats, like the one shown in **Figure 3-5**, are flexible structures made of fabric-filled concrete or grout or interlocking concrete blocks that protect stream slopes from erosion. Gabions are rectangular rock-filled containers made from mesh wire that are usually stacked on top of each other or placed as a continuous mattress for slope protection (U.S. Department of Agriculture Natural Resources Conservation Service [NRCS] 2002). Geocellular containment systems are flexible, three-dimensional, hexagonal structures usually made of polyethylene, that can be backfilled with gravel, stones, soil, and plants to stabilize banks and slopes (FEMA 2023a). Retaining walls have soil on both sides, while bulkheads have soil on one side and water on the other; both can be made from concrete, stone, or steel interlocking sheet piles.

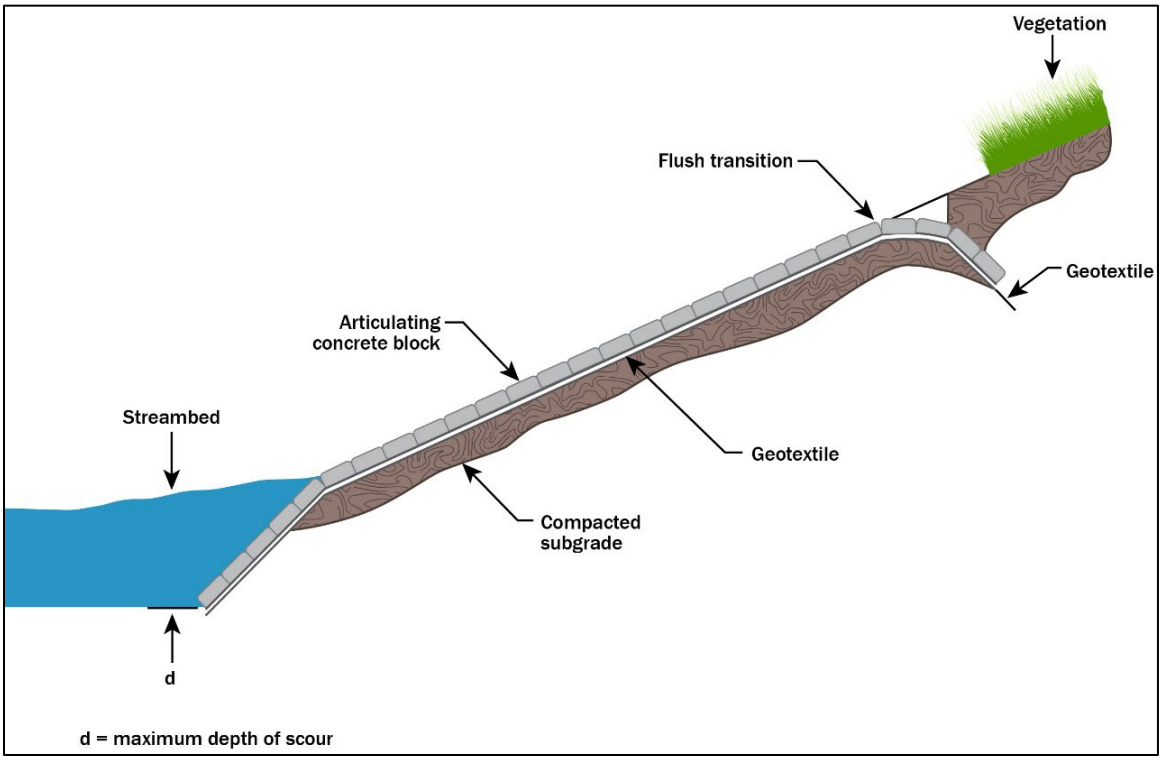


Figure 3-5. Articulating Concrete Block Revetment Cross Section Example

These methods are suited to high-risk sites and areas where additional bank movement is unacceptable (NRCS 2008), such as improved sites where there is little room between a body of water and a facility, such as a road or building. Rigid structures have more structural strength than flexible structures and often provide greater protection using less material. Rigid structures do not accommodate for uneven settlement of the underlying ground and are more difficult to repair than flexibly placed riprap or modular structures. The entire bank is susceptible to failure once part of a structural embankment is damaged.

Specialized construction activities that may be associated with this type of work include but are not limited to:

- Installation of drainage systems behind revetments and bulkheads
- Use of soil nails
- Application of flowable or sprayed concrete
- Installation of stacked rock masonry
- Installation of sheet pile or micropile
- Installation of concrete forms in and near water
- Installation of precast concrete blocks in water

3.2.5. BIOENGINEERING

This alternative encompasses projects that use plant materials alone or in combination with other practices to stabilize banks adjacent to streams. FEMA defines bioengineering as "the use of a combination of biological, mechanical, and ecological concepts to control erosion and stabilize soil through the sole use of vegetation or a combination of vegetation and construction materials" and "the use of living and nonliving plant materials in combination with natural and synthetic support materials for slope stabilization, erosion reduction, and vegetative establishment" (FEMA 2017b). Bioengineering may include practices such as the following: fascines (bundles of woody material or branches), coir logs and mats (sediment retention rolls made of coconut fibers), root wads, tree revetments (cut trees placed parallel to the stream and anchored to the bank, shown in **Figure 3-6**), vegetated banks, live stakes (cut tree branches that are planted to establish new vegetation), spiling (branches or rods woven between upright stakes), wattles (usually made of straw fiber contained in mesh logs that are held in place by wooden stakes), live brush mattresses (interlaced live branches placed on the bank face), large woody debris structures known as engineered log jams, and similar methods (FEMA 2023a; FEMA 2017b). Bioengineering can also include vegetating upland areas adjacent to bodies of water to minimize impacts from stormwater runoff.

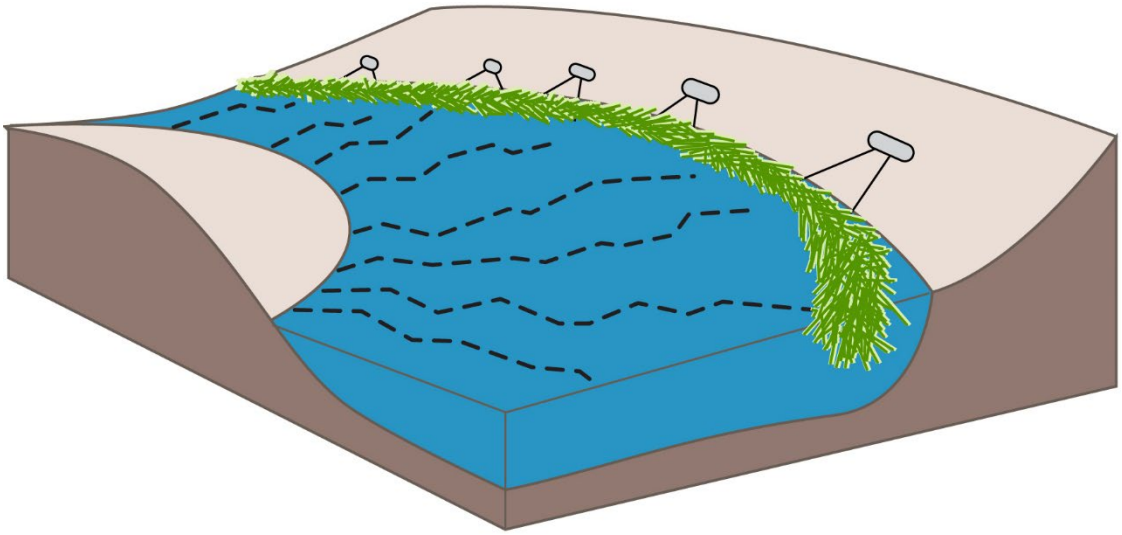


Figure 3-6. Tree Revetments

In some low-velocity situations, bioengineering alone can be used below the ordinary high-water mark (OHWM); however, under most conditions where erosion is actively taking place, plantings would be positioned higher on a streambank or anchored into stable ground to prevent washouts. Plant materials can be incorporated into traditional structural bank armoring practices like riprap toe protection, retaining walls, geogrid or geocellular systems, and soil nailing techniques, depending on project-specific needs. Vegetative measures can also be used above OHWM to stabilize soil above riprap or other slope toe armoring (National Academies 2005).

Specialized activities associated with this alternative include, but are not limited to, the following:

- Excavation landward of a bank
- Live staking of living plant cuttings
- Bioengineering, including bare root planting, tree planting, and hydroseeding
- Post-construction monitoring and maintenance

3.2.6. STREAM CHANNEL NATURALIZATION

This alternative encompasses projects that restore streams and drainage channels to a more naturalized state. Naturalized streams would mimic, to the extent possible, the former historical layout of the waterway. Elements of naturalization include a broad range of measures that include the removal of watershed disturbances that are causing stream instability; installation of structures such as vanes, riffles (shallow rocky sections of streams with fast moving water), and step pools (formed by stone weirs); planting of vegetation to protect stream banks and provide habitat; and the reshaping or replacement of unstable stream reaches into appropriately designed functional streams (North Carolina University 2003). **Figure 3-7** shows a cross-vane structure that is also an example of a step pool.

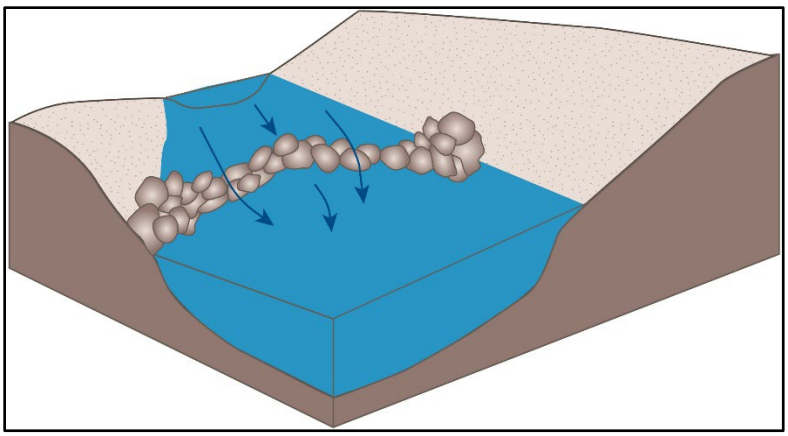


Figure 3-7. Cross-Vane Structure

The reshaping of streams would not exceed the historical footprint of the channel or move the channel more than 100 feet beyond the existing alignment. Naturalization may include dredging to restore the stream to its previous historical depth but would not exceed it.

Specialized construction activities would include elements described for loose stone and riprap (Section 3.2.3) and bioengineering projects (Section 3.2.5). It also may include:

- Dredging
- Installing vane structures
- Installing constructed riffles
- Installing step pools
- Erosion control matting
- Live staking

3.3. Alternatives Considered and Eliminated from Evaluation

This section describes stream stabilization and naturalization activities considered but eliminated from evaluation within the PEA because they are either ineligible activities or activities that fall within the parameters of a CATEX.

3.3.1. ACTIVITIES WITH A PRIMARY PURPOSE NOT RELATED TO STREAM STABILIZATION OR NATURALIZATION

Stream stabilization or naturalization activities that do not have a primary purpose of addressing hazards related to erosion, scouring, and flooding and are not connected actions to a covered stream stabilization and naturalization project are not eligible for coverage under this PEA.

3.3.2. ACTIVITIES INELIGIBLE FOR FEMA FUNDING

FEMA policies for the HMA and PA programs identify the eligible and ineligible types of activities under each program. Activities that are not eligible for funding under either program are not feasible alternatives to the Proposed Action; therefore, they were not retained as alternatives for consideration under this PEA.

3.3.3. ACTIONS COVERED BY CATEGORICAL EXCLUSIONS

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 individually covered by a CATEX are not evaluated in this PEA. This section describes CATEXs that may apply to stream stabilization and naturalization projects that impact small areas.

CATEX N4 *Federal Assistance for Actions Involving Stream Work and Modification and Floodways* provides assistance for repair and restoration actions, hazard mitigation actions other than flood control or the new construction of facilities that are functionally dependent or facilitate open space use, when the actions are within or affect regulatory floodways defined as the channel and the adjacent portion of the floodplain that is needed to safely convey and store floodwaters, streams, and stream banks, as well as meeting the following criteria:

- Involve ground disturbance of less than 0.5 acre.
- Involve stream bank work or alteration of less than 300 linear feet.
- Do not involve hardening or armoring of the stream banks unless the project uses stream or stream bank bioengineering techniques and improves fish passage or habitat.
- Do not result in adverse flood risk effects to downstream communities.
- Do not result in any increase of flood levels within the community during the occurrence of the base flood discharge if the action takes place within the regulatory floodway.
- Where the effect of the proposed project when combined with other existing or reasonably foreseeable development will not increase water surface elevation of the base flood more than 1 foot at any point within the community if the action takes place in a floodplain with no regulatory floodway.

CATEX N9 *Federal Assistance for Flood Hazard Reduction Actions* provides assistance for drainage, berm, water crossing, and detention, retention, or sediment pond projects that have the primary purpose of addressing flood hazards as well as meeting the following criteria:

- Do not affect more than 25 acres.
- Do not result in adverse flood risk effects to downstream communities.

- Do not result in any increase of flood levels within the community during the occurrence of the base flood discharge if the action takes place within the regulatory floodway.

- Where the effect of the proposed project when combined with other existing or reasonably foreseeable development will not increase water surface elevation of the base flood more than 1 foot at any point within the community if the action takes place in a floodplain with no regulatory floodway.

This CATEX covers minor flood control actions as identified in Sections 1366 and 1361 of the National Flood Insurance Act (NFIA). Actions that are not covered in Sections 1366 and 1361 of the NFIA, such as dikes and levees, are excluded from this CATEX.

3.3.4. NON-ENGINEERED OR AD HOC SOLUTIONS

A registered engineer must design stream stabilization and naturalization measures proposed for funding by FEMA. This PEA does not cover activities that are non-engineered or are ad hoc. This may include projects that are not based on an engineering or hydraulic analysis or have an incomplete or inappropriate engineering analysis.

SECTION 4. Affected Environment and Consequences

This section describes the environment potentially affected by the alternatives, evaluates potential environmental impacts, and recommends measures to avoid or reduce those impacts. When possible, quantitative information is provided to establish potential impacts; the significance of potential impacts is based on the criteria listed in **Table 4-1**. The study area generally includes the project area and access and staging areas needed for the Proposed Action. If the study area for a particular resource category is different from the project area, the differences will be described in the appropriate subsection.

Table 4-1. Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
Negligible	The resource area would not be affected, or changes or benefits would be either nondetectable or, if detected, would have impacts 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 impacts.
Moderate	Changes to the resource would be measurable and have either localized or regional-scale impacts/benefits. Impacts would be within or below regulatory standards, but historic conditions would be altered on a short-term basis. Mitigation measures would be necessary to reduce any potential adverse impacts.
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 impacts would be required to reduce impacts, though long-term changes to the resource would be expected.

4.1. Resources Considered and Dismissed

Based on a preliminary screening of resources and the project's geographic location, the following resources do not require a detailed assessment because they do not exist within the study area or the alternatives would have no effect on the resource.

- *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.

- *Geology*. Rocky streams are generally not subject to erosion and bank failure and therefore are not anticipated to be the subject of stream stabilization and naturalization projects. If a proposed project would impact bedrock, then an SEA would be required.

- *Wild and Scenic Rivers.* The Wild and Scenic Rivers Act, 16 U.S.C. §§ 1271 *et seq.*, is not applicable because any designated rivers within FEMA Region 5 are excluded from the study area covered by this PEA. Therefore, none of the alternatives would have the potential to affect rivers protected under the Act.

- *Coastal Barrier Resource Act*. Areas within the Coastal Barrier Resources System (CBRS) would not be eligible for FEMA grant funding because federal expenditures that support development within the CBRS are restricted. Therefore, CBRS are not covered under this PEA.

4.2. Physical Environment

4.2.1. 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 over the long-term. Potential impacts on soils and topography are assessed qualitatively by comparison with the surrounding environment. Therefore, this section presents existing conditions within the study area for this PEA related to soils and topography.

The Farmland Protection Policy Act (FPPA) 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 FPPA 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 important farmland soils to non-farm uses would need to consult with NRCS and complete a land evaluation and site assessment (U.S. Department of Agriculture's Form AD-1006). While farms don't necessarily indicate farmland soils, they can provide an indication of which areas include protected farmland soils. Additional farmland soils could exist in parts of the states that are not currently occupied by farms. Farms occupy 75 percent of the state of Illinois, and include approximately 73,400 farms. Farms occupy 64 percent of the land in the state of Indiana and include approximately 57,700 farms. Michigan includes approximately 51,500 farms, encompassing 27.5 percent of the state's land. Minnesota has 65,531 active farms, occupying approximately 51 percent of the state's land. Ohio has approximately 74,400 active farms, occupying approximately 53.5 percent of the state's land. The state of Wisconsin has approximately 68,900 farms, encompassing 41.5 percent of the state's land (Farmland Information Center 2024).

Much of the topography in the study area is characterized by rolling hills and valleys and flat prairie lands, formed by glacial deposits during the last ice age. However, there are areas that escaped glaciation and offer more rugged terrain such as steep hills, deep river valleys, dense forests, rocky coastlines, and dramatic elevation changes (**Figure 4-1**).

Illinois: Illinois can be divided into six general physiographic divisions. The Till Plains encompasses a majority of the state. The Till Plains are characterized by gently rolling plains and fertile soils, as a result of glacial till deposits from the last ice age. The northwestern corner is part of the Wisconsin Driftless, while the northeastern corner of the state is part of the Eastern Lake Division. The Driftless Area is named for its lack of glacial sediment, or "drift", which left it untouched by the last glacier that covered most of Wisconsin 10,000 years ago, and is characterized by its rolling hills, bluffs, and deep river valleys. The southern portion of the state includes small areas of Highland Rim, Eastern Lake, Mississippi Alluvial Plain, and East Gulf Coastal Plain divisions (U.S. Geological Survey [USGS] 2024). The Highland Rim is a cuesta (hill or ridge with a gentle slope on one side, and a steep slope on the other) surrounding a basin. The Eastern Lake is a section of the Interior Plains physiographic division. The Mississippi Alluvial Plain is an alluvial plain created by the Mississippi River. The northern Illinois region is predominantly rolling hills and valleys. This region also includes an area that escaped glaciation during the last ice age, that features unique topography of steep hills and deep river valleys. Central Illinois is characterized by its flat prairie lands with minimal elevation changes. Southern Illinois is more rugged and forested compared to the northern and central regions. The lowest point in the state lies within this region, at the confluence of the Mississippi River and Ohio River, with an elevation of 315 feet (World Atlas 2024a).

The majority (45 percent) of Ilinois' soil is classified under the Alfisols Order. Alfisols are fertile soils of the forest, formed in loamy or clayey material (University of Minnesota 2021) The other predominant soil order in Illinois is Mollisols (43%) which is the basis for the state's productive agricultural base. The most distinguishing feature of these soils is a thick, dark surface layer that's high in nutrients (NRCS 2018).

The main types of parent materials of Illinois soils are loess, outwash, till, and alluvium. Other soil parent materials, such as bedrock weathered in place and plant remains, are present but are not extensive in Illinois. Loess is the most extensive parent material in Illinois, occupying about 63 percent of the state's land area, predominating in the western, central, and southern parts. Loess is a silty wind deposit (USDA 1984).

Indiana: Indiana can be divided into three general physiographic divisions. The northern quarter of the state is in the Eastern Lake Division, and the southern quarter of the state is in the Highland Rim Division. The Till Plains encompass a majority of the central portion of Indiana (USGS 2024). The region located near Lake Michigan and the associated Morainal Complexes is characterized by their undulating topography, formed by glacial deposits. This region also includes various drainageways and valleys, many of which were carved by retreating glaciers. The valleys and drainageways provide a natural drainage network in this region. The southern portion of the state (Highland Rim) includes a more varied topography, including plateaus, uplands, and rolling hills, descending into fertile lowlands. The landscape is a result of both erosional processes and sediment deposits from ancient water bodies. The Ohio River forms the southern boundary of Indiana (World Atlas 2024b).

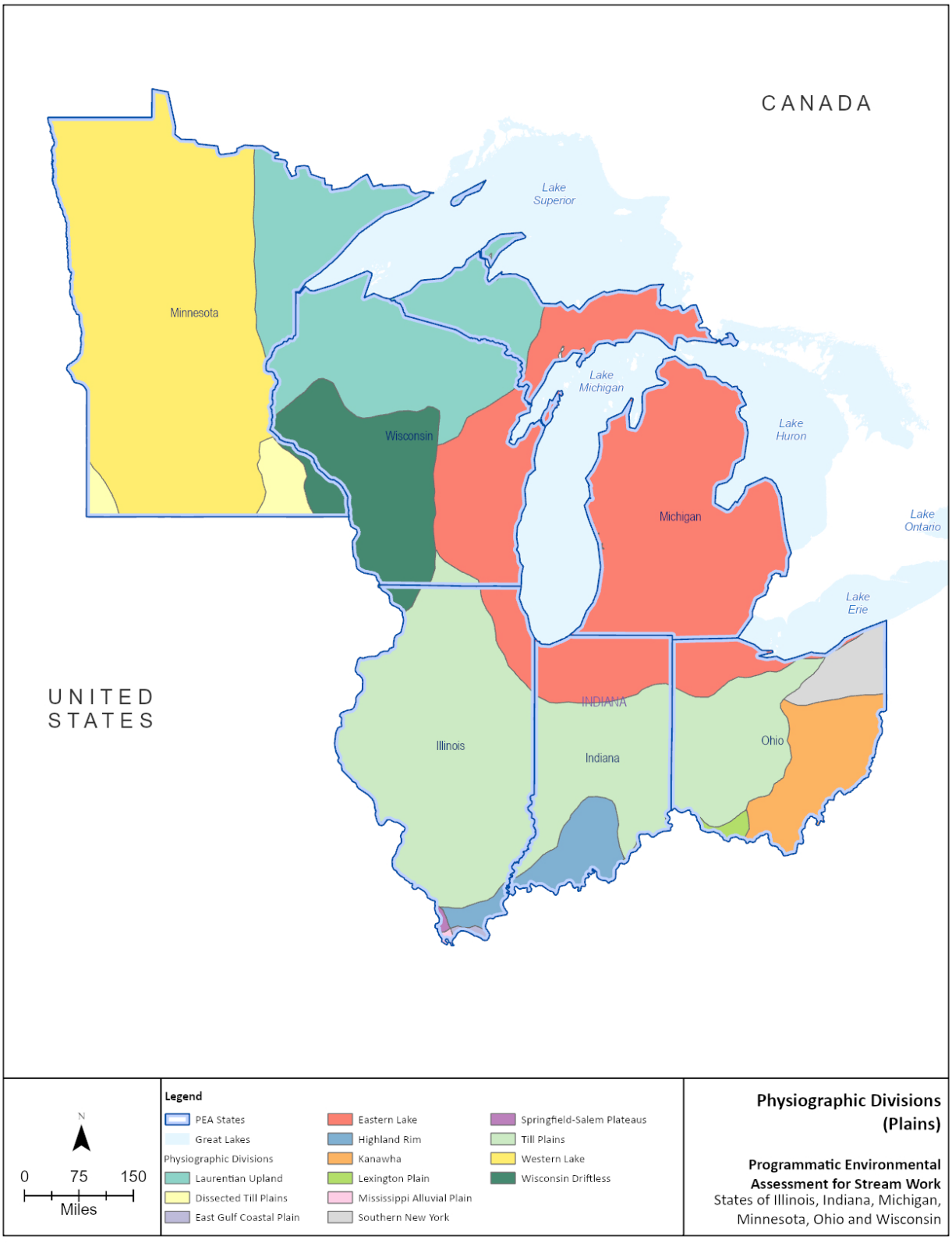


Figure 4-1. U.S. Geological Survey Physiographic Divisions (Plains)

Approximately 75 percent of soil in the state of Indiana is classified under the Alfisols Order. The Mollisols Order encompasses approximately 15% of the soils along the eastern border of the state. Approximately 5% of the soil in the northwest corner of the state are in the Entisols Order, and another 5% at the southern end are in the Ultisols Order. Most Entisols are very young soils and occur where soil parent materials have only recently been deposited, such as on very steep slopes or floodplains. Ultisols occur on old, stable landscapes and are formed under forest. The pH tends to be low, and aluminum often occurs in forms toxic to plants (NRCS 2024).

There are 13 soil regions in the state of Indiana. Thin loess over loamy glacial till (medium-textured (wet soils on Wisconsinan till plains) is the most predominant parent material. Clayey glacial till (fine-textured, wet soils on Wisconsinan till plains) is the second most predominant parent material in the state of Indiana (Purdue 2004).

Michigan: Michigan is divided into two general physiographic divisions. The Upper Peninsula is divided between the Laurentian Upland and the Eastern Lake Division, and the Lower Peninsula is dominated by the Eastern Lake Division (USGS 2024). The Laurentian Upland is the western extension of the Laurentian Mountains and part of the southern rim of the Canadian Shield that extends into the United States. The western portion of the Upper Peninsula is characterized by rugged terrain formed by ancient volcanic activity and glaciation. This area is known for dense forests and a rocky coastline. The eastern part of the Upper Peninsula includes lower elevation and a smoother landscape. The Lower Peninsula is marked by rolling hills and an elevation that gradually decreases from the highlands toward the central part of the state. The northern portion is characterized by a flat to gently rolling landscape. The Black River and parts of the Inland Waterway traverse through this lowland area. A fertile agricultural region is in the east–central part of the Lower Peninsula. The region adjacent to Lake Michigan, along the western edge of the Lower Peninsula is characterized by sandy shores and dunes (World Atlas 2024d).

The soils of Michigan vary greatly, with more than 500 soils mapped in the state. Spodisols (sandy soils) are the most predominant soil order, located mostly in the western and northern parts of the state. Spodisols are very sandy soils that are often formed under coniferous forest (NRCS 2024). Alfisols (clays and loams) are the next most common soil order, mostly located in the southern Lower Peninsula (Sommers 1984).

Minnesota: Minnesota can be divided into three general physiographic divisions. The Western Lake Division (a section of the Interior Plains Physiographic division) encompasses a majority of the state. The northeast corner of the state is in the Laurentian Upland Division, and the southwest and southeast corners of the state belong in the Dissected Till Plains Division (USGS 2024). The northwestern part of Minnesota includes the remnants of the prehistoric Lake Agassiz and extends over the Lake of the Woods. The area is flat and fertile with occasional low rolling hills. The northeastern part of the state encompasses rugged terrain along the shores of Lake Superior. The Sawtooth Mountains run through this region and include Eagle Mountain, the highest point in Minnesota, at 2,301 feet. This region includes rocky cliffs and experiences dramatic elevation changes. The state's heartland includes gently rolling hills formed by glacial deposits and is prime

land for farming. The southwestern part of Minnesota includes prairie lands and is part of the larger Greater Plains of North America (WorldAtlas 2024e).

The majority (32.1 percent) of Minnesota's soil is classified under the Mollisols Order which is the basis for the state's procuctive agricultural base. The most distinguishing feature of these soils is a thick, dark surface layer that's high in nutrients. Alfisols comprise an additional 27.4% of Minnesota's soil. Alfisols are fertile soils of the forest, formed in loamy or clayey material (University of Minnesota 2021).

Ohio: Ohio is divided into five physiographic divisions. The Eastern Lake Division is located in the northwest corner, while the Southern New York Division is in the northeast corner. The Till Plains encompasses the majority of the central–western portion of the state, while the Kanawha Division encompasses a majority of the eastern part of the state. The Southern New York and Kanawha sections are a part of the larger Appalachian Highlands. The Lexington Plain Division is a small portion in the southwest corner of the state, and part of the Interior Low Plateaus (USGS 2024). The Till Plains feature gently rolling terrain created by glacial till deposits. The eastern and southeastern parts of Ohio are divided into two distinct areas: the Glaciated Allegheny Plateaus and the Unglaciated Allegheny Plateaus. The Glaciated Allegheny Plateaus feature rugged terrain, with the effects of glacial activity evident in the landscape's features. In contrast, the Unglaciated Allegheny Plateaus do not bear the marks of glaciation and have a much different topography, dominated by sharper ridges and valleys. A small section of the eastern part of the state (The Bluegrass Region) is characterized by rolling hills and meadows (WorldAtlas 2024f).

The primary soil order found in Ohio is Alfisols, covering approximately 75% of the state. The second most predominant soil order in Ohio is Inceptisols. Inceptisols are often found on fairly steep slopes, young geomorphic surfaces and on resistant parent materials. They are often found in mountainous areas and are used for forestry, recreation and watershed (NRCS 2024).

Ohio has more than 100 specific types of parent material, thus, soils in Ohio are divided into 12 soil regions based primarily on soil parent material and the glacial history. The predominant soil regions in the state are Blount-Pewamo-Glynwood (Region 3), Bennington-Cardinton-Centerburg (Region 5), and Mahoning-Canfield-Rittman-Chili (Region 6). Soils in Region 3 were developed in glacial till containing considerable limestone material and clay, and their textures range from medium silt to fine clay. Soils in Regions 5 and 6 were also developed in glacial till, and are predominately medium textured, with some areas of fine texture (OSU 2024).

Wisconsin: The majority of Wisconsin is divided fairly equally into three physiographic divisions—the Laurentian Upland in the north, the Wisconsin Driftless in the southwest, and the Eastern Lake Division in the southeast. A small portion in the central–south part of the state is in the Till Plains (USGS 2024). The northernmost part of the state features a narrow, level plain that is a transitional area between the lake and a large wooded upland that occupies the northern portion of the state, with many lakes and wetlands. This region includes substantial elevation changes and is the epitome of Wisconsin's glaciated areas. The middle of Wisconsin is relatively flat with a gradual transition to the more rugged terrains in the east and west. The area surrounding the Mississippi River along the

western edge of Wisconsin is characterized by its rugged terrain with steep bluffs and narrow valleys. The southeastern quadrant of the state features a series of ridges paralleling Lake Michigan. This region transitions from higher elevations to the low-lying areas adjacent to Lake Michigan and is intersected by several significant rivers, including the Fox River and Milwaukee River (WorldAtlas 2024g).

Wisconsin's predominant soil order is Alfisols, covering approximately fifty percent of the state. The second most predominant soil order is Spodosols (found in the north), followed by Entisols and Mollisols (found in the south) (NRCS 2024).

Several hundred kinds of soils have been mapped in Wisconsin; thus, they have been divided into regions. Of the 14 major soil regions in the state of Wisconsin, 4 are most predominant; Soil Region G (Iron River, Gogebic, and Kennan loams over glacial till); Soil Region F (Withee, Santiago, Amery, and Antigo silt loams over acid loamy glacial till); Soil Region B (Dodge, Miami, Morley, and Casco silty soils over glacial till); and Soil Region A (Fayette and Dubuque silt loams) (Hole 1976).

Alternative 1 – No Action

Under the No Action alternative, communities may implement minor efforts to repair damaged infrastructure and stabilize streambanks. The No Action alternative could have minor adverse short-term impacts on soils and topography from construction activities that disturb the ground, such as excavation and grading, and that may lead to increased erosion. Clearing and grading during construction would also result in the temporary loss of native vegetation and exposure of soils to the elements that could cause increased erosion. Site soils may be replaced with fill materials such as riprap or structures such as concrete or metal walls and topography may be altered during grading and reshaping of stream banks.

In the long term, the risk of erosion, scouring, and flood hazards would not be substantively reduced. Over time, stream erosion and flooding could move large amounts of sediment, damaging embankments, or ultimately leading to failure. The No Action alternative may result in minor to moderate adverse long-term impacts on soils from sediment deposition downstream of an eroding or failed embankment that may evolve into significant instability, depending on the extent, frequency, and duration of flood and high-water flow events. Soil instability may present increasing risk to nearby infrastructure, such as roads and utilities. Stream erosion and flooding would also affect topography by altering the slopes within the area. In more rugged areas, where there are steep streambanks, erosion and flooding could have more severe impacts on topography. The No Action alternative may result in minor to moderate impacts on topography relative to site characteristics.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

In the short term, construction activities that disturb the ground would have similar impacts on soils and topography as described in the No Action alternative. However, erosion and sediment control measures would be implemented in accordance with national, state, and county requirements. Specifically, construction of the Proposed Action would comply with the General Construction

Stormwater Permit, which is required for construction disturbance of one or more acres and is discussed in greater detail in Section 4.2.2. In accordance with the General Construction Stormwater Permit, the project proponent would develop a Stormwater Pollution Prevention Plan (SWPPP) for specific proposals under the Proposed Action, which would require the implementation of measures to reduce pollutants in stormwater discharges and prevent sediment from leaving the construction site. Example control measures include minimizing areas of exposed soil, retaining natural buffers around waters, and installing erosion control measures such as silt fencing. During construction, the Proposed Action would have minor short-term impacts on soils and topography.

In the long term, streambank stabilization and naturalization measures would reduce the risk of flooding, slope failure, and continued erosion. Reduced flooding, slope failure, and erosion would help to conserve soils and protect existing topography. The Proposed Action would result in long-term minor to moderate beneficial impacts on soils and topography.

The Proposed Action may have the potential to have negligible to no impacts on farmland soils, depending on the project location. There are no specific impacts or mitigation that would affect farmland or consistency with the FPPA. Most stream stabilization and naturalization projects would not irreversibly convert farmland to other uses. Stream stabilization that reduces erosion and slope failure would have the potential to protect adjacent farmland soils from washing away. Therefore, the Proposed Action would likely be consistent with the FPPA. If NRCS requires further review of a specific project, FEMA would complete Form AD-1006 (NRCS 2022) and make a determination under the FPPA.

Project-Specific Measures

Bioengineering

In the long term, bioengineering may provide increased streambank stability by implementing nature-based stabilization techniques. Plant roots reinforce soil and decrease both erosion and embankment failure risk. Plants at the water's edge dissipate wave and current energy, reducing erosion. Plants also contribute organic matter to surface soils, which improves productivity and helps to further reduce erosion. More gentle slopes could be treated using plant materials alone, while more steep and highly eroded sites may require extensive excavation to bench or terrace the bank before planting. However, regardless of the initial condition of a site, bioengineering approaches would provide the soil benefits of installing plant material along a stream channel. Bioengineering would result in minor to moderate long-term beneficial impacts on soils and topography.

Stream Channel Naturalization

In the short term, stream channel naturalization projects would require more ground-disturbing activities, such as stream bed dredging and channel reshaping, as compared to other project types under the Proposed Action. This could increase the level of erosion and sedimentation downstream during construction when compared to other project types. However, the erosion and sediment control measures discussed in the general consequences of the Proposed Action would continue to be implemented in accordance with the General Construction Stormwater Permit, and the project proponent would develop and implement a stormwater pollution prevention plan for the Proposed Action. This alternative would have minor short-term adverse impacts on soils during the construction

period. Channel reshaping and naturalization would have the effect of slowing down both normal flows and flood flows and enhanced vegetative cover along the stream banks would further reduce erosion potential. Slower flows allow sediments to settle out of the water column and reduces offsite transport of soils. By reducing the risk of flooding and continued erosion, stream channel naturalization would result in minor to moderate long-term beneficial impacts on soils.

4.2.2. WATER RESOURCES AND WATER QUALITY

This section evaluates alternatives for the potential to degrade existing water quality conditions or impact surface and groundwater resources regulated by the Clean Water Act (CWA) of 1977, 33 U.S.C. §§ 1251 *et seq.*, and other federal, state, and international water quality laws.

Section 401 of the CWA gives states and tribes 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 33 U.S.C. § 1341 . Furthermore, Section 401 also requires that, before a Section 404 permit (as discussed below) can be issued for an activity, the activity must not exceed state- or tribal-specific water quality standards. In the absence of an approved state or tribal water quality program, EPA administers the water quality regulations (EPA 2024a). See Section 4.2.4 Wetlands for states' implementations of Section 401.

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) 33 U.S.C. § 1313. 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.

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 (NPDES) permits 33 U.S.C. § 1342. These permits limit what can be discharged into waterways and provide for 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 for stormwater discharges.

Section 404 of the CWA regulates the placement of dredged or fill material into waters of the United States, including wetlands, lakes, streams, rivers, and other waterways 33 U.S.C. § 1344. Through Section 404 permitting, EPA and USACE aim to avoid and minimize loss of 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 CWA in most areas of the state. Stream work that is near or adjacent to the shores of the Great Lakes may be jointly administered by USACE and Michigan Department of

Environment, Great Lakes, and Energy (EGLE) (EGLE 2024). In Minnesota and Wisconsin, USACE issued a Regional General Permit for Bank Stabilization and Habitat Improvement that includes three categories: Bio Stabilization and Habitat Improvement Projects, Hard Armoring Projects, and Federal and State Resource Agency Sponsored Bank Stabilization (USACE 2023). USACE comprises several divisions, under which specific districts were created and hold regulatory jurisdiction over specified areas. The overall study area is overseen by the Mississippi Valley, the Great Lakes and Ohio River, and the Northwestern Divisions of USACE and, depending upon the location of a proposed project, a specific district within these divisions would manage the permits on behalf of USACE, as follows (and as shown in

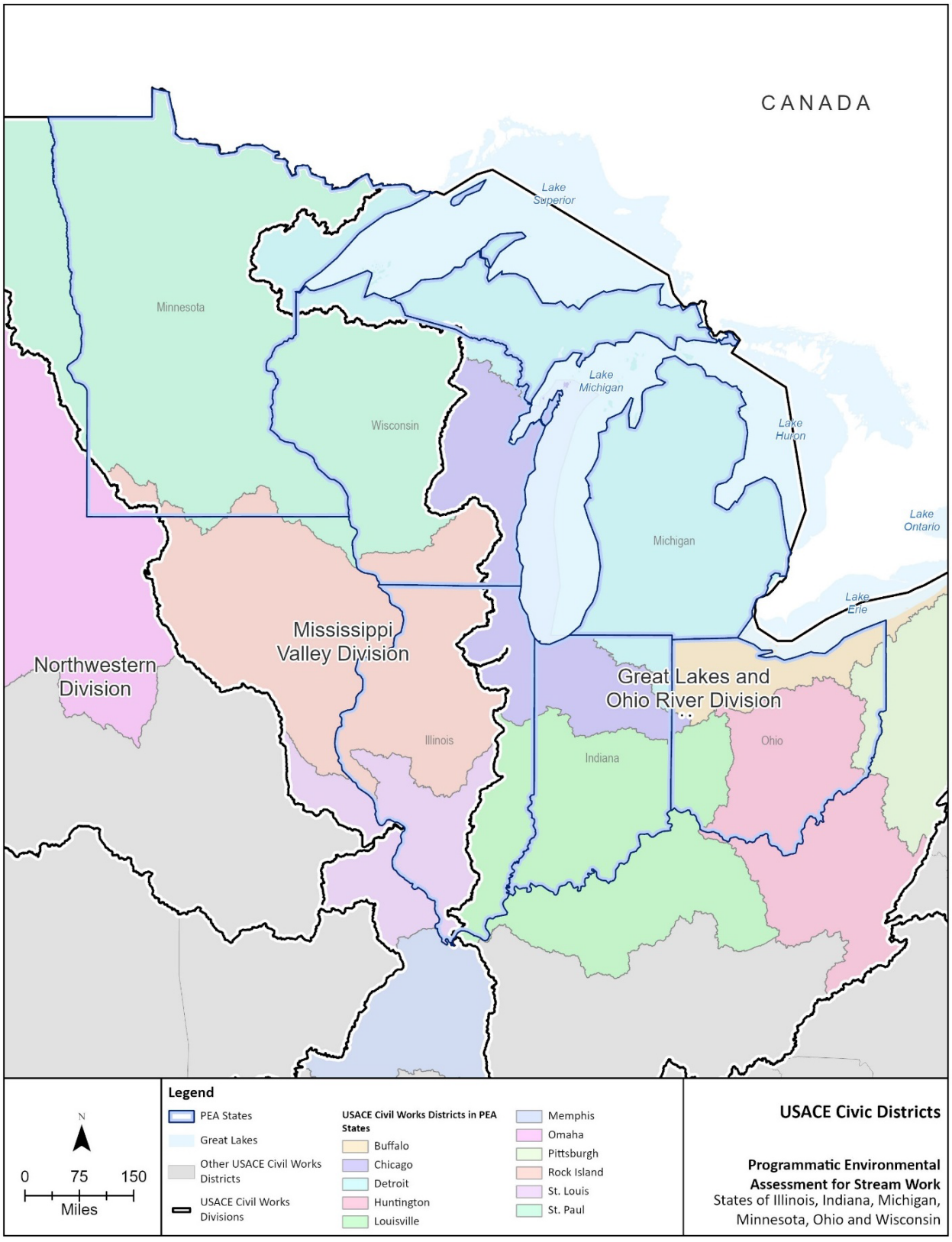

CANADA
Lake Superior
Minnesota
Lake Michigan
Wisconsin
Lake Huron
Lake Ontario
Michigan
Lake Erie
Mississippi Valley Division
Northwestern Division
Great Lakes and Ohio River Division
Illinois
Indiana
Ohio
N
0 75 150
Miles
Legend
PEA States
Great Lakes
Other USACE Civil Works Districts
USACE Civil Works Divisions
USACE Civil Works Districts in PEA States
Buffalo
Chicago
Detroit
Huntington
Louisville
Memphis
Omaha
Pittsburgh
Rock Island
St. Louis
St. Paul
USACE Civic Districts
Programmatic Environmental Assessment for Stream Work
States of Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin

Figure 4-2):

- Illinois is managed by four districts that include the Rock Island District in the northwest, the Chicago District in the northeast, the St. Louis District in the southwest, and the Louisville District in the southeast.

- Indiana is managed by three districts that include the Chicago District in the northwest, the Detroit District in the northeast, and the Louisville District in the south.

- Michigan is managed by the Detroit District and the State of Michigan.

- Minnesota is primarily managed by the St. Paul District; other districts include the Detroit District along the coast of Lake Superior, the Omaha District in a small portion in the southwest, and the Rock Island District in small locations in the south.

- Ohio is managed by four districts, with the Louisville District in the southwest, the Buffalo District in the north, the Huntington District within the south and central portions of the state, and the Pittsburgh District in the east.

- Wisconsin is managed by four districts that include the St. Paul District in the western and central portion, the Chicago District in the east, the Detroit district along a small portion to the north, and the Rock Island District in the south.

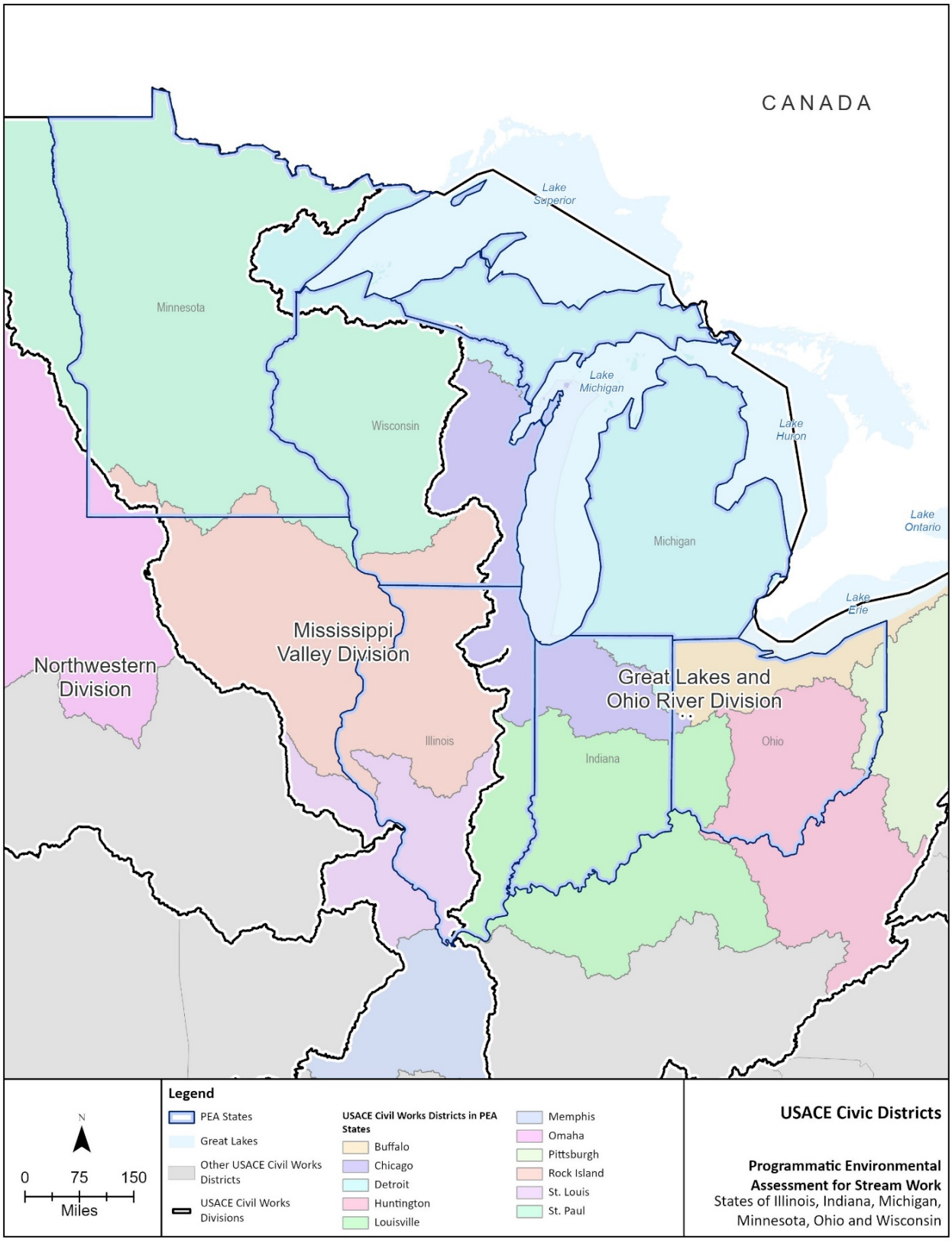


Figure 4-2. USACE Civil Works Divisions and Districts

The Rivers and Harbors Act of 1899, 33 U.S.C. § 401 *et seq.*, regulates the development and use of the nation's navigable waterways. If proposed construction activities would occur below the OHWM, Sections 9 and 10 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, as it pertains to bridges and causeways, has been delegated to the U.S. Coast Guard, USACE regulates dams and dikes in navigable waters. Bridges, causeways, dams, or dikes in intrastate waters must be approved by state legislatures. In interstate waters, Section 9 permits require congressional approval. 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. Under Section 10, USACE authorization is also required prior to any work above the OHWM that affects the course, location, condition, or capacity of navigable waters.

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 1424I of the Safe Drinking Water Act of 1974 authorizes EPA to designate an aquifer for special protection under the sole source aquifer program if (1) 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 (2) if its contamination would create a significant hazard to public health.

The Great Lakes Restoration Initiative (GLRI) was launched in 2010 as a nonregulatory program to accelerate efforts to protect and restore the largest system of fresh surface water in the world, and to provide additional resources to accelerate progress toward the most critical long-term goals for this important ecosystem. Every five years, the GLRI develops action plans that identify goals, objectives, and measures of progress for five GLRI focus areas (Great Lakes Restoration Initiative 2019).

In 1972, the United States and Canada, recognizing the widespread deterioration of water quality in the Great Lakes on both sides of their shared border, signed the Great Lakes Water Quality Agreement (GLWQA) (revised in 1978; amended in 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, clean up areas of concern, restore habitat, reduce nutrient pollution, and assess the overall health of the Great Lakes. The GLWQA includes the interaction and management of upstream impacts on the health of the Great Lakes within the Great Lakes Basin Ecosystem.

In addition to the federal acts and regulations described above, water quality is also regulated by state environmental agencies that set water quality standards and may have additional requirements for work in waters of the state. Subapplicants should coordinate with the appropriate state-specific governing agency for stream work, as listed in **Table 4-2**, 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 the Section 303(d) List for each state are also summarized in Table 4-2.

Table 4-2. 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 5, Chapter 415 Illinois Compiled Statutes: Environmental Protect Act (The Act) 17 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 Title 40, Chapter I, Subchapter D, Part 132 Water Quality Guidance for the Great Lakes System Illinois Integrated Water Quality Report and Section 303(d) List, 2020/2022 – (Illinois EPA Bureau of Water [IEPA], 2022)
Indiana	Indiana Department of Environmental Management	Title 327 of the Indiana Administrative Code (Ind. Admin. Code); under Article 2 Designated Uses: 327 Ind. Admin. Code 2-1.5-5 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, 2022 (Indiana Department of Environmental Management [IDEM] 2022)
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 Mich. Admin. Code R. 323.1041 to r 323.1117 (activities resulting in a discharge all surface waters must comply with these standards) Water Quality and Pollution Control in Michigan, 2022 Sections 303(d), 305(b), and 314 Integrated Report (EGLE 2022)
Minnesota	Minnesota Pollution Control Agency	Minnesota Statues Chapters 115 and 116 and Minnesota Administrative Rules §§ 7001.1400-7001.1470, and Chapters 7050, 7052, and 7053. 2024 Minnesota Water Quality (Minnesota Pollution Control Agency [MPCA], November 2023)

State	State Regulatory Agency (Water Quality)	State Water Quality Regulation Reference and Documentation
Ohio	Ohio Environmental Protection Agency	Ohio's water quality standards, set forth in Chapter 3745-1 of the Ohio Administrative Code Ohio 2022 Integrated Water Quality Monitoring and Assessment Report (Ohio Environmental Protection Agency , Division of Surface Water Final Report, February 2022) Ohio Revised Code § 1501.30.
Wisconsin	Wisconsin Environmental Management Division	Wisconsin Statutes § 35.93 Chapter NR 102: Water Quality Standards for Wisconsin Surface Waters Wisconsin Water Quality Report to Congress, 2022 (Wisconsin Department of Natural Resources [WDNR] 2022)

Affected Environment

Illinois has approximately 119,299 miles of streams and rivers. A total of 18,508 miles, or approximately 15.5 percent of the total miles of stream in Illinois, were assessed by the Illinois Environmental Protection Agency (IEPA) in the 2022 Integrated Water Quality Report for attainment of one or more of the following designated uses: aesthetic quality, aquatic life, indigenous aquatic life, primary contact recreation, public and food processing, and fish consumption. The major potential causes of stream impairment are fecal coliform bacteria, mercury, polychlorinated biphenyls (PCBs), low dissolved oxygen, physical-habitat alterations, high phosphorus, excessive siltation, high total suspended solids, atrazine, iron, simazine, and nitrate (IEPA 2022). There is one sole source aquifer within Illinois, the Mahoment Aquifer, located in the central portion of the state (EPA 2024b) (**Figure 4-3**).

Indiana has approximately 63,511 miles of streams and rivers. Since 2002, IDEM has assessed approximately 33,904 miles of streams for full body contact recreational use, 8,865 miles for human health and wildlife use, 23 miles for public water supply use, and 36,653 miles for warm water aquatic life use. The major potential causes of stream impairments include pathogens, PCBs, and mercury (IDEM 2022). There is one sole source aquifer within Indiana, the St. Joseph Aquifer, located along the northern central border of the state (EPA 2024b) (**Figure 4-3**).

Michigan has approximately 76,000 miles of streams and rivers. Michigan assesses surface water quality health for the following designated areas: agriculture, navigation, industrial water supply, warmwater fishery, other indigenous aquatic life and wildlife, partial body contact recreation, and fish consumption. The major potential causes of stream impairment included PCBs and mercury. Additionally, per- and polyfluoroalkyl substances comprise an emerging group of contaminants that may impact water quality (EGLE 2022). No sole source aquifers are within the state of Michigan (EPA 2024b).

Minnesota has approximately 105,000 miles of streams and rivers. Minnesota has adopted a watershed-based management approach where the MPCA and its partners evaluate waters in each major watershed in Minnesota every 10 years. Each watershed is evaluated for the following designated uses: aquatic consumption, aquatic life, aquatic recreation, drinking water, limited resource value, and wild rice production. The major potential causes of stream impairment include low dissolved oxygen, *E. coli*, mercury, PCBs, and sulfates. There is one sole source aquifer within Minnesota, the Miles Lacs sole source aquifer, located in the central–eastern portion of the state (EPA 2024b) (**Figure 4-3**).

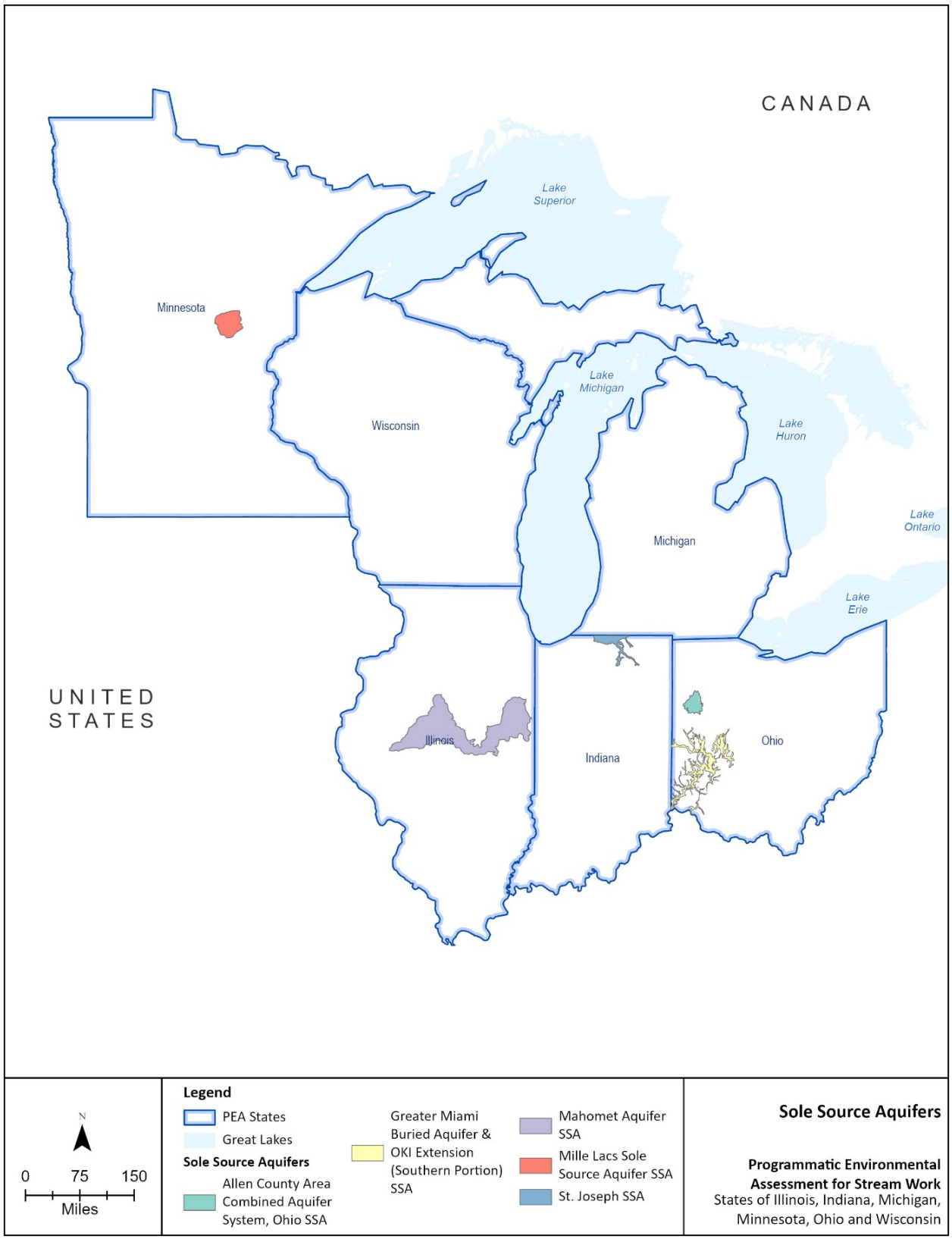


Figure 4-3. Sole Source Aquifer Locations

Ohio has approximately 25,000 miles of streams and rivers. Each stream and river is evaluated for the following designated uses: human health use (fish tissue), recreation, aquatic life, and drinking water. The major concerns for each designated use include (OEPA 2022):

- Human Health Use – PCBs and mercury
- Recreation – Bacteria
- Aquatic Life – Nutrient enrichment, sedimentation, and organic enrichment
- Drinking Water – Nitrate, atrazine, and cyanotoxin

There are two sole source aquifers within Ohio, the Allen County Area Combined Aquifer System, which is located in the central–western section of the state, and the Greater Miami Buried Aquifer, which is located in the southwestern section of the state (EPA 2024b) (**Figure 4-3**).

Wisconsin has approximately 88,000 miles of streams and rivers. Each stream and river is evaluated for the following designated uses: aquatic life, recreation, public health and welfare, and wildlife. The major potential causes of stream and river impairments include total phosphorus, chlorophyll a, mercury, total suspended solids, PCBs, and low dissolved oxygen (WDNR 2022). No sole source aquifers are within the state of Wisconsin.

Alternative 1 – No Action

Under the No Action alternative, construction associated with minor stream stabilization and naturalization measures could potentially cause sediment and pollutants to enter waterways. Some of these measures may require in-water work that could further contribute to sedimentation and may potentially alter waterways. However, these project types would be required to adhere to CWA and state waterway regulations, including obtaining necessary permits that would have mitigation and Best Management Practices (BMPs) to minimize impacts on waterways. These measures would be smaller in scale and would likely not provide the same level of hazard mitigation, repair, or resilience as the Proposed Action described in this PEA. Therefore, as long as projects under the No Action alternative adhere to permitting requirements, there would be minor short-term impacts from construction activities.

Although minor measures under the No Action alternative would have some mitigative effects, these effects would be limited because the measures would likely be smaller in scale and less comprehensive than the Proposed Action. Thus, the risk of flooding and streambank erosion would not be substantially reduced, and sediments and pollutants would continue to be transferred into surface waters via floodwaters, leading to an increase in the level of impairment in waterways. For streams that empty into the Great Lakes, this could also lead to localized impacts on the water quality of the Great Lakes at the mouth of the impacted stream. Therefore, there may be a minor to moderate long-term adverse impact on waterways under the No Action alternative. Receding floodwaters that have been contaminated by pollutants could percolate down to the sole source aquifers within the region, causing a long-term minor adverse impact on aquifer health and groundwater quality.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

In the short term, construction activities that disturb the ground, such as excavation and grading, may lead to increased erosion to and sedimentation of surface waters. Clearing and grading during construction would also result in the temporary loss of native vegetation and exposure of soils to the elements that could cause increased erosion and sedimentation. Prior to construction, the subapplicant would coordinate with USACE and their respective state agency listed in Table 4-2 to obtain any required CWA permits. Potential erosion issues would be minimized by following all conditions within any acquired CWA permits and federal, state, and local regulations that require erosion control, including developing a SWPPP. Pollutants such as oils, lubricants, and other hazardous materials have the potential to percolate down to aquifers as a result of spills and leaks from construction equipment. Project activities would need to adhere to state and local regulations to reduce the risk of hazardous leaks and spills; therefore, there would be a minor, short-term impact from construction activities.

In the long term, the Proposed Action has the potential to affect surface water resources and alter channel or shoreline geometry, structure, and alignment. Armoring, straightening, or other stream bank treatments that increase channel smoothness could also increase stream velocity and flow. This in turn could increase the moving water's erosive force and sediment load, while increasing the risk of flooding downstream. These impacts can be mitigated by design measures that increase channel roughness, resulting in increased deposition and vegetative growth and decreased velocity and flow along the length of a channel. In developed areas, bank stabilization can reduce non-point source contamination from erosion, sedimentation, and receding floodwaters, thus improving water quality downstream. As long as proper engineering designs are followed (to ensure increased velocity would not occur), there would be a long-term minor to moderate beneficial impact on water quality.

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; such projects would need to prepare an SEA. Further, the beneficial effects on water quality would be consistent with the PR&G guiding principle on healthy and resilient ecosystems described in the PR&G analysis (Appendix A). Beneficial effects on water quality would also benefit public safety and wellbeing as showing in the conceptual model for ecosystem services.

Project-Specific Measures

Bioengineering

In the long term, bioengineering may provide increased streambank stability by implementing nature-based stabilization techniques. Natural planting could also further reduce pollutants entering surface waters by absorbing and filtering pollutants from stormwater runoff.

Stream Channel Naturalization

In the short term, stream channel naturalization projects would likely result in more ground-disturbing activities, as compared to other project types under the Proposed Action from streambed dredging and channel alignment alterations. This could also increase the level of sedimentation and

pollutants downstream, as compared to other project types under the Proposed Action. Stream channel naturalization projects could also require temporary dewatering during construction, which could alter the velocity of water flow downstream. These projects would likely not fall under an NWP and would require individual CWA permits with specific conditions and mitigation measures. Though there would be a greater level of construction activity, the impact on water quality would likely still be minor and short-term because of permit requirements.

In the long term, stream channel naturalization would further reduce erosion because the stream mitigation would likely be designed to reduce stream velocity. These projects would also likely include an increase in water storage, thereby further reducing flooding extent, which would reduce erosion and pollutant runoff into waterways. Therefore, stream channel naturalization would have a minor to moderate beneficial effect on water quality.

4.2.3. FLOODPLAIN MANAGEMENT (EXECUTIVE ORDER 11988)

EO 11988, Floodplain Management, requires federal agencies to minimize occupancy and modification of the floodplain. Specifically, EO 11988 prohibits federal agencies from funding construction in the 100-year floodplain (defined as an area with a 1-percent annual chance of flooding) unless there are no practicable alternatives. FEMA's regulations for complying with EO 11988 are found in 44 C.F.R. Part 9. 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 4-3 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 4-3. NFIP Participating Communities and State Implementing Agency

State	Number of NFIP Participating Communities	State NFIP Implementing Agency
Illinois	730	Illinois Department of Natural Resources/ Office of Water Resources
Indiana	451	Indiana Department of Natural Resources
Michigan	1,073	Michigan Department of Environment, Great Lakes, and Energy
Minnesota	635	Minnesota Department of Natural Resources
Ohio	753	Ohio Department of Natural Resources
Wisconsin	568	Wisconsin Department of Natural Resources

Source: FEMA 2024b

Illinois: In accordance with Title 17 of the Illinois Administrative Code § 3700, all construction activities that occur in the floodways 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 1 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 Natural Resources and Environmental Protection Act (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 Sections R.323.1311–323.1329.

Minnesota: The Minnesota floodplain ordinance is contained in Minnesota Statutes (Minn. Stat.) Section 103F; Minnesota administrative rules, 6120.5000–6120.6200; and the planning and zoning enabling legislation. In addition, the Minnesota Shoreland Management Act authorizes the Shoreland Rules that regulate all land zoning 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. The purpose of the Shoreland Rules are to manage the effects of shoreland and water surface crowding, to prevent pollution of surface and ground waters of the state, to provide ample space on lots for sewage treatment systems, to minimize flood damages, to maintain property values, to maintain historic values of significant historic sites, and to maintain natural characteristics of shorelands and adjacent water areas, shoreland controls must regulate lot sizes, placement of structures, and alterations of shoreland areas.

Ohio: In accordance with Ohio Revised Code Title 14 § 1521.13, development in the 100-year floodplain must be protected to at least the 100-year flood level. Floodwater conveyance must be maintained, at a minimum, in accordance with standards established under the NFIP. Prior to the expenditure of money for or the construction of buildings, structures, roads, bridges, or other facilities in locations that may be subject to flooding or flood damage, all state agencies and political subdivisions shall notify and consult with the Ohio DNR Division of Water Resources and shall furnish information that the division reasonably requires in order to avoid the uneconomic, hazardous, or unnecessary use of floodplains in connection with such facilities.

Wisconsin: The Wisconsin Shoreline Management Program has established shoreline zoning rules that apply to the landward side of a floodplain, as identified in the Wisconsin Administrative 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 meet or exceed the minimum requirements set forth by the Wisconsin Shoreline Management Program.

These ordinances require a floodplain development permit for any development occurring within the regulatory floodplain.

FEMA produces Flood Insurance Rate Maps (FIRMs) that map floodplains and are used to determine whether an action is located in the floodplain. The FIRMs depict calculated locations of the 1-percent (100-year) and the 0.2-percent (500-year) floodplains, coastal high hazard areas, and base flood elevation levels. FEMA also produces Advisory Base Flood Elevation maps as an interim product to assist flood-impacted communities in their rebuilding efforts while the agency completes new FIRMs. FIRMs may not map floodplains for all streams, especially in remote areas with minimal development.

Alternative 1 – No Action

Under the No Action alternative, there could be some construction associated with minor mitigation measures occurring within the floodplain that could alter the floodplain or potentially release pollutants and sediments into the floodplain. Thus, there would be a negligible to minor short-term impact on floodplains.

In the long term, facilities would continue to be vulnerable to flood risks in the absence of comprehensive repair or stream mitigation work. Unstable embankments would be more vulnerable to further erosion or failure during subsequent storms. Sediment may build up in downstream structures, such as culverts, which may increase flood risk by impeding stream flow, potentially altering the floodplain. Furthermore, erosion of soils into surface waters would continue to impact water quality, altering the natural value and function of floodplains. Therefore, there would be a minor to moderate long-term impact from flood risks and impacts on floodplains.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

Under the Proposed Action, construction activities could cause the potential release of sediments and pollutants into the floodplain. These impacts would be minimized by following all permit conditions related to sediment control described in Section 3.2.2. Thus, there would be a minor short-term impact on floodplains. Furthermore, subapplicants would be required to comply with state and local floodplain and floodway regulations, including coordination with their local floodplain manager, to ensure impacts on floodplains would be minimized.

In the long term, stream stabilization and naturalization measures would reduce erosion along stream banks, thus decreasing sedimentation within the floodplain. The reduction in overtopping of streams would reduce the amount of pollutants entering the floodplain from floodwaters. Therefore, there would be a minor to moderate benefit from stream stabilization or naturalization on floodplain resources. FEMA will apply the eight-step decision-making process to consider site-specific impacts of proposed projects prior to approval in order to consider alternatives and mitigation measures.

Project-Specific Measures

In-Stream Structures, Loose Stone and Riprap, and Rigid and Semirigid Armoring

Stream stabilization measures that use hardening measures, as described in the in-stream structures, loose stone and riprap, and rigid and semirigid armoring actions, have the potential to change the height, length, or permeability of an embankment, potentially affecting stream hydrology. At the site scale, bank stabilization projects can cut off the hydrological connection between a body of water and the surrounding land. This effectively reduces or eliminates floodplain functions adjacent to a project site. On a larger scale, hardening measures may change erosion and deposition patterns. Subapplicants may need to prepare hydrologic and hydraulic studies to demonstrate that the proposal would not impact flood levels.

Bioengineering

Bioengineering stream work would have the added benefit of restoring natural functions of the floodplain through the use of native plantings and other natural elements. Use of vegetative bank stabilization tends to not have the negative impacts of hardened structures and can result in increased soil stability, pollutant filtering, and increased wildlife habitat while reducing stormwater runoff and velocity. Furthermore, the beneficial effects are consistent with the PR&G principal of healthy and resilient ecosystems (**Appendix A**). Therefore, bioengineering would have a minor to moderate beneficial impact on floodplains and their natural values and functions.

Stream Channel Naturalization

Stream channel naturalization would have the additional benefit of restoring the natural function of the floodplain by reestablishing the natural flow of the stream to historical conditions. This restoration, along with the addition of features, such as vane structures, riffles, and step pools, would reduce water velocity and minimize erosive forces within the floodplain. Stream channel naturalization projects may also include the added benefit of additional water storage within the floodplain, further reducing the risk of flooding and pollutant runoff from receding floodwaters. Furthermore, the beneficial effects are consistent with the PR&G principles of healthy and resilient ecosystems and public safety (**Appendix A**). Therefore, stream channel naturalization would have a minor to moderate long-term benefit to floodplains.

4.2.4. 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 work within wetlands is 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: IEPA issues Section 401 Water Quality Certifications for projects that require a Section 404 permit from USACE for wetland impacts. 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 Compliled Statues § 1994). Illinois DNR also issues permits for construction and other activities in the public waters of the state, which include the commercially navigable streams of the state and the backwater areas of those streams, which would include wetlands.

Indiana: IDEM issues Section 401 Water Quality Certifications for projects that require a Section 404 permit from USACE for impacts on wetlands. 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 Administrative Code [Ind. Admin. Code] 17). Impacts on 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 non-exempt Class II isolated wetland is also usually regulated under a general isolated wetland permit. An Isolated Wetland Individual Permit is required for any impact to a Class II wetland not covered under the general permit requirements (Rule 327 Ind. Admin. Code 17-2) and any impact to a Class III wetland.

Michigan: EGLE administers its own Section 404 program, as explained in Section 4.2.2. EGLE has adopted administrative rules that provide clarification and guidance on interpreting the state 1979 Natural Resources and Environmental Protection Act (NREPA), as amended in 1994, Public Act 451, Part 303 for Wetlands Protection. In accordance with Part 303, wetlands are regulated if they meet any of the following criteria:

- 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
- Any waters that meet the definition of a water of the U.S. under the federal CWA

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 inland areas under Michigan's Section 404 jurisdiction, federal agencies (USACE and U.S. Fish and Wildlife Services [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 USFWS
- 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 OHWM of a Great Lake or of waters affected by levels of the Great Lakes.

Minnesota: The Minnesota Pollution Control Agency issues Section 401 Water Quality Certifications for projects that require a Section 404 permit from USACE for wetland impacts. The Minnesota DNR regulates activities in public waters, which includes most lakes, rivers, streams, and "public waters

wetlands." Public waters wetlands generally include wetlands 10 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 Section 401 Water Quality Certifications for projects that require a Section 404 permit from USACE for impacts on wetlands. 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 Section 401 Water Quality Certifications for projects that require a Section 404 permit from USACE for wetland impacts. 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 the following provisions of DNR's Administrative Code, DNR 299 and DNR 103. 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 Natural Resources' administrative code sections NR 151.11 and 151.12 for stormwater discharges.
- The activity must not result in significant adverse impacts on 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 on historical or cultural resources and will comply with Section 44.40 of the Wisconsin Statues.

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.

Alternative 1 – No Action

Under the No Action alternative, there would be some construction associated with minor measures that could occur within or adjacent to wetlands and potentially release pollutants and sediments into those wetlands. Although minor measures under the No Action alternative would have some long-term mitigative effects, the risk of flooding and streambank erosion would not be substantially reduced, and sediments and pollutants would continue to be transferred into wetlands via floodwaters. Therefore, potential impacts on wetlands would be minor to moderate, in both the short term and long term.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

Construction of the Proposed Action has the potential to result in short-term temporary impacts if wetlands were to be directly disturbed or impacted by fill or other construction activities within or adjacent to wetlands. Short-term detrimental impacts may also occur if the construction activities occurring within or near wetlands increase sedimentation or turbidity within wetland waters.

There may be impacts beyond the project footprint if a project affects sources of hydrology or requires filling or conversion of portions of wetlands. When partially filled or converted, the remaining wetland acreage may experience declines in functions, values, and habitat quality; changes in hydrology and natural flow within the wetlands; and spread of invasive species. This PEA presumes that projects and any connected actions would follow any CWA permit conditions to minimize impacts on wetlands. The PEA also presumes projects would be designed to avoid permanent impacts on wetlands, with the exception of marsh/wetland creation measures implemented through bioengineering techniques. 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. Therefore, there would be no to minor potential impacts on wetlands, both in the short term and long term, as long as permanent impacts are avoided and all permit conditions are adhered to. Stream stabilization and naturalization project would be consistent with the PR&G guiding principles as naturalization could have the benefit of increasing wetlands that would promote healthy and resilient ecosystems, increase functional floodplain habitat, and would benefit the affected watersheds (**Appendix A**).

Project-Specific Measures

In-Stream Structures, Loose Stone and Riprap, and Rigid and Semirigid Armoring

As described in the floodplain section, stream stabilization measures that use hardening measures (as described in Sections 3.2.2, 3.2.3, and 3.2.4) have the potential to change the height, length, or permeability of a stream bank, potentially affecting stream hydrology. At the site scale, stream stabilization projects could change the hydrological connection between a body of water and associated or nearby wetlands. This could alter the wetland functions because surface or groundwater levels or flow velocities could increase or decrease, or seasonality of inundation could change, depending on the hydrological change. Subapplicants may need to prepare hydrologic and hydraulic studies to demonstrate impacts on wetlands.

Bioengineering

Some bioengineering measures may have the added benefit of increasing wetland habitat within a project area through the use of native plantings and other natural elements. The use of vegetation in bank stabilization tends to not have the negative impacts of hardened structures, and can result in increased soil stability and pollutant filtering, reducing contamination of wetlands. Therefore, there would be a minor long-term benefit on wetlands.

Stream Channel Naturalization

Stream channel naturalization may require ground disturbance and fill within wetlands and this activity may temporarily or permanently reduce wetland area. Any permanent wetland loss that would require compensatory mitigation would not be covered under this PEA; therefore, an SEA would need to be prepared. However, some stream channel naturalization projects may include additional wetland habitat creation, and thus have a long-term minor benefit on wetlands.

4.2.5. 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 that persistently exceed one or more of the NAAQS as nonattainment or maintenance areas.

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), 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).

Affected Environment

The status of nonattainment and maintenance areas is available through EPA's Green Book, which is updated periodically (EPA 2024c). **Table 4-4** 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 2024c).

Table 4-4. State Air Quality Regulatory Agencies and Counties in Nonattainment Status within the Study Area

State	State Regulatory Agency (Air Quality)	Counties in Nonattainment Status in the Study Area
Illinois	Illinois Environmental Protection Agency Bureau of Air	Cook, DuPage, Grundy, Kane, Kendall, Lake, Madison, McHenry, Monroe, St. Clair, Will
Indiana	Indiana Department of Environmental Management Office of Air Quality	Huntington, Lake, Porter
Michigan	Michigan Department of Environment, Great Lakes, and Energy	Allegan, Berrien, Muskegon, St. Clair, Wayne
Minnesota	Minnesota Pollution Control Agency	Dakota
Ohio	Ohio Environmental Protection Agency Division of Air Pollution Control	Cuyahoga, Geauga, Lake, Lorain, Medina, Morgan, Portage, Stark, Summit, Washington
Wisconsin	Wisconsin Department of Natural Resources	Kenosha, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, Waukesha

Source: EPA 2024c

Alternative 1 – No Action

Under the No Action alternative, some communities may implement minor measures, but they would not constitute the same level of duration or organization as the Proposed Action described in this PEA. Therefore, there may be minor short-term impacts from vehicle and equipment emissions at

project sites. The minor measures would reduce stream bank erosion and flooding, but not to the level of the Proposed Action. Continued erosion and floods could cause instability in the soils and have the potential to impact structures and infrastructure located near the streambank that would require repair work. Repair work would result in minor temporary increases in localized emissions from construction equipment and vehicles. Therefore, there may be a minor periodic long-term adverse impact on air quality.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

The Proposed Action 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. Local $PM_{2.5}$ and PM_{10} levels can increase during excavation of soils, demolition of concrete structures, and movement of vehicles on unpaved surfaces. Depending on the extent of the equipment and vehicle use, and with implementation of standard construction BMPs and compliance with current EPA emissions standards (EPA 2016) and all other local, state, and federal regulations, there would be short-term, negligible to minor, adverse 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, or those with longer construction periods, could involve more truck trips and longer 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 as to whether completing a conformity analysis is necessary, particularly for project areas in nonattainment areas.

In general, no long-term impacts on air quality are anticipated because the Proposed Action would not be a source of long-term air emissions. The Proposed Action would reduce the need for repairs due to erosion and flooding, thus reducing the air pollutants emitted during repairs. If a Proposed Action would result in a new long-term source of air pollutants, an SEA may need to be prepared. Additionally, protecting infrastructure from flooding would have beneficial effects consistent with the following PR&G principals: healthy and resilient ecosystems, sustainable economic development, and public safety (**Appendix A**).

Project-Specific Measures

Stream Channel Naturalization

In the short term, stream channel naturalization projects would likely have a longer construction period compared to other project types under the Proposed Action. This could result in higher levels of air pollutant emissions compared to other project types within the Proposed Action. Therefore, stream channel naturalization could have a short-term increase in air quality impacts, as compared

to the other project types; although, the adverse impacts would still be expected to be negligible to minor.

4.2.6. 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 can affect species distribution, 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 (GHG) per year. On a regional scale, climate change may cause increased variations in stream levels due to changes in precipitation, water temperature, ice coverage, and evaporation.

EO 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, directed federal agencies to review and address regulations that conflict with national objectives, such as reducing greenhouse gas emissions, strengthening climate resilience, and prioritizing environmental justice (EJ) and public health. CEQ's "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change" was published in the *Federal Register* on January 9, 2023. The new guidance provides best practices for climate change analyses, including actions such as considering GHG emissions and climate change impacts during the identification of alternatives, quantifying a proposed action's projected GHG emissions or reduction using best available data, and providing social cost of GHG estimates to translate climate impacts into a more accessible metric of dollars. Social cost of GHG estimates represent the societal value or cost of GHG emissions changes resulting from actions that impact cumulative global emissions in a small or marginal way. Federal agencies have used social cost of GHG metrics to estimate the impacts of their actions on the climate for over a decade (Harvard Environmental and Energy Law Program 2022).

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, and temperatures are projected to continue increasing across the Midwest at an accelerating rate. In addition to increasing temperatures, climate change is intensifying storms and leading to greater precipitation across the entire region. Between 1901 and 2015, the Great Lakes region experienced an almost 10-percent increase in

annual precipitation. U.S. Global Change Research Program projections indicate that precipitation will continue to increase, especially in the winter and spring seasons (EPA 2014). Climate projections suggest an increased risk of inland flooding, and average annual damage from heightened flooding risk in the Midwest region are projected to rise as a result (U.S. Climate Resilience Toolkit 2019).

Alternative 1 – No Action

Under the No Action alternative, minor mitigation measures could result in minor temporary localized GHG emissions from vehicles and equipment used to implement projects. However, construction activities would not be expected to increase GHG to the extent that they would contribute to regional climate change. As discussed in Section 4.2.5, minor measures would reduce stream bank erosion and flooding, but not to the level of the Proposed Action, requiring continued repair work with associated emissions. Repair activities would also not be expected to increase GHG to the extent that the regional climate would be affected. Therefore, there would be a minor, short-term impact on climate change from repeated repair work. There would be no long-term impact on climate because the minor measures would not create new sources of GHG emissions.

Alternative 2 – Proposed Action

Under the Proposed Action, stream stabilization, minor modifications, and naturalization measures would be constructed and maintained. The Proposed Action would result in temporary GHG emissions from the operation of vehicles and equipment with diesel and gasoline engines. GHG-generating construction activities would be temporary and the BMPs described in Section 4.2.5 would be implemented to reduce emissions from equipment use. Thus, the Proposed Action would have minor short-term impacts related to GHG emissions during construction.

The Proposed Action would not be a long-term source of GHG emissions. The Proposed Action would not increase or exacerbate climate impacts on underserved communities in the project area in the long term. Additionally, the Proposed Action would increase the study area's resilience to climate change impacts (particularly increased precipitation events) by providing flood risk reduction, erosion and scour control, increased infrastructure resilience, and improved floodplain functions. Thus, the Proposed Action would result in minor long-term benefits from stream stabilization and naturalization and increasing community resilience to climate change impacts.

If any project would result in a new long-term source of air pollutants, an SEA would be required.

4.2.7. COASTAL RESOURCES

Congress passed the Coastal Zone Management Act (CZMA) in 1972 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 agencies' actions, within or outside of the coastal zone, to be consistent with enforceable policies of a state's federally approved Coastal Zone Management Program (CZMP) (National Oceanic and Atmospheric Administration [NOAA] 2024a). Projects receiving federal assistance must follow the procedures outlined in 15 C.F.R. §§ 930.90-930.101 for federal coastal zone consistency determinations.

The CZMA outlines three national programs, including the National CZMP, the National Estuarine Research Reserve System (Reserve System), and the Coastal and Estuarine Land Conservation Program (CELCP). The CZMP works to balance issues of competing land and water uses 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 the CELCP provides matching funds to state and local governments to purchase threatened coastal and estuarine lands or obtain conservation easements (NOAA 2024b). Projects occurring on federal lands within the Reserve System or funded by CELCP would not be eligible for FEMA funding.

The CZMA provides a partnership between states and NOAA to implement state-specific CZMPs. The CZMPs 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.

Each state covered in this PEA has federally approved CZMPs with missions to protect property and ecologically important habitats along the coastal shoreline and to minimize the dangers of erosion to human life and development. The programs may include setback regulations for building along the coastal shoreline that account for local erosion rates. Each state's CZMP is briefly summarized below:

Illinois: The Illinois DNR Illinois Coastal Management Program manages the Illinois CZMP, which is dedicated to protecting and enhancing the environmental, economic, and social values of the Illinois Great Lakes coastal region. The coastal zone designated boundary generally follows watershed boundaries but is based in some areas on regional transportation networks such as roads, streets, highways, and railroads that provide an easily recognizable boundary. The Illinois CZMP has four primary goals: (1) protecting and improving coastal habitats, (2) supporting and facilitating resource-related coastal economic development, (3) helping coastal communities improve their capacity to protect natural, cultural, and economic resources, and (4) improving, refining, and administering the CZMP to provide the most effective and responsive implementation of coastal resource management (Illinois DNR 2024b).

Indiana: The Indiana DNR manages the Indiana Lake Michigan Coastal Program's CZMP, which is dedicated to protecting and enhancing coastal resources by providing technical and financial assistance and coordination to current and future partners. The coastal zone designated boundary is generally defined by watershed boundaries as well as practical landmarks, and ranges from a minimum of 2 miles from the shoreline to a maximum of 17 miles from the shoreline. The CZMP's goals and objectives include: (1) informing coastal decision-makers about coastal resources, issues, and values, (2) ensuring that the program's resources are used for planning and implementing projects that will restore and protect coastal areas, and (3) helping partners take action by sharing information and guidance (Indiana DNR 2024a).

Michigan: The Michigan EGLE Michigan Coastal Management Program manages the Michigan CZMP. The coastal zone boundary in Michigan generally includes the areas within 1,000 feet of Lakes Michigan, Superior, Huron, and Erie, their connecting channels, all waters and bottomlands of

Michigan's Great Lakes and connecting channels, and islands in those waters. The inland boundary extent varies in some locations to appropriately accommodate coastal resources such as coastal lakes, river mouths and embayments, floodplains, wetlands, dunes, urban areas, public parks, and other recreation/natural areas (EGLE 2017). The current objectives of the CZMP include: (1) providing increased assistance at the state and local level for creative solutions to coastal issues and problems, (2) minimizing program duplication and conflict, (3) improving enforcement and streamlining permit processes, and (4) providing opportunities for citizens and other public and private interests to become involved in coastal management (EGLE 2019).

Minnesota: The Minnesota DNR Minnesota Lake Superior Coastal Program manages the operation of the Lake Superior CZMP, which provides technical and financial resources for the local community to preserve, protect, develop, and, where possible, restore or enhance coastal resources along Minnesota's North Shore of Lake Superior. The Minnesota coastal boundary follows the nearest legal coastal township along the shore, or approximately six miles inland. In the metropolitan area around Duluth, the coastal area fully encapsulates the cities of Duluth, Hermantown, Proctor, Carlton, Wrenshall, and Cloquet (Minnesota DNR 1999).

Ohio: The DNR Ohio Coastal Management Program manages the Ohio CZMP, which 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 Ohio coastal zone includes all shorelands subject to erosion or flooding, estuarine areas and wetlands, and other areas in which activities would have the potential to affect Lake Erie directly and significantly. The inland extent of the boundary varies based on the biogeographic features of the area. The CZMP identifies six areas of strategic emphasis to guide program initiatives and activities: (1) water resources and watersheds, (2) coastal land use and development, (3) coastal habitat, wetlands and natural areas, (4) coastal flooding and erosion, (5) recreational opportunities, and (6) fisheries and wildlife resources (Ohio DNR 2007).

Wisconsin: The Wisconsin Department of Administration Wisconsin Coastal Management Program manages the Wisconsin CZMP, which preserves, protects, develops, and restores or enhances the coastal resources in Wisconsin. The Wisconsin coastal zone includes the areas from the state boundary landward to the inland boundary of the 15 counties with frontage on Lake Superior, Lake Michigan, and Green Bay. The CZMP's objectives include: (1) improving implementation and enforcement of existing state regulatory and management policies and programs affecting coastal uses and areas, (2) improving the coordination of existing policies and activities of governmental units and planning agencies on matters affecting key coastal uses and areas, (3) strengthening local government capabilities to initiate and continue effective coastal management consistent with identified state standards and criteria, (4) providing a strong voice to advocate for the wise and balanced use of the coastal environment, and (5) increasing public awareness and opportunities for citizens to participate in decisions affecting the Great Lakes resources (Wisconsin Department of Administration 2024).

Affected Environment

Intermittent and perennial streams occur within the coastal zones designated within each state. The condition and quality of the resource within any particular project area is expected to vary based on where the project would be located. The study area includes the full range of coastal conditions from natural, undisturbed areas 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 along Lake Superior are likely to be remote and undisturbed, whereas areas along Lake Erie and Lake Michigan are likely to be more urbanized with residential and commercial developments close to or right up to stream shorelines.

Alternative 1 – No Action

Under the No Action alternative, some minor efforts to construct stream mitigation activities may occur, but they would occur without FEMA funding. Therefore, there could be negligible to minor short-term impacts on water quality in coastal zones from the construction of minor efforts, as described in Section 4.2.2. Construction of minor efforts may also result in short-term road closures, which could have negligible to minor impacts on transportation and recreation access in coastal zones. Portions of the study area within coastal zones would still be subject to erosion, scouring, and flooding resulting from the unmitigated effects of flowing water and storm and flood events. As described previously, each states' CZMP outlines several priorities, including reducing coastal hazards, supporting economic development and recreation, and improving water quality and wildlife habitat. The No Action alternative may not be consistent with state CZMPs because there would be no larger projects able to provide coordinated protection, restoration, or creation of coastal resources within the study area. Continued erosion, scour, and flooding along streams within coastal zones could result in the loss of coastal resources by damaging infrastructure and impacting water quality, wildlife habitat, and fisheries (Section 4.3). Ongoing flooding may result in the closure of roadways or recreational facilities, which could impact recreational use of coastal zones. Therefore, the No Action alternative would have a negligible to minor long-term impact on coastal resources, depending on specific site conditions, and the extent and duration of continued erosion and flooding.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

Projects within the coastal zone could result in negligible to minor short-term impacts on coastal resources from construction activities. Any activities associated with the Proposed Action occurring in designated coastal zones would require consultation with the appropriate state agency responsible for implementing the relevant CZMP. Favorable determinations of consistency with the CZMA and compliance with state and federal permits would ensure that potential impacts on coastal resources would not exceed a moderate level. Potential temporary impacts during construction include a reduction in water quality, disturbance of wildlife habitat, and/or slightly reduced access to recreational areas due to construction-related road closures.

As described in Section 4.2.2, the Proposed Action is expected to reduce non-point source contamination from erosion, sedimentation, and receding floodwaters, thus improving water quality downstream of the project areas. Because many of the streams and rivers within the study area drain into coastal zones (or into other streams that themselves terminate in coastal zones), the improvements in water quality within streams in individual project areas are likely to result in improvements in water quality within coastal zones. Because implementation of the Proposed Action is expected to reduce impacts on coastal resources from continued erosion, scour, and flooding, the Proposed Action could also benefit wildlife habitats and fisheries and improve the reliability of access to existing recreational areas within coastal zones. Therefore, projects within, and upstream of, coastal zones are generally expected to have negligible to minor beneficial effects on coastal resources in the study area. The benefits that would be provided by the Proposed Action are expected to support the goals and priorities outlined in many of the states' CZMPs.

Rigid and Semirigid Armoring

Rigid and semirigid armoring projects would result in reduced channel roughness, causing flow velocity to increase and biodiversity in localized portions of the channel to decrease, as described in Section 3.4.2. These potential impacts could be reduced by using wall and geogrid systems that allow for planting or are otherwise designed to provide habitat improvements. Therefore, these projects could have long-term, negligible adverse impacts on aquatic habitats and biodiversity in coastal zones.

Bioengineering

Implementing nature-based stream stabilization techniques is expected to improve water quality within individual project areas and downstream in coastal areas, as natural plantings are expected to absorb and filter pollutants into the soil (described in Section 4.2.2). Bioengineered projects are also expected to improve the quality of terrestrial and aquatic habitats within and adjacent to individual project areas in coastal zones through planting new vegetation (described in Sections 4.3.1 and 4.3.2).

Stream Channel Naturalization

Stream naturalization projects would likely require more ground disturbance in the short term as compared to other project types and may also require temporary dewatering. There could be minor temporary impacts on water quality associated with construction of stream naturalization projects occurring upstream of or within coastal areas. Additionally, these projects would implement conditions included in any permits issued for the projects, as described in Section 4.2.2. Because these projects would likely be designed to reduce stream velocity, they are expected to reduce flooding and increase water storage in the long term. As described in Section 4.3.2, these projects would restore streams and drainage channels to more natural states; therefore, they are expected to have benefits on local aquatic habitat in coastal zones.

4.3. Biological Environment

4.3.1. VEGETATION AND INVASIVE SPECIES

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 caused by invasive species. EO 13112 defines invasive species as alien species whose introductions do or are likely to cause economic or environmental harm or harm to human health, including noxious weed plant species. Invasive plants are capable of altering an area's diversity for both plant and animal life by dominating areas where they have become established and crowding out native vegetation (U.S. Forest Service 2024). 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.

Affected Environment

Vegetation refers to all plants and trees that occur within the study area. Vegetation composition varies greatly between habitats and microhabitats depending on environmental conditions (including water availability, soil type, temperature and sunlight exposure, etc.). Because the study area encompasses the areas within up to 500 feet of streams and rivers, vegetation in the study area is expected to be dominated by species that can tolerate saturated soils and occasional flooding (i.e., riparian vegetation). Riparian tree species likely to occur in the study area include willow (*Salix* spp.), river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), cottonwood (*Populus sect. Aigeiros*), hackberry (*Celtis occidentalis*), sweet gum (*Liquidambar styraciflua*), green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*), and silver maple (*Acer saccharinum*) (Indiana Division of Fish and Wildlife 2004). Emergent herbaceous plants and grasses that are native to the study area include sweet flag (*Acorus calamus*), water plantain (*Alisma subcordatum*), river bulrush (*Scirpus fluviatus*), arrowhead (*Sagittaria latifolia*), big bluestem (*Andorpogon gerardii*), and bluejoint grass (*Calamagrostis canadensis*) (Lake County Stormwater Management Commission 2014).

Invasive plant species commonly found in riparian areas along streams and drainages in the Midwest include buckthorn (*Rhamnus* spp.), reed canary grass (*Phalaris arundinacea*), phragmites (*Phragmites* spp.), tree-of-heaven (*Ailanthus altissima*), and more (National Park Service [NPS] 2023).

EPA has developed a system of ecoregions to inventory and assess national and regional environmental resources and to structure and implement ecosystem management strategies across federal agencies, state agencies, and nongovernmental organizations. Ecoregions are areas where the type, quality, and quantity of environmental resources are generally similar; they are identified by analyzing the patterns and composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality (EPA 2023a). These ecoregions provide a high-level view of the vegetation and general ecosystem characteristics within their footprints. The study area overlaps 18 EPA-designated Level III ecoregions, as shown in **Figure 4-4** and described in **Table 4-5**.

Alternative 1 – No Action

Under the No Action alternative, minor measures to reduce erosion, scour, and flooding within the study area may occur. These activities could cause a short-term minor to moderate localized effect on vegetation from ground disturbance and possible riparian vegetation removal, which could alter the composition of the vegetative community and result in the introduction or spread of invasive species. The removal of riparian vegetation could also result in stream banks becoming destabilized, which could increase the potential for erosion and scour to continue or worsen. Because the risk of erosion, scour, and flooding in the study area would not be substantially abated under the No Action alternative, the continued loss of soils along streams and rivers from periodic flooding could result in the loss of existing vegetation established in those soils or a reduction in the availability of suitable habitat for vegetation to colonize. Vegetation functions to hold soils in place, so the loss of vegetation along stream banks could accelerate the problem of stream bank erosion over time. Additionally, the resulting deposition of sediment around river, estuarine, and coastal areas may smother vegetation in and near project sites. The deposition of sediment downstream of project areas could result in the loss of wetland and riparian vegetation and the exposed soils could create conditions conducive to colonization by invasive plant species, which typically thrive in disturbed areas. Therefore, the No Action alternative would have long-term, negligible to minor, adverse impacts, depending on the local extent of erosion, vegetation loss, and spread of invasive species.

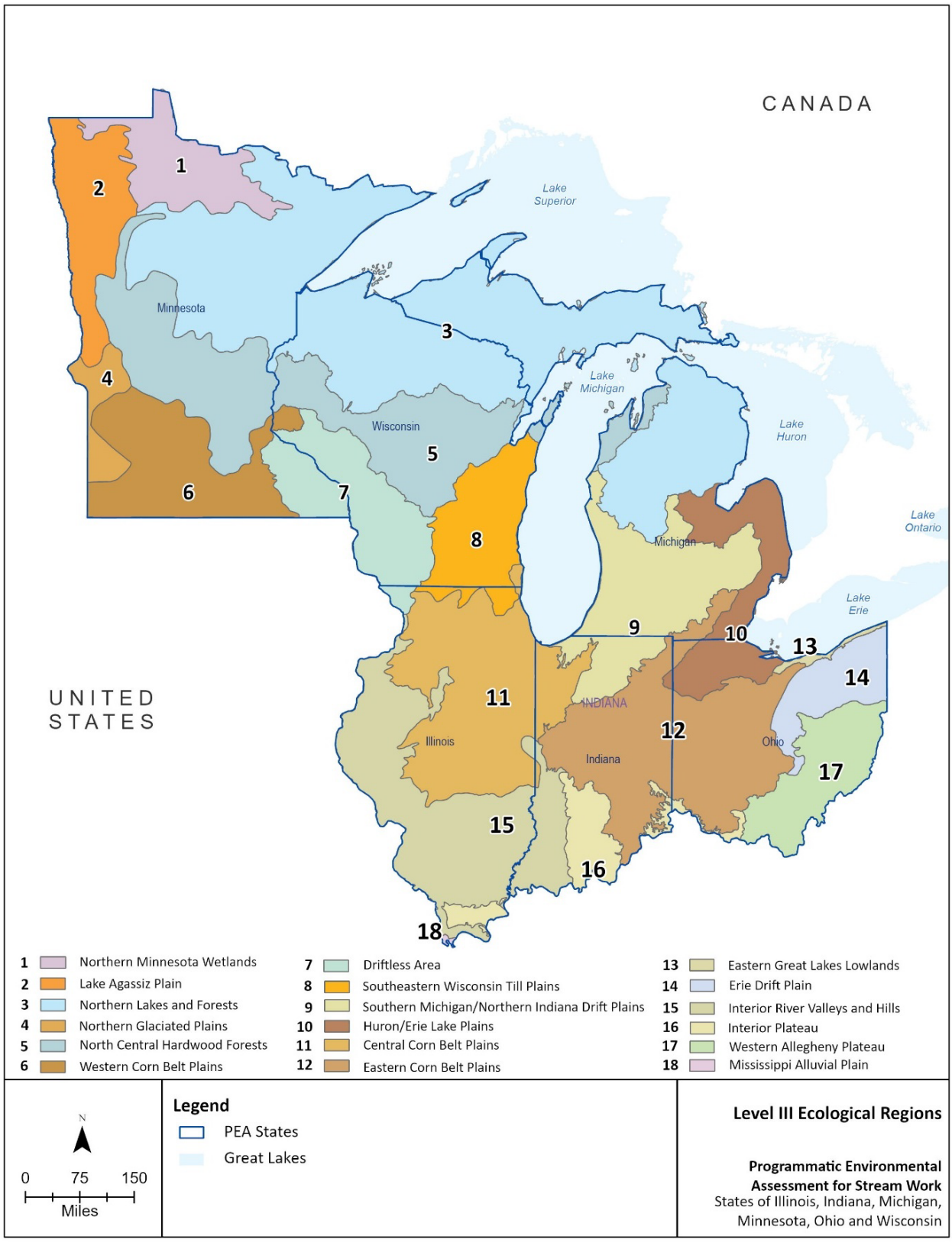


Figure 4-4. Level III Ecoregions

Table 4-5. Level III Ecoregions within the Study Area

Level III Ecoregion	State(s)	Area (Acres)	Percentage of Total Area	Description of Vegetation and Other Ecosystem Features
Northern Lakes and Forests	Michigan, Minnesota, Wisconsin	47,415,400	22.3	Characterized by coniferous and northern hardwood forests, morainal hills, broad lake basins, and extensive sandy outwash plains. Soils are relatively nutrient-poor. Areas have lower annual temperatures and a shorter frost-free period than ecoregions to the south.
North Central Hardwood Forests	Michigan, Minnesota, Wisconsin	21,970,023	10.3	Transitional area between the Northern Lakes and Forests ecoregion and the warmer, mostly agricultural ecoregions to the south. Land cover consists of a mosaic of forests, wetlands and lakes, cropland agriculture, pasture, and dairy operations. The topography ranges from nearly level to rolling till plains.
Eastern Corn Belt Plains	Indiana, Michigan, Ohio	21,462,957	10.1	Historically, this ecoregion was dominated by beech (*Fagus* spp.), maple (*Acer* app.), and basswood (*Tilia americana*) forests. However, now this area is dominated by extensive corn (*Zea mays*), soybean (*Glycine max*), and livestock production.
Interior River Valleys and Hills	Illinois, Indiana	20,907,437	9.8	Natural vegetation likely included oak (*Quercus* spp.) – hickory (*Carya* spp.) forests, beech – maple forests, and bluestem prairies. Today, approximately 30 percent of the ecoregion is pastureland, less than half is cropland, and the rest is forest. Forests are typically found in steeper areas.
Central Corn Belt Plains	Illinois, Indiana, Wisconsin	18,905,973	8.9	While these areas were historically dominated by tallgrass prairies, the area is now dominated by extensive cropland and livestock farming. The main crops grown are corn and soybeans. Agriculture has affected stream chemistry, turbidity, and habitats in the ecoregion.
Southern Michigan/ Northern Indiana Drift Plains	Indiana, Michigan	13,105,269	6.2	Vegetation comprises oak-hickory forests, northern swamp forests, and beech forests. Feed grain, soybean, and livestock farming are common. Woodlots, quarries, recreational developments, and urban-industrial areas are also common.

Level III Ecoregion	State(s)	Area (Acres)	Percentage of Total Area	Description of Vegetation and Other Ecosystem Features
Western Corn Belt Plains	Minnesota, Wisconsin	10,777,948	5.1	Although historically dominated by tallgrass prairie, now more than 75 percent of this ecoregion is used for cropland agriculture, and much of the remaining area is in forage for livestock. Topography ranges from nearly level to gently rolling till plains and hilly loess plains. Fertile, warm, and moist soils support corn and soybean crops.
Driftless Area	Illinois, Minnesota, Wisconsin	9,925,051	4.7	Topography in this ecoregion is hilly, differentiating it from the surrounding ecoregions. Land cover includes agriculture within the upland areas and oak forests and savannas, prairie grassland areas, and sugar maple (*Acer saccharum*)-basswood-oak forests.
Huron/Erie Lake Plains	Indiana, Michigan, Ohio	7,807,234	3.7	Historically, vegetation was dominated by elm (*Ulmus* spp.) – ash (*Fraxinus* spp.) swamp and beech forests. Now, much of the area has been cleared and artificially drained and supports crops including corn, soybeans, and other vegetables. Urban and industrial areas are also extensive.
Southeastern Wisconsin Till Plains	Illinois, Wisconsin	7,746,839	3.6	This ecoregion historically supported a diversity of vegetation types including oak savanna, bluestem prairie, maple-basswood forest, and oak-hickory forest. Currently, more than half the ecoregion is used for agriculture and the remaining areas comprise forests, wetlands, and residential developments.
Western Allegheny Plateau	Ohio	7,604,318	3.6	Topography within this ecoregion is hilly, and vegetation is dominated by mixed mesophytic forests and mixed oak forests. Although the ecoregion is still dominated by forest vegetation, some land within it has been converted for dairy, livestock, general farm, and residential use.
Lake Agassiz Plain	Minnesota	6,608,790	3.1	Areas historically dominated by tallgrass prairie within this ecoregion have been replaced by agriculture lands supporting corn, soybeans, and sugar beets (*Beta vulgaris ssp. vulgaris*). Topography in this ecoregion is relatively flat.

Level III Ecoregion	State(s)	Area (Acres)	Percentage of Total Area	Description of Vegetation and Other Ecosystem Features
Northern Minnesota Wetlands	Minnesota	5,641,178	2.7	Topography within this ecoregion is nearly level. This ecoregion is sparsely inhabited by humans and is dominated by conifer bog, mixed forest, and boreal forest ecosystems. Formerly dominated by broad glacial lakes, much of this ecoregion is still inundated with standing water.
Interior Plateau	Illinois, Indiana, Ohio	5,083,320	2.4	Dominated by oak-hickory forest. The topography is characterized by rugged hills that contain bluffs, ravines, and karst features. Pastureland, hayland, limestone glades, and some cropland also occurs within portions of the ecoregion.
Erie Drift Plain	Ohio	4,979,164	2.3	Land cover within this ecoregion comprises urban and industrial development, agriculture, and some scattered woodlands. Terrain ranges from level to rolling hills. Soils are generally lower in carbonate and less fertile than other glaciated ecoregions. Lakes, wetlands, and swampy streams occur in flat, clayey portions of the ecoregion.
Northern Glaciated Plains	Minnesota	2,268,300	1.1	Characterized by a flat to gently rolling landscape. Soils are fertile, however agricultural success is subject to annual climatic variations. The land cover is dominated by corn and soybeans, and the remaining areas are dominated by pastureland and grassland.
Eastern Great Lakes Lowlands	Ohio	423,423	0.2	Land cover includes orchards, vineyards, and vegetable farming as well as dairy operations. The portion of this ecoregion in Ohio experiences an increased growing season, more winter cloudiness, and greater snowfall than the portions of this ecoregion in Pennsylvania.
Mississippi Alluvial Plain	Illinois	74,527	0.0	Characterized by a nearly flat alluvial plain that extends along the Mississippi River from southern Illinois to the Gulf of Mexico. Although previously dominated by bottomland deciduous forests and swamps, the ecoregion has been mostly cleared for cultivation and now cropland is the dominant land cover type. Soybeans, corn, and wheat (*Triticum aestivum*) are the main crops grown in the ecoregion.

Source: EPA 2023a

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

Stream mitigation projects implemented under the Proposed Action would have short-term, minor to moderate impacts on vegetation during and immediately following construction. Equipment and vehicles used during construction could disturb riparian vegetation and compact soils, and certain construction activities may require vegetation removal. The removal of riparian vegetation could also result in stream banks becoming destabilized, which could increase the potential for erosion and scour to continue or worsen. However, any periods of bank destabilization would be short-term, as the purpose of the proposed activities is to stabilize stream banks. Furthermore, temporarily disturbed areas would be reseeded or replanted with native vegetation to mitigate any long-term impacts from construction disturbance. Project work would adhere to the respective project's state invasive species management plan or regulations when applicable.

In the long term, stream mitigation projects are expected to reduce erosion, scour, and flooding along streams. Reducing erosion and scour along streambanks could decrease the potential for existing riparian vegetation to be lost with eroded soils, reducing the availability of disturbed areas in which invasive species could establish. Projects under the Proposed Action would remove non-native invasive plants from project areas when practicable. Therefore, the Proposed Action would have long-term, negligible to minor, beneficial effects on vegetation in the study area.

In-Stream Structures, and Loose Stone and Riprap

As described in Section 3.2, many of these measures are likely to occur in conjunction with native vegetation planting to achieve maximum erosion control. These measures would potentially create conditions that allow for aggradation and subsequent vegetation establishment (U.S. Department of the Interior Bureau of Reclamation 2015). Although installing loose stone and riprap would inhibit vegetation establishment in the short-term, project designs would likely incorporate mitigation including revegetating above the OHWM as needed to promote the establishment of native vegetation over invasive species.

Bioengineering

As described in Section 3.2.5, bioengineered stream mitigation measures would accomplish bank stabilization and erosion reduction through either vegetation establishment alone or through a combination of vegetation and construction materials. Vegetation that would be planted in service of bioengineered projects would be native. FEMA anticipates that bioengineered stream mitigation measures would have added beneficial effects on vegetation resulting from an increase in native vegetation and streambank stability that supports vegetation in project areas.

Stream Channel Naturalization

The construction of stream channel naturalization measures would require ground disturbance that may necessitate riparian vegetation removal or disturbance. Although some areas requiring vegetation removal would be inundated by the stream following construction, most disturbed areas disturbed would be reseeded or revegetated with native plants following implementation of the

project. Many stream channel naturalization project designs are also expected to incorporate native vegetation planting. Thus, while these projects are expected to have minor to moderate short-term impacts from the increased ground-disturbing activities, they are expected to have long-term minor beneficial effects on vegetation.

4.3.2. 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 species are evaluated separately in Section 4.3.3.

The MBTA of 1918, as amended, 16 U.S.C. §§ 703–712, protects migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions. All native birds, including common species, are protected by the Migratory Bird Treaty Act. A migratory bird is any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. Projects that are likely to result in the purposeful taking of birds protected under the MBTA would require the issuance of permits from the USFWS. The nesting season for migratory birds in the Great Lakes region is generally spring to fall.

The Bald and Golden Eagle Act (BGEPA) of 1940, 16 U.S.C. §§ 668 *et seq.*, prohibits the take, possession, sale, or other harmful action of any golden eagle (*Aquila chrysaetos*) or bald eagle (*Haliaeetus leucocephalus*), alive or dead, including any part, nest, or egg (16 U.S.C. § 668(a)). The BGEPA 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.

As described in Section 4.3.1, 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. Each state designates invasive species and has adopted regulations regarding the sale, spread, and control of invasive species.

Affected Environment

Given that the study area encompasses streams and their adjacent riparian corridors (up to 500 feet from the stream), the study area includes both aquatic and terrestrial habitats that have potential to support a diversity of fish and wildlife species. The aquatic and terrestrial resources that are expected to occur within the study area are described below.

Aquatic Habitat and Species

Aquatic habitat resources in the study area include freshwater streams, wetlands, and portions of lakes and ponds. More than 100 fish species, including sturgeons (Acipenseridae), lampreys (Petromyzontidae), carps and minnows (Cyprinidae), trouts and salmons (Salmonidae) occur within the study area and the abutting Great Lakes. Common species include largemouth bass

(*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), crappie (*Pomoxis* spp.), bluegill (*Lepomis macrochirus*), and steelhead (*Oncorhynchus mykiss*) (Illinois Natural History Survey 2021; Indiana DNR 2024b; Michigan DNR 2024a; Minnesota DNR 2024a; Ohio DNR 2024a; and Wisconsin DNR 2024). Freshwater mollusks, including mussels, clams, and snails, are also found within the study area. Common reptiles and amphibians that may use aquatic habitats in the study area include the painted turtle (*Chrysemys picta*), northern water snake (*Nerodia sipedon*), American toad (*Anaxyrus americanus*), common garter snake (*Thamnophis sirtalis*), American bullfrog (*Lithobates catebeianus*), green frog (*Lithobates clamitans*), eastern red-backed salamander (*Plethodon cinereus*), and wood frog (*Lithobates sylvaticus*) (iNaturalist 2024). Mammals, including river otters (*Lontra canadensis*) and muskrats (*Ondatra zibethicus*), may also use aquatic habitats within the study area, as well as birds such as mallards (*Anas platyrhynchos*) and Canada geese (*Branta canadensis*) (iNaturalist 2024). Listed threatened and endangered species that may use aquatic habitats within the study area are discussed separately in Section 4.3.3.

Aquatic invasive species of concern include zebra mussels (*Dreissana polymorpha*), Chinese mystery snail (*Cipangopaludina chinensis*), Asiatic clam (*Corbicula fluminea*), and marbled crayfish (*Procambarus virginalis*) (Indiana DNR 2024c; Wisconsin DNR 2015; Michigan Invasive Species 2024).

Terrestrial Habitat and Species

Terrestrial habitat resources within the study area include stream banks and the areas within 500 feet of streams. Typical vegetation found within the study area is described in Section 4.3.1. Although much of the study area and surrounding areas have been developed, a diversity of wildlife species persists in both the developed and more natural terrestrial environments within the study area. Hundreds of bird species occur within the study area; common species include the white-throated sparrow (*Zonotrichia albicollis*), red-winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaida macroura*), hairy woodpecker (*Leuconotopicus villosus*), eastern bluebird (*Sialia sialis*), great blue heron (*Ardea herodias*), and red-shouldered hawk (*Buteo lineatus*) (Indiana Audubon 2022; Audubon Great Lakes 2024; and iNaturalist 2024). As mentioned in Section 4.3.2, all native birds, including common species, are protected by the Migratory Bird Treaty Act.

Common mammals expected to occur within the terrestrial portions of the study area include the eastern gray squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*), gray fox (*Urocyon cinereoargenteus*), cougar (*Puma concolor*), and little brown bat (*Myotis lucifugus*) (Michigan DNR 2024b; Minnesota DNR 2024b; and Ohio DNR 2024b). As mentioned previously, bald eagles also have potential to breed in the study area. Additionally, many of the reptiles, amphibians, mammals, and birds described in the preceding Aquatic Resources section also use and require suitable terrestrial habitat adjacent to aquatic habitats.

Bald eagles require habitats that have perching areas and nesting sites and that support an adequate prey base. Bald eagles often occur near estuaries, large lakes, reservoirs, and rivers, although they are increasingly being found in drier areas that are farther from water sources such as in farmlands and suburban and urban habitats (USFWS 2024b). Bald eagles have moderate potential to occur within and adjacent to the study area, based on a review of recent occurrence data and the general habitat conditions within the study area (Cornell Lab of Ornithology 2024a). Golden eagles are typically found in areas of open land near hills, cliffs, and bluffs. Golden eagles are known to be sensitive to human activity and tend to avoid more developed areas. A review of species occurrence data indicates that golden eagles have low to moderate potential to occur within portions of the study area that provide suitable habitat (Cornell Lab of Ornithology 2024b). Bald eagles occur year-round and breed within the study area, while golden eagles migrate through and overwinter in the study area.

Terrestrial invasive species of concern within the study area include the mountain pine beetle (*Dendroctonus ponderosae*), feral pigs (*Sus scrofa*), jumping worms (*Amynthas agrestis*), emerald ash borer (*Agrilus planipennis*), Asian longhorned beetle (*Anoplophora glabripennis*), and spotted lanternfly (*Lycorma delicatula*) (Indiana DNR 2024c; Wisconsin DNR 2015; Michigan Invasive Species 2024).

Alternative 1 – No Action

Because some minor stream mitigation measures may occur under the No Action alternative, there could be some negligible to minor short-term impacts on fish and wildlife species (including migratory birds and eagles) from construction-related noise, vibration, ground disturbance, vegetation removal, and in-water work. These impacts could result in temporary habitat loss, changes in individuals' behavior, and/or mortality or injury of individuals present during construction work. Implementation of minor mitigation projects without systematic coordination could result in a larger number of piecemeal projects and therefore greater frequency of disturbances associated with construction and maintenance that might affect multiple breeding seasons as compared to a larger coordinated project that might affect only one or two breeding seasons. Any minor stream mitigation measures implemented would likely occur in or near developed areas. Thus, any fish and wildlife species (including migratory birds and eagles) choosing to inhabit project areas are likely to be somewhat acclimated to human noise and activities. However, because existing habitat is already scarce in developed areas, even small disturbances within available habitat may result in adverse effects on wildlife species occupying it.

In the long term, hazards including stream bank erosion, scouring, and flooding would not be substantially mitigated. As described in Section 4.2.2, continued stream bank erosion, scouring, and flooding would continue to allow pollutants and sediments to enter aquatic habitats, which could reduce water quality within and near the study area. Reduced water quality could adversely affect fish, freshwater mollusks, and other taxa that rely on aquatic habitats. Additionally, continued erosion and scour of stream banks could create disturbed areas within the stream channels that are conducive to colonization by invasive aquatic species. Similarly, the quality of terrestrial habitats within the study area is expected to be reduced, as native vegetation along streams may be

damaged or removed from continued stream bank erosion. As described in Section 4.3.1, disturbed terrestrial areas may be more readily colonized by invasive species, resulting in reduced species diversity and creating habitat conditions that are generally less suitable for many wildlife species. Therefore, the No Action alternative is expected to have minor to moderate long-term impacts on fish and wildlife species reliant on the aquatic and terrestrial habitats in the study area.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

During construction, the use of vehicles and equipment could result in the injury or death of individuals present during project implementation; however, implementing appropriate measures such as preconstruction surveys and installing exclusionary fencing when deemed necessary could reduce the potential for harm. Project-related disturbances could result in altered or disrupted foraging, breeding, or resting behaviors that could affect the health of species and populations. However, the duration of each project activity in any one location would be limited. Additionally, the purpose of FEMA-funded projects is to protect infrastructure; therefore, projects that would be implemented under the Proposed Action are likely to occur in or near developed areas. Thus, any fish and wildlife species (including migratory birds and eagles) choosing to inhabit project areas are likely to be somewhat acclimated to human noise and activities. However, because existing habitat is already scarce in developed areas, even small construction disturbances within available habitat may result in adverse effects on wildlife species occupying it.

Project work would adhere to the respective project's state invasive species management plan or regulations when applicable. Should a project require in-water work, impacts on aquatic species may be minimized or mitigated by seasonal restrictions for in-water work as well as adherence to other construction-related measures, including silt fences or coffer dams to decrease runoff and turbidity and bubble curtains to restrict underwater noise levels. Project work would adhere to any relevant conditions prescribed in project-specific permits or agency consultations.

The use of motorized vehicles and equipment during a project could have minor impacts on nesting birds protected by the MBTA. To minimize potential impacts, vehicles and equipment should access project areas using existing roads whenever possible, and project activities should be timed to avoid the breeding season whenever possible. Projects that involve vegetation removal have a greater potential to adversely affect nesting migratory birds. Projects would have minor to moderate impacts on nesting migratory birds if vegetation removal work were to occur during nesting seasons. Should a project need to be conducted during the migratory bird nesting 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 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 or golden eagle nests or roost sites are identified in a project area, consultation with USFWS would be required to establish appropriate buffers and actions to protect sites and the subapplicant would be responsible for obtaining an eagle disturbance permit if necessary. Typical mitigation measures include establishing seasonal limits on vegetation clearing activities, retaining nest trees, establishing buffers around nest trees or roosts, and implementing the USFWS Bald Eagle Management Guidelines.

Therefore, with the implementation of the measures described above, FEMA expects that short-term impacts on fish and wildlife species, including migratory birds and eagles, would range from negligible to moderate.

Projects that would require vegetation removal would result in long-term impacts through the loss of habitat for wildlife species. Although many projects under the Proposed Action would require disturbed areas to be replanted, they would still result in a loss of habitat until the replacement vegetation becomes established and matures, which could be many years. In many cases, projects would replace non-native or invasive vegetation with native plant species that have higher value as wildlife habitat in the long term. Additionally, implementation of projects under the Proposed Action would be expected to reduce the occurrence of future stream bank erosion, scouring, and flooding within the project area, which would improve water quality within aquatic habitats (Section 4.2.2) and improve terrestrial habitats by allowing native plants established along stream banks to persist (Section 4.3.1). Therefore, the Proposed Action is expected to improve aquatic and terrestrial habitats in the long term and result in minor to moderate beneficial effects on fish and wildlife that rely on those habitats.

In-Stream Structures

As described in Section 4.2.2, the installation of in-stream structures achieves a secondary goal of improving aquatic habitat by creating flow diversity through the formation of scour pools and deep holes. Flow diversity within streams and rivers mimics natural stream conditions and provides microhabitats that can be used by aquatic organisms in varying life stages. For example, scour pools and deep holes can provide refuge for juvenile and adult fish and aquatic invertebrates during high-flow events (U.S. Forest Service 2021). Additionally, in-stream structures allow plants to establish naturally along banks and in the voids between stones. Roots from established vegetation along a stream bank can provide additional microhabitat for aquatic organisms, and shade generated from the trees and vegetation along a stream bank helps to maintain cooler water temperatures.

Loose Stone and Riprap

FEMA anticipates that the long-term impacts of riprap and loose stone on aquatic habitats and organisms will vary depending upon site conditions; riprap toe protection is expected to have minor localized impacts on aquatic habitat in areas adjacent to roads, infrastructure, and buildings, and moderate localized impacts on aquatic habitat in less-developed areas. In sites that have already been degraded by intensive land uses and previous embankment hardening, certain kinds of riprap can improve aquatic habitat quality by providing habitat diversity particularly beneficial for juvenile fish and other aquatic invertebrates (Quigley and Harper 2004). However, in some sites, riprap has

been found to limit the potential for large woody debris and gravel recruitment and the natural fluvial processes that many aquatic species depend on. In these cases, bioengineering and mitigation such as including spurs and groins in the project design, lowering the angle of the riprap slope, and planting riparian vegetation can reduce the potential for adverse impacts (Quigley and Harper 2004).

Rigid and Semirigid Armoring

Underwater noise, vibration, and turbidity from pile driving during bulkhead installation could have additional short-term impacts on aquatic habitats and the species that rely on them. However, adherence to any relevant permit conditions and seasonal work restrictions would be required; thus, FEMA does not expect short-term impacts on fish and wildlife to exceed a moderate level. In the long term, placement of bulkheads may also reduce sessile species diversity, and there is potential for invasive mollusks to colonize areas of hard surface that are introduced within a stream (EPA 2009). Rigid and semirigid armoring materials typically have fewer voids between stones or masonry units than stacked stone, pinned toe stone, timbers, and other materials and therefore have fewer surfaces for native aquatic vegetation or sessile organisms to attach. This reduced roughness along the stream bank may also increase flow velocity in the stream. These potential impacts could be reduced by using wall and geogrid systems that allow for planting or are otherwise designed to provide habitat improvements.

Bioengineering and Stream Channel Naturalization

In the long term, bioengineered projects are expected to result in an increase in native riparian plant coverage within project areas, which would reduce the likelihood of colonization by invasive plant species. Well-established native riparian vegetation improves terrestrial and aquatic habitats in the long term because it provides shelter, shade, food, cover, bank stabilization, and other benefits (U.S. Forest Service 2007; NPS 2022). Stream channel naturalization measures would decrease flow velocity in the stream channel and may add habitat diversity within the aquatic habitats in the stream channel. The benefits of bioengineered and stream channel naturalization projects can be especially valuable in sites that are currently heavily developed,degraded, and block fish passage.

4.3.3. THREATENED AND ENDANGERED SPECIES

The Endangered Species Act (ESA) of 1973, 16 U.S.C. §§ 1531–1544, provides a framework for the conservation of endangered and threatened species and their habitats. The lead federal agencies for implementing the ESA are USFWS and National Marine Fisheries Service (NMFS). Federal agencies are required to ensure that actions they fund, authorize, or carry out are not likely to jeopardize the continued existence of any listed species (including plant species) or result in the destruction or adverse modification of designated critical habitats for such species. The ESA also prohibits any action that causes a "take" of any listed species. The term "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, capture, or collect, or to attempt to engage in any such conduct."

Affected Environment

Based on a review of the USFWS Information for Planning and Consultation tool conducted in February 2024, there are 63 federally listed species and 3 species proposed for listing that have the

potential to occur within the states covered by this PEA, as summarized **Table 1** in **Appendix B** (USFWS 2024d). Of these 66 listed and proposed species, 6 are mammals, 4 are birds, 3 are reptiles, 2 are fish, 20 are clams, 1 is a snail, 8 are insects, 1 is a crustacean, 20 are flowering plants, and 1 is a fern (**Appendix B**; USFWS 2024d). All of the federally listed or proposed species with the potential to occur in the study area are under USFWS's jurisdiction; no federally listed species under NMFS's jurisdiction have potential to occur in the study area (NMFS 2022). The study area overlaps designated critical habitat areas for 12 species, as summarized in **Table 1** in **Appendix B**.

Because the study area only encompasses stream and riparian habitats, the potential for the species described in **Appendix B** to occur within the study area varies based on the species' habitat requirements. For example, federally listed clam species are expected to have higher potential to occur in the study area than other species with more specialized habitat requirements that occur infrequently in streams and riparian areas.

Alternative 1 – No Action

Under the No Action alternative, non-FEMA-funded minor stream mitigation projects could have adverse effects on listed species and their habitats through construction activities. Construction work to reduce flood hazards or repair flood damage may cause noise, vibration, vegetation removal or disturbance, erosion and sedimentation in waterways. Noise disturbances may disrupt the normal behaviors of listed wildlife species, resulting in reduced fitness or death (e.g., if a species is unable to escape the noise or is driven into unsuitable or unfamiliar habitats where they are eaten by other species). Vegetation removal, sedimentation, and erosion could degrade the quality of or destroy designated critical habitat or suitable habitat for federally listed species. Therefore, these non-FEMA-funded projects could result in negligible to moderate adverse effects on federally listed species or designated critical habitat.

In the long term, erosion and flooding would not be substantially mitigated under the No Action alternative. Ongoing erosion and flooding could increase sedimentation and turbidity, which may impair the quality and availability of suitable habitat or designated critical habitat for listed aquatic species within and downstream of project areas. Stream bank erosion and scour could reduce the amount of available terrestrial stream bank habitat, reducing suitable habitat or designated critical habitat for listed terrestrial species including plants. Areas disturbed by erosion and flooding could be readily colonized by invasive plant species, which may outcompete listed plants and reduce the quality of terrestrial habitat for other listed species. Therefore, the No Action alternative is expected to have long-term, minor to moderate, adverse effects on federally listed species and designated critical habitat from continued stream erosion and flooding.

Alternative 2 – Proposed Action

Stream stabilization and mitigation projects performed under the Proposed Action have the potential to affect listed species and designated critical habitat, as federally listed species and their habitats are expected to be subject to the same impacts as those described in Sections 4.3.1 and 4.3.2. Although the magnitude of the potential effects is expected to vary based on specific project activities and locations, FEMA expects that short-term impacts would not exceed a moderate level

because construction activities would be limited by permit conditions and any recommendations from USFWS resulting from informal or formal consultation. Prior to implementing any project under the Proposed Action, FEMA would analyze the project location, habitat conditions, USFWS's Information for Planning and Consultation (IPaC) tool, and any available and relevant natural heritage database information. Based on the review, FEMA would determine whether there is a potential for the project to affect federally listed species or designated critical habitat.

FEMA would consult with USFWS under Section 7(a)(2) of the ESA for all projects that may affect listed species or designated critical habitat, including newly listed species and critical habitat that were not originally summarized in **Appendix B** of the PEA, and would seek concurrence with findings of *not likely to adversely affect,* or conduct a formal consultation for findings of *likely to adversely affect.* If a proposed project is *likely to adversely affect* a federally listed species, issuance of a biological opinion and incidental take permit by USFWS would be required prior to project implementation. A tiered SEA would need to be developed for any proposed projects with findings of *may affect, and is likely to adversely affect.*

Threatened and endangered species are expected to be subject to the same project-specific impacts as other fish and wildlife species; therefore, the impact evaluations for the common scope of work and specific projects provided in Section 4.3.2 are expected to apply to federally listed species as well.

4.4. Socioeconomics

4.4.1. HAZARDOUS MATERIALS

Hazardous materials and wastes are regulated under several federal laws, including 40 C.F.R. Part 260; the Resource Conservation and Recovery Act (RCRA) of 1976; the Solid Waste Act; the Toxic Substances Control Act; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act; and the CAA of 1970. Occupational Safety and Health Administration standards under the Occupational Safety and Health Act seek to minimize adverse impacts on worker health and safety (29 C.F.R. Part 1926). Evaluating hazardous substances and wastes includes consideration of whether any hazardous material would be generated by the proposed activity or already exists at or in the general vicinity of the site (40 C.F.R. § 312.20).

Affected Environment

Table 4-6 provides the number of Superfund sites, brownfield sites, Toxic Release Inventory sites, and RCRA corrective action sites located in each state within the study area.

Table 4-6. 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	63	1,382	3,149	38,642
Indiana	Indiana Department of Homeland Security	49	1,294	2,520	16,815
Michigan	Michigan Department of Environment, Great Lakes, and Energy	69	3,269	2,337	44,066
Minnesota	Minnesota Pollution Control Agency	24	844	1,319	41,110
Ohio	Ohio Environmental Protection Agency	41	1,407	3,712	32,781
Wisconsin	Wisconsin Department of Natural Resources	37	987	2,104	23,801

Source: EPA 2024d

Alternative 1 – No Action

Under the No Action alternative, construction activities from minor mitigation projects would introduce the risk of oil and fuel leaks from equipment and the potential use or exposure of contaminated fill and materials. However, minor mitigation projects would be required to conform to local, state, and federal regulations and standards. Equipment would be inspected to monitor for leaks and stored at the appropriate staging areas. Any fill used would need to be contaminant-free and properly permitted under Section 404 of the CWA. Therefore, construction of minor measures would have a negligible to minor impact from hazardous materials. In the long term, flooding and erosion would not be substantially mitigated and could continue to threaten exposure of hazardous material sites or release hazardous materials into the environment within or near the study area. Contaminated materials at hazardous material sites could be exposed by erosion or carried by floodwaters and lead to the contamination of soil and water in the project area and vicinity. Therefore, there could be negligible to moderate long-term impacts from hazardous materials.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

During construction, there would be a minor risk of leaks of oils, fuels, and lubricants from construction equipment. Any fill brought in from outside the project site would need to come from a

licensed or permitted source and would be free of contaminants. 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. FEMA would review the databases of known contaminated sites during project reviews to confirm that there would not be more than a minor potential for people and the environment to be exposed to hazardous materials. In addition, the project would have to conform to local, state, and federal regulations and standards. With the implementation of the BMPs listed below, the Proposed Action would have negligible to minor short-term effects related to hazardous materials.

- Any hazardous and contaminated materials discovered, generated, or used during construction of the Proposed Action would be disposed of and handled by the subapplicant in accordance with applicable federal, state, and local regulations.

- Construction equipment would be kept in proper working order. Any equipment to be used above, in, or within 100 feet of water would be inspected daily for fuel and fluid leaks consistent with 29 C.F.R. 1926.1412(d). Any leaks would be promptly contained and cleaned up, as required by 40 C.F.R. 450.21(d)(3), and the equipment would be repaired.

- Any imported fill used at the project site would meet state and local regulations for clean fill. Fill material discharged below the ordinary high-water mark of a stream or into a wetland would require a Section 404 permit and must be free from hazardous materials, as determined by 40 C.F.R. 230.60(b).

- In the event of an inadvertent spill, the subapplicant must immediately contact the appropriate regulatory agency, or other contact listed on the subapplicant's NPDES permit, if applicable. State or local requirements that may necessitate reporting of spills or other prohibited discharges to local emergency response, public health, or drinking water supply agencies would also be followed.

The Proposed Action would not involve the addition of hazardous facilities, operations, or chemicals to the project area. Therefore, adverse long-term impacts are not anticipated. The Proposed Action would have long-term, minor to moderate, beneficial effects by protecting hazardous sites in the vicinity of streams from flooding and erosion damage.

Stream Channel Naturalization

Construction of stream channel naturalization projects would include grading and restoration of stream channel meanders and channel form. Soils that are exposed could potentially contain hazardous materials and the subapplicant would be required to follow all federal, state, and local hazardous waste requirements when handling or disposing of any contaminated materials. Thus, in the short term, there would be negligible to minor impacts from hazardous materials. In the long term, stream channel naturalization would further reduce the risk of hazardous material exposure and protect hazardous waste sites in the vicinity of the project through a reduction in water velocity that reduces erosion and an increase in floodplain storage that may reduce flooding. Therefore, there would be a minor to moderate beneficial impact on hazardous materials.

4.4.2. LAND USE AND PLANNING

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.

Illinois allows every local 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 Illinois Compiled Statues § 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 use, and policies for development of public ways, places, lands, structures, and utilities. Additional comprehensive plan contents are outlined in 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 that 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 § 713.23).

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.

Affected Environment

According to the USGS National Landcover Database, the study area has a variety of land covers that encompass a wide range of land uses, including urban, residential, open space, recreational, agricultural, and natural areas, such as forests and wetlands. The top two land uses across all six states are agricultural and forested land. Streams in the six states run through a mix of rural and forested land and developed urban areas (Dewitz and USGS 2021). Additional information on vegetation and landcover is discussed in Section 4.3.1.

Alternative 1 – No Action

Under the No Action alternative, communities may implement minor stream stabilization and naturalization measures. These measures would likely not change current land uses; however, because these minor measures would not effectively reduce erosion or flooding over a substantial area, they may not allow land use plans to be fully implemented in the long-term. The minor measures would likely not change the land use zoning within the communities these projects are implemented. Therefore, the No Action alternative may have negligible adverse impacts on land use and planning within communities in the project area from the implementation of minor actions.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

Construction of stream stabilization and or naturalization measures would support existing land uses by reducing erosion and flooding that would otherwise threaten infrastructure. The Proposed Action would likely be consistent with long-term planning efforts described in community comprehensive and master plans by reducing the impacts of flooding and erosion, promoting long-term resilience to changing climatic conditions, and protecting public health and safety. In addition, implementation of the Proposed Action would likely not require changes in zoning within these communities. Thus, there could be long-term minor benefits on land use and zoning from implementation of the Proposed Action.

4.4.3. 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 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.

Sound is most commonly measured in decibels on the A-weighted scale (a scale based on the range of sounds that the human ear can hear); it is expressed as dBA. The day-night averaged sound level (DNL or Ldn) is an average measure of sound for a 24-hour period expressed in dBA. It takes into account the volume of each sound incident, the number of times each incident occurs, and the time of day each incident occurs (nighttime sound being weighted more heavily because it is assumed to be more disruptive to the community). Federal agencies accept the DNL descriptor as a standard for estimating sound impacts and establishing guidelines for compatible land uses.

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 areas; such as parks, campgrounds, water access sites, trails; and Tribal Nation properties of religious and cultural significance. Sensitive 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).

Affected Environment

The study area encompasses a wide range of noise environments and individual project areas may include noise sensitive receptors such as libraries, schools, parks, or residential areas. Because the purpose of the projects would be to reduce hazards that threaten structures and infrastructure, there would likely be some human use near each project area.

Alternative 1 – No Action

Under the No Action alternative, communities may implement minor mitigation efforts to stabilize streams and reduce erosion and flooding, which would have short-term, minor, and localized noise impacts from construction activities. Streambank erosion and flooding would not be substantially mitigated by these efforts, and continued erosion or periodic flooding could result in damage to structures and infrastructure near the stream. Construction to repair structures and infrastructure may follow, resulting in minor short-term increases in noise levels from equipment use and potential detours. These activities may occur near sensitive receptors resulting in adverse impacts. Any construction work would comply with local noise ordinances that regulate the hours of construction. Therefore, long-term noise impacts would be intermittently minor and relatively short in duration from both the construction of minor mitigation measures and from the repair of structures and infrastructure affected by ongoing erosion and periodic flooding.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

Under the Proposed Action, construction activities would temporarily increase noise levels in each project vicinity, causing minor short-term, temporary impacts on the ambient noise levels in the project area. Common equipment would include excavators, dump trucks, dozers, and other heavy equipment as needed. Minor traffic noise would also be produced by construction vehicles and trucks arriving and departing from the project area. If detours are required, traffic noise could be rerouted to areas that may not experience that level of vehicle noise. Construction activities would be limited to allowable construction noise hours consistent with local noise ordinances and equipment used would meet applicable local, state, and federal noise control regulations.

The Proposed Action would reduce the risk of flood damage to embankments and infrastructure, thereby indirectly reducing construction activities and associated noise that would be required to repair damage. The Proposed Action would not include any increases in traffic or creation of new

permanent noise sources. Therefore, operation of the Proposed Action would have a negligible long-term noise impact.

Rigid and Semirigid Armoring

This alternative encompasses projects that repair, replace, or install embankment armoring using structural methods like stone, concrete, or metal that is stacked, anchored, pinned, fastened, placed, or driven to form a semirigid to rigid structure. Specialized construction activities (i.e., pile driving) that may be associated with this type of work could create louder ambient noise levels compared to other project types, although these would also be short-term, temporary impacts. Impact equipment, such as a pile driver, generates impulsive noise, which is of short duration (generally less than one second) and high intensity and would be the loudest equipment potentially used (Federal Highway Administration [FHWA] 2017). Vibratory pile-driving methods, which do not produce the high intensity impact sounds of an impact pile driver, would generally be used unless dense substrate is encountered that would require impact driving to properly set piles. Noise levels would vary with the level of construction activity and the types of equipment being operated. Because sound levels decrease with increasing distance from the source, noise impacts would also vary with the proximity of sensitive receptors to construction activities. All construction equipment used would meet applicable local, state, and federal noise control regulations. The use of pile driving would have minor to moderate, short-term, temporary impacts on the ambient noise levels in the project area due to the increased noise associated with it. All other installation methods would have similar impacts on noise as described in the general consequences section.

4.4.4. PUBLIC SERVICES AND UTILITIES

Utility infrastructure in the study area may include natural gas lines, electricity infrastructure, telecommunications, and potable water, wastewater, and stormwater utilities. Electricity and telecommunications are often provided to communities through private suppliers. Water and wastewater facilities are generally managed, owned, and operated by local municipalities. 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 4-7. These state agencies oversee the public and private utility companies in their respective states.

Table 4-7. 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

State	State Regulatory Agency (Utilities)	State Regulatory Agency (Water Authorities)
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.

Alternative 1 – No Action

Under the No Action alternative, communities may implement minor efforts to stabilize streams and reduce erosion and flooding whose construction may result in minor interruptions to utilities in the vicinity, temporary loss in access to open spaces and parks near streams, and potential road closures that may impede emergency services. Interruption of utility service would follow all local and state requirements to ensure minimal impact on these services. Thus, there would be a negligible to minor short-term impact.

Erosion and flooding would not be substantially mitigated under the No Action alternative, putting utilities and public services at risk of unplanned interruptions. Erosion and flooding could damage infrastructure including downed power and telecommunication lines, overwhelmed stormwater systems, interruptions in water and sewer treatment or the loss of pipelines. Interruptions could last hours or be more extensive and last days while repairs are underway. Erosion and flooding could also threaten public facilities, such as schools and parks, resulting in damage and closures that could be temporary or long-term depending on the severity and extent of the damage. Road closures from erosion or flood-related damage could result in traffic congestion on open alternate routes, which could impact emergency response times. Therefore, under the No Action alternative, there would be long-term minor to moderate impacts on public services and utilities from continued erosion and periodic flooding.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

Utilities located in the vicinity of the project area including power lines, gas lines, telecommunication lines, water and sewer pipelines, may be temporarily shut off during construction of the Proposed Action. Work may also require temporary road closures and detours, which could impact the

response times of emergency services; although, in most cases, at least one lane would be kept open around the construction zone. As discussed in Section **Error! Reference source not found.**, detour signage and flaggers would be used to redirect traffic to other routes, which may result in minor increases in traffic on alternative routes. This minor increase in traffic could result in delays in emergency response times. Therefore, the Proposed Action would have a negligible to minor impact on emergency services. If utilities or public facilities need to be temporarily shut off during construction, the subapplicant would follow local ordinances and coordinate with utilities and public services regarding shutdown procedures and notifications. Any utilities that are abandoned in place during construction would be decommissioned to state and local standards. Thus, there may be negligible to minor short-term impacts on utilities and public services with implementation of BMPs.

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

4.4.5. TRAFFIC AND CIRCULATION

The U.S. Department of Transportation Federal Highway Administration (FHWA) has jurisdiction over the National Highway System, which includes the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility. Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin are all included in FHWA's North Central Region. Each state's DOT is responsible for constructing and maintaining interstate highways, U.S. routes, and state roads in their state. The state DOT also administers federal highway funds provided to cities, towns, and counties, and supports and provides financial assistance to public transit systems, freight and passenger rail, and port facilities. Local cities, counties, and towns/townships are responsible for the roadways that are not Interstate highways, U.S. routes, or state roads; and tribal roads are under the jurisdiction of the appropriate tribal nation (USDOT 2016).

The U.S. Department of Transportation Federal Railroad Administration (FRA) regulates most railroad operational procedures, including highway-railroad crossing signals, train speeds, train horn use, and track condition. Illinois, Indiana Michigan, Minnesota, and Wisconsin are included in Region 4 of the FRA, and Ohio is in FRA Region 2 (C.F.R. 2024). Each state's Department of Transportation has minimal regulatory jurisdiction over rail operations or service but can provide direction to the appropriate agency or railroad representative.

Illinois: The Illinois system of highways has been divided into four distinct highway systems and associated highway authorities under the Illinois Department of Transportation (IDOT). Each authority has jurisdiction that confers the obligation and the authority to administer, control, construct, maintain, and operate the highway system subject to the provisions of the Illinois Highway Code (IDOT 2018). The Illinois Commerce Commission works with the FRA to ensure railroad safety in Illinois (IDOT 2024).

Indiana: The Indiana Department of Transportation (INDOT) has jurisdiction over U.S. routes, and state roads in the state of Indiana (INDOT 2024). The Rail Programs Office of INDOT helps to fund critical projects to maintain and improve rail service in the state (INDOT 2021).

Michigan: The Michigan system of highways is divided into four distinct highway systems and associated highway authorities under the Michigan Department of Transportation (MDOT) (Michigan Highways 2024a). The Forest Highways are forest roads designated by the U.S. Forest Service and funded by the federal government, but are often maintained by state or local agencies, such as MDOT or the County Road Commissions in Michigan (Michigan Highways 2024b). MDOT's Office of Rail works to ensure that Michigan's rail system meets the economic needs of the state and is safe for the motoring public, rail passengers, and railroad employees (MDOT 2024).

Minnesota: In Minnesota, the primary road authority of the state highway system is the Minnesota Department of Transportation (MnDOT). State highway construction and maintenance responsibilities are divided into eight MnDOT districts (MinnesotaGo 2024). MnDOT coordinates rail crossing safety, state highway projects, and rail regulatory activities for public highway-rail grade crossings throughout Minnesota (MnDOT 2024).

Ohio: The public highways of Ohio are divided into three classes: state roads, county roads, and township roads. The Ohio Department of Transportation (ODOT) maintains all Interstate Highways, US Routes, and State Routes (ODOT 2023). Through ODOT, the Public Utilities Commission of Ohio regulates rail crossings throughout Ohio (ODOT 2024).

Wisconsin: The Wisconsin Department of Transportation (WisDOT) has jurisdiction over the state highway system (WisDOT 2021). In Wisconsin, the Office of the Commissioner of Railroads has primary responsibility for approving the installation of new railroad crossings, alteration of existing crossings, and closing or consolidation of existing crossings (Wisconsin 2024).

Alternative 1 – No Action

Under the No Action alternative, communities may implement minor mitigation efforts that would have negligible to minor impacts on traffic if road closures or detours occur while the repairs are being constructed. These minor efforts would not mitigate streambank erosion or reduce flooding to the extent of the Proposed Action and transportation infrastructure near the stream would continue to be at risk for erosion or flood-induced damage. Road and rail closures may include traffic diversions if transportation systems because impassable from damage or during repair work. Depending on the extent of damage, and the importance of the infrastructure to the community, the No Action alternative could have minor to moderate long-term impacts on traffic and transportation.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

During construction, the Proposed Action 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. 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. Traffic management plans would typically aim to maintain at least one lane of traffic open at all times during construction where possible. If detours are required, traffic could be rerouted to areas that may not ordinarily experience that level of vehicle traffic. Thus, there would be minor to moderate, short-term, adverse impacts on traffic near the project site. The Proposed Action would reduce erosion risks to adjacent parallel linear facilities such as roads or utility lines, or perpendicular facilities such as bridges, and other stream crossings, thus reducing the likelihood of closure of the transportation infrastructure. Flooding would be reduced, decreasing the potential for damage to transportation resources and reducing road closure extent or duration. The Proposed Action would have minor to moderate, long-term, beneficial impacts on traffic by mitigating erosion and flooding and avoiding damage to adjacent facilities and infrastructure and the potential for road closures or detours.

4.4.6. ENVIRONMENTAL JUSTICE (EXECUTIVE ORDER 12898)

Executive Order (EO) 14096 *Revitalizing Our Nation's Commitment to Environmental Justice for All* defines Environmental Justice (EJ) as the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other federal activities that affect human health and the environment. EO 14096 builds upon EO 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, which requires agencies to identify and address any disproportionately high and adverse human health or environmental effects its activities may have on people of color or low-income populations. The EPA's Environmental Justice Screening Tool (EJ Screen), which was used to complete this analysis, defines people of color as all people other than non-Hispanic white-alone individuals and low-income persons as those whose household income is less than or equal to twice the national poverty threshold (EPA 2023b). EJ Screen also presents 13 EJ Indexes that provide a measure of how environmental factors may be affecting EJ populations in an area.

In accordance with the FEMA *EO 12898 Environmental Justice: Interim Guidance for FEMA EHP Reviewers*, environmental justice populations are defined by demographic indicators using the following criteria:

- The population of people of color and/or low-income in the study area equals or exceeds the 50th percentile compared to the state average.

- One or more of the 13 EJ Indexes for the study area equals or exceeds the 80th percentile compared to the state average.

The EJ 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 people of color or low-income populations.

Affected Environment

A summary of people of color and low-income populations within each state covered by this analysis is shown in **Table 4-8.** People of Color State Totals and **Table 4-9**, respectively. For each proposed project, the demographic characteristics and environmental indicators for the adjacent populations would need to be investigated to determine whether an EJ population is present, and the potential for disproportionately high and adverse impacts would need to be evaluated. Specific project areas may have higher percentiles of EJ indicators when compared to the appropriate state.

Table 4-8. People of Color State Totals

States	Percentage of People of Color
Illinois	40%
Indiana	22%
Michigan	26%
Minnesota	22%
Ohio	22%
Wisconsin	20%

Source: U.S. Census Bureau 2021

Table 4-9. Low-Income Population State Totals

States	Percentage of Low-Income Households
Illinois	27%
Indiana	30%
Michigan	30%
Minnesota	23%
Ohio	30%
Wisconsin	26%

Source: U.S. Census Bureau 2021

Alternative 1 – No Action

Under the No Action alternative, communities may implement some minor mitigation efforts to stabilize streams. Temporary construction activities from these minor efforts may result in noise, traffic, and air quality impacts. These short-term temporary impacts may adversely affect EJ populations but would be unlikely to be disproportionate. The location of the work would be constrained by the location of the stream system and construction impacts would likely affect all populations in the project area equally. Erosion and flooding would not be substantially mitigated

under the No Action alternative and all populations within a project area would continue to be at risk of erosion and flood hazards. Infrastructure ranging from utility services to roads, bridges, and culverts may be disrupted periodically over the long term. Erosion and flooding that result in closed roads or bridges may isolate populations in remote areas or increase travel time, increasing vehicle emissions and exacerbate barriers to accessing services. Accumulation of sediment mobilized by erosion and flooding has the potential to increase flood risks in downstream areas where the material settles out and may alter stream channel morphology. The potential for disproportionate adverse impacts would vary widely by the location, and the lack of substantial mitigation of erosion and flooding could disproportionally affect EJ populations. Therefore, potential impacts on EJ populations would range from none to moderate over the long term.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

FEMA anticipates that none of the action alternatives would have disproportionately high and adverse long-term impacts on EJ populations. For each project location, FEMA would consider the scope of work and location to identify potential impacts on communities of concern. Short-term construction impacts would primarily include temporary increases in traffic, air emissions, and noise associated with vehicles and heavy equipment use. Rerouting of traffic is possible during construction, which could temporarily increase traffic in EJ neighborhoods (Section 3.4.5).

FEMA anticipates that construction of the Proposed Action would have negligible to minor impacts for projects located in communities of concern during construction. If a project would have the potential to affect EJ populations disproportionately and adversely, an SEA would be required. If EJ populations are present in a project area and there would be adverse impacts, the subapplicant would develop public outreach efforts and engagement strategies to effectively engage these populations about the proposed project.

In the long term, populations within the project area would see a reduction in the risk of erosion, flooding, and stream degradation from the Proposed Action. Therefore, there would be a minor to moderate beneficial impact on EJ populations in the project vicinity. Additionally, the benefits of action alternatives would be consistent with the PR&G guiding principles on sustainable economic development and environmental justice.

4.5. Historic and Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (54 U.S.C. §§ 300101–307108), requires that federal agencies consider the potential effects of actions (i.e., an undertaking) it proposes on cultural resources. Cultural resources are defined as prehistoric or historic archaeology sites, historic standing structures, historic districts, objects, artifacts, cultural properties of historic or traditional significance—referred to as Traditional Cultural Properties—that may have religious or cultural significance to federally recognized Indian tribes (tribes), or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons.

Cultural resources listed, eligible for listing, or potentially eligible for listing in the National Register of Historic Places (NRHP) or their state equivalent are subject to protection from adverse impacts resulting from a federally funded undertaking.

Pursuant to 36 C.F.R. § 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the undertaking may directly or indirectly affect cultural resources. Within the APE, impacts on cultural resources are evaluated for both historic structures (aboveground cultural resources) and archaeology (belowground cultural resources).

In addition to the NHPA, FEMA must also comply with other federal laws that relate to historic and cultural resources:

- The Archaeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, archaeological, or paleontological data when such data may be destroyed or irreparably lost because of a federal, federally licensed, or federally funded (in part or whole) project.

- The American Indian Religious Freedom Act of 1978, 42 U.S.C. § 1996, which provides for the protection and preservation of American Indian sites, possessions, and ceremonial and traditional rites.

4.5.1. CONSULTATION PROTOCOLS

FEMA has established NHPA Programmatic Agreements with the individual State Historic Preservation Offices (SHPO), state emergency management agencies, and interested tribes in Indiana, Illinois, Minnesota, Michigan, Ohio, and Wisconsin. The programmatic approach in each of these executed 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 any tribe that has assumed the Section 106 responsibilities of the SHPO for activities on tribal land pursuant to Section 101(d)(2), the Tribal Historic Preservation Officer (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 process 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 directed by EO 13175, Consultation and Coordination with Indian Tribal Governments and 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 Region 5 regularly consults with all federally recognized Native American tribes with jurisdictional lands in Region 5. In addition, FEMA consults with federally recognized tribes that reside outside of Region 5 but have areas of ancestral interest within the region. For example, when preparing to negotiate the 2014 FEMA Region 5 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.

Consultation would be conducted for each project reviewed under this PEA and would follow the regulations and guidance that are in place at the time of review. For each project, FEMA would update the list of tribes, interested parties, and contacts to be consulted with 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 would consult resources such as the tribal nations' websites and NPS and the Bureau of Land Management maintained tribal directories for information. In addition, each notification lists the federally recognized tribes being contacted and requests notice of any other tribes that may have an interest in the undertaking. In this way, Region 5 continuously improves its outreach to federally recognized tribes with potential interests within the six-state region.

4.5.2. AFFECTED ENVIRONMENT

Streams, streambanks, and adjacent upland areas in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin hold a rich history of Native American and EuroAmerican prehistoric and historic activity as both transportation corridors and preferred areas of human settlement spanning thousands of years. Waterways are often associated with historic and prehistoric, short- and long-term settlements and early contact-period settlements, including Native American settlements and military, trade, and navigation activities. Waterways are also rich in the remains left by these settlements and activities. Common archaeological sites include buildings, estates, mills, mining sites, fort complexes, shipwrecks, seawalls, and docks. More recently developed infrastructure features include canals, ornamental masonry retaining walls, bridges, and dams. All of these resources can be NRHP-eligible individually or they may contribute to a historic district or landscape. Stream banks and the upland areas around them are often archaeologically sensitive as well, with a high likelihood to contain prehistoric sites in undisturbed soil. 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 in compliance with Section 106 of the NHPA.

Five of the six FEMA Region 5 SHPOs have organized digital databases with cultural resource information to which researchers can submit an application for access or to request a records search from the SHPO staff. As of March 2024, the Michigan SHPO is updating their system to an online data; however, at the time of this PEA, it is not readily available. The following includes a summary by state of historic properties eligible for or listed in the NRHP as of March 2024.

Illinois: As of March 2024, there are 1,965 historic properties listed in the NRHP in Illinois. Most of the historic properties are aboveground buildings (1,391), historic districts (370), or structures (81) (NPS 2024). Only 111 archaeological sites are listed in the NRHP, and there are four unknown belowground historic properties. Of the 1,965 historic properties listed in the NRHP in Illinois, 13 districts, 57 buildings, 11 structures, 1 object, and 12 archaeological sites are designated National Historic Landmarks.

Indiana: As of April 2024, there are 2,097 historic properties listed in the NRHP in Indiana. Most of the historic properties are aboveground buildings (1,359), historic districts (505), or structures (137) (NPS 2024). Only 82 archaeological sites are listed in the NRHP, and there are 14 unknown belowground historic properties. Of the 2,097 historic properties listed in the NRHP in Indiana, 9 districts, 30 buildings, 5 structures, and 3 archaeological sites are designated National Historic Landmarks.

Michigan: As of April 2024, there are 2,009 historic properties listed in the NRHP in Michigan. Most of the historic properties are aboveground buildings (1,313), historic districts (397), or structures (188) (NPS 2024). Only 102 archaeological sites are listed in the NRHP and there are seven objects. Of the 2,009 historic properties listed in the NRHP in Michigan, 11 districts, 20 buildings, 7 structures, 1 object, 3 archaeological sites, and 2 unknown belowground historical sites are designated as National Historic Landmarks.

Minnesota: As of April 2024, there are 1,782 historic properties listed in the NRHP in Minnesota. Most of the historic properties are aboveground buildings (1,307), historic districts (221), or archaeological sites (128) (NPS 2024). Of the 1,782 historic properties listed in the NRHP in Minnesota, 8 districts, 14 buildings, 2 structures, and 4 archaeological sites are designated National Historic Landmarks.

Ohio: As of April 2024, there are 4,205 historic properties listed in the NRHP in Ohio. Most of the historic properties are aboveground buildings (3,125), historic districts (640), or structures (238) (NPS 2024). Only 180 archaeological sites are listed in the NRHP, and there are 15 unknown belowground historic properties. Of the 4,205 historic properties listed in the NRHP in Ohio, 9 districts, 45 buildings, 10 structures, and 13 archaeological sites are designated National Historic Landmarks.

Wisconsin: As of April 2024, there are 2,613 historic properties listed in the NRHP in Wisconsin. Most of the historic properties are aboveground buildings (1,798), historic districts (419), or archaeological sites (297) (NPS 2024). Only 90 archaeological sites are listed in the NRHP, and there are 5 unknown belowground historic properties. Of the 2,613 historic properties listed in the NRHP in Wisconsin, 7 districts, 29 buildings, 1 structure, 9 archaeological sites, and 2 unknown belowground historical properties are designated National Historic Landmarks.

Alternative 1 – No Action

Under the No Action alternative, there would be no FEMA action; therefore, there would be no effect on historic and cultural resources from FEMA-funded grant activities. However, under the No Action

Alternative, minor measures would be constructed to provide some stream stabilization and naturalization in limited areas. Because these minor measures would not necessarily be constructed with federal funding, there may be no Tribal consultation and only applicable state law to account for the potential identification and protection of cultural resources. Projects that involve work below the ordinary high-water mark may still require a federal authorization and would thus comply with the NHPA. Therefore, there would be negligible to moderate adverse impact on cultural resources from the implementation of minor stabilization measures under the No Action alternative.

Although minor measures implemented under the No Action alternative would reduce some of the effects of erosion and flooding, these effects would be limited because the measures would likely be smaller in scale and less comprehensive than the Proposed Action. Thus, in the long term, cultural resources, such as archaeological sites, would continue to be vulnerable to erosion and flood risks. Unstable stream banks would be more vulnerable to further erosion or failure during storms, thus exposing or washing away cultural artifacts. Erosion and scouring are likely to have substantial impacts on buried archaeological sites and any possible historic structures located along the waterways or within the upland locations. Buried archaeological sites may erode out of stream banks into stream channels and can deteriorate as their individual elements disperse. Therefore, there would be a minor to major long-term impact from erosion and flooding on historic and cultural resources.

Alternative 2 – Proposed Action

General Consequences of the Proposed Action

All action alternatives have the potential to impact aboveground historic architectural resources, both physically and visually, as well as belowground archaeological sites. Archaeological resources have a high potential of being impacted by excavation, construction staging, and site access activities that disturb previously undisturbed soils. Projects that include demolition, repair, or construction of bulkheads, retaining walls, revetments, or other structures may affect character-defining elements of a historic property. Additionally, water access for repairs may require barges that could impact underwater resources. Before the start of a project, FEMA and the subapplicant would comply with the NHPA by identifying the potential for resources to occur in the project area and conducting appropriate consultations. To comply with the NHPA, project-specific consultation with the SHPO or THPO would be necessary for all stream stabilization activities and any identified connected actions that are covered by the Proposed Action. FEMA would conduct an individual Section 106 consultation for each project application in accordance with the NHPA and any applicable Programmatic Agreement before the grant is awarded. The Section 106 process requires consideration of the potential for known and unknown resources to be affected, including a good faith effort to identify all resources within a project area. FEMA would identify the APE for each project and determine whether there were any historic or cultural resources potentially present within the project area. This identification would be conducted in consultation with the SHPO and the THPO, and any interested parties, including tribes, as appropriate. 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. Field surveys or architectural

assessments may be needed to determine if resources are present, particularly if there are eroded embankments or compromised structures.

To minimize potential impacts on historic properties, low-impact equipment should be used to cross intact landscapes to access project areas to the extent practicable (e.g., rubber-tired vehicles and equipment). Grading and dredging should be limited to the minimum required depth and avoid natural cultural-bearing strata, if possible. Existing roads and access points should be used to the maximum extent possible to limit construction-related land clearing and impacts from heavy machinery. If new access roads or staging areas are required, those areas would be surveyed for the presence of cultural resources before construction begins. If appropriate, shoreline stabilization structures would be constructed with materials that are context sensitive.

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

Inadvertent discovery protocols would be applied as a mitigation measure to any project that proposes ground-disturbing activities, regardless of how minor the disturbance may appear. Inadvertent discovery protocols specify that if archaeological 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 archaeological resources would be secured, and the subapplicant would restrict access to the sensitive area. The subapplicant would inform FEMA immediately of such finds, and FEMA would consult with the SHPO or THPO, as appropriate. Work in sensitive areas would not resume until consultation is complete and until FEMA determines that the appropriate measures have been taken to ensure 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 aboveground and belowground historic properties and submerged cultural resources would be assessed as negligible to moderate in both the short and long term.

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

In-Stream Structures, Loose Stone and Riprap, and Rigid and Semirigid Armoring

Stream stabilization measures that use hardening measures, as described in Sections 3.2.2, 3.2.3, and 3.2.4. are typically considered to have minimal potential to impact or affect certain types of archaeological resources, such as buried prehistoric lithic scatters or camp sites, if there is no excavation into the natural strata. However, even if grading is limited, the weight of certain revetments could have an adverse effect on archaeological sites, such as unmarked human burials.

If grading is conducted in undisturbed soils, there would be a greater potential to impact archaeological resources. In addition, 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 would be adverse effects to nearby aboveground historic properties.

Bioengineering

Bioengineering stream work is generally viewed as having a lower potential to impact cultural resources. However, if the work would involve excavation of soils, the impacts would be similar to those described under the general consequences. The implementation of bioengineered projects may require excavators and other heavy equipment to install structural components and place soils, but would not typically require heavy equipment to plant vegetation. Bioengineering stream work would have the added benefit of restoring the stream banks utilizing less-intrusive measures that could impact aboveground and belowground cultural resources. The use of vegetative bank stabilization tends to have more beneficial effects as compared to hardening techniques, and can result in increased soil stability, thereby reducing future impacts on archaeological resources.

Stream Channel Naturalization

Stream channel naturalization would restore streams and drainage channels into a more naturalized state. Construction methods associated with stream channel naturalization use a broad range of measures that include grading and dredging to reshape or replace unstable stream reaches, installation of structures, and planting of vegetation to protect stream banks and provide habitat. Naturalization may include dredging to restore the stream to its previous historical depth but generally would not exceed it. When stream channel naturalization includes use of heavy machinery for regrading of unstable slopes and there are cuts into the natural soil profile, there would be the potential to adversely impact buried archaeological resources or properties of religious and cultural interest. Minimizing excavation into natural cultural resource-bearing strata during the construction process would reduce the potential for adverse impacts on historic properties. The same BMPs and conditions that apply to projects using hardening techniques would apply to naturalization projects.

Through a combination of BMPs, consultation and mitigation, the Proposed Action would have a negligible to moderate short- and long-term impacts on historic and cultural resources.

4.6. Comparison of Alternatives

Table 4-10 provides a summary of the potential environmental effects from implementing the No Action alternative, Proposed Action, and any applicable proposed mitigation.

Table 4-10. Summary of Environmental Impacts and Mitigation

Resource	No Action Impacts	Proposed Action Impacts	Mitigation
Topography and Soils	• Minor short-term, adverse impacts. • Minor to moderate, long-term, adverse impacts on soil.	• Short-term, minor, adverse impacts on soil and topography. Minor to moderate long-term benefits on soil and topography.	• Adhere to BMPs from permits and SWPPP.
Water Resources and Water Quality	• Minor short-term impacts. Minor to moderate long-term impacts on surface waters. Minor long-term impacts on aquifers.	• Minor short-term impacts. Long-term, minor to moderate beneficial impact on water quality.	• Adhere to BMPs from permits, regulations, and SWPPP. • Ensure that construction equipment is maintained to mitigate spills and leaks.
Floodplain Management	• Negligible to minor short-term impact and a minor to moderate long-term impact on floodplains.	• Minor short-term impacts on floodplains and a minor to moderate long-term benefit on floodplains.	• Adhere to all condition issued by local floodplain manager.
Wetlands	• Minor to moderate short-term and long-term impacts on wetlands.	• There would be none to minor potential impacts on wetlands, both short- and long-term, as long as permanent impacts are avoided.	• Avoid permanent impacts on wetlands, with the exception of marsh/wetland creation measures from bioengineering measures.
Air Quality	• Minor short-term impact. Minor, periodic, long-term, adverse impacts from repair related emissions.	• Negligible to minor, adverse, short-term impacts • No long-term impacts	
Climate	• Minor short-term impacts. No long-term impact.	• Minor short-term impacts • Minor long-term benefits	
Coastal Resources	• Negligible to minor short-term impacts from ad hoc construction. • Negligible to minor long-term impacts from continued flooding and erosion.	• Negligible to minor short-term impacts from construction activities. • Negligible to minor beneficial effects from reduced flooding and stream bank erosion.	• Adhere to state coastal management plan requirements.

Resource	No Action Impacts	Proposed Action Impacts	Mitigation
Vegetation and Invasive Species	• Negligible to minor, short-term, localized impacts from ad hoc construction. • Negligible to minor long-term impacts from continued erosion, vegetation loss, and the spread of invasive species.	• Minor to moderate short-term impacts from construction activities. • Negligible to minor, long-term, beneficial effects from an increase in native vegetation and a decrease in erosion and associated vegetation loss.	• Implement SWPPP. • Adhere to relevant state invasive species plans and replanting regulations.
Fish and Wildlife	• Negligible to minor short-term impacts from ad hoc construction. • Minor to moderate long-term impacts on species and their habitats resulting from ongoing flooding and erosion.	• Negligible to moderate short-term impacts from construction activities. • Minor to moderate, long-term, beneficial effects from improved aquatic and terrestrial habitat quality resulting from reduced flooding and erosion.	• Adhere to conditions in project-specific permits and/or agency consultations. • Implement seasonal work restrictions, as necessary. • Implement no-work buffers around nests and other sensitive habitat areas, as necessary. • Conduct pre-construction surveys, as necessary. • Consult with USFWS if a project could impact eagles or migratory birds.
Threatened and Endangered Species	• Negligible to moderate short-term impacts from ad hoc construction. • Minor to moderate long-term impacts on listed species and/or critical habitats resulting from ongoing flooding and erosion.	• Negligible to moderate short-term impacts from construction activities. • Minor to moderate, long-term, beneficial effects from improved aquatic and terrestrial habitat quality resulting from reduced flooding and erosion.	• Consult with USFWS if a project may affect any listed species and/or critical habitat. Implement any conservation measures required by the biological opinion, if issued. • Adhere to conditions in project-specific permits and/or agency consultations. • Implement seasonal work restrictions, as necessary. • Implement no-work buffers around nests and other sensitive habitat areas as necessary. • Conduct pre-construction surveys, as necessary.

Resource	No Action Impacts	Proposed Action Impacts	Mitigation
Hazardous Materials	• Negligible to minor short-term impacts. • Negligible to moderate long-term impacts on hazardous materials from flooding and erosion.	• Negligible to minor short-term impacts from construction activities. • Minor to moderate, beneficial, long-term impact from protecting hazardous sites from flooding and erosion.	• Any hazardous and contaminated materials discovered, generated, or used during construction of the Proposed Action would be disposed of and handled by the subapplicant in accordance with applicable federal, state, and local regulations. • Construction equipment would be kept in proper working order. Any equipment to be used above, 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 subapplicant must immediately contact the appropriate regulatory agency, or other contact listed on the subapplicant's permits, if applicable.
Land Use and Planning	• Negligible short-term impact. • Negligible long-term impacts.	• Minor beneficial impacts on land use and zoning from reduced flooding and erosion.	
Noise	• Minor, short-term, and localized impacts. • Intermittently minor long-term impacts.	• Minor, short-term, temporary adverse impacts. Pile driving would have a minor to moderate short-term impact. • Negligible long-term impacts.	

Resource	No Action Impacts	Proposed Action Impacts	Mitigation
Public Services and Utilities	• Negligible to minor short-term impacts. • Minor to moderate long-term impacts on public services and utilities from continued flooding and erosion.	• Negligible to minor short-term impacts on public services and utilities from construction activities. • Minor to moderate long-term benefits on public services and utilities from reduced flooding and erosion.	• If utilities need to be temporarily shut off during construction, the subapplicant would follow local ordinances regarding shutdown procedures and notification. • Utilities that are abandoned in place would be decommissioned to state and local standards. • Subapplicant would develop a maintenance of traffic plan to determine detours and methods to accommodate emergency response vehicles during construction.
Traffic and Circulation	• Negligible to minor short-term impacts. • Minor to moderate long-term impacts.	• Minor to moderate short-term impact from road closures and detours. • Minor to moderate, long-term, beneficial effect.	• Traffic mitigation measures, such as the installation of clear detour signage or flaggers, would be required.
Environmental Justice	• None to moderate impact on environmental justice populations.	• Negligible to minor short-term impact and minor to moderate long-term beneficial effect.	

Resource	No Action Impacts	Proposed Action Impacts	Mitigation
Historic and Cultural Resources	• Negligible to minor short-term impacts on historic and cultural resources from minor mitigation construction activity. • Minor to major long-term impact on historic and cultural resources from continued flood risks, further erosion, and scouring impacts.	• Negligible to moderate effects on historic and cultural resources 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.	• 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, streambank stabilization structures would be constructed with materials that are context sensitive.

SECTION 5. Cumulative Effects

This section addresses the potential cumulative effects associated with the implementation of the Proposed Action. Cumulative effects represent the "impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. "Reasonably foreseeable" means sufficiently likely to occur such that a person of ordinary prudence would take it into account in reaching a decision. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 C.F.R. 1508.1). CEQ's regulations for implementing NEPA require an assessment of cumulative effects during the decision-making process for federal projects. This PEA reviews the potential for other construction projects to create cumulative effects in and near the project area. Other statutes also require federal agencies to consider cumulative effects. These include the CWA Section 404(b)(1) guidelines, the regulations implementing the conformity provisions of the Clean Air Act, the regulations implementing Section 106 of the NHPA, and the regulations implementing Section 7 of the ESA.

Projects covered under the Proposed Action of this PEA may have additional activities included within their respective scopes that would normally be covered under FEMA CATEXs (FEMA Instruction 108-01-1) individually (**Section 3.3.3**). However, there may be cases where these separate actions would not function without the Proposed Action and, therefore, must be evaluated as a complete project. In addition to CATEX N4 and N9 listed in **Section 3.3.3**, the following CATEXs are expected to be used in conjunction within many projects covered under the Proposed Action:

CATEX N2 *Federal Assistance for Facility Repair*. Federal assistance for the repair of structures and facilities in a manner that conforms to pre-existing design, function, location, and land use.

CATEX N5 *Federal Assistance for Actions in Coastal Areas Subject to Moderate Wave Action or V Zones*. Federal assistance for repair, hazard mitigation, new construction, or restoration actions of less than 0.5 acre within the following areas: areas seaward of the limit of moderate wave action (a line mapped to delineate the inland extent of wave heights of 1.5 feet) during the base flood (an area that has at least a 1-percent chance of being flooded in any given year), or areas within the V Zone (a coastal area where there is a velocity hazard due to wave action) if the limit of moderate wave action has not been established. The actions must meet the following criteria:

a) They are consistent with the state- or tribe-enforceable policies of approved coastal management programs

b) They are not within or do not affect a Coastal Barrier Resource System unit

c) They do not result in human-made alterations of sand dunes

d) They do not result in the permanent removal of vegetation (including mangrove stands, wetlands, and dune vegetation)

e) Applicable federal requirements and local codes and standards are followed

f) They involve substantial improvement or new construction of structures, the structure is elevated in open works (e.g., piles and columns) as opposed to fill in a manner that the bottom lowest horizontal structural member is at or above the base flood level; the foundation is anchored to resist flotation, collapse, and lateral movement due to the effects of wind and water loads; and the siting of the project conforms to applicable state, tribe, or local setback requirements.

CATEX N7 *Federal Assistance for Structure and Facility Upgrades*. Federal assistance for the reconstruction, elevation, retrofitting, 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.

FEMA anticipates any CATEX action connected to Proposed Actions would not have cumulatively significant adverse impacts on environmental or historic resources. If any projects covered under the PEA, in conjunction with the aforementioned CATEXs, would have major impacts or impacts that cannot be mitigated, a separate SEA would be required.

SECTION 6. Agency Coordination and Public Involvement

6.1. Notice of Intent

FEMA published a notice of intent (NOI) to 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 6-1**). 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 March 10, 2024. 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.

6.1.1. NOTICE OF INTENT DISTRIBUTION

FEMA published the NOI in a major newspaper of each state within the study area. These newspapers are outlined in **Table 6-1**. The NOI was sent directly to federal and state agencies and tribes for comment, as shown in **Table 6-2**.

Table 6-1. NOI Newspaper Publication

State	Newspaper	Date Published
Illinois	The Chicago Tribune	February 4, 2024
Indiana	Indianapolis Star	February 4, 2024
Michigan	The Detroit Free Press	February 8, 2024
Minnesota	Star Tribune	February 4, 2024
Ohio	The Plain Dealer	February 4, 2024
Wisconsin	The Milwaukee Journal Sentinel	February 5, 2024

Table 6-2. NOI Agency and Tribal Distribution

Federal	State	Tribal
Bureau of Indian Affairs National Oceanic and Atmospheric Administration (NOAA) U.S. Army Corps of Engineers: Chicago Regulatory Branch Buffalo Regulatory Branch Detroit Regulatory Branch Huntington Regulatory Branch Louisville Regulatory Branch Memphis Regulatory Branch Pittsburgh Regulatory Branch Rock Island Regulatory Branch St. Louis Regulatory Branch St. Paul Regulatory Branch U.S. Department of Agriculture: Rural Development Natural Resource Conservation Service U.S. Department of Interior U.S. Environmental Protection Agency, Region 5 U.S. Fish and Wildlife Service: Illinois Field Office Indiana Field Office Michigan Field Office Minnesota Field Office Ohio Field Office Wisconsin Field Office U.S. Forest Service U.S. Geological Survey	Illinois Coastal Management Program Illinois Department of Natural Resources – Office of Water Resources Illinois National Flood Insurance Program State Coordinator Illinois State Hazard Mitigation Officer Illinois State Historic Preservation Office Indiana Coastal Management Program Indiana Department of Natural Resources – Water Indiana Department of Environmental Management Indiana National Flood Insurance Program Indiana State Hazard Mitigation Officer Indiana State Historic Preservation Office State Coordinator Michigan Coastal Management Program Michigan Environment, Great Lakes & Energy – Water Resources Michigan Environment, Great Lakes & Energy – Office of the Great Lakes Michigan National Flood Insurance Program Michigan State Hazard Mitigation Officer Michigan State Historic Preservation Office Minnesota DNR, Division of Water Minnesota Coastal Management Program Minnesota State Historic Preservation Office Minnesota National Flood Insurance Program Minnesota State Hazard Mitigation Officer	Absentee Shawnee Tribe of Oklahoma Bad River Band of Lake Superior Tribe of Chippewa Indians Bay Mills Indian Community, Michigan Bois Forte Band of Chippewa Indians Cherokee Nation Chippewa Cree Tribe of the Rocky Boy's Reservation of Montana Citizen Potawatomi Nation Delaware Nation Delaware Tribe of Indians Eastern Shawnee Tribe of Oklahoma Flandreau Santee Sioux Tribe of South Dakota Fond du Lac Band of Lake Superior Chippewa Forest County Potawatomi Community of Wisconsin Fort Peck Assiniboine and Sioux Tribes Grand Portage Band of Lake Superior Chippewa Grand Traverse Band of Ottawa and Chippewa Indians Hannahville Indian Community Ho–Chunk Nation Iowa Tribe of Kansas & Nebraska Keweenaw Bay Indian Community Kickapoo Traditional Tribe of Texas Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas Kickapoo Tribe of Oklahoma

Federal	State	Tribal
U.S. Housing and Urban Development, Region 5	Ohio Coastal Zone Management Program Ohio Environmental Protection Agency Ohio National Flood Insurance Program State Coordinator Ohio State Hazard Mitigation Officer Ohio State Historic Preservation Office Wisconsin Coastal Management Program Wisconsin Department of Natural Resources – Secretary and Directors Wisconsin National Flood Insurance Program State Coordinator Wisconsin State Historic Preservation Office State Coordinator Wisconsin State Hazard Mitigation Officer	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 Lower Sioux Indian Community of Minnesota 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 Nottawaseppi Huron Band of the Potawatomi Oneida Nation of Wisconsin Osage Nation Ottawa Tribe of Oklahoma Peoria Tribe of Indians of Oklahoma Pokagon Band of Potawatomi Indians Ponca Tribe of Nebraska Prairie Band Potawatomi Nation Prairie Island Indian Community Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin Red Lake Band of Chippewa Indians of Minnesota Sac and Fox Nation Sac and Fox Nation of Missouri in Kansas and Nebraska Sac and Fox Tribe of the Mississippi in Iowa

Federal	State	Tribal
		Saginaw Chippewa Indian Tribe of Michigan Santee Sioux Tribe Sault Ste. Marie Tribe of Chippewa Indians of Michigan Seneca Nation of Indians Seneca-Cayuga Nation Shakopee Mdewakanton Sioux Community of Minnesota Shawnee Tribe Sisseton Wahpeton Oyate of the Lake Traverse Reservation, South Dakota Sokaogon Chippewa Community Spirit Lake Tribe of Fort Totten St. Croix Chippewa Indians of Wisconsin Stockbridge-Munsee Community Band of Mohican Indians Tonawanda Band of Senecas Turtle Mountain Band of Chippewa Upper Sioux Community of Minnesota White Earth Band of Ojibwe Winnebago Tribe of Nebraska Wyandotte Nation

Below is a summary of the responses received during the NOI comment period:

- The Ohio Fish and Wildlife Services inquired on February 1, 2024 if individual projects would undergo ESA Section 7 consultation with the appropriate USFWS field office(s). Section 4.3.3 Threatened and Endangered Species is conditioned to require consultation with USFWS to develop avoidance and minimization measures.

- The Michigan SHPO inquired on February 2, 2024 whether the PEA would change the Section 106 process. FEMA responded on February 2, 2024 that the PEA covers general impacts and procedures and that they will still consult on individual projects that require it.

- The Wisconsin SHPO confirmed on February 5, 2024that they received the NOI.

- The Turtle Mountain Band of Chippewa tribe inquired on February 6, 2024 if a Class I or Class III archaeological survey had been completed. FEMA responded on February 7, 2024 that the PEA requires Cultural Resources be taken into consideration and Class I and Class III surveys would be required as part of the compliance.

- The USACE Huntington District provided a response accepting the responsibility of a cooperating agency on February 23, 2024.

- The Ohio SHPO responded on February 26, 2024 that they do not have concerns with the proposed work items and request that they review projects for affects on cultural resources prior to any work being done.

- The Wisconsin Historical Society responded on February 27, 2024 that they look forward to reviewing the PEA.

- The Indiana SHPO responded on March 6, 2024 that they have concerns about potential impacts on archaeological sites and unknown archaeological resources found within and near streams and rivers. FEMA addressed those concerns in Section 4.5 Historic and Cultural Resources.

- EPA Region 5 provided comments and recommendations for the PEA on March 13, 2024. Their letter included recommendations on how FEMA should conduct the NEPA process for the PEA including public outreach and what should be included in their coastal resources, water quality, wetland, contaminated waters and soils, environmental justice, NHPA, ESA, and climate change impact review (**Appendix C**). FEMA addressed their recommendations and included them throughout the PEA.

6.2. Notice of Availability and Public Comment

In accordance with NEPA, FEMA is releasing this draft PEA to the public, federal and state agencies, and tribes listed in **Table 6-2** for a 30-day public review and comment period. 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 consider any substantive comments received during the public review period to inform the final decision regarding NEPA reviews for grant projects under the PEA. If no substantive comments are received form the public, federal and state agencies, and/or tribes, this draft PEA will be finalized and a Finding of No Significant Impact will be issued by FEMA. The Notice of Availability was posted to the state newspapers of record (**Table 6-1)** and the draft PEA will be made available on FEMA's NEPA repository (https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa-repository).

Comments on the draft PEA may be submitted to fema-r5-environmental@fema.dhs.gov with the subject line "Stream Projects PEA" Comments may also be submitted via mail to:

Duane Castaldi
Regional Environmental Officer
FEMA Region 5
536 South Clark Street, 6th Floor
Chicago, IL 60605-1521

6.3. Preparation of SEAs

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 for those specific projects. When a proposed action could result in impacts on 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 prepare and circulate a draft SEA for public and agency review and comment. For these types of activities, FEMA would prepare a separate decision document (i.e., a Finding of No Significant Impact or a Notice of Intent to prepare an Environmental Impact Statement).

FEMA would comply with the public notification process required for compliance with EO 11988 and 11990 and 40 C.F.R. § 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 under which FEMA funded projects may be proposed that could be covered by this PEA for NEPA compliance.

SECTION 7. Project Conditions and Permits

Soils, Water Resources and Water Quality, Floodplains , Wetlands, and Coastal Resources

- Projects that would result in the conversion of important farmland soils to non-farm uses would need to consult with NRCS and complete a land evaluation and site assessment (U.S. Department of Agriculture's Form AD-1006).

- Subapplicants must coordinate with USACE and their respective state agency listed in **Table 4-2** to obtain any required CWA permits or NWP authorizations.

- Subapplicant must develop a SWPPP in accordance with the required NPDES permit.

- Subapplicants must comply with state and local floodplain and floodway regulations, including coordination with their local floodplain manager.

- Subapplicants must comply with state coastal management plan requirements for all projects within the coastal zone.

Air Quality and Climate

- Subapplicants must adhere to all EPA, state, and local emission standards.

Vegetation and Invasive Species

- Vehicles and equipment must be confined to existing roadways to the maximum extent practicable.

- Vehicles used off-road will be rubber-tired to the maximum extent practicable to reduce the potential for soil disturbance.

- For projects involving planting vegetation, native plants appropriate for site conditions must be used.

Fish and Wildlife

- Spray/rinse all equipment used in the water with high-pressure hot water to clean off mud and kill aquatic invasive species after use in project areas. Drain motor, bilge, livewell, and other water-containing devices from all equipment before leaving aquatic project areas.

- Dry all equipment used in the water for five days or more or wipe dry with a towel before use in another water body.

- To the maximum extent practicable, avoid vegetation removal from March through August to avoid impacts on nesting migratory birds.

- If bald or golden eagles are present in the project area, subapplicants must consult with USFWS to develop mitigation measures (pursuant to 16 U.S.C. § 668).

- Conduct in-water work during times of the year that minimize adverse effects on fish spawning areas during spawning seasons.

Threatened and Endangered Species

- Implement BMPs related to the protection of water quality, wetlands, vegetation, and fish and wildlife habitat.

- 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).

Hazardous Materials

- Excavated soil and waste materials must be managed and disposed of in accordance with applicable federal, state, and local regulations. In the event of discovery of soil or water contaminants exceeding reportable levels, the subapplicant and its construction contractor(s) will follow applicable federal, state, and local protocol to report and handle the contaminants appropriately.

- All fill material must come from pre-existing stockpiles or commercially procured material from a permitted and licensed source. Documentation of borrow sources used is required at closeout.

- If hazardous materials (or evidence thereof) are discovered during the implementation of the project, the subapplicant must handle, manage, and dispose of petroleum products, hazardous materials, and/or toxic waste in accordance with the requirements and to the satisfaction of the governing local, state, and federal regulations.

- During construction, the subapplicant and/or their contractor must notify the local regulatory agency (Table 4-6) about any sudden release or spill of any chemical (either oil or a hazardous material), that exceeds the threshold for a Reportable Quantity. Local agencies have clean up regulations that require Reportable Quantities of spills and other sudden releases be reported so that assessment and clean up can begin. Copies of documentation to and from the local regulatory agency must be forwarded to the State and FEMA for inclusion in the administrative record.

Land Use and Planning

- Projects must be consistent with local land use plans as described in community comprehensive and master plans.

Noise

- Construction activities must comply with allowable construction noise hours and be consistent with local noise ordinances.

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

Public Services and Utilities

- If utilities need to be temporarily shut off during construction, the subapplicant must follow local ordinances regarding shutdown procedures and notification.

- Utilities that are abandoned in place must be decommissioned in accordance with state and local standards.

Environmental Justice

- If environmental justice populations are present in a project area, and disproportionately impacted, the subapplicant would develop public outreach efforts and engagement strategies to effectively engage these populations about the proposed project.

Archaeological Resources and Tribal and Religious Sites

- Project designs should minimize deep cuts into natural cultural resource-bearing strata during grading and excavation to the maximum extent 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.

SECTION 8. List of Preparers

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

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Appendix A – Principles, Requirements, and Guidelines

1. Principles, Requirements, & Guidelines

Under the Principles, Requirements, and Guidelines (PR&G), in addition to meeting the project purpose and need, the alternatives for water resource projects must also be evaluated against their ability to achieve the Federal Objective and to conform to the guiding principles. The Federal Objective specifies that federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

1. Seeking to maximize the sustainable economic development;
2. Seeking to avoid the unwise use of floodplain and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and
3. Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

The guiding principles for the PR&G analysis are six overarching concepts that the federal government seeks to promote through federal investments in water resources. The guiding principles are: (1) Healthy and Resilient Ecosystems, (2) Sustainable Economic Development, (3) Floodplains, (4) Public Safety, (5) Environmental Justice, and (6) Watershed Approach (FEMA 2018). The guiding principles are key concepts that the potential consequences of the alternatives are evaluated against and are often framed in terms of ecosystem services that may be provided or affected by a project. This appendix provides the watershed context for the study area and a model of ecosystem services potentially provided by the Proposed Action. A comparison of the alternatives against the Guiding Principles is shown in **Table A-1.**

This PR&G analysis provides an overview of watershed conditions within the six-state study area and establishes a framework for the evaluation of stream stabilization and naturalization projects. Because a PR&G analysis is intended to evaluate how a proposed project may affect water resources and the services provided by those resources within the context of a specific watershed and other activities in that watershed, it is not possible to complete the evaluation on a programmatic basis. The PR&G is intended to provide a consistent framework for evaluating water resource projects that considers public benefits and promotes consistency, resilience, and coordination among federal agencies' investments from a watershed perspective, This programmatic evaluation identifies the larger environmental trends and context that would affect all proposed projects within the study area and provides a conceptual framework for how stream stabilization and naturalization projects may affect ecosystem services and the guiding principles. This framework can be used to expeditiously conduct project level reviews when applying the PEA to specific proposed action.

The first two steps of the PR&G analysis, defining the purpose and need and describing a range of alternatives, are completed in the PEA in Sections 2 and 3, respectively. The third step, identify existing conditions, is presented programmatically in Section 4 of the PEA; however, existing conditions will also need to be assessed on a project specific basis to identify any conditions not described in the PEA and to identify the project-specific watershed conditions. Specific watershed considerations may include existing watershed plans; other water resource investment projects,

needs, or trends in the watershed; or project area environmental justice communities that may be affected. The future conditions of the study area, the fourth step, is a description of the future under the no action alternative. The no action alternative is evaluated in the PEA. The fifth step is to evaluate the proposed action, which is presented in Section 4 of the PEA. If there are watershed specific, existing conditions relevant to the PR&G, then a brief supplemental analysis would be needed to fully assess the effects of a proposed project against the guiding principles and for consistency with the Federal Objective.

1.1. Watershed Context

In compliance with the PR&G analysis, the watershed context for the Proposed Action provides additional insight regarding the need for this project as well as other water resources investments proposed within the vicinity. The study area for this PEA encompasses four regional watersheds, the Upper Mississippi, Ohio, Great Lakes, and the Souris Red Rainy watersheds, and portions of two additional regional watersheds. The Upper Mississippi watershed encompasses a drainage area of approximately 189,000 square miles in Illinois, Minnesota, Wisconsin, and two states outside of the project area, Iowa and Missouri (American Sustainable Business Council 2024) and includes approximately 1,200 miles of navigable river waters (Wisconsin DNR 2024). The Ohio watershed encompasses approximately 75,000 square miles within the study area which includes 981 miles of the Ohio River (Ohio River Foundation 2024). The Great Lakes basin includes approximately 155,000 square miles within the study area (Great Lakes Commission 2024). Lastly, the Souris Red Rainy Watershed encompasses approximately 15,000 square miles in Minnesota and approximately 225 miles of the Red River. These regional watersheds are the largest geographic area in the U.S. Geological Service's classification of hydrologic units. Water resource planning and project development typically occurs at a smaller scale; often in areas represented by 8-, 10-, or 12-digit hydrologic unit codes where the larger numbers represent smaller geographic areas. While the regional scale watersheds are useful for providing some context and insights into general trends, understanding of the project-scale watershed area will be necessary to identify project-specific PR&G considerations.

Erosion and flooding within these watersheds are common occurrences that cause extensive damage to stream channels, infrastructure that crosses or is adjacent to streams, and properties adjacent to stream banks. Climate change is increasing the incidence of heavy precipitation and storm events, which have become more frequent and intense in the past 30 to 40 years, resulting in increased stream flows and incidents of erosion and flooding. Annual precipitation has increased 5 percent to 15 percent from the first half of the last century (1901 to 1960) compared to the present day (1986 to 2015). Winter and spring precipitation is projected to increase by up to 30 percent by the end of this century. Heavy precipitation events have increased in frequency and intensity since 1901 and are projected to increase throughout this century (Easterling et al. 2017). The increased frequency and intensity of storms and stream flows has also increased the levels of stream erosion and flooding in these watersheds and it is expected to continue to worsen.

1.2. Conceptual Model for Ecosystem Services

The conceptual model for the PR&G principles shows how changes in ecological conditions resulting from the implementation of the Proposed Action would affect the provision of ecosystem services and their linked societal benefits. In an ecosystem services assessment, the conceptual diagram provides a systematic approach to connect ecological conditions to societal benefits. It also considers how and which changes in the environment affect benefits to people. When causal connections to people are not made explicit, it is unclear whether and how each ecological change would result in changes to social benefits, and important changes to societal benefits may be left out of the analysis.

Figure A-1 shows the general model for stream stabilization and naturalization projects. The model—also known as a causal chain—links changes caused by an external stressor or intervention (i.e., construction of stream mitigation projects) through the ecological system to socioeconomic and human well-being outcomes. The conceptual model provides a visual representation of cause and effect but does not indicate the direction of the effect or the change (e.g., increase or decrease). More integral or stronger connections are emphasized in the model with larger boxes and thicker connector lines. The model for the stream stabilization and naturalization projects considers the expected outcomes from the effects of constructing projects to reduce erosion and flooding.

The conceptual model for the Proposed Action was developed by first considering how the Proposed Action would affect the ecological conditions of the project area. Next, these anticipated changes in ecological conditions were considered as to whether and how they would change the delivery of ecosystem services currently provided within the project area, and how changes in the delivery of ecosystem services could affect benefits or costs to individuals or groups within the project area and the larger watershed (FEMA 2018).

As shown in Figure A-1, the Proposed Action would change ecological conditions by potentially changing streambanks. Alteration of a streambank would affect water flows and floodplain functions to varying degrees. Each of those functions contributes to one or more societal benefits. As the change in the streambank alters the water flow and floodplain functions, the corresponding societal benefits are impacted to a greater or lesser degree and effects may be positive or negative. The model provides a conceptual visualization of the connections and the magnitude of the potential changes but does not indicate whether changes would be considered beneficial or adverse. The model does show that the societal functions most likely to be affected by the proposed stream work are those most closely aligned with the purpose and need for the Proposed Action, such as public safety and property damage.

Stream stabilization and naturalization projects would meet the purpose and need by reducing stream related erosion and flooding. These projects would have a beneficial effect on water quality, including floodplain and wetland health, resulting in a resilient ecosystem. Reduced erosion and flooding would have a positive impacts on the community by reducing the associated insurance costs, reducing property damage costs, and reducing risks to public health and safety. Additionally, stream stabilization and naturalization projects would protect important public services that are needed within the community while also increasing employment and recreational opportunities. Therefore, the Proposed Action meets the PR&G federal objective and follows the guiding principles.

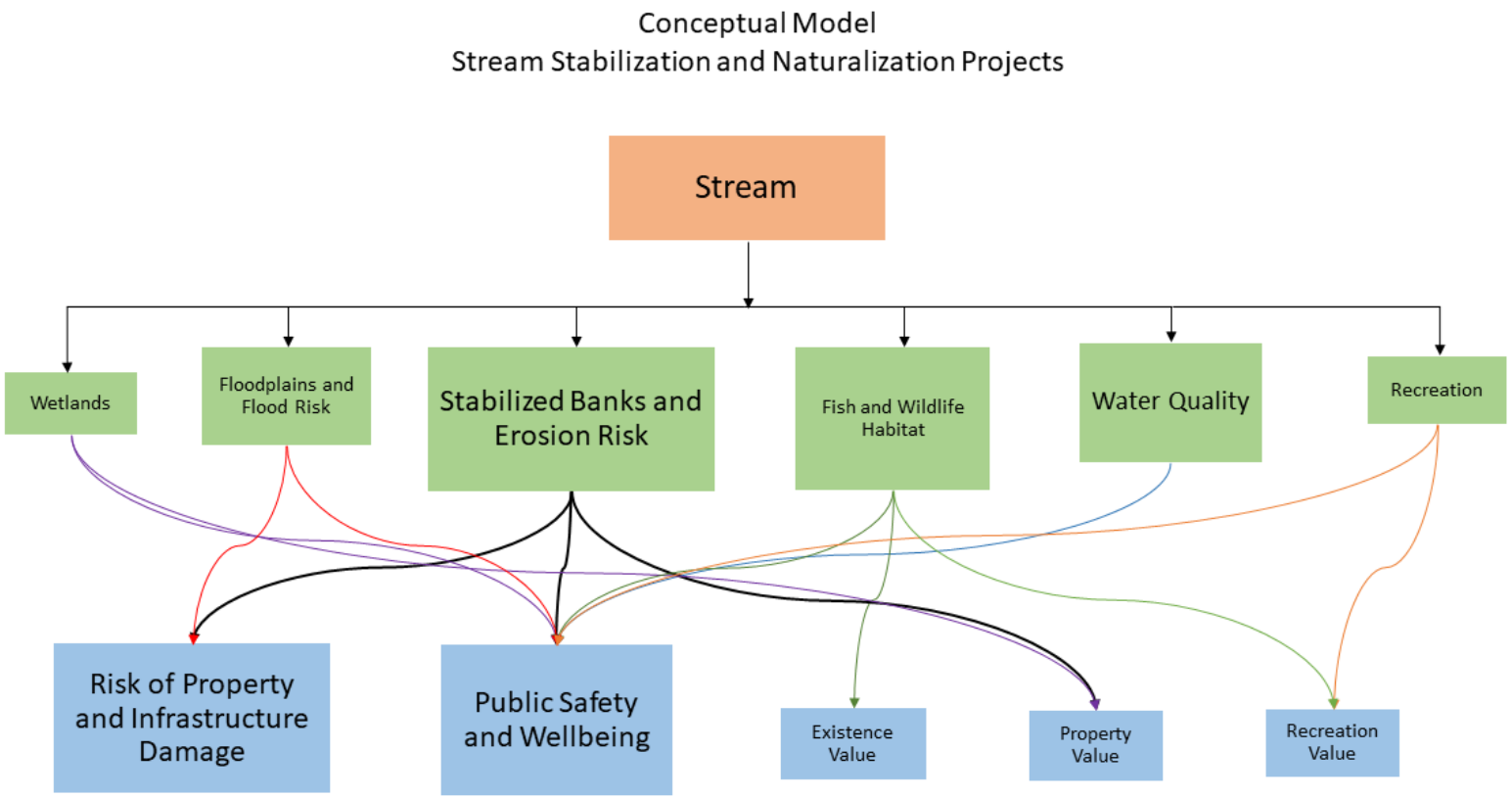

Figure A-1. Conceptual Model for Stream Stabilization and Naturalization Projects

Construction of streambank stabilization and naturalization projects (the Proposed Action) would clearly meet the purpose and need by reducing erosion and flood risks throughout the Great Lakes region, thus resulting in positive impacts on communities by reducing erosion and flood risk and the associated insurance costs, reducing property damage costs, and reducing risks to public health and safety. Additionally, the Proposed Action could potentially protect important public services that are needed within the community while also increasing employment and recreational opportunities. Therefore, the Proposed Action meets the PR&G federal objective and follows the guiding principles. The Proposed Action was determined to be the best alternative to meet the purpose and need for streambank stabilization and naturalization projects.

1.3. Interplay of Ecosystem Services and Societal Benefits and Costs

The FEMA PR&G Agency-Specific Procedures (FEMA 2018) require that impacts of the Proposed Action be analyzed using an ecosystem services approach. Ecosystem services are benefits that flow from nature to people. These services include direct and indirect contributions, including the economic and social benefits, that ecosystems provide to the environment and human population. Changes in the ecological condition due to the Proposed Action would affect ecosystem services and their linked societal benefits or costs. Ecosystem services are categorized into three general types:

1. Provisioning services, which refer to the food, fuel, fiber, and clean water that ecosystems provide.
2. Regulating services, which refer to the benefits obtained from the regulation of ecosystem processes.
3. Cultural services, which refer to the benefits ecosystems confer that do not directly relate to human physical health or material well-being.

Ecosystem services as shown in the conceptual model were analyzed programmatically for impacts on watersheds that would be impacted by stream work within the six states. However, when considering a specific project, reviewers should evaluate potential effects against the local watershed and site-specific conditions and identify if there are any impacts not described below.

- **Wetlands** provide a variety of ecosystem services that encompass both provisioning and regulating services. Wetlands provide food, fiber, and clean water; regulate water supply (e.g., flood retention, base stream flow support); and sequester carbon. Wetlands in the study area would be adversely affected if they were directly disturbed or impacted by fill or other construction activities within or adjacent to wetlands. Construction related impacts can also include increased sedimentation or turbidity within wetland waters. If stream stabilization projects disconnect nearby wetlands from the stream, their hydrology could be adversely impacted. Stream stabilization and naturalization projects that restore natural stream functions and stabilize eroding banks would likely benefit nearby wetlands and protect the wetland services. Healthy wetlands would benefit the public safety and wellbeing by improving water quality, providing erosion control and flood abatement. These services would provide protection

to adjacent properties and recreational opportunities that would also benefit property values and public wellbeing.

- **Floodplains** provide provisioning, regulating, and cultural ecosystem services. Floodplains are prime locations for food and fiber production; they regulate flooding; and historically are the preferred location for human settlements due to their position along streams and rivers that provided connectivity and access to other settlements and resources. Construction activities could potentially release of sediments and pollutants into the floodplain. In the long term, stream stabilization and naturalization measures would reduce erosion along stream banks, thus decreasing the release of sediments and pollutants within the floodplain. Furthermore, some project types would have flood mitigation elements, reducing flood-related damage to infrastructure and flood-related health and safety risks to the community; thereby benefiting the social benefits of public safety and wellbeing and property values.

- **Erosion Risk** affects the provisioning and regulating services of the ecosystem. Erosion results in soil loss at the point of erosion, affecting soil productivity and water quality. Degradation of a stream channel can affect flows, which may alter fish and wildlife habitats, flood levels, and water supply. When soil erodes from one area in a stream system, it will be deposited somewhere else, creating similar issues in the aggrading area. Construction of the Proposed Action could cause temporary erosion in and near the project sites. However, the primary purpose of the stream stabilization and naturalization projects would be to reduce erosion risks to property and infrastructure. Erosion mitigation would prevent damage to nearby properties, reduce health and safety risks to the community from unsafe conditions, and increase property values by reducing risk of property loss.

- **Fish and wildlife habitat** provides provisioning and cultural services. Construction activity could result in the injury or death of individuals during project implementation or the loss or degradation of habitat. Nesting bird species protected by the Migratory Bird Treaty Act could be negatively impacted by construction activities that require the removal of vegetation. Over the long term, stream naturalization projects that restore natural habitats would improve fish and wildlife habitat. Reduced bank erosion, scouring, and flooding would improve both aquatic and terrestrial habitats by improving water quality, maintaining or restoring natural channel forms and flows, and by passively or actively restoring native vegetation along stream channels. This in turn would provide protection for the public and increase recreation, existence, and property values as healthy habitats support a diversity of fish and wildlife and creates a healthy ecosystem for people and supports the value of nature itself.

- Stream stabilization and naturalization projects would directly affect **water quality**, a provisioning service. Water quality in the study area would be affected in the short term by construction-related turbidity, stormwater runoff, or pollutants entering the water. In the long term, water quality may be improved by reducing erosion and downstream sedimentation. Reducing erosion would aid in avoiding the mobilization of pollutants from the urban environment. Improved water quality would benefit community health and wellbeing by providing clean water and reducing the risk of water-related contamination.

- **Recreation** is a cultural ecosystem service provided by streams and could include direct contact recreation (e.g., swimming) and indirect contact recreation (e.g., boating, walking along streams and rivers, fishing). Recreation could be impacted by changes in access both during construction of projects and by structural changes in streams following construction. Improved bank stability and flood management at recreational facilities would improve access for recreational activities by reducing future damage to these facilities. Stream naturalization projects may improve the natural setting and fish and wildlife habitats, resulting in areas that are more attractive for a variety of recreational pursuits. Improved recreational value and opportunities along streams would also benefit public health and wellbeing.

1.4. PR&G Principles Impact Analysis Summary

The Federal Objective specifies that federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by: seeking to maximize sustainable economic development; seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

Table A-1 provides a summary of the potential impacts on ecosystem services from each alternative and their linked societal benefits.

Table A-1. PR&G Guiding Principles for the No Action and Proposed Action Impacts

PR&G Guiding Principles	No Action Alternative	Proposed Action
Healthy and Resilient Ecosystems	Minor changes to the baseline could occur, however, not to the extent of the Proposed Action. Ecosystems in and near project areas would continue to experience erosion and sedimentation from storm events that would be made worse by climate change.	Proposed Action would provide erosion and flood attenuation and reduce the spread of pollution carried by erosion and floodwaters in and downstream of project sites. Erosion reduction would help prevent loss of vegetated habitats.
Sustainable Economic Development	Homes and businesses in project vicinities would continue to be susceptible to erosion and flood related damage that would result in economic disruptions and require funds to repair damage.	Streambank stabilization and naturalization projects would reduce streambank erosion, mitigate flooding, and would reduce the amount of future spending required for insurance and repairs. The stream projects would also reduce erosion and flooding related road closures and utility outages resulting in fewer economic disruptions.

PR&G Guiding Principles	No Action Alternative	Proposed Action
Floodplains	Existing floodplains would be at risk from erosion related sedimentation and pollution washing into them. Facilities and infrastructure would continue to be vulnerable to flood damage.	Proposed Action could improve the function of floodplains by restoring them to a more natural state. Naturalization of the floodplain through bioengineering and restoring stream flows to historic locations could reduce flooding and increase the health and habitat functions of floodplains. The Proposed Action would also provide additional flood mitigation, reducing flood risk to facilities and infrastructure.
Public Safety	Public safety in and near project areas would continue to be threatened by erosion and flooding including the potential for adverse impacts on critical facilities.	Improved public safety resulting from a reduction in erosion and flood risk, a reduction of possible pollutants and hazardous materials that could be transported by floodwaters into streams, and a reduction in the likelihood that public services and critical facilities in the benefit area would be damaged or disrupted by erosion and flood damage.
Environmental Justice	Continued risk of erosion and flooding has the potential for disproportionately high and adverse impacts on low-income communities near at-risk streams, as they are unlikely to have the same resources available to recover from flood damage compared to other populations.	Proposed Action would not have a disproportionately high and adverse impacts on low-income populations. Stream stabilization and naturalization projects would benefit low-income populations both by reducing erosion and flood risk to assets that serve environmental justice communities.
Watershed Approach	There would be a continued risk of erosion and flood related sediments and pollutants entering watersheds. The sediments and pollutants impacts would likely be localized due to the size constraint of the Proposed Action.	The Proposed Action projects are expected to provide erosion and flood risk reduction within the study area. Streambank stabilization and naturalization projects would reduce sediments and pollutants entering watersheds and would stabilize water flows. This would have a localized benefit on the health of watershed as the size of the projects allowed under the Proposed Action would likely not have a regional impact on watershed health. Where watershed planning has occurred, the Proposed Action would likely be consistent with the watershed approach. This principle is difficult to assess programmatically, and individual projects would need to be evaluated for consistency with existing watershed approaches.

The Proposed Action would be consistent with the PR&G Federal Objective that water resource investments shall reflect national priorities, encourage economic development, and protect the environment because it would reduce erosion and flood related damage within floodplains, which would promote sustainable economic development by lowering damage costs and improving natural functions. The Proposed Action would also avoid the unwise use of floodplains, minimize adverse impacts and vulnerabilities, and protect the functions of natural systems by avoiding impacts on functional floodplain habitats to the maximum extent possible and mitigating remaining impacts on functional floodplain habitats within each project site.

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Appendix B – Threatened and Endangered Species List

Based on a review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation tool conducted in February 2024, 63 federally listed species and three species proposed for listing have the potential to occur within the states covered by this PEA, as summarized in the table below (USFWS 2024d). The study area overlaps designated critical habitat areas for 12 species, as summarized in the table below (USFWS 2024e). All federally listed or proposed species with potential to occur in the study area are under USFWS's jurisdiction; no federally listed species under the National Marine Fisheries Services' (NMFS's) jurisdiction have the potential to occur in the study area (NMFS 2022).

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Mammals									
Canada lynx Lynx canadensis	Threatened	Yes (Final)			X	X C		X	Occupies boreal spruce-fir forest (taiga) featuring deep snow and dense horizontal forest that supports prey species (snowshoe hares [*Lepus americanus*]).
Gray bat Myotis grisescens	Endangered	No	X	X					Typically occurs in caves or cave-like structures year-round, although the species has been documented in dams, mines, quarries, and the underside of bridges.
Gray wolf Canis lupus	Threatened (MN) Endangered (MI, part of MN, and WI)	Yes (Final)			X	X C		X	Habitat generalists; can thrive in temperate forests, mountains, tundra, taiga, grasslands, deserts, and other areas.
Indiana bat Myotis sodalis	Endangered	Yes (Final)	X C	X C	X		X C		Winter habitat includes underground hibernacula including caves and abandoned mines. Summer habitat includes forested areas under the exfoliating bark of dead/dying trees.
Northern long-eared bat Myotis septentrionalis	Endangered	No	X	X	X	X	X	X	Hibernates in caves and mines in the winter. Roosts in the bark, cavities, or crevices of live and dead trees in the summer. May roost in structures such as barns and sheds.
Tricolored bat Perimyotis subflavus	Proposed Endangered	No	X	X	X	X	X	X	Primarily roosts in live and dead leaf clusters of live or recently dead deciduous hardwood trees during spring, summer, and fall. Hibernates in caves and mines in the winter.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Birds									
Eastern black rail Laterallus jamaicensis ssp. Jamaicensis	Threatened	No		X					Can occur in salt, brackish, and freshwater marsh habitats that are tidally or non-tidally influenced. Requires dense vegetative cover that allows movement under the canopy.
Piping plover Charadrius melodus	Endangered	Yes (Final)	X C	X C	X C	X C	X C	X C	Foraging habitat includes sandy mud flats, ephemeral pools, and seagrass beds. Nesting habitat includes unvegetated shorelines of alkaline lakes, reservoirs, or river sandbars.
Rufa red knot Calidris canutus rufa	Threatened	Yes (Proposed)	X	X	X[1]	X	X	X	Migration and overwintering habitat generally includes coastal marine and estuarine habitats with exposed intertidal sediments.
Whooping crane Grus americana	Endangered (Experimental Population)	No	X	X	X	X	X	X	Can occupy a variety of aquatic habitats including coastal marshes, inland marshes, open ponds, wet meadows and rivers, and pastures/agricultural fields.
Reptiles									
Alligator snapping turtle Macrochelys temminckii	Proposed Threatened	No	X						Occurs in deep waters of large rivers, major tributaries, bayous, canals, lakes, and other freshwater aquatic habitats during the late summer and winter and occupy shallower waters in early summer.
Copperbelly water snake Nerodia erythrogaster neglecta	Threatened	No		X	X		X		Typically occurs in wetland complexes featuring shallow, isolated wetlands distributed within a forested upland habitat. Individuals aestivate in upland habitats.
Eastern massasauga Sistrurus catenatus	Threatened	No	X	X	X[2]		X	X	Occurs in shallow wetlands,, wet prairies, marshes, and low areas along rivers and lakes as well as adjacent uplands.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Fish									
Pallid sturgeon Scaphirhynchus albus	Endangered	No	X						Inhabits large, deep turbid river channels, usually with strong currents and firm sand or gravel substrates.
Topeka shiner Notropis topeka	Endangered	Yes (Final)				X C			Suitable habitat includes pools (in or off-channel) with low flows, gravel substrates, and groundwater input.
Clams									
Clubshell Pleurobema clava	Endangered	No	X	X	X		X		Generally occurs in clean, stable, coarse sand and gravel substrates in small to medium rivers/streams. Is often found just downstream of riffle areas.
Fanshell Cyprogenia stegaria	Endangered	No	X	X			X		Generally occurs within gravel substrate in medium to large rivers of the Ohio River basin.
Fat pocketbook Potamilus capax	Endangered	No	X	X					Found in large rivers within a variety of substrates including silt, mud and sand, sticky mud, and/or a mixture of these substrates (Missouri Department of Conservation 2015).
Higgins eye (pearlymussel) Lampsilis higginsii	Endangered	No	X			X		X	Occupies stable substrates ranging from sand to boulders in large rivers. Does not occur in firmly packed clay, flocculent silt, organic material, concrete, or unstable sand. Occur in mussel beds that support a diversity of other mussel species.
Longsolid Fusconaia subrotunda	Threatened	Yes (Final)	X	X			X		Typically occurs in sand and gravel substrates within streams and small rivers. In large rivers, the species has been observed occupying coarse gravel and cobble substrates.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Northern riffleshell Epioblasma rangiana	Endangered	No	X	X	X		X		Generally thought to occur in riffles, but is also known to occur in slow-moving and more lentic habitats. Also known to occur in Lake Erie.
Orangefoot pimpleback (pearlymussel) Plethobasus cooperianus	Endangered	No	X						Occurs in moderate to large rivers in sand and gravel substrates in riffles and shoals.
Pink mucket (pearlymussel) Lampsilis abrupta	Endangered	No	X	X			X		Found in regulated rivers modified by locks and dams. Also occurs in the transitional areas between the lentic and lotic habitats of reservoir and tailwater systems, though does not typically occur in reservoirs.
Purple cat's paw (pearlymussel) Epioblasma obliquata	Endangered	No					X		Occurs in shallow waters with swift currents within medium to large rivers in the Ohio River basin. Found in substrates varying from sand to boulders.
Rabbitsfoot Quadrula cylindrica cylindrica	Threatened	Yes (Final)	X C	X C			X C		Suitable habitat characterized as small to medium streams and some larger rivers. Suitable bottom substrates include a mixture of sand and gravel.
Rayed bean Villosa fabalis	Endangered	No		X	X		X		Generally found in smaller headwater creeks. May also occur in larger rivers and wave-washed areas of glacial lakes. Typically found in gravel or sand substrates in and around the roots of aquatic vegetation.
Rough pigtoe Pleurobema plenum	Endangered	No		X					Only known to occur within streams in the Ohio River basin. Found in the shallow riffle areas within a variety of substrates including mud and sand, bedrock, and rubble/gravel.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Round hickorynut Obovaria subrotunda	Threatened	Yes (Final)		X C	X		X		Typically occurs up to 6.5 feet deep in sand and gravel riffle, run, and pool habitats in streams and rivers. May also be found in sandy mud.
Salamander mussel Simpsonaias ambigua	Proposed Endangered	Yes (Proposed)	X	X	X C	X C	X C	X C	Inhabits swift-flowing rivers and streams featuring rocks and crevices that provide areas of shelter.
Scaleshell mussel Leptodea leptodon	Endangered	No	X						Occupies stable riffles and runs with gravel or mud substrate in medium to large rivers with low to medium gradients.
Sheepnose mussel Plethobasus cyphyus	Endangered	No	X	X		X	X	X	Found in mixtures of coarse sand, gravel, and clay in medium to large stream systems. Generally found in shallow shoal habitats with moderate to swift currents.
Snuffbox mussel Epioblasma triquetra	Endangered	No	X	X	X	X	X	X	Occurs in small to medium creeks, large rivers, and lakes. Typically found in riffles, shoals, and wave-washed lake shores in areas of swift current/wave action and substrates including gravel, sand, and sometimes cobble/boulders.
Spectaclecase (mussel) Cumberlandia monodonta	Endangered	No	X			X		X	Found in large rivers in areas sheltered from the force of the main current. Often found clustered in firm mud, beneath rock slabs, between boulders, or under tree roots.
White catspaw (pearlymussel) Epioblasma perobliqua	Endangered	No		X			X		Currently known to exist only in a 3-mile portion of Fish Creek in Ohio, although the species historically occurred in Indiana as well. Occurs in areas of coarse gravel and sand substrate within fast flowing riffles and runs.
Winged mapleleaf Quadrula fragosa	Endangered	No				X		X	Found in riffles with clean gravel, sand, or rubble substrates and clear, high-quality water. May also occur in large rivers and streams on mud/mud-covered gravel and gravel bottoms.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Snails									
Iowa Pleistocene snail Discus macclintocki	Endangered	No	X					X	Restricted to algific talus slopes, which are developed over the entrances to small fissures and caves. Algific slopes only form under unusual circumstances in areas with significant rock exposure and recent proximity to a large ice sheet.
Insects									
American burying beetle Nicrophorus americanus	Threatened	No					X		Habitat generalist occurring in wet meadows, partially forested loess canyons, oak – hickory forests, shrubland and grasslands, pastures, riparian areas, and coniferous and deciduous forests.
Dakota skipper Hesperia dacotae	Threatened	Yes (Final)				X C			Occurs in two types of prairies: (1) moist bluestem prairie supporting wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*), and smooth camus (*Zygadenus elegans*); and (2) upland, dry prairie on hillsides and ridges dominated by bluestem grasses, needlegrass (*Stipa* spp.), and floral resources.
Hine's emerald dragonfly Somatochlora hineana	Endangered	Yes (Final)	X C		X C			X C	Occupies wetlands dominated by grass-like plants and fed by water from a mineral source or fens. Wetlands are typically groundwater fed with shallow water slowly flowing through vegetation.
Hungerford's crawling water beetle Brychius hungerfordi	Endangered	No			X				Often found in plunge pools downstream of culverts and natural or human-made impoundments. Generally found in areas with moderate to fast stream flow in seasonal streams fed at least partially by groundwater.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Karner blue butterfly Lycaeides melissa samuelis	Endangered	Yes (Proposed)	X	X	X	X	X	X	Dependent on wild lupine (*Lupinus* spp.) plants. Adults mate and lay eggs on wild lupines, and caterpillars feed on the wild lupine leaves. Typically found in grasslands.
Mitchell's satyr butterfly Neonympha mitchellii mitchellii	Endangered	No		X	X		X		Restricted to fen wetlands containing low nutrients and receiving carbonate-rich groundwater from seeps and springs. Generally associated with beaver-influenced wetlands, although occasionally occur in semi-open riparian or floodplain forest areas.
Poweshiek skipperling Oarisma Poweshiek	Endangered	Yes (Final)			X C			X C	Suitable habitat includes prairie fens, grassy lake and stream margins, moist meadows, sedge meadows, and wet- to dry- native prairie.
Rusty patched bumble bee Bombus affinis	Endangered	No	X	X		X	X	X	Occurs in a variety of habitats including prairies, woodlands, marshes, agricultural landscapes, and residential parks and gardens with sufficient nectar and pollen food resources.
Crustaceans									
Illinois cave amphipod Gammarus acherondytes	Endangered	No	X						Inhabits shallow waters less than 15.7 inches with gravel or cobble substrates. Requires cold water.
Flowering Plants									
Decurrent false aster Boltonia decurrens	Threatened	No	X						Occurs on the shores of lakes and banks of streams including the Illinois River. Most commonly found in lowland areas that are subject to flood disturbances.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Dwarf Lake iris Iris lacustris	Threatened	No			X			X	Found within shallow soils over moist calcareous sands, gravel, and beach rubble on the Great Lakes coasts. Requires at least some direct sunlight.
Eastern prairie fringed orchid Platanthera leucophaea	Threatened	No	X	X	X		X	X	Can be found within a variety of habitats including wet prairie, mesic prairie, sedge meadow, fen, marsh, and marsh edge. Habitat is typically moist or moderately moist.
Fassett's locoweed Oxytropis campestris var. chartacea	Threatened	No				X		X	Grows on gentle, sand-gravel shoreline slopes around shallow lakes fed by groundwater seepage. Suitable habitat areas are typically subject to frequent, large fluctuations in water levels.
Houghton's goldenrod Solidago houghtonii	Threatened	No			X				Houghton's goldenrod is primarily found in shallow, trough-like interdunal wetlands that parallel shoreline areas as well as on calcareous beach sands, rocky and cobble shores, beach flats, and edges of marl ponds. Occurs in areas lacking competing vegetation.
Lakeside daisy Hymenoxys herbacea	Threatened	No	X		X		X		Occurs in alvar habitat, which consists of sparsely vegetated flat limestone or dolostone bedrock with thin to no soil cover. Alvar habitat is also subject to drought.
Leafy prairie-clover Dalea foliosa	Endangered	No	X						Requires direct sunlight. Occurs in thin-soiled mesic and wet-mesic dolomite prairie, limestone cedar glades, and limestone barrens lacking competing vegetation. Does not occur in areas of advanced stages of woody succession.
Leedy's roseroot Rhodiola integrifolia ssp. leedyi	Threatened	No				X			Found only on cliffsides, although the specific conditions of suitable cliffsides may vary. Primarily occurs on north-facing moderate cliffs.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Mead's milkweed Asclepias meadii	Threatened	No	X	X				X	Typically found in grasslands that are adapted for drought and fire, such as upland tallgrass prairies and glad/barren habitats.
Michigan monkey-flower Mimulus michiganensis	Endangered	No			X				Occurs in cold calcareous springs, seeps, and streams through northern white-cedar (*Thuja occidentalis*) forests. Also occurs at the base of bluffs near the Great Lakes shoreline.
Minnesota dwarf trout lily Erythronium propullans	Endangered	No				X			Occurs on fewer than 600 acres of woodland habitat. Suitable areas are characterized by rich slopes dominated by maple and basswood and in adjacent floodplains dominated by elm and cottonwood.
Northern wild monkshood Aconitum noveboracense	Threatened	No					X	X	Generally found on partially or fully shaded cliffs, algific talus slopes, or in cool areas along streams. Suitable habitat is characterized by cool soils and cold air drainage or cold groundwater flowage.
Pitcher's thistle Cirsium pitcher	Threatened	No	X	X	X			X	Grows on open sand dunes and low open beach ridges along the shores of Lakes Michigan, Superior, and Huron. The species was previously extirpated from Illinois but has since been reintroduced in Lake County.
Prairie bush-clover Lespedeza leptostachya	Threatened	No	X			X		X	Found in disturbed tallgrass prairie habitats in a variety of soil conditions including dry, dry-mesic, or bedrock prairies. Suitable habitats are those that have previously been mowed, burned, cultivated, or grazed.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Short's bladderpod Physaria globosa	Endangered	Yes (Final)		X C					Thrives in areas with direct sunlight and low levels of shading from midstory and overstory vegetation. Habitat conditions including shallow soils, limited water availability, and frequent disturbances often limit woody vegetation growth and are therefore optimal for this species.
Short's goldenrod Solidago shortii	Endangered	No		X					Occurs in open, dry habitats with full sun or partial shade. Suitable habitat typically includes limestone cedar glades, open eroded areas, cedar thickets, pastures, rock ledges along highways, and the edges of dry, open oak-hickory forest.
Small whorled pogonia Isotria medeoloides	Threatened	No					X		Occurs in older hardwood stands of beech, oak, maple, birch (*Betula* spp.), and hickory featuring an open understory. May also grow in stands of softwoods such as hemlock (*Tsuga* spp.). Typically grows in acidic soils near small streams with a thick layer of dead leaves.
Virginia sneezeweed Helenium virginicum	Threatened	No		X					Generally occurs in seasonally flooded sinkhole ponds. May also occur in disturbed sites including wet meadows, depressions in lawns, roadside ditches, and along the edges of farm ponds.
Virginia spiraea Spiraea virginiana	Threatened	No					X		Typically found in disturbed (frequently scoured) areas in the early stages of succession along the banks of rivers.
Western prairie fringed orchid Platanthera praeclara	Threatened	No				X			Found in moist tallgrass prairies and sedge meadows. Typically associated with sedges, reedgrass, and rushes.

Species Name	Federal Status	Critical Habitat	Potential to Occur and Designated Critical Habitat in State						Preferred Habitat
			IL	IN	MI	MN	OH	WI	
Ferns and Allies									
American Hart's-tongue fern Asplenium scolopendrium var. Americanum	Threatened	No			X				Found in areas with approximately 25 to 75 percent herbaceous cover. Requires winter snow cover.

Sources (unless otherwise indicated): USFWS 2024d, 2024e, 2024f

Key: C= Critical Habitat has been designated in state, IL = Illinois, IN = Indiana, MI = Michigan, MN = Minnesota, OH = Ohio, WI = Wisconsin, X = Species has potential to occur in state.

[1]Species only needs to be considered in this state if any of the following conditions apply: (1) only actions that occur in large wetland complexes during the red knot migratory window (May 1 to September 30); or (2) only actions that occur along coastal areas during the red knot migratory window (May 1 to September 30).

[2]Species only needs to be considered in this state if any of the following conditions apply: (1) project is within Tier 1 habitat; (2) project is within Tier 2 habitat; or (3) project is within eastern massasauga range.

Appendix C – Environmental Protection Agency's Notice of Intent Response

REGION 5
CHICAGO, IL 60604

March 13, 2024

Duane Castaldi
Federal Emergency Management Agency
536 S. Clark Street, 6th Floor
Chicago, Illinois 60605

Re: EPA Scoping Comments – Proposed Programmatic Environmental Assessment for Stream Work in Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio

Dear Mr. Castaldi:

The U.S. Environmental Protection Agency (EPA) has reviewed the Federal Emergency Management Agency's (FEMA) Notice of Intent (NOI) to prepare a Programmatic EA (PEA) for the project referenced above. This letter provides EPA's comments, pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's (CEQ) NEPA Implementing Regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The NOI explains that increased stream flow is occurring with greater frequency and intensity. This, coupled with a rise in storm frequency and intensity from climate change, is resulting in increased flooding and erosion along streams within Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. The project purpose is to mitigate erosion hazards via implementation of stream modification projects and erosion control practices to reduce erosion hazards and flood loss and damage to communities. The PEA would evaluate flooding and erosion mitigation measures eligible for FEMA grant funding.

The proposed measures may include minor modifications to restore stream function, adding nature-based bioengineering measures to stream banks, installation of in-stream structures, loose stone and riprap, rigid and semi-rigid armoring, and channel naturalization. Project implementation may 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 bioengineering, stabilization, and stream channel naturalization has the potential to result in environmental and community benefits, including water quality, 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 and provide scoping comments on this project. When the Draft PEA is released, please notify our office electronically at R5NEPA@epa.gov. If you have any questions about this letter, please contact the lead NEPA Reviewer, Liz Pelloso, at 312-886-7425 or via email at pelloso.liz@epa.gov.

Sincerely,

KRYSTLE MCCLAIN

Digitally signed by KRYSTLE MCCLAIN
Date: 2024.03.13 10:47:41 -04'00'

Krystle Z. McClain, P.E.
NEPA Program Supervisor
Environmental Justice, Community Health, and Environmental Review Division

Enclosures:
EPA Detailed Scoping Comments
Construction Emission Control Checklist

CC (with enclosures):
Chad Konickson, USACE-St. Paul District (chad.konickson@usace.army.mil)
Keith McMullen, USACE-St. Louis District (keith.a.mcmullen@usace.army.mil)
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EPA Scoping Comments: Proposed Programmatic Environmental Assessment for Stream Work in Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio

March 13, 2024

NEPA PROCESSES, PROJECT DEVELOPMENT, AND AFFECTED ENVIRONMENTS

EPA understands that FEMA is developing a Programmatic EA (PEA), which will take a broad look at potential stream modifications[1] that can restore stream functions and opportunities across six midwestern states. With the limited information provided, it is unclear which decisions FEMA plans to make based on the PEA process and which decisions would be made in subsequent project specific plans and work. As a result, some of EPA's 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 CEQ NEPA Regulations (40 CFR § 1502.14).
- Describe resources and communities that may be impacted by the proposed undertaking. Include photos, figures, and maps.
- For each specific modification action and 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 AND 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.[2] The PEA may also consider alignment with Lakewide Action and Management Plans[3] (LAMPs), which are ecosystem-based management strategies for protecting and restoring Great Lakes water quality.

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

[1] The proposed actions include minor modifications to restore stream function, adding nature-based bioengineering measures to stream banks, installation of in-stream structures, installation of loose stone and riprap, rigid and semi-rigid armoring, and channel naturalization.

[2] https://www.glri.us/

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

Restoration Initiative Action Plan III[4]; (2) the goals, objectives, priority projects and actions of the Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, and Lake Superior LAMPs, and (3) the individual water quality goals and commitments of each individual state.

WETLANDS/STREAMS/AQUATIC RESOURCES

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 (as required). Fill below the Ordinary High Water Mark of Waters of the United States, or fill into regulated adjacent wetlands, may trigger Clean Water Act (CWA) Section 404 permitting and the need for CWA Section 401 water quality certification from state or tribal governments.

Recommendations for the PEA:

- Analyze and disclose potential permanent, temporary, direct, indirect and cumulative impacts to aquatic resources at a programmatic level.
- Discuss how activities under the PEA would fulfill the requirements of 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).
- Make programmatic-level commitments for best practices to protect water quality and in-stream aquatic habitats during future project implementation.

PROJECT DESIGN / PROJECT STAGING

As the studies of alternatives progresses and advances, ensure that the PEA considers the following:

Recommendations for the PEA:

- Consider impacts on existing infrastructure (e.g., drinking water intake locations, sewer/septic locations, utilities, stormwater and effluent discharge point sources, existing public and private piers and boat ramps) and how project implementation and construction would impact or otherwise affect this infrastructure.
- Commit to undertaking wetland delineations for all project locations, including a commitment to investigate all staging locations and access road areas for the presence of regulated water resources.
- Provide information on coordination with the state resource agencies regarding required permitting and any required mitigation for proposed work under the scope of activities identified.
- Provide a rationale to support selection of the storm design-year that would be used for individual projects.
- Describe how the proposed projects would incorporate or align with the coastal and inland 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 stream 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

[4] https://www.epa.gov/sites/production/files/2019-10/documents/glri-action-plan-3-201910-30pp.pdf

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:** 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 stream and shoreline stabilization measures associated with the proposed project. Consider general procedures for contractors to safely identify, manage, and dispose of contamination, if any should be found.

COMMUNITY AND ENVIRONMENTAL JUSTICE IMPACTS AND CHILDREN'S HEALTH

To promote environmental justice, *EO 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations* requires Federal agencies to identify and address disproportionately high and adverse impacts of all programs, policies, and activities on low income and/or minority populations. EPA encourages the use of EJSCREEN[6] for Environmental Justice (EJ) scoping efforts. EPA's nationally consistent EJ screening and mapping tool is a useful first step in highlighting locations that may be candidates for further analysis. The tool can help identify potential community vulnerabilities by calculating EJ Indexes and displaying other environmental and socioeconomic information in color-coded maps and standard data reports (e.g., pollution sources, health disparities, critical service gaps, climate change data). EJSCREEN can also help focus environmental justice outreach efforts by identifying potential language barriers, meeting locations, tribal lands and indigenous areas, and lack of broadband access. For purposes of NEPA review, EPA considers a project to be in an area of potential EJ concern when the area shows one or more of the twelve EJ Indexes at or above the 80th percentile in the nation and/or state. However, scores under the 80th percentile should not be interpreted to mean there are definitively no EJ concerns present.

While EJSCREEN provides access to high-resolution environmental and demographic data, it does not provide information on every potential community vulnerability that may be relevant. The tool's standard data report should not be considered a substitute for conducting a full EJ analysis, and scoping efforts using the tool should be supplemented with additional data and local knowledge. Also, in recognition of the inherent uncertainties with screening level data and to help address instances when the presence of EJ populations may be diluted (e.g., in large project areas or in rural locations), EPA recommends assessing each block group within the project area individually and adding an appropriate buffer around the project area. Please see the EJSCREEN Technical Documentation[7] for a discussion of these and other issues.

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

[6] https://www.epa.gov/ejscreen

[7] https://www.epa.gov/ejscreen/technical-information-about-ejscreen

The PEA and subsequent decision document have the potential to impact communities by making decisions about types and locations of stream and waterway projects that may be funded, as well as decisions about how such projects could be implemented. FEMA should analyze if construction, operation, and maintenance of the proposed project categories will impact communities with EJ concerns. Our recommendations below suggest opportunities to further analyze, disclose, and reduce such impacts.

Recommendations for the PEA:

- Discuss equity considerations in selecting the locations of proposed stream modification projects.
- 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.
- In conducting the EJ analysis, utilize resources such as the *Promising Practices Report*[8] and the *Community Guide to EJ and NEPA Methods*[9] to appropriately engage in meaningful, targeted, community outreach, analyze impacts, and advance environmental justice through NEPA implementation.
- 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, 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.
- 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.
- Describe past activities and future plans to engage minority populations, low-income populations, and Tribes during the environmental review and planning phase, and, if the project commences, during construction and operations.
- Consider any disproportionate non-project-related pollution exposures that communities of concern may already be experiencing, as well as any disproportionate non-pollution stressors that may make the communities susceptible to pollution, such as health conditions, other social determinants of health, and disproportionate vulnerability related

[8] https://www.epa.gov/sites/default/files/2016-08/documents/nepa_promising_practices_document_2016.pdf
[9] https://www.energy.gov/sites/prod/files/2019/05/f63/NEPA%20Community%20Guide%202019.pdf

to climate change.

- Identify measures to (1) ensure meaningful community engagement; (2) minimize adverse community impacts; and (3) avoid disproportionate impacts to communities with EJ concerns.
- Consider cumulative environmental impacts to minority populations, low-income populations, Tribes, and indigenous peoples in the project area within the environmental justice analysis and disclose conclusions on those impacts.
- Provide an analysis and findings as to whether the Proposed Project and all alternatives, including the No Action Alternative, would likely have disproportionate adverse impacts on minority populations, low-income populations, or Tribes.
- Establish material hauling routes away from places where children live, learn, and play, to the extent feasible. Consider homes, schools, daycares, and playgrounds. In addition to air quality benefits, careful routing may protect children from vehicle-pedestrian accidents.

NATIONAL HISTORIC PRESERVATION ACT AND TRIBAL CULTURAL RESOURCES

The National Historic Preservation Act (NHPA) and NEPA are independent statutes, yet may be executed concurrently to optimize efficiencies, transparency, and accountability to better understand the effects to the human, natural, and cultural environment.

Recommendations for the PEA: FEMA should investigate the potential for development of a programmatic agreement (PA) with the individual State Historic Preservation Officers (SHPOs) to complete Section 106 consultation on a project-by-project basis during the design phase for each individual project in a state. Additionally, in the PEA:

- Describe FEMA's approach to fulfilling NHPA Section 106 requirements for individual projects;
- Document coordination and input received from the SHPOs and Tribal Historic Preservation Officers (THPOs) thus far and explain how FEMA has and will continue to address input provided by the SHPOs and THPOs;
- Assess options for documenting historic building or structure information prior to demolition, should removal or demolition be necessary;
- Discuss the status of developing one or more PAs for this project; and
- Describe the process for (1) addressing inadvertent discoveries (e.g., Tribal remains, artifacts, other culturally or historically sensitive items) and (2) complying with the Native American Graves Protection and Repatriation Act.

THREATENED AND ENDANGERED SPECIES AND WILDLIFE CONSIDERATIONS

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 to proposed or designated Critical Habitat for an identified species. Stream stabilization measures and in-stream work could introduce non-native invasive species and could degrade aquatic habitats if not implemented correctly or thoughtfully. Additionally, consideration should be taken to determine if potential project locations are important migratory bird stopover locations, which are critical for migratory birds to rest, eat, and shelter each spring and fall.

Recommendations for the PEA:

- Use the U.S. Fish and Wildlife Service (USFWS) "Information for Planning and Conservation" (IPaC) tool to obtain a list of trust resources in project areas. 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.
- Determine whether the proposed actions may affect trust resources[10]. If trust resources may be affected, engage in consultation with USFWS. Document coordination and formal consultation in the PEA, with the goal of aligning NEPA and the 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 – 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.
- Commit to revegetating 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.
- Identify critical flyway and migratory bird stopover locations within the states covered by the project. Discuss the proposed construction schedule(s) of any work in the vicinity of the these identified sites in relation to migratory seasons (spring and fall). Document discussions with the state Departments of Natural Resources (DNRs) and USFWS to determine if spring and/or fall construction will impact use of any identified Bird Sanctuaries by migratory bird species. Additionally, include information discussing consultation efforts and recommendations, if any, with state DNRs and USFWS.

CLIMATE CHANGE

Executive Order 14008: Tackling the Climate Crisis at Home and Abroad states, "*The United States and the world face a profound climate crisis. We have a narrow moment to pursue action…to avoid the most catastrophic impacts of that crisis and to seize the opportunity that tackling climate change presents*." The U.S. Global Change Research Program's National Climate Assessment provides data and scenarios that may be helpful in assessing trends in temperature, precipitation, and frequency and severity of storm events.[11]

Project construction would directly release greenhouse gas (GHG) emissions during construction from trucks hauling materials, workers' vehicles, and operation of construction equipment. It is important for the PEA to acknowledge disclose the impacts of the GHG emissions from the No Action alternative

[10] The USFWS is responsible for the conservation of trust wildlife resources, including endangered and threatened species, migratory birds, certain marine mammals, certain native and interjurisdictional fish, and other species of concern.
[11] Information on changing climate conditions is available through the National Climate Assessment at: https://nca2023.globalchange.gov/

and all action alternatives and discuss the implications of those emissions considering science-based policies established to avoid the worsening impacts of climate change.

In addition, estimates of the social cost of greenhouse gases (SC-GHG[12]) are informative for assessing the impacts of GHG emissions. SC-GHG estimates allow analysts to monetize the societal value of changes in GHG emissions from actions that have small, or marginal, impacts on cumulative global emissions. Estimates of the social cost of carbon (SC-CO_2) and other greenhouse gases (e.g., social cost of methane (SC-CH_4)) have been used for over a decade in Federal government analyses. Quantification of anticipated GHG releases and associated SC-GHG comparisons among all alternatives (including the No Action Alternative scenarios) within the PEA would inform project decision-making and provide clear support for implementing all practicable measures to minimize GHG emissions and releases.

On January 9, 2023, the Council on Environmental Quality (CEQ) published interim guidance to assist Federal agencies in assessing and disclosing climate change impacts during environmental reviews[13]. CEQ developed this guidance in response to Executive Order 13990 - Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis. This interim guidance was effective immediately. CEQ indicated that agencies should use this interim guidance to inform the NEPA review for all new proposed actions and may use it for evaluations in process, as agencies deem appropriate, such as informing the consideration of alternatives or helping address comments raised through the public comment process. EPA recommends that FEMA apply the interim guidance as appropriate, to ensure robust consideration of potential climate impacts, mitigation, and adaptation issues.

> **Recommendations for the PEA:** FEMA should apply the interim guidance as appropriate, to ensure robust consideration of potential climate impacts, mitigation, and adaptation issues. Additional recommendations are as follows:
>
> *Emissions & SC-GHG Disclosure and Analysis*
> - Use comparisons of GHG emissions and SC-GHG across alternatives to inform project decision-making.
>
> *Resilience and Adaptation*
> - Describe changing climate conditions (i.e., temperatures and frequency and severity of storm events) and assess how such changes could impact the proposed project and the environmental impacts of the proposed project and alternatives.
> - Incorporate robust climate resilience and adaption considerations into (1) project design and engineering; (2) construction oversight; (3) commitments for protective measures related to stormwater and erosion; and (4) routine monitoring during operations. The PEA should describe how FEMA has addressed such considerations and provide a rationale for

[12] EPA uses the general term, "social cost of greenhouse gases" (SC-GHG), where possible because analysis of GHGs other than CO_2 are also relevant when assessing the climate damages resulting from GHG emissions. The social cost of carbon (SC-CO_2), social cost of methane (SC-CH_4), and social cost of nitrous oxide (SC-N_2O) can collectively be referenced as the SC-GHG.

[13] https://www.federalregister.gov/documents/2023/01/09/2023-00158/national-environmental-policy-act-guidance-on-consideration-of-greenhouse-gas-emissions-and-climate

any reasonable alternatives to enhance resilience that were not adopted or discussed in detail.

Reduction and Mitigation

- Identify practices to reduce and mitigate GHG emissions; include commitments to do so in the PEA. We recommend FEMA consider practices in the enclosed Construction Emission Control Checklist.

PUBLIC OUTREACH AND PLAIN LANGUAGE

The proposed projects may be highly visible to the public.

Recommendations for the PEA:

- Discuss how FEMA plans to keep surrounding communities informed of project schedules, plans, and protective measures that construction contractors will be required to follow.
- Consider creating a list of required construction mitigation measures and how FEMA will ensure that information is easily accessible by the public. Include a phone number for residents to call if contractors do not follow protective measures, such as idling time limits.
- Ensure the PEA is written in plain language with the ability to be understood by a reader not familiar with project locations, area history, related/previous projects in the vicinity, or a background in ecology, engineering, or water resources. Technical terms (e.g., floodplain mapping terms) should be explained in plain language.

RESPONSE TO COMMENTS RECEIVED

FEMA should plan to respond to substantive comments received on the scoping request from the public and all comments from other state and federal agencies and Tribes.

Recommendations for the PEA: Create an appendix for all substantive comments received on the scoping request. Provide the actual comment letters and emails from all government agencies and Tribes. EPA recommends that all comments be responded to individually, especially those from government agencies and Tribes. EPA suggests that FEMA utilize an organized format to respond to agency and public comments as follows: reproduction of the original comment letter, numeric sequencing of specific comments, and corresponding responses to those comments.

U.S. Environmental Protection Agency
Construction Emission Control Checklist

Diesel emissions and fugitive dust from project construction may pose environmental and human health risks and should be minimized. In 2002, EPA classified diesel emissions as a likely human carcinogen, and in 2012 the International Agency for Research on Cancer concluded that diesel exhaust is carcinogenic to humans. Acute exposures can lead to other health problems, such as eye and nose irritation, headaches, nausea, asthma, and other respiratory system issues. Longer term exposure may worsen heart and lung disease.[1] We recommend FEMA consider the following protective measures and commit to applicable measures in the Programmatic EA.

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 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.).[2]
- 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.).[3]
- 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).[4]
- 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

[1] Carcinogenicity of diesel-engine and gasoline-engine exhausts and some nitroarenes. *The Lancet.* June 15, 2012
[2] http://www.epa.gov/otaq/standards/heavy-duty/hdci-exhaust.htm
3 https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-nonroad-engines-and-vehicles
[4] https://www.epa.gov/emission-standards-reference-guide/all-epa-emission-standards

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.
- 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 National Institute for Occupational Safety and Health approval number.

NEPA Documentation

- Per Executive Order 13045 on Children's Health[5], EPA recommends the lead agency and project proponent pay particular attention to 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 in order to be protective of children's health.
- Specify how impacts to sensitive receptors, such as children, elderly, and the infirm will be minimized. For example, locate construction equipment and staging zones away from sensitive receptors and fresh air intakes to buildings and air conditioners.

[5] 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. EPA views childhood as a sequence of life stages, from conception through fetal development, infancy, and adolescence.