SUBJECT: U.S. Army Corps of Engineers - Draft Detailed Project Report and Environmental Assessment – Section 14 Emergency Streambank and Shoreline Erosion Protection Project, Grand River, Bank Street, City of Painesville, Lake County, Ohio

TO ALL INTERESTED PARTIES:

The U.S. Army Corps of Engineers (USACE), Buffalo District has assessed the environmental impacts of the Section 14 Emergency Streambank and Shoreline Erosion Protection Project, Grand River, Bank Street project in accordance with the National Environmental Policy Act (NEPA) of 1969 and has determined a Finding of No Significant Impact (FONSI). The attached Detailed Project Report and Environmental Assessment (DPR/EA) presents the results of the project feasibility study and environmental analysis.

The DPR/EA and FONSI have been prepared in accordance with the Council on Environmental Quality's "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act," 40 CFR 1500-1506; and Corps of Engineers Regulation 200-2-2, "Environmental Quality: Policy and Procedures for Implementing NEPA."

Interested parties are encouraged to contact the USACE with their comments regarding the proposed project. Please review the DPR/EA/FONSI and send your comments in writing by Monday, September 28, 2020, to the following e-mail address:

GrandRiver_BankSt14@usace.army.mil or via mail to:

U.S. Army Corps of Engineers - Buffalo District
1776 Niagara Street
Buffalo, New York 14207-3199
ATTN: Environmental Analysis – Grand River 14
Detailed Project Report and Environmental Assessment

Section 14 Grand River/Bank Street Emergency Streambank and Shoreline Protection
City of Painesville, Ohio

August 2020

US Army Corps of Engineers®
Buffalo District
BUILDING STRONG®
DETAILED PROJECT REPORT AND ENVIRONMENTAL ASSESSMENT (DPR/EA)
CONTINUING AUTHORITIES PROGRAM (CAP)
SECTION 14
EMERGENCY STREAMBANK AND SHORELINE EROSION PROTECTION PROJECT
GRAND RIVER, BANK STREET (P2 #461094)

CITY OF PAINESVILLE, LAKE COUNTY, OHIO

AUGUST 2020
FINDING OF NO SIGNIFICANT IMPACT

SECTION 14 EMERGENCY STREAMBANK AND SHORELINE EROSION PROTECTION PROJECT – GRAND RIVER, BANK STREET

CITY OF PAINESVILLE, LAKE COUNTY, OHIO

The U.S. Army Corps of Engineers, Buffalo District (USACE) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Draft Detailed Project Report and Environmental Assessment (DPR/EA) dated August 2020 for the Grand River, Bank Street Section 14 Project addresses the feasibility of emergency streambank protection to protect public services including (but not limited to) streets, bridges, schools, water and sewer lines, National Register sites, and churches from damage or loss by natural erosion potential on Bank Street, in the City of Painesville, Lake County, Ohio. This study was conducted as part of the Continuing Authorities Program, under the authority of Section 14 of the Flood Control Act of 1946, as amended.

The Draft DPR/EA, incorporated herein by reference, evaluated various alternatives that would stabilize approximately 325 feet of streambank using an Anchored Steel Sheet Pile Wall in the study area. The recommended plan (Alternative 1) is the National Economic Development (NED) Plan and includes:

- Construction of a steel sheet pile wall approximately 325 feet in length near the top-of-slope.
- Sheet pile embedment to a stable depth within the overburden soils or to the top of rock.
- Removal of the existing soil nails and wire mesh reinforcement.

In addition to a “no action alternative (NAA)” plan, two alternatives were evaluated, both involving the stabilization of approximately 325 feet of streambank.¹ Both alternatives share the same footprint due to the nature of the bank erosion in the project area. In addition to the recommended plan (Alternative 1), Alternative 2 (Anchored Soldier Pile and Lagging Wall) includes installation of socketing soldier pile within the shale bedrock along with the placement of lagging panels. The formulation of alternatives and the eventual selection of the recommended plan are discussed in Sections 4-2 of the DPR/EA. The project’s final array of alternatives is outlined in Section 4.2.1. The recommended plan is cost effective, within the Section 14 authority, will provide the largest benefits, and is the preferred plan of the project’s non-federal sponsor (City of Painesville).

For all alternatives, the potential effects were evaluated, as appropriate. A detailed assessment of the potential adverse effects of the project alternatives is presented in Section 6 of the DPR/EA while a summary assessment of the potential effects of the recommended plan is listed in the table below:

---
¹ 40 CFR 1505.2(b) requires a summary of the alternatives considered.
### Summary of Potential Effects of the Recommended Plan

<table>
<thead>
<tr>
<th>Category</th>
<th>Insignificant effects</th>
<th>Insignificant effects as a result of mitigation</th>
<th>Resource unaffected by action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Waters</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Floodplains</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wetlands</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Water Quality</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Vegetation</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wildlife</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Invasive/Exotic Species</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Threatened &amp; Endangered Species*</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>Recreational, Scenic, and Aesthetic Resource</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Air Quality</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Climate Change and Greenhouse Gases</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Noise</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Hazardous and Toxic Substances</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Demographics</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Associated Land Use and Development</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Public Facilities and Services</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Water and Sewer Facilities</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Environmental Justice</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Transportation</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Health and Human Safety</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Cumulative Impacts</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

* Effect on T&E species, in this case the Indiana and northern long-eared bats, is insignificant due to the provision provided by the U.S. Fish & Wildlife Service of limiting when existing vegetation at the site may be removed.

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices as detailed in the DPR/EA will be implemented, if appropriate, to minimize impacts.²

No compensatory mitigation is required as part of the recommended plan.

A scoping document was distributed to the public, local, state, and federal agencies and Indian tribes on April 30, 2019. Comments were received from the U.S. Environmental Protection Agency and Ohio Department of Natural Resources on May 21, 2019 and June 6, 2019, respectively. Those comments were evaluated and addressed in the appropriate sections of

² 40 CFR 1505.2(C) all practicable means to avoid and minimize environmental harm are adopted.
Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the USACE determined that the recommended plan will have no effect on federally listed species or their designated critical habitat. The project is within the range of several species that are listed as threatened or endangered. The project will have no effect on these species. The project may affect, but will not adversely affect the Indiana bat and northern long-eared bat due to restrictions on seasonal vegetation clearing restrictions (Section 6.1.4). The U.S. Fish & Wildlife Service concurred with these determinations on January 16, 2020.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the USACE determined that the recommended plan has no effect on historic properties. In a letter dated May 14, 2019 Ohio's State Historic Preservation Office (SHPO) concurred with our no effects determination and no further coordination was required.

Pursuant to the Clean Water Act of 1972, as amended, no discharge of dredged or fill material is associated with the recommended plan. A water quality certification, pursuant to Section 401 of the Clean Water Act, will not be needed from the Ohio Environmental Protection Agency (OEPA) due to no in-water work associated with the recommended plan.

The project is not located within the Ohio Coastal Zone. Therefore, compliance with the Coastal Zone Management Act of 1972 is not applicable to this project.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed sufficient for completion of this DPR/EA. A list of these laws is provided in Section 9, Compliance with Environmental Protection Statutes and Executive Orders.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council’s 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. Analysis has shown that the proposed project is not a major federal action that would result in significant adverse impacts on the quality of the human or natural environment. Public coordination, to date, has uncovered no areas of significant environmental controversy that have not been resolved. All applicable laws, executive orders, regulations, and local government plans were considered in the evaluation of alternatives.\(^3\) Based on this report, the reviews by other federal, state and local agencies, tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.\(^4\) Those who may have information that may alter this assessment and lead to a

---

\(^3\) 40 CFR 1505.2(B) requires identification of relevant factors including any essential to national policy which were balanced in the agency decision.

\(^4\) 40 CFR 1508.13 stated the FONSI shall include an EA or a summary of it and shall note any other environmental documents related to it. If an assessment is included, the FONSI need not repeat any of the discussion in the assessment but may incorporate by reference.
reversal of this decision should notify me within 30 days. If no comments that would alter this finding are received within the 30-day review period, this FONSI will be signed and filed with the project documentation.

___________________________  ____________________________________
Date                           ELI S. ADAMS
                               LTC, EN
                               District Commander
EXECUTIVE SUMMARY

This Detailed Project Report and Environmental Assessment (DPR/EA) presents the findings of the Section 14 Grand River/Bank Street Streambank and Shoreline Erosion Protection Project in Painesville, Ohio. This report, prepared by the Buffalo District (LRB) of the U.S. Army Corps of Engineers (USACE), documents the feasibility phase, plan formulation process and potential environmental effects associated with the implementation of streambank protection measures. All plan formulation elements are completed during this phase, including technical analyses, policy compliance determinations, and environmental and regulatory compliance activities required for approval of the decision document. This study is authorized under the Continuing Authority Program (CAP), Section 14 of the 1946 Flood Control Act, as amended.

The geographic scope of this study consists of approximately 325 linear feet (LF) of significantly eroded streambank along the west bank of the Grand River directly adjacent to Bank Street within the City of Painesville, Lake County, Ohio. The project area is located near the Bank Street intersection with South State Street, less than one quarter mile south of downtown Painesville. The overall goal of this project is to protect a streambank from further erosion and prevent an eventual failure of the Bank Street infrastructure and associated public utilities. Further streambank erosion at the site could disrupt vehicular traffic, residential access and public utility services for the residential area and require relocation of multiple public utilities including gas, water, sewer, and electric lines.

Stabilizing the streambank adjacent to Bank Street would ensure vehicular safety and the safety and protection of the adjacent public utilities. Without Bank Street, several homeowners would have no access to their property. With implementation of the proposed project, the streambank and adjacent infrastructure within the project area would be stabilized long term with a top-of-slope engineered wall.

In past years, the City of Painesville (non-federal sponsor) attempted multiple unsuccessful streambank repairs. The most recent repair in 2012 consisted of wire mesh facing and reinforcing bars (i.e., soil nails). Since that time, significant erosion and undermining of this repair has occurred. According to a report prepared by Burgess & Niple in 2016, without treatment, the streambank material will continue to undergo river-related erosion and failure, resulting in potential road collapse and breaching of public utilities. Field reconnaissance and analysis of site conditions conducted by USACE in 2018 and 2019 revealed a sequential slope failure process that includes weathering and erosion of the fissile shale at the river’s edge, creation of rock overhangs, failure of the rock crest, loss of toe at the base of the upper soil slope, and subsequently shallow slope failures/erosional recession of the soil slope. Deep seated rotational failures are not evident. The recent site visits also revealed an average erosion rate of 0.23 feet per year on the upper slope. This rate is an average of more substantial erosion events interspersed with long periods of little to no erosion. At the current erosion rate, failure of the road and associated utilities is likely to occur within the next 10 to 15 years or less. Potential unexpected large episodic event(s) could accelerate that timeframe.

This DPR/EA summarizes baseline existing conditions in the study area, evaluates various streambank erosion and protection measures and alternatives, and considers the anticipated environmental impacts of the final array of alternatives. The economic evaluations assess
benefits and costs in order to ensure resources are allocated in the most efficient manner possible.

This report identified, evaluated, and recommends Alternative 1 (i.e., Anchored Steel Sheet Pile Wall) to best meet the planning objectives of comprehensive streambank protection within the study area and is in alignment with the goals of the non-federal project sponsor.

The total estimated project cost for implementation of the recommended plan is $3,788,000. The period of analysis used to compute costs is 50 years with a fiscal year (FY) 2020 federal interest rate of 2.75 percent. The recommended plan provides streambank protection over a projected 50 year lifespan of the project. One of the factors in justifying the recommended plan is a positive Benefit Cost Ratio (BCR). The BCR is based on the comparison of the annual “first (constant dollar basis) cost” of the recommended plan ($137,200) compared to the annual cost of the relocation alternative ($176,000). As a result, the BCR for the project is 1.28 to 1, justifying the recommended streambank protection plan. Design and construction costs (if the project is implemented) must be shared with the non-federal project sponsor. The City of Painesville would therefore be obligated to contribute 35 percent of the costs for design and construction. The city must also pay for 100 percent of the cost of any operation and maintenance requirement after construction.
# TABLE OF CONTENTS

## 1 INTRODUCTION

1.1 STUDY PURPOSE, SCOPE AND NEED ................................................................. 1
1.2 PROJECT LOCATION ......................................................................................... 2
    1.2.1 Study Area .......................................................................................... 2
    1.2.2 Project Site ....................................................................................... 4
1.3 STUDY AUTHORITY ....................................................................................... 10
1.4 RELEVANT PRIOR STUDIES AND REPORTS .................................................. 10

## 2 AFFECTED ENVIRONMENT ............................................................................. 12

2.1 CLIMATE AND TOPOGRAPHY ..................................................................... 12
    2.1.1 Climate .............................................................................................. 12
    2.1.2 Physiography and Topography ............................................................. 12
2.2 SOILS AND GEOLOGY .................................................................................... 15
    2.2.1 Stratigraphic Sequence ....................................................................... 15
    2.2.2 Surficial Geology ............................................................................... 15
    2.2.3 Soil Associations ................................................................................ 16
    2.2.4 Hydric Soils ...................................................................................... 16
    2.2.5 Bedrock Geology ............................................................................... 16
    2.2.6 Summary of February 2019 Subsurface Investigation ......................... 16
2.3 SURFACE WATER AND OTHER AQUATIC RESOURCES ............................ 21
    2.3.1 Surface Water .................................................................................... 21
    2.3.2 Groundwater ..................................................................................... 21
    2.3.3 Floodplains ........................................................................................ 21
    2.3.4 Wetlands ............................................................................................ 23
    2.3.5 Water Quality .................................................................................... 23
2.4 VEGETATION .................................................................................................. 24
2.5 WILDLIFE ..................................................................................................... 24
    2.5.1 Reptile and Amphibians ..................................................................... 24
    2.5.2 Birds .................................................................................................. 25
    2.5.3 Mammals ........................................................................................... 25
    2.5.4 Invasive/Exotic Species ..................................................................... 25
2.6 THREATENED AND ENDANGERED SPECIES ............................................ 26
2.7 RECREATIONAL, SCENIC, AND AESTHETIC RESOURCES ......................... 28
    2.7.1 Recreation ......................................................................................... 28
    2.7.2 Scenic and Aesthetic Resources ........................................................... 29
2.8 CULTURAL RESOURCES .............................................................................. 29
2.9 AIR QUALITY AND CLIMATE CHANGE ..................................................... 29
    2.9.1 Air Quality .......................................................................................... 29
    2.9.2 Climate Change and Greenhouse Gases .............................................. 29
2.10 NOISE ........................................................................................................... 30
2.11 HAZARDOUS AND TOXIC SUBSTANCES .................................................. 30
    2.11.1 Environmental Baseline Study/Limited Phase I HTRW Investigation Baseline ........................................... 30
2.12 DEMOGRAPHICS, LAND USE, SOCIOECONOMIC AND ENVIRONMENTAL JUSTICE .................................................. 31
    2.12.1 Demographics ............................................................................... 31
    2.12.2 Associated Land Use and Developments ......................................... 31
    2.12.3 Public Facilities and Services ......................................................... 32
Detailed Project Report and Environmental Assessment
Section 14 Grand River, Bank Street Streambank Protection, Painesville, OH (P2# 461094)

2.12.4 Water and Sewer Facilities .................................................................32
2.12.5 Environmental Justice (EO 12898) .........................................................32
2.12.6 Protection of Children (EO 13045) .........................................................33
2.13 TRANSPORTATION ...............................................................................33
2.14 HEALTH AND HUMAN SAFETY ..............................................................34

3 PLAN FORMULATION ..............................................................................35

3.1 PROBLEMS AND OPPORTUNITIES .........................................................35
3.1.1 Problems .........................................................................................35
3.1.2 Opportunities .................................................................................36
3.2 OBJECTIVES AND CONSTRAINTS ..........................................................36
3.2.1 Planning Objectives .......................................................................36
3.2.2 Planning Constraints ...................................................................36
3.3 MOST PROBABLE FUTURE WITHOUT PROJECT CONDITIONS ...............37
3.4 MEASURES AND ALTERNATIVES TO ACHIEVE PLANNING OBJECTIVES ...38
3.4.1 Screened Measures .......................................................................38
3.4.2 Excluded Measures ......................................................................41
3.4.3 Non-Structural and Structural Measures .......................................41
The non-structural and structural measures that were retained are described in further detail below. ........41

4 FORMULATION AND COMPARISON OF ALTERNATIVE SOLUTION SETS.....43

4.1 PRELIMINARY FORMULATION AND SCREENING OF ALTERNATIVES ..........43
4.2 ALTERNATIVE PLAN DESCRIPTION .........................................................43
4.2.1 Final Array of Alternatives Considered ...........................................54
4.3 FURTHER SCREENING CRITERIA OF ALTERNATIVE PLANS .....................54
4.4 EXCLUDED PLANS .............................................................................56
4.5 RISK AND UNCERTAINTY ...................................................................57

5 TENTATIVELY SELECTED PLAN (TSP) - RECOMMENDED PLAN ............58

5.1 TENTATIVELY SELECTED PLAN/RECOMMENDED PLAN DESCRIPTION ....58
5.1.1 Estimated Project Costs and Schedule .............................................61
5.1.2 Non-Federal Sponsor Responsibilities ...........................................65

6 ENVIRONMENTAL EFFECTS OF RECOMMENDED PLAN ..................66

6.1 PHYSICAL ENVIRONMENT ..................................................................66
6.1.1 Surface Water and Other Aquatic Resources ..................................66
6.1.2 Vegetation ......................................................................................67
6.1.3 Wildlife ..........................................................................................68
6.1.4 Threatened and Endangered Species ..........................................69
6.1.5 Recreational, Scenic, and Aesthetic Resources ..............................69
6.1.6 Cultural Resources .......................................................................70
6.1.7 Air Quality and Climate Change ...................................................71
6.2 SOCIO-ECONOMIC IMPACTS ...............................................................72
6.2.1 Noise ............................................................................................72
6.2.2 Hazardous, Toxic Substances .....................................................73
6.2.3 Demographics, Land Use, Socioeconomic and Environmental Justice ....73
6.2.4 Transportation ..............................................................................74
6.2.5 Health and Human Safety .............................................................75
6.3 Cumulative Effects .............................................................................75

7 MITIGATION OF ADVERSE EFFECTS ......................................................80

8 IMPLEMENTATION REQUIREMENTS .......................................................81
8.1 PROJECT PARTNERSHIP AGREEMENT (PPA) ................................................................. 81
8.2 REAL ESTATE ................................................................................................................. 83
  8.2.1 Real Lands, Easements, Rights-Of-Way, Relocations and Disposal Areas .................. 83
8.3 MONITORING AND ADAPTIVE MANAGEMENT .......................................................... 84
8.4 OPERATION, MAINTENANCE, REPAIR, REPLACEMENT AND REHABILITATION .... 84

9 COMPLIANCE WITH ENVIRONMENTAL PROTECTION STATUTES AND 
EXECUTIVE ORDERS ........................................................................................................ 86

  9.1 ARCHAEOLOGICAL AND HISTORICAL PRESERVATION ACT OF 1979 (16 USC 470 et seq.); NATIONAL HISTORIC PRESERVATION ACT OF 1966 (16 USC 470 et seq.); EXECUTIVE ORDER 11593 (PROTECTION AND ENHANCEMENT OF THE CULTURAL ENVIRONMENT), MAY 13, 1979 .................................................. 86
  9.2 CLEAN AIR ACT, AS AMENDED (42 USC 7401 – 7671G) ............................................. 86
  9.3 CLEAN WATER ACT, AS AMENDED (33 USC 1251 ET SEQ.) .................................... 86
  9.4 COASTAL ZONE MANAGEMENT ACT OF 1972, AS AMENDED (16 USC 1451 – 1464) .... 86
  9.5 ENDANGERED SPECIES ACT OF 1973, AS AMENDED (16 USC 1531 ET SEQ.) ........ 86
  9.6 NATIONAL ENVIRONMENTAL POLICY ACT (42 USC 4321 – 4347) ......................... 87
  9.7 FISH AND WILDLIFE COORDINATION ACT (16 USC 661 ET SEQ.) ......................... 87
  9.8 WILD AND SCENIC RIVERS ACT (16 USC 1271, ET SEQ.) ...................................... 87
  9.9 FEDERAL WATER PROJECT RECREATION ACT; AND LAND AND WATER CONSERVATION ACT (16 USC 460l-12 – 4601-22, 662) 87
  9.10 WATERSHED PROTECTION AND FLOOD PREVENTION ACT ............................. 87
  9.11 EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS, MAY 24, 1977 ............. 87
  9.12 EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT, MAY 24, 1977 ............... 87
  9.13 EXECUTIVE ORDER 12898, FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS, FEBRUARY 11, 1994; EXECUTIVE ORDER 12948, AMENDMENT TO EXECUTIVE ORDER 12898, JANUARY 30, 1995 88
  9.14 ANALYSIS OF IMPACTS ON PRIME AND UNIQUE FARMLANDS, CEQ MEMORANDUM, 30 AUGUST 1976 ................................. 88

10 PUBLIC INVOLVEMENT ................................................................................................. 89

11 RECOMMENDATION .................................................................................................... 91

12 REFERENCES ............................................................................................................... 94

13 ACRONYMS .................................................................................................................. 96

LIST OF FIGURES

Figure 1-1. Study Area – Lower Grand River Watershed, Ohio. (ESRI Data, 2019) .......... 3
Figure 1-2. Vicinity Map and Project Area – Bank Street/Grand River, Painesville, Ohio. (ESRI Data, 2019) 4
Figure 1-3. Aerial View of Project Area – Bank Street/Grand River, Painesville, Ohio. (Google Earth, 2019). 5
Figure 1-4. Assessor Parcel Map – Bank Street/Grand River, Painesville, Ohio. (Lake County GIS Dept., 2018) ................................................................. 6
Figure 1-5. Project Area – Bank Street/Grand River, Painesville, Ohio. (ESRI Data, 2019) ........ 6
Figure 1-6. 2015 Streambank Conditions – Significant Erosion and Undermining. (Bing Maps, 2018) 8
Figure 1-7. 2015 Streambank Conditions (Failed 2012 Reinforced Slope Repair) Significant Erosion and Undermining – Looking Down Slope To Water (North East). (USACE Staff, 2018) 8
Figure 1-8. Existing Streambank Conditions. (USACE Staff, 2018) .................................. 9
Figure 1-9. Existing Streambank Conditions. (USACE Staff, 2018) .................................. 9
Figure 2-1. Project Area Topography, Aerial View. (ESRI Data, 2019) ............................... 13
Figure 2-2. Project Area Topography, Side View. (ESRI Data, 2019) ................................. 14
Figure 2-3. Project Area Topography, Plan View. (USACE Survey Staff, 2019) .................. 15
Table 2-1. Reptile List ................................................................. 24
Table 2-2. Amphibian List .......................................................... 24
Table 2-3. Nonindigenous Aquatic Species List ............................ 25
Table 2-4. Air Quality Statistics Report Lake County (2017) .......... 29
Table 2-5. City, County and State Demographics (2017) ............... 31
Table 2-6. Minority and Low-Income Populations (2016) ............... 33
Table 3-1. Screened Measures .................................................. 40
Table 4-1. Array of Alternatives Considered Comparison ............... 54
Table 4-2. Criteria Evaluation and Comparison of Alternative Plans ................................................................. 55
Table 5-1. Estimated Economic Costs for Recommended Plan .......... 61
Table 5-2. Estimated Road Relocation Costs Avoided ................... 62
Table 5-3. Estimated Project Costs and Apportionment .................. 63
Table 5-4. Key Project Milestones ............................................. 64
Table 6-1. CEQ 11-Step Process ................................................ 76
Table 8-1. Implementation Schedule .......................................... 82
LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>Engineering</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Real Estate Plan</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Cost Engineering</td>
</tr>
<tr>
<td>Appendix D</td>
<td>NEPA Scoping</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Phase 1 ESA/HTRW</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Economic Analysis</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Correspondence</td>
</tr>
</tbody>
</table>
1 INTRODUCTION

1.1 Study Purpose, Scope and Need

This integrated Detailed Project Report and Environmental Assessment (DPR/EA) has been prepared by the Buffalo District (LRB) of the U.S. Army Corps of Engineers (USACE) to identify the most cost effective alternative for providing streambank protection along the Grand River directly adjacent to Bank Street in the City of Painesville, Ohio while minimizing environmental, economic, and social impacts. The City of Painesville (City) is the non-federal sponsor. Initially, the City requested federal assistance from USACE in May 2016 through a Letter of Intent (LOI) to address the streambank erosion issues at Bank Street under the Section 14 authority. A subsequent LOI from the City was received by USACE in September 2017.

The primary purpose of this project is to develop a long-term viable alternative and provide a cost-effective means to protect Bank Street and associated public utilities from further slope failure as a result of significant streambank erosion on the Grand River. This section of Bank Street in Painesville is located in a residential area and is adjacent to the Grand River valley formed by river flows and erosional processes.

This report documents the study results for the proposed action. The study has been conducted in accordance with feasibility study guidelines contained in the Planning Guidance Notebook (ER-1105-2-100) and other pertinent USACE regulations and guidance.

The other key features of this DPR/EA Study include:

• Documenting the project objectives
• Discussing opportunities and constraints
• Describing existing and potential future conditions
• Identifying alternative means to achieve the project objectives
• Analyzing the feasibility, effects, benefits, and costs of the alternatives
• Recommending an alternative that best meets project objectives in a cost-effective manner

In accordance with ER-200-2-2 (Procedures for Implementing the National Environmental Policy Act (NEPA)), USACE has assessed the potential environmental effects of the project alternatives on the quality of the human environment. Using a systematic and interdisciplinary approach, an assessment has been made of the potential environmental impacts for each plan as judged by comparing with and without-project conditions.

The need for the proposed federal action arises from the significant erosion of the Grand River streambank upper slope in study area as described in Section 2 of this report. The purpose of the proposed federal action is to work within the defined study area to enact solutions within the Corps’ authority to stabilize the slope along the Grand River adjacent to Bank Street. Stabilization of the slope will maintain the safety of the Bank Street roadway and associated public utilities.
This study documents the plan formulation process, including the selection of the recommended plan. The level of detail is appropriate to the scope and complexity of the recommended solution and sufficient to proceed into the preparation of engineering design plans and specifications. This streambank protection study was planned in cooperation with the City as the project’s non-federal sponsor. The project planning process has also included an opportunity for public comment to ensure all stakeholder parties and the general public have an opportunity to contribute to project development.

1.2 Project Location

1.2.1 Study Area

The City of Painesville is located in Lake County in northeastern Ohio, approximately 30 miles east of Cleveland. Much of the city is situated along the west side of the Grand River that flows northward into Lake Erie. The proposed project would address approximately 325-feet of slope failure along the top portion of the streambank at approximately river mile seven (7) of the Grand River. The study area falls within the Lower Grand River Watershed, which is identified by Hydrologic Unit Code (HUC) 0411000406 (Figure 1-1). The Grand River is a tributary of Lake Erie and is 102.7 miles long. The Grand River rises in southeastern Geauga County and initially flows eastwardly into Trumbull County. Downstream of West Farmington it turns northward into Ashtabula County, where it passes the village of Rock Creek and then turns westward into Lake County, where it passes the communities of the city of Painesville and village of Grand River before flowing into Lake Erie at 41°45′37″N 81°16′50″W in Fairport Harbor to its confluence with Lake Erie. Grand River drains an area of approximately 287 square miles.
Figure 1-1. Study Area – Lower Grand River Watershed, Ohio. (ESRI Data, 2019)
1.2.2 Project Site

The project area is located along the left bank (looking downstream) of the Grand River, within the City (Figure 1-2). Bank Street is located along the top of the bank. The project area is defined as approximately 325 LF along the top of the slope formed by riverine flow-related erosion and recession. For several decades, the city has monitored river flow erosion and slope failure conditions resulting in the displacement of existing retaining wall(s) and reinforced slope protection.

Bank Street is a two-lane residential street aligned in a northwest to southeast direction from South State Street to East Walnut Avenue and parallel to a section of the Grand River on the east side of the City limits. Bank Street provides the main transportation route for residences in this neighborhood within the City. There are 20 land parcels along Bank Street that could potentially be affected by the eroding streambank. USACE, in coordination with the city, determined that there are 17 homes on those properties along Bank Street that would be affected by continued erosion of the streambank that would impact the public utility and road infrastructure. The west bank of the Grand River throughout this area has a very
narrow and steep slope. The river bed is approximately 95-100 feet below the Bank Street road surface.

Approximately 325 feet of the streambank is most severely eroded, exacerbated by previous loss of segmented retaining wall failures (Figure 1-3, 1-4 and 1-5). All of the homes on Bank Street have driveway access on the street. Seven (7) of the 17 affected homes are located directly across from the subject slope reach. The top-of-slope along this portion of the streambank ranges from approximately 7 to 12 feet from the edge of curb.

Figure 1-3. Aerial View of Project Area – Bank Street/Grand River, Painesville, Ohio. (Google Earth, 2019)
Figure 1-4. Assessor Parcel Map – Bank Street/Grand River, Painesville, Ohio. (Lake County GIS Dept., 2018)

Figure 1-5. Project Area – Bank Street/Grand River, Painesville, Ohio. (ESRI Data, 2019)
In 2016, the City released an inspection report (2015 Retaining Wall Inspection Report, Burgess & Niple, March 2016) documenting previous and existing retaining wall structures, streambank erosion conditions and previous repair attempts. These include a historic crib wall and a soil nailing slope remediation project. Existing conditions are shown in Figures 1-6 thru 1-8. Overhead electric utility lines on Bank Street run parallel adjacent to the top-of slope along the river-side of the street. Gas, water, sanitary sewer, and storm drain lines are located between the center line and west side of Bank Street.

Documentation regarding the historic crib wall present in the project area has not been found, but anecdotal evidence suggests the structure had been in-place for over 50 years. A short length of the crib wall remains with a segment at the immediate project area having recently collapsed (2015) and fallen into the river. Field reconnaissance and photographic evidence indicate the crib wall base support had become undermined overtime by loss of material and the cribs have been sliding down the upper soil slope from their original position. The soil nailing slope remediation project was implemented in 2012. As is described within later parts of this report and appendices, the soil nailing has been unsuccessful in stopping the shallow slope failure conditions that currently threaten the Bank Street infrastructure. As evident from field reconnaissance, slope soil material is actively slumping and eroding from beneath and beyond the open wire mesh and soil nail array that was installed.

The streambank material consists of a layer of unconsolidated deposits over shale bedrock (see Section 2.2). Recent analysis conducted in 2018 and 2019 indicates the top of slope is encroaching toward the road at an average rate of 0.23 feet per year. However, it is believed that large portions of slope have failed in episodes with spaces of time in between (Figure 1-9). Impacts to the road and associated utilities is likely to occur within the next 10 to 15 years, however, an episodic event(s) could accelerate that timeframe.
Figure 1-6. 2015 Streambank Conditions – Significant Erosion and Undermining. (Bing Maps, 2018)

Figure 1-7. 2015 Streambank Conditions (Failed 2012 Reinforced Slope Repair) Significant Erosion and Undermining – Looking Down Slope To Water (North East). (USACE Staff, 2018)
Figure 1-8. Existing Streambank Conditions. (USACE Staff, 2018)

Figure 1-9. Existing Streambank Conditions. (USACE Staff, 2018)

High angle slumping slope: mid slope tension cracks, erosional recession mid-slope at 18” since 2013; top of slope crest recession at Bank street estimated at 8’+ since 1984. Failed soil nailing remedy.
1.3 Study Authority

Section 14 of the Flood Control Act of 1946, as amended, authorizes USACE to study, design and construct emergency streambank and shoreline protection works to protect public services including (but not limited to) streets, bridges, schools, water and sewer lines, National Register sites, and churches from damage or loss by natural erosion. This program is designed to implement projects to protect public facilities and facilities owned by non-profit organizations that are used to provide public services that are open to all on equal terms. These facilities must have been properly maintained but be in imminent threat of damage or failure by natural erosion processes on stream banks and shorelines, and must be essential and important enough to merit federal participation in their protection. Section 14 falls within the Continuing Authorities Program (CAP), which focuses on water resource related projects of relatively smaller scope, cost and complexity. CAP is a delegated authority to plan, design, and construct certain types of water resource and environmental restoration projects without specific Congressional authorization. Additional Information on this program can be found in Engineering Pamphlet (EP) 1105-2-58, Continuing Authorities Program.

The total federal cost for planning, designing and constructing individual Section 14 projects is limited to a federal cost of $5,000,000 and the cost share for design and implementation is 65% federal and 35% non-federal. The first $100,000 of the feasibility phase for this project was 100% federally funded. Feasibility costs over $100,000, are being shared equally (50% each) between USACE and the City pursuant to the terms of the June 2018 CAP Feasibility Cost Sharing Agreement (FCSA), executed between USACE and the City.

Initially, USACE received a Letter of Intent (LOI) from the City in May 2016 requesting an investigation into the erosion and potential failure of the streambank adjacent to Bank Street. In that letter, the City acknowledged the requirement to provide 50 percent cost share during the Feasibility phase as well as a 35 percent cost share during the Implementation phase. Additionally, the City indicated an understanding of the sponsor’s responsibility to provide all lands, easements, rights-of-way and relocations (LERRD) necessary for the construction, operation and maintenance of a Section 14 project. In response to this letter, the USACE completed an initial evaluation in October 2017, concluding that there was a federal interest in continuing with this Section 14 Feasibility Study.

1.4 Relevant Prior Studies and Reports

Previous studies, investigations, plans and reports exist concerning the Grand River, Bank Street streambank erosion. These include the following:

- **Section 14 Reconnaissance Report for the Grand River along Bank Street in Painesville, Ohio (USACE, August 1977).** In 1977, USACE issued a reconnaissance report, and an initial finding relative to the conditions of the streambank adjacent to Bank Street. USACE staff conducted a field investigation and determined that there was not a federal interest in further study. At that time, erosion of the streambank was identified to be a local responsibility, and therefore not eligible for Section 14 authority federal assistance. Since the issuance of the reconnaissance report in 1977, the streambank has eroded significantly causing the City to
attempt several repairs which have also failed. In 2017, USACE recommended positive Federal Interest Determination for an emergency streambank protection project.

- **Section 14 Reconnaissance Report on the Grand River in the Vicinity of East Main Street, Madison Avenue, Painesville, Ohio (USACE, September 1982).** In 1982, USACE issued a reconnaissance report, describing an economic analysis and a brief environmental evaluation relative to the concept of a potential streambank protection measure near the vicinity of East Main Street and Madison Avenue, located just outside the City of Painesville in the Township of Painesville. Only Appendix B, Economic Evaluation and Appendix C, Environmental Evaluation were found in the report. USACE has no further record of additional feasibility report(s) associated with any project in the Madison Avenue area.

- **Retaining Wall Improvement Project - Madison Avenue; Painesville Township, Lake County, Ohio – Plans and design drawings (CT Consultants, Inc., 1993) provided by the City of Painesville for an existing retaining wall, located adjacent to Madison Avenue, approximately one-half mile to the northeast of Bank Street, just outside Painesville’s jurisdiction. The plans, prepared for the Township of Painesville, also include drawings (by Lake County Engineers Office and others), for toe protection improvement at the riverbank below Madison Avenue. After USACE reconnaissance of the wall in 2019, observations included the toe protection improvement was either washed away or never constructed as there is no evidence of it currently along the river.

- **2015 Retaining Wall Inspection Report, Burgess & Niple, March 2016 (City of Painesville, Ohio).** The City of Painesville released an inspection report (2015 Retaining Wall Inspection Report, Burgess & Niple, March 2016) documenting the condition of the existing retaining wall structures, as well as erosion conditions and past repair attempts.
2 AFFECTED ENVIRONMENT

2.1 Climate and Topography

2.1.1 Climate

Lake County has warm summers and cold winters with precipitation evenly distributed during the year. Average annual precipitation is 37.8 inches. From late fall through winter, snow squalls are frequent and total snowfall is normally heavy. The average high temperature is 58.9º F and the average low temperature is 42.8 º F. (www.usclimatedata.com).

2.1.2 Physiography and Topography

Physiographically, Lake County is situated in the Eastern Lake section of the Central Lowland province (USDA, January 1979). Lake County lies in two markedly different physiographic provinces. The northern end of the glaciated Southern New York Section of the Appalachian Plateaus Province, referred to here as the Allegheny Plateau or the Plateau, extends into the southern and southeastern parts of the county. The Eastern Lake Section of the Central Lowland Province, referred to here as the Lake Plain, occupies a belt about three to five miles wide paralleling the lake shore. The plateau rises above the Lake Plain in a distinct escarpment. The Lake Plain is bounded at the shore of Lake Erie by a cliff ranging from 30 to 70 feet or more in height. The mean lake level is 571 feet and the Lake Plain rises very gradually, and almost imperceptibly, from 600 or 620 feet at the top of the cliff above the lake to a little more than 700 feet at the base of the escarpment. The escarpment in one to three miles wide and rises from the southern margin of the Lake Plain to 900 feet or more at the top of the escarpment. The plateau rises from the top of the escarpment to 1,240 feet at the extreme southeastern corner of Leroy Township and continues to rise to over 1,300 feet farther south and southeast in Geauga County (ODNR, Geological Survey).

The area surrounding the project site has an average slope of four degrees until it reaches within a few hundred feet of the Grand River. The bluff within the study area drops steeply from approximately 690 feet to the river’s surface at 590 feet. Figures 2-1 thru 2-3 illustrate the topography within the vicinity of the project area. The USACE conducted a topographic survey of the subject slope in December 2018.
Figure 2-1. Project Area Topography, Aerial View. (ESRI Data, 2019)
Figure 2-2. Project Area Topography, Side View. (ESRI Data, 2019)
2.2 Soils and Geology

2.2.1 Stratigraphic Sequence

Field reconnaissance and nearby historic boring information indicates the generalized stratigraphic sequence at the project location consists of approximately 40 feet of surficial fill/glacial soil deposits overlying shale bedrock. The following sections further describe characteristics of the general site stratigraphy and Section 2.2.6 provides site specific data obtained from a February 2019 subsurface investigation conducted within the project area.

2.2.2 Surficial Geology

Glacial till (Ashtabula Till) is the primary continuous soil stratigraphic unit present within the project vicinity. Ashtabula Till is named for exposures near Ashtabula, Ohio east of Lake County and has been traced from extreme northeastern Cuyahoga County, across Lake County and Ashtabula County, into Pennsylvania and into New York State (Shepps and others, 1959;
Ashtabula Till is the youngest till deposit in Ohio and was deposited by the final advance of the Erie lobe ice sheet, after which ice retreated from Ohio and never re-entered.

Ashtabula Till is the surface till of the Painesville and Euclid Moraines and of the Lake Plain. In the Lake Plain, Ashtabula Till is generally covered by sand or silt of various thickness: more than 10 feet in Madison Township and generally thinning westward. Ashtabula Till on the Lake Plain has been more or less wave washed, so that the upper part of the till has been partly eroded. The overlying silt has been at least partly derived from reworking of till. It is a calcareous silty clay till, sparingly to moderately pebbly. Cobbles and boulders are present but not conspicuous.

2.2.3 Soil Associations

The project area consists of only the Painesville fine sandy loam soil series. The Painesville series consists of deep, somewhat poorly drained, slowly or moderately slowly permeable soils on lake plains where a potential for surface runoff is high to very high. These soils formed in glaciofluvial loamy material over medium textured and moderately fine textured glacial till.

2.2.4 Hydric Soils

The Painesville fine sandy loam soil series is characterized as a somewhat poorly drained soil with a hydrologic soil group of C/D. Lake County Soil and Water Conservation District (Lake SWCD) and the Natural Resources Conservation Service (NRCS) characterize this soil as being hydric only within depressions. The project area is steeply sloped, urbanized and highly disturbed due to infrastructure, on-going erosion, and previous stabilization projects. No hydric soil indicators are expected within the project area.

2.2.5 Bedrock Geology

Beneath the overlying Painesville loam series and glacial till unconsolidated deposits, Devonian age Ohio Shale forms the bedrock beneath the project area, extending in thickness from 250 to over 500 feet. The Ohio shale is a carbonaceous shale with carbonate/siderite concretions, typically brownish black to greenish gray in color and weathering to brown. The shale is laminated to thin bedded and highly fissile. Systematic vertical to semi-vertical jointing is present within the shale and exhibited in the outcrop which forms the escarpment of the project area.

2.2.6 Summary of February 2019 Subsurface Investigation

In February 2019, TTL Associates, Inc. (TTL) on behalf of USACE conducted a subsurface exploration program within the project area with the purpose of better defining the geologic and geotechnical conditions at the site. The field program included the installation of three exploratory borings along the top of the streambank at Bank Street. Two of the three borings were advanced approximately 25 feet into underlying rock. To assess local groundwater conditions, a temporary piezometer was installed within the boring. Standard penetration testing along with the collection of split-spoon samples for field and laboratory testing was conducted.
within each borehole along with field classification of the soil and rock strata encountered. Shelby tube (thin-walled) samples were collected at select strata within two of the borings. Rock coring was performed within two of the borings and selected rock core samples were sent to the laboratory for strength and durability testing. Appendix A presents the full report from TTL including boring logs and geotechnical laboratory testing results. Figure 2-4 presents a geologic cross-section summarizing the general stratigraphic column present at the project site as identified by the April 2019 field program. The stratum are presented on the 2018 LIDAR slope survey conducted at the site.

Summary of Soil & Rock Properties

Summary of Soils Properties:
Beneath a roughly one to two foot thickness of surficial fill, stratigraphic conditions at the site area consist of approximately 45 feet of glacial deposits overlying rock. These soil deposits are designated as Stratums I to IV on Figure 2-4.

- **Stratum I** is comprised of primarily a sandy unit with Unified Soil Classification System (USCS) designations varying from SM, SP, SW/SM. Based on published geologic mapping, these granular soils are interpreted as glacial beach ridge deposits. Standard Penetration Test (SPT) N60 values for these soils ranged from 6 to 10 blows per foot (bpf).

- **Stratum II** consists primarily of medium to stiff cohesive soils, interpreted as glacial lacustrine deposits. Some sandy silt (ML) horizons were identified however, the
predominant soils are sandy lean clay (CL) with trace gravel. Standard Penetration Test N60 values for these soils ranged from 8 to 14 bpf. Unconfined compressive strengths, based on use of a calibrated field pocket penetrometer, generally exceeded 3.5 tons per square foot (TSF) indicative of stiff fissured clays developed by desiccation and overconsolidation.

- Stratum III consists of very stiff to hard cohesive soils interpreted as glacial till deposits. The Stratum III cohesive soils consist of lean clay (CL) with varying amounts of sand and gravel, as well as several sandy silt (ML) horizons with gravel and shale fragments. Standard Penetration Test N60 values for these soils ranged from 19 to 35 bpf. Unconfined compressive strengths, based on field pocket penetrometer testing, ranged from 2 TSF to >4.5 TSF, the high limit of the penetrometer.

- Stratum IV consists of hard cohesive glacial till soils with USCS designations ranging from silty clay (CL/ML) to lean clay (CL) with sand and trace gravel. A lean clay with cobble layer was identified within this zone at one of the borings. Standard Penetration Test N60 values for these soils ranged from 75 bpf to sampler refusal (>50 blows over 6-inches or less penetration). Pocket penetrometer unconfined compressive strengths were >4.5 TSF, exceeding the upper range of the instrument.

**Summary of Rock Properties:**

Bedrock beneath the site consists of Devonian age Ohio Shale (Stratum V on Figure 2-4). The Ohio Shale is a thick sequence of shale that extends to significant depths (greater than 200 feet) beneath the project site. The upper 30 feet of the shale was investigated as part of the February 2019 field work. Evaluations of rock mass quality and rock strength were made based on the cored bedrock. Unconfined compressive strengths ranged from 2,967 to 8,155 pounds per square inch (psi) with an average of approximately 4,500 psi, indicating moderately hard to hard strength. Based on rock quality designation values ranging from 50 to 98 percent, the rock mass index of the shale can be categorized as fair to excellent. Slake durability testing of core samples yielded slake durability indices ranging from 92.6 to 97.9 percent indicating fairly durable intact rock. It is noted that although the intact rock properties suggest fairly competent rock, the shale rock mass includes systematic jointing features (both valley parallel and perpendicular joints) that primarily influence rock face stability along the river gorge.

As seen from the LIDAR cross-section (Figure 2-4), the upper soil slope is currently at a nearly 1V:1H geometry with its toe located at the near vertical face of the underlying shale. These upper and lower slope geometries are tenuous and coupled with the physical characteristics of the soil/rock strata, have led to the problematic slope stability issues present at the site (see Section 3.1.1 for further description). A reconnaissance of geologic conditions on the streambank has revealed the following on-going problems: weathering and erosion of the fissile shale, creation of rock overhangs, failure of the rock crest, loss of toe at the base of the upper soil slope, and shallow slope failures/erosional recession of the soil slope. These conditions are depicted in Figures 2-5 thru 2-8 below:
Figure 2-5. Existing Geologic Problems – Rock Overhangs; Erosion of Fissile Shale. (USACE Staff, 2019)

Figure 2-6. Existing Geologic Problems – Failure of Rock Crest; Loss of Toe Support. (USACE Staff, 2019)
Figure 2-7. Existing Geologic Problems – Failure of Wooden Crib. (USACE Staff, 2019)

Figure 2-8. Existing Geologic Problems – Crest Recession: High Angle Slumping. (USACE Staff, 2019)
2.3 Surface Water and Other Aquatic Resources

2.3.1 Surface Water

The eastern portion of the project area extends into the Grand River. The lower portion of the Grand River watershed is located in northeast Ohio in Lake, Ashtabula and Geauga counties and drains 287 square miles. The river flows into Lake Erie at Painesville, Ohio. The Grand River downstream from Mill Creek transitions from a low-gradient swamp stream to a higher-gradient bedrock stream near Mechanicsville. Jefferson, Chardon and Painesville are the three largest communities in the watershed. Land use in the lower Grand River watershed transitions from urban/suburban on the western edge to rural and agricultural in the eastern two-thirds. The lower section of the Grand River in Lake County is characterized by steeply-incised valley walls of Ohio Shale.

Since 1974, the U.S. Geological Survey (USGS) has maintained a stream gage on the Grand River near Painesville at Walnut Avenue (USGS Gage No. 04212100). The gage is located approximately 1.3 river miles upstream of the project location. The flood of record for the Grand River at the Painesville gage on July 28, 2006 had a record peak stage of 19.35 feet (elevation, 614.94 feet), with a record peak streamflow of 35,000 cubic feet per second, and an estimated recurrence interval of approximately 500 years (0.2% ACE). The one percent Annual Chance Flood elevation in the location of the project is approximately 606.8 feet (NAVD88). Although the project study area extends into the Grand River, the actual project itself is not proposed to occur below the ordinary high water elevation of this stream.

2.3.2 Groundwater

As determined from the February 2019 field program, groundwater is present as a perched horizon approximately 12-16 feet below the ground surface within the unconsolidated deposits above bedrock. Although not investigated as part of the recent field program, a deeper, continuously saturated zone in the Ohio Shale approximating the Grand River water surface elevation is likely present.

2.3.3 Floodplains

In past years, the Grand River has experienced periodic flooding. In the summer of 2006, the Grand River overflowed its banks and caused a state of emergency in Lake and Ashtabula Counties due to flooding. The river reached 11 feet above flood level, a 500-year flood, due to an extreme 48-hour rainfall event. The 2006 flooding event was significant and caused a tributary (Paine Creek) to change course in at least one location. The area was subsequently declared a federal disaster area by the Federal Emergency Management Agency (FEMA).

The lower elevations of the project area are in the 100-year floodplain for the Grand River. This area is designated as Zone AE. These areas are defined as the floodway channel of a stream, plus any adjacent floodplain areas that must be kept free from encroachment so that the one percent annual chance flood can be carried without substantial increases in flood height. Figure 2-9 depicts the location of the project area in relation to the floodplain.
Detailed Project Report and Environmental Assessment
Section 14 Grand River, Bank Street Streambank Protection, Painesville, OH (P2# 461094)

Figure 2-9. Project Area Floodplains. (ESRI Data, 2019)
2.3.4 Wetlands

No state or federally jurisdictional wetlands are located within the project area. Figure 2-10. Project Area Wetlands depicts the lack of mapped wetland areas within the vicinity of the project site.

![Figure 2-10. Project Area Wetlands. (ESRI Data, 2019)]

2.3.5 Water Quality

Ohio EPA conducted water quality monitoring of the Grand River in 2003 and 2004. The river was noted as being “very good quality.” However, the tributaries in the urbanized and agricultural portions of the watershed were generally of lower quality. Aquatic life impairments were caused by flow regime alterations from urbanization although there were some natural causes and sources, such as low flow or homogeneous (bedrock) substrates. Nutrients contributed to impairment at several sites upstream in tributaries (OEPA 2006).
2.4 Vegetation

Vegetation within the study area consists mostly of tree and shrub species, with grass interspersed from the edge of Bank Street to where the bank becomes unstable. Due to the steep bank and urbanized nature of the site there is no agricultural activity in the project area. The area has been highly disturbed through erosion; therefore, very few trees exist within the project area that have a diameter breast height (DBH) larger than 2.5 inches. The trees present are perched on the failing slope and due to safety concerns accessibility was limited to measure the tree trunks. After analyzing photographs from the 2019 site visit, it appears there are approximately six to eight mature trees with a DBH of greater than 12 inches. The tree species present are likely willows, ashes, black alders, and maples. Although proposed in Alternative 2 of the NEPA scoping document, the proposed project will no longer require site access from the other side of the Grand River. Therefore, consideration of vegetation in that area is now outside the scope of this project.

2.5 Wildlife

2.5.1 Reptile and Amphibians

A variety of reptile and amphibian species are likely present in the vicinity of the Grand River near the project site but not necessarily present at the project site due to the steep topography and terrestrial nature of the habitat (Table 2-1 and Table 2-2 below).

Table 2-1. Reptile List

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chelydra serpentina</td>
<td>snapping turtle</td>
</tr>
<tr>
<td>Chrysemys picta marginata</td>
<td>midland painted turtle</td>
</tr>
<tr>
<td>Coluber constrictor</td>
<td>northern black racer</td>
</tr>
<tr>
<td>Diadophis punctatus edwardsii</td>
<td>northern ring-necked snake</td>
</tr>
<tr>
<td>Graptemys geographica</td>
<td>northern map turtle</td>
</tr>
<tr>
<td>Lampropeltis triangulum</td>
<td>eastern milksnake</td>
</tr>
<tr>
<td>Nerodia sipedon</td>
<td>common watersnake</td>
</tr>
<tr>
<td>Pantherophis alleghaniensis</td>
<td>black ratsnake</td>
</tr>
<tr>
<td>Plestiodon fasciatus</td>
<td>common five-lined skink</td>
</tr>
<tr>
<td>Sternotherus odoratus</td>
<td>eastern musk turtle</td>
</tr>
<tr>
<td>Terrapene carolina</td>
<td>eastern box turtle</td>
</tr>
<tr>
<td>Thamnophis sirtalis</td>
<td>eastern garter snake</td>
</tr>
</tbody>
</table>

Table 2-2. Amphibian List

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaxyrus americanus</td>
<td>American toad</td>
</tr>
</tbody>
</table>
2.5.2  Birds

Painesville is located on both the Atlantic and the Mississippi flyways, with over three million ducks and geese using this corridor. Many migratory bird species nest on the outer breakwalls and wetlands near the river. These include, but are not limited to, the osprey (*Pandion haliaetus*), wood duck (*Aix sponsa*), Canada goose (*Branta canadensis*), common merganser (*Mergus merganser*), great blue heron (*Ardea herodias*), cliff swallow (*Hirundo pyrrhonta*), tree swallow (*Tachycineta bicolor*), Caspian tern (*Sterna caspia*), Forster's tern (*Sterna forsteri*), common tern (*Sterna hirundo*), mallard (*Anas platyrhynchos*), black duck (*Anas rubripes*), lesser scaup (*Aythya affinis*), bald eagle (*Haliaeetus leucocephalus*) and kingfisher (*Ceryle alcyon*). Numerous additional species of migratory neotropical songbirds inhabit the area seasonally.

2.5.3  Mammals

Mammals in the vicinity of the project are indicative of the species present in urban and suburban neighborhoods. Likely species present are white-tailed deer, fox, cottontail rabbits, ground hogs, and raccoon have also been observed. The area is also likely inhabited by various small mammals such as mice, moles, and chipmunks.

2.5.4  Invasive/Exotic Species

Table 2-3 lists the Nonindigenous Aquatic Species present within the Grand River watershed within Lake County.

### Table 2-3. Nonindigenous Aquatic Species List

<table>
<thead>
<tr>
<th>Group</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Locality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crustaceans-Cladocerans</td>
<td>water flea</td>
<td><em>Bosmina coregoni</em></td>
<td>Lake Erie, EPA Station ER32, ER36, ER78M</td>
</tr>
<tr>
<td></td>
<td>spiny waterflea</td>
<td><em>Bythotrephes longimanus</em></td>
<td>Lake Erie, EPA Station ER32, ER36, ER78M</td>
</tr>
<tr>
<td></td>
<td>fishhook waterflea</td>
<td><em>Cercopagis pengoi</em></td>
<td>Lake Erie, EPA Station Fairport Harbor ER32, ER78M</td>
</tr>
<tr>
<td>Crustaceans-Copepods</td>
<td>a calanoid copepod</td>
<td><em>Eurytemora affinis</em></td>
<td>Lake Erie, EPA Station ER32, ER36, ER78M</td>
</tr>
<tr>
<td>Fishes</td>
<td>Bigmouth Buffalo</td>
<td><em>Ictiobus cyprinellus</em></td>
<td>Grand River RM 3-5</td>
</tr>
<tr>
<td>Warmouth</td>
<td>Lepomis gulosus</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------</td>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>unidentified pacu</td>
<td>Colossoma or Piaractus sp.</td>
<td>Lake Erie</td>
<td></td>
</tr>
<tr>
<td>Round Goby</td>
<td>Neogobius melanostomus</td>
<td>Grand River, Lake Erie</td>
<td></td>
</tr>
<tr>
<td>White Perch</td>
<td>Morone americana</td>
<td>Grand River, 0.3 miles dst SR 535 RM 2</td>
<td></td>
</tr>
<tr>
<td>Sea Lamprey</td>
<td>Petromyzon marinus</td>
<td>Grand River</td>
<td></td>
</tr>
<tr>
<td>Pink Salmon</td>
<td>Oncorhynchus gorbuscha</td>
<td>Lake Erie</td>
<td></td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>Oncorhynchus mykiss</td>
<td>Grand River (Painesville, OH)</td>
<td></td>
</tr>
<tr>
<td>Mollusks-Bivalves</td>
<td>zebra mussel</td>
<td>Grand River (Painesville, OH), Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>quagga mussel</td>
<td>Lake Erie</td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td>forget-me-not</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Myosotis scorpioides</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>keek</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rorippa sylvestris</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>flowering rush</td>
<td>Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Butomus umbellatus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carolina fanwort</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cabomba caroliniana</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>brittle waternymph</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Najas minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>gypsywort</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lycopus europaeus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>purple lythrum</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lythrum salicaria</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>water foxtail</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alopecurus geniculatus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>narrow-leaved cattail</td>
<td>Southern Lake Erie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Typha angustifolia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: U. S. Geological Survey (Nonindigenous Aquatic Species information resource (http://nas.er.usgs.gov/default.aspx)

### 2.6 Threatened and Endangered Species

The Painesville site falls within range of the Indiana bat, piping plover, and snuffbox mussel, federally listed endangered species. An endangered species is any species that is in danger of extinction throughout all or a significant portion of its range. The Painesville site also falls within range of the northern long-eared bat, and red knot, federally listed threatened species. A threatened species is likely to become endangered in the foreseeable future. A candidate species is a species for which the U.S Fish and Wildlife Service (USFWS) has sufficient information on their biological status and threats to propose listing them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

The proposed project lies within the range of the Indiana bat (*Myotis sodalis*), a federally listed endangered species. During winter, Indiana bats hibernate in caves and abandoned mines. Summer habitat requirements for the species are not well defined, but the following are considered important:

(1) Dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or
branches, or cavities, which may be used as maternity roost areas;

(2) Live trees (such as shagbark hickory and oaks) which have exfoliating bark;

(3) Stream corridors, riparian areas, and upland woodlots which provide forage sites.

The proposed project also lies within the range of the Kirtland’s warbler (Dendroica kirtlandii). This small songbird migrates through Ohio in the spring and fall. Its suitable migration stopover habitat includes scrub/shrub and forest habitat.

Piping plover (Charadrius melodus) habitat includes sand or pebble beaches with sparse vegetation along the shore of Lake Erie. The piping plover was designated as endangered in the Great Lakes watershed in December 1985. The decline in piping plover populations has been linked to natural and human caused factors such as high water levels, eroding beaches, and commercial and residential beach front. Critical habitat for the piping plover was designated in 2001 at Headlands Dune in neighboring Lake County and Sheldon Marsh in north-central Ohio’s Erie County. Critical habitat is an area that is essential for the conservation of a threatened or endangered species that may require special management and protection. None of the habitat requirements for foraging or breeding of piping plover are met in any of the potential restoration areas.

Snuffbox (Epioblasma triquerta) is a small to medium sized freshwater mussel typically found in small to medium sized creeks, to larger rivers, and in lakes (along wave-washed shores of lakes over gravel and sand with occasional cobble and boulders).

Northern-long eared bat (Myotis septentrionalis) is a medium-sized bat with a body length of 3 to 3.7 inches but a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside.

Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible.

During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, like barns and sheds.

Red Knot (Calidris canutus rufa) have wingspans of 20 inches, are about 9 inches long, and are about the size of a robin. This species winters at the tip of South America in Tierra del Fuego, in northern Brazil, throughout the Caribbean, and along the U.S. coasts from Texas to North Carolina. The rufa red knot breeds in the tundra of the central Canadian Arctic from northern Hudson Bay to the southern Queen Elizabeth Islands. Breeding habitat consists of slightly vegetated land in the tundra where it is sunny and windy. Wintering and migration habitats
consist of large, sandy tidal flats and coastlines near inlets of bays and estuaries that have remained undeveloped.

The project also lies within the range of the bald eagle (Haliaeetus leucocephalus), a species protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles build large stick nests lined with soft materials such as grass, leaves, and Spanish moss. Nests are used for several years by the same pair of eagles, with the birds adding materials each year. The bald eagle was designated as endangered in the lower 48 states in March of 1967 due to declining populations resulting from chemical usage, shooting and persecution of individual birds, and the loss of nesting habitat due to development along the coast and near inland rivers and waterways. After years of protection, decrease in chemical usage in the United States, and education against shooting eagles, there has been an increase in eagle populations. The bald eagle was reclassified as threatened in 1995. In 2007, the bald eagle was de-listed.

The Ohio Department of Natural Resources (ODNR) also commented in a letter dated June 6, 2019 on state- and federally listed species recorded or within the range of the project location. In addition to the federal species, they list the following state-listed species:

**Records Within One Mile Radius of Project Site:**
- Early butter (Ranunculus fascicularis) – Threatened
- Eastern sand darter (Ammocrypta pellucida) – State & Federal Species of Concern
- Northern brook lamprey (Ichthyomyzon fossor) – State Endangered
- River redhorse (Moxostoma carinatum) – State Species of Concern

**State-Listed Species Within Range of Project Site:**
- Snuffbox (Epioblasma triquetra) – State Endangered
- Eastern pondmussel (Ligumia nasuta) – State Endangered
- Threehorn wartyback (Obliquaria reflexa) – State Threatened
- Black sandshell (Ligumia recta) – State Threatened
- Fawnsfoot (Truncilla donaciformis) – State Threatened
- American eel (Anguilla rostrata) – State Threatened
- Spotted turtle (Clemmys guttata) – State Threatened
- Upland sandpiper (Bartramia longicauda) – State Endangered
- Least bittern (Ixobrychus exilis) – State Threatened

### 2.7 Recreational, Scenic, and Aesthetic Resources

#### 2.7.1 Recreation

The ODNR commented that the Grand State Scenic River occurs within a one-mile radius of the project location (Appendix G). The Grand River is a waterway that is used, where applicable, by both recreational paddlers and motorized watercraft. Due to the safety concerns such as the steep slope within the project area, public access to the streambank for recreational purposes is not permissible.
2.7.2 Scenic and Aesthetic Resources

The project area is outside the Wild and Scenic River corridor. It is, however, adjacent to the Grand State Scenic River (Section 2.7.1).

2.8 Cultural Resources

Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of all federally funded or permitted undertakings on historic properties and to prevent, minimize, or mitigate adverse effects on such resources.

The Ohio State Historic Preservation Office (SHPO) Online Mapping System was consulted in December, 2018. The Online Mapping System identified no significant historic properties (e.g., objects, prehistoric and historic sites, structures, or districts) within the area of potential effect. Consultation with the Ohio SHPO was initiated for their input and concurrence with this finding, which was provided in a letter from them dated May 14, 2019 (Appendix G).

2.9 Air Quality and Climate Change

2.9.1 Air Quality

The Clean Air Act designates six pollutants as “criteria pollutants” for which National Ambient Air Quality Standards (NAAQS) have been promulgated to protect public health and welfare. The six criteria pollutants are particulate matter (i.e., PM10 and PM2.5), carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), lead (Pb), and ozone (O₃). Areas that do not meet NAAQSs are designated as being in “non-attainment” for that criteria pollutant. Air quality data for the State of Ohio is collected and published annually by Ohio Environmental Protection Agency (OEPA). Five ambient air quality monitoring stations are located within Lake County. Based on the NAAQS, Lake County is designated as a non-attainment area for 8-hour O₃ and 1-hour SO₂ (USEPA, 2012b). Existing air quality conditions have been estimated from measurements conducted at air quality monitoring stations within Lake County. Table 2-4 shows the monitored concentrations of criteria pollutants.

<table>
<thead>
<tr>
<th>CO 1-hr 2nd Max</th>
<th>CO 8-hr 2nd Max</th>
<th>O₃ 1-hr 4th Max</th>
<th>SO₂ 99th Percentile</th>
<th>SO₂ 24-hr 2nd Max</th>
<th>PM2.5 98th Percentile</th>
<th>PM2.5 Weighted Mean</th>
<th>PM10 24-hr 2nd Max</th>
<th>PM10 Annual Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>2.8</td>
<td>0.09</td>
<td>0.073</td>
<td>29</td>
<td>16</td>
<td>7.3</td>
<td>28</td>
<td>13</td>
</tr>
</tbody>
</table>

Source: U.S. EPA AirData http://www.epa.gov/airdata, Generated: January 8, 2019

1Statistics in boldface are above the level of the respective air quality standard.

2.9.2 Climate Change and Greenhouse Gases

Greenhouse gases (GHG) are produced by the burning of fossil fuels and through industrial and biological processes. On September 22, 2009, the USEPA issued a final rule for mandatory GHG reporting from large emissions sources in the United States. The purpose of the rule is to collect comprehensive and accurate data on carbon dioxide (CO₂) and other GHG emissions that can be
used to inform future policy decisions. In general, the threshold for reporting is 25,000 metric tons or more of CO2 equivalent per year. For 2012, over 8,000 facilities and suppliers reported to the greenhouse gas reporting program. Among these reporters, 7,809 facilities in nine industry sectors reported direct emissions to the atmosphere, with emissions totaling 3.13 billion metric tons CO2 equivalent (CO2e), or about half of total U.S. greenhouse gas emissions (USEPA, GHGRP: 2012b. Greenhouse gases are not currently regulated under the Clean Air Act.

Extreme rainfall events and flooding have increased during the last century, and these trends may continue, causing erosion, declining water quality, and negative impacts on transportation, agriculture, human health, and infrastructure. The USEPA commented on May 21, 2019 that the National Climate Assessment “finds that in the Midwest, extreme heat, heavy downpours, and flooding will affect infrastructure” and that “increases in the frequency and severity of storm events under changing climate conditions are particularly relevant to stream bank erosion and the durability of corrective measures” (U.S. Global Change Research Program, 2017). Climate change may also exacerbate a range of risks to the Great Lakes, including changes in the range and distribution of certain fish species, increased invasive species and harmful blooms of algae, and declining beach health.

2.10 Noise

The Noise Control Act of 1972 (P.L. 92-574) directs federal agencies to comply with applicable federal, state, interstate, and local noise control regulations. In 1974, the USEPA provided information suggesting that continuous and long-term noise levels in excess of day-night average sound level (DNL) 65 A-weighted decibels (dBA) are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals. Ohio has no statewide noise regulation. However, Section 505.172 of the Ohio Revised Code (ORC) states that townships may adopt noise control regulations within their unincorporated territory. Noise Control Regulation for Painesville Township (adopted June 6, 2000) related to construction activities specifically prohibit “operating or permitting the operation of any tools or equipment used in construction, drilling or demolition work between the hours of 11:00 p.m. and 7:00 a.m. such that the sound therefrom creates a noise disturbance across a residential real property boundary, except for emergency work of public service utilities or by special variance.” Existing noise sources in the project area in the vicinity of the project are limited to vehicular traffic along Bank Street. However, due to the low to medium level of development in the area, impacts on sensitive noise receptors (e.g., schools, hospitals, residential areas) are typically negligible.

2.11 Hazardous and Toxic Substances

2.11.1 Environmental Baseline Study/Limited Phase I HTRW Investigation Baseline

The USACE has performed a Phase I Environmental Site Assessment (ESA) of the project area in conformance with the scope and limitations of American Society for Testing and Materials (ASTM) Standard E 1527-13 (Appendix E). On June 7, 2019, personnel from USACE conducted a site reconnaissance of accessible areas of the project. This assessment has revealed no evidence of recognized environmental conditions in connection with the project area.
2.12 Demographics, Land Use, Socioeconomic and Environmental Justice

2.12.1 Demographics

The City of Painesville has an area of 7.02 square miles and is where the county seat is located. Based on July 1, 2017 U.S. Census estimates, there were 19,813 people, (i.e., 7,272 households with an average number of 2.59 persons per household) residing within the City of Painesville, Ohio. The population density of the city is 3,112.6 people per square mile based on the 2010 Census. The racial makeup of the city is 72.6 percent white, 13.5 percent African American, 0.3 percent Native American, 0.2 percent Asian, and 9.2 percent from two or more races. Hispanic or Latino of any race made up 25.8 percent of the population. White persons not Hispanic were 57.9 percent. Median Household income (2013-2017) in Painesville is $45,806, compared to $61,137 and $52,407 in Lake County, and the State of Ohio, respectively. Table 2-5 below provides a breakdown of the demographics within the City of Painesville, Lake County, and the state of Ohio.

Table 2-5. City, County and State Demographics (2017)

<table>
<thead>
<tr>
<th>Race and Hispanic Origin</th>
<th>Painesville, Ohio</th>
<th>Lake County, Ohio</th>
<th>State of Ohio</th>
</tr>
</thead>
<tbody>
<tr>
<td>White alone, percent</td>
<td>72.60%</td>
<td>92.20%</td>
<td>82.20%</td>
</tr>
<tr>
<td>Black or African American alone, percent (a)</td>
<td>13.50%</td>
<td>4.40%</td>
<td>12.90%</td>
</tr>
<tr>
<td>American Indian and Alaska Native alone, percent (a)</td>
<td>0.30%</td>
<td>0.20%</td>
<td>0.30%</td>
</tr>
<tr>
<td>Asian alone, percent (a)</td>
<td>0.20%</td>
<td>1.50%</td>
<td>2.30%</td>
</tr>
<tr>
<td>Native Hawaiian and Other Pacific Islander alone, percent (a)</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.10%</td>
</tr>
<tr>
<td>Two or More Races, percent</td>
<td>9.20%</td>
<td>1.70%</td>
<td>2.30%</td>
</tr>
<tr>
<td>Hispanic or Latino, percent (b)</td>
<td>25.80%</td>
<td>4.30%</td>
<td>3.80%</td>
</tr>
<tr>
<td>White alone, not Hispanic or Latino, percent</td>
<td>57.90%</td>
<td>88.40%</td>
<td>79.10%</td>
</tr>
</tbody>
</table>

(a) Includes persons reporting only one race
(b) Hispanics may be of any race, so also are included in applicable race categories

2.12.2 Associated Land Use and Developments
Land use patterns in Lake County reflect a transition from urban and suburban at the western end of the county to an increasingly rural character to the east (Lake County, Ohio, 2006). Around the project area there is a mixture of developed, low intensity, developed, open space, and wooded areas.

2.12.3 Public Facilities and Services

Fire protection and emergency medical services are provided by the City of Painesville Fire Department. The City of Painesville Police Department and Lake County Sheriff’s Department provide police protection for the City (Lake County Planning Commission, July 2007). The Lake County Solid Waste District is responsible for the collection, recycling, and disposal of solid waste.

2.12.4 Water and Sewer Facilities

The City of Painesville receives its water from its own water plant located adjacent to Mentor Headlands State Park and the Mentor Marsh. The plant pumps over 4 million gallons of water a day to customers in the City and other nearby jurisdictions including Grand River and sections of Painesville and Concord Townships. Established in 1896, the plant has the capability to handle up to 7.5 million gallons per day. The city’s system consists of three water towers, one stand pipe and one above ground storage tank. Additionally, there are five pumping stations. The Painesville Water Distribution system consists of over 128 miles of water mains. The system has four pressure districts with ground elevations ranging from 583 feet to 1150 feet. Water and sanitary sewer lines serving the homes on Bank Street are directly adjacent to the project site under the Bank Street road surface. The City also owns and operated its own wastewater system. The City of Painesville Water Pollution Control Plant treats wastewater from homes, businesses, industries, schools and agencies of the City of Painesville, which equates to approximately 20,000 people. A gravity system channels wastewater underneath the Grand River and into the 20-million gallon per day plant. Treated wastewater is discharged into Lake Erie.

2.12.5 Environmental Justice (EO 12898)

Executive Order 12898, issued by President Clinton on February 11, 1994, requires that impacts on minority or low income populations be accounted for when preparing environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by federal agencies. The policy defines a minority population as a group of individuals that are identified or recognized as African American, Asian American/Pacific Islander, American Indian, or Hispanic. Hispanic refers to ethnicity and language, not race. A minority community exists where a census block group, or multiple census block groups, has a minority population equal to or greater than 51.1 percent in urban areas or 33.8 percent in rural areas.

The U.S. Census Bureau identifies minority populations as Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, persons of two or more races, and persons of Hispanic or Latino origin. Minority population data are presented in Table 2-6. As of the 2012-2016 ACS Data, 38 percent of the population for the
census tract including the project area was of minority race or ethnicity. However, within the census block group there is a four percent minority population.

Poverty thresholds established by the Census Bureau are used to identify low income populations (CEQ 1997). As of 2016, the Census Bureau defined the poverty level as $12,228 of annual income or less. The census data shows some small low income communities within the census tract which encompasses the project area (Table 2-6).

**Table 2-6. Minority and Low-Income Populations (2016)**

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Minority Population (%)</th>
<th>Persons below the poverty level (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block Group 390852044002</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Census Tract 39085204400</td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td>Painesville Township</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>Lake County</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Ohio</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>United States</td>
<td>38</td>
<td>34</td>
</tr>
</tbody>
</table>

2.12.6 Protection of Children (EO 13045)

Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks,” was issued in 1997. This order applies to economically significant rules under EO 12866 “Regulatory Planning and Review” that concerns an environmental health or safety risk that the USEPA has reason to believe may disproportionately affect children. Environmental health risks or safety risks refer to risks to health or to safety which are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to). When promulgating a rule of this description, USEPA must evaluate the effects of the planned regulation on children and explain why the regulation is preferable to potentially effective and reasonably feasible alternatives.

2.13 Transportation

The project area is located along the Grand River and can be accessed from Bank Street. Bank Street is a main north south thoroughfare within the city from SR 84 to South State Street. This transportation route has approximately 17 households along it within the City of Painesville and is directly adjacent to the project area. This street and the residences and public utilities located
along it are what are directly threatened by the continued failure of the bank slope between Bank Street and the Grand River in the project area.

2.14 Health and Human Safety
The currently failing and receding streambank are a potential safety hazard. Continued failure could impact water quality and aquatic resources within the Grand River. The failing stream bank is threatening the structural integrity of Bank Street and the adjacent utilities. There are no other human health or safety concerns associated with the project site other than the failing bank.
3 PLAN FORMULATION

This section discusses problems and opportunities, objectives and constraints related to the streambank/slope stabilization initiative within the study area. Based on these problems and opportunities, objectives and constraints, a series of alternatives have been developed. The report also incorporates the environmental assessment of anticipated impacts these project alternatives may have in compliance with NEPA.

Plan formulation was conducted in accordance with existing laws, regulations, and policies, which limit the study to streambank protection projects. Section 14 of the Flood Control Act of 1946, as amended, specifically limits the federal contribution to the project at $5,000,000 or less.

3.1 PROBLEMS AND OPPORTUNITIES

3.1.1 Problems

As discussed earlier, for several decades the city has monitored river flow erosion and recessional failure site conditions resulting in the displacement of the existing retaining wall(s) and reinforced slope features designed to protect the streambank along Bank Street. At the present time, several on-going problems in the project area continue to exist, including:

a. Approximately 325 feet of the Grand River streambank and bank slope adjacent to Bank Street is significantly eroded within the project area.

b. The city has attempted repairs in prior years to address this problem that have not been successful.

c. Since the last repair (i.e., 2012, Soil Nailing), significant erosion and undermining of this repair has occurred.

d. City staff and its consultants have observed a significantly increased erosion rate on the streambank slope (September 2017 LOI, City of Painesville).

e. USACE, in coordination with the city determined that there are 17 homes along Bank Street that would be affected by continued erosion of the streambank/slope that would impact the public utility and road infrastructure. Without Bank Street, several homeowners would have no access to their property.

f. Further streambank/slope erosion at the site could disrupt public utility services for the residential area and require relocation of multiple public utilities including gas, water, electric, sanitary sewer and storm drain infrastructure.

g. Without additional repair, the bank slope will continue to undergo erosion and failure, resulting in potential road collapse and breaching of public utilities.
h. Failure to protect this road would result in potential loss of public access to the residential area and endanger adjacent public utilities.

3.1.2 Opportunities

The following opportunities were identified over the course of the study process:

a. Implementation of the proposed protection measures contained herein will provide long-term stabilization of the streambank/slope and prevent further erosion and slope failures that would impact Bank Street and adjacent public utilities.

b. Protecting the streambank/slope adjacent to Bank Street would ensure a safe environment for the road and the public infrastructure with continued operation of a residential street.

c. Public utilities associated with the neighborhood would also remain in a safe and functional condition.

d. If the project moves forward and work is conducted, the overall effects on public safety (i.e. improvements to streambank/slope protection/stability) will be positive.

3.2 OBJECTIVES AND CONSTRAINTS

3.2.1 Planning Objectives

The primary objective of this DPR/EA is to develop a long-term, viable, least cost alternative solution to address and stabilize bank erosion issues along the Grand River that currently threaten Bank Street and adjacent public utilities in the City of Painesville. The least cost alternative plan is considered to be justified if the total costs of the proposed alternative is less than the costs to relocate the threatened public infrastructure.

3.2.2 Planning Constraints

Unlike planning objectives that represent desired positive changes, planning constraints represent restrictions that limit the planning process and should not be violated. Planning constraints are limitations or requirements that affect proposed alternatives. This study will consider resource, legal, and policy constraints. Resource constraints are those associated with limits on knowledge, expertise, experience, ability, data, information, money, and time. Legal and policy constraints are those defined by law, USACE policy, and guidance.

As previously stated, the study will recommend the most cost effective and environmentally acceptable solution for stabilizing the streambank along the Grand River directly adjacent to Bank Street. At this time, no planning constraints have been identified which would negatively affect resources. Challenges associated with this study include determining the optimal method and sequence of construction for the least cost alternative solution. Land based construction could be implemented due to the close proximity of the treatment to Bank Street. Partial closure of Bank Street in the project area vicinity may be required for construction activities, including excavation and installation of stabilization materials. The intersection of Bank Street and South
State Street may be partially closed to allow for the transport of equipment and materials to the worksite.

The risks associated with implementation of stabilization measures will be addressed by limiting excavation and material placement and ensuring that construction does not cause increased risk to existing streambank areas outside of the specific project area. Any risks associated with construction impacts outside of project area would be associated with scope growth and any associated increased construction costs. These would effect USACE policy pertaining to the $5,000,000 maximum federal contribution. These risks are anticipated to be low. Due to the extent of the project area and its location adjacent to the Grand River, coordination with multiple agencies is necessary for the completion of all required local, state, and federal regulations, including but not limited to, USFWS, OEPA, ODNR, Lake County, and the City.

3.3 MOST PROBABLE FUTURE WITHOUT PROJECT CONDITIONS

The USACE is required to consider the “Without Project” condition (also referred to as the “No Action” Alternative (NAA)) as one of the alternatives in order to comply with the requirements of NEPA. “Without Project” assumes that no project would be implemented by either the Federal Government or the local communities, to achieve the planning objectives. The “Without Project” condition forms the “base condition” from which all other alternative plans are measured.

In the absence of a federal project, the project area (approximately 325 linear feet (LF)) along the Grand River adjacent to Bank Street will continue to erode with imminent slope failure. Failure of this bank would lead to the potential collapse of Bank Street and its associated public utilities within the project area. Failure to protect the bank, the road and the public utilities would also result in loss of public access to a residential area within the city. Without assistance from USACE, the city would continue to observe significant erosion rates of the bank adjacent to Bank Street. As discussed earlier, USACE reconnaissance and site analysis conducted in 2018 and 2019 revealed the erosion rate on the upper slope as episodically controlled (average is 0.23 feet per year). However, realistically, large portions of slope have failed in episodes with spaces of time in between. At the current erosion rate, failure of the road and associated utilities is likely to occur within the next 10 to 15 years and possibly sooner.

Consequently, the primary purpose of this DPR/EA is to develop a long-term viable alternative for the protection of Bank Street and adjacent public utilities. The Without Project alternative does not address bank erosion or the related failure processes and therefore would not be a permanent solution. Without action, loss of public utilities and public access to Bank Street would occur and the road, together with adjacent utilities would eventually be undermined.

In the absence of a plan to eliminate erosion (i.e. Without Project), it is assumed that the City will take action to repair the Bank Street road and associated utilities when a section of the adjacent streambank slope fails. Discussions between USACE and the City resulted in an coordinated evaluation of the relocation of Bank Street in the Without Project scenario. Road failure would result in the need to relocate the road approximately 100 feet from its current location. This would involve the reconstruction of approximately 750 feet of roadway.
Relocation/realignment of approximately 750 feet of road would result in the need for approximately 750 feet of public utilities, currently located adjacent to the road to also be relocated. As discussed earlier in this report, the coordination between USACE and the city, determined that there are 17 homes along Bank Street that would be affected, and subject to purchase involving either relocation or demolition, by continued erosion of the streambank that would impact relocation/realignment of approximately 750 feet of public utility and road infrastructure. All of the road relocation/realignment and public utility relocation would be located on private property. Consequently, the lands needed for relocations would have to be purchased from the private homeowners.

Total facility relocation costs are estimated to be $4,750,300. These costs are composed of purchase and relocation of 17 homes ($3,435,000), utility relocation costs ($900,300) and road relocation costs ($415,000). The land related costs consisted of the “full market value” of the 17 homes ($3,435,000) based on Lake County property assessment data, and included administrative and demolition costs associated with each of the 17 properties.

The “Without Project” condition or NA is described as the likely scenario for land use and related conditions in the study area in the absence of a Section 14 bank protection project. The increment of change between an alternative plan and the NA condition provides the basis for evaluating the beneficial or adverse economic, environmental, and social effects of each of the alternative plans under consideration. The city, as the owners of the property will be responsible for the continued maintenance and upkeep of the selected alternative solution and the embankment. The City has indicated that they are committed to perform the required operation and maintenance for the continued structural integrity of the streambank.

3.4 MEASURES AND ALTERNATIVES TO ACHIEVE PLANNING OBJECTIVES

This section details the measures (non-structural and structural) developed to address the stability problem for the Grand River streambank in the project study area. During an initial Planning Charrette on the project, a number of measures were first identified (Table 3-1 below) that would meet one or more of the planning objectives. These measures were coordinated with the USACE Project Delivery Team (PDT) and the city, and include best management practices that are determined to be suitable to resolve the problems associated with the existing conditions along the streambank. Each measure was assessed (scored) and a determination made regarding whether it should be retained in the formulation of alternative plans. The descriptions and results of the evaluations of the measures considered in this study are presented below.

3.4.1 Screened Measures

The table below was developed during the initial Planning Charrette on the project and depicts all of the conceptual measures which were preliminarily screened. The PDT evaluated these measures using a variety of factors and screened by assigning scores in each category. The factors included; engineering resilience, environmental resilience, cost effectiveness, technical feasibility and complexity, constructability, safety, and project life cycle. Measures were scored using a point system with “1” being the lowest and “10” being the highest. Measures with a cumulative score higher than 40 have been retained. After evaluation was complete, two (2) non-
structural and five (5) structural measures were retained. The retained measures are shaded in green.
Table 3.1. Screened Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Engineering Resilience (1-10 or NA)</th>
<th>Environmental Resilience (1-10 or NA)</th>
<th>Cost Effectiveness (1-10 or NA)</th>
<th>Technical Feasibility and Complexity (1-10 or NA)</th>
<th>Constructability (1-10 or NA)</th>
<th>Safety (1-10 or NA)</th>
<th>Project Life Cycle (1-10 or NA)</th>
<th>Totals</th>
<th>Violate a Constraint? Y/N?</th>
<th>Retain for Further Evaluation? Y/N?</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Project</td>
<td>1</td>
<td>8</td>
<td>10 NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>52</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Relocation</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Anchored Steel Sheet Pile Wall (upper slope)</td>
<td>8</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>54</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Anchored Soldier Pile Wall (upper slope)</td>
<td>9</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>54</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Mechanically Stabilized Earth Embankment (upper slope)</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>43</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Vegetated Reinforced Earth Embankment (upper slope)</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>40</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Geocell (or equivalent) Vegetated Slope (upper slope)</td>
<td>2</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>37</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Soil Nails (upper slope)</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>28</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Drilled Shaft/Soil Mixing Secant/Tangent Wall (upper slope)</td>
<td>8</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>49</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Cantilever Sheet Pile Wall (upper slope)</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>38</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>T-Wall/Gravity Wall (upper slope)</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>39</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Lower Slope Toe Protection</td>
<td>8</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>55</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>
3.4.2 Excluded Measures

As stated above, measures with a cumulative score higher than 40 were retained. Several structural measures identified in Table 3-1 above including Geocell, cantilever sheet pile wall, gravity/T-wall, soil nails, shotcrete bottom slope protection, and gabions curb bottom slope protection were not retained for further evaluation based on several factors that the PDT evaluated. Specifically, the Geocell, cantilever sheet pile wall with no anchors and gravity/T-wall were screened out based on being technically infeasible and cost prohibitive. Slope stabilization through soil nailing was attempted at the site and has failed. Consequently, these measures were not carried forward for further consideration. Other measures such as shotcrete bottom slope protection, and gabions curb bottom slope protection were not retained due to complexity of construction and cost effectiveness.

3.4.3 Non-Structural and Structural Measures

The non-structural and structural measures that were retained are described in further detail below.

3.4.3.1 Non-Structural Measures

Two non-structural measures were considered throughout alternative formulation to address the streambank erosion impacting Bank Street in the city and include the following:

**Relocation** – This measure would involve the relocation of Bank Street and associated utilities and potential acquisition of necessary properties and easements. Relocation would not address long term streambank erosion and failure processes, and consequently, this measure would require subsequent replacements of utilities. This is a complete plan in that it would remove and relocate residential structures and adjacent public utilities from the threatened slope failure and would not require additional measures.

**Vegetative Stabilization** - Installation of this measure would rely on slope stabilization through vegetative treatments. Vegetative stabilization would necessitate fill placement and re-grading to a stable slope geometry followed by plantings within a geosynthetic slope reinforcement material
(e.g. Geocell). This is not a complete plan and would require additional engineering features such as drainage, re-vegetation, etc.

### 3.4.3.2 Structural Measures

Five structural measures were considered throughout alternative formulation to address streambank erosion impacting the Grand River along Bank Street in the city. The structural measures considered include the following:

**Anchored Sheet Pile Wall** – Installation of this measure would require sheet pile embedment to a stable depth within the overburden soils or to the top of rock. The wall design would require a whaler system and anchorage in the form of an earth/rock anchor or deadman structure. This is not a complete plan and would require additional features such as drainage, re-vegetation, etc.

**Anchored Soldier Pile and Lagging Wall** – Installation of this measure would require socketing soldier pile within the shale bedrock along with the placement of lagging panels from the top of bank elevation to a designed lower elevation along the overburden slope. The wall design would require anchorage in the form of an earth/rock anchor or deadman structure. This is not a complete plan and would require additional features such as drainage, re-vegetation, etc.

**Secant/Tangent Wall** – Installation of this measure would require installing drilled shaft/soil mixed columns to form a secant/tangent wall. The wall design may require anchorage in the form of an earth/rock anchor or deadman structure. This is not a complete plan and would require additional features such as drainage, re-vegetation, etc.

**Reinforced Earth Embankment (MSE Wall/Vegetative Reinforced Embankment)** - Installation of this measure would require constructing a reinforced earth embankment consisting of either mechanically stabilized earth with structural facing (MSE wall) or vegetative reinforced earth embankment. Both of these measures include geosynthetic reinforced layered structural fill placement extending from the top of bank to a designed lower elevation along the overburden slope. This is not a complete plan and would require additional features such as drainage, re-vegetation, etc.

**Lower Slope Toe Protection** – Installation of this measure would require constructing a lower slope toe revetment at the river’s edge. The revetment would consist of either a formed concrete curb structure, riprap, or gabion baskets with or without bendway weirs. Shotcrete application along the rock face is a sub-measure under consideration. If this measure were to be implemented, it would be combined with the structural measures described above that directly address the failing upper slope area. This measure has been carried forward primarily as it was an initial consideration of the PDT, however, site geologic conditions along with the inclusion of structural measures addressing the upper slope as described above necessitate further evaluation as to the need or cost effectiveness of including this measure. These considerations are further described below.
4 FORMULATION AND COMPARISON OF ALTERNATIVE SOLUTION SETS

4.1 Preliminary Formulation and Screening of Alternatives

The measures described in Section 3.4.1 above were formulated to create a preliminary list of alternatives. Those measures that were not screened out and retained were used to create alternatives that would meet the desired objectives. This preliminary assessment was based upon qualitative assumptions and the best quantitative data available at the time. Determinations were made regarding which measures should proceed forward. During the development of the Federal Interest Determination, two alternative plans (Alternatives 1 and 2) were considered on a conceptual level. Three additional alternatives (Alternatives 3, 4 and 5) have also been formulated. These alternatives underwent preliminary screening based on the following factors including:

- Cost effectiveness
- Compatibility with non-federal sponsors plans (i.e., public use, shoreline, recreation features, etc.)
- Engineering resilience - (Rating of High, Medium and Low) (i.e., based on construction for a 50-year project life)
- Technical feasibility and complexity
- Constructability
- Public safety
- Public acceptability

4.2 Alternative Plan Descriptions

The following alternative plans and No Action Alternative (NAA) were considered in response to the Grand River flood erosion and streambank failure adjacent to Bank Street which is endangering Bank Street and adjacent public utilities.

**No Action Alternative (NAA):** No Action assumes that no project would be implemented by the Federal Government or by local interests to achieve the planning objectives. For the NAA, USACE would not provide streambank stabilization adjacent to Bank Street along the project reach. This alternative would result in continued bank erosion and failure due to Grand River flows, leading to increased erosion rate and the potential collapse of Bank Street and associated public utilities. Failure to protect the streambank and road would result in loss of public access to the residential area within the city and would preclude truck, school bus, and emergency response traffic and breach adjacent public utilities. This alternative is not considered to be acceptable due to the immediate need for protection of Bank Street and utilities. Without assistance from USACE, the city would, as funding allows, likely continue to fund small streambank repairs as interim measures until funding is available for a permanent solution. With no action, loss of public access to portions of Bank Street would occur and limited repair work would likely be undertaken by the city to temporarily repair failing reaches.
Alternative 1 (Anchored Steel Sheet Pile Wall) - This alternative would include construction of a steel sheet pile wall approximately 325 feet in length near the top-of-slope. Installation would require sheet pile embedment to a stable depth within the overburden soils or to the top of rock. This is a top-down construction technique where the majority of construction equipment would operate near the top of slope. Removal of the existing soil nails and wire mesh reinforcement will be required. This alternative would include necessary surface water drainage features, drainage behind and adjacent to the wall, fence removal and re-installation, and temporary traffic diversion during construction and roadway repair. The wall design will require anchorage in the form of an earth/rock anchor or deadman structure. Conceptual generic drawings showing typical features of this approach along with a representative photograph of a constructed project using this technique are provided in Figure 4-1 thru Figure 4-3.
Figure 4-2. Plan View Alternative 1 – Anchored Steel Sheet Pile Wall. (Google, 2019)

Figure 4-3. Example Photograph of Anchored Steel Sheet Pile Wall (Madison Avenue). (USACE Staff, 2019)
Alternative 2 (Anchored Soldier Pile and Lagging Wall) - This alternative would include construction of a steel soldier pile and lagging wall approximately 325 feet in length near the top-of-slope. Installation would require socketing soldier piles within competent soil and/or shale bedrock along with the placement of lagging panels from the top of bank elevation to a designed lower elevation along the overburden slope. This is also a top-down construction technique where the majority of construction equipment would operate near the top of slope. Removal of the existing soil nails and wire mesh reinforcement will be required. This alternative would include necessary surface water drainage features, drainage behind and adjacent to the wall, fence removal and re-installation, and temporary traffic diversion during construction and roadway repair. There is some uncertainty regarding location and depth of the failure surfaces as well as causative processes, consequently, the lagging panels would be extended to a significant depth on the slope to ensure long term integrity and this would require significant laying back of the excavation as well as worker hand positioning of panels adding to safety and cost escalations. Additionally, the soldier piles would conceptually require a cased drill hole for installation with the drilling and socketing advanced into the upper surface of rock, thus increasing time and effort. The wall design will require anchorage in the form of an earth/rock anchor or deadman structure. Conceptual generic drawings showing typical features of this approach along with a representative photograph of a constructed project using this technique are provided in Figure 4-4 thru Figure 4-6.

Figure 4-4. Concept Drawing of Alternative 2 - Anchored Soldier Pile and Lagging Wall. (USACE Staff, 2019)
Figure 4-5. Plan View Alternative 2 - Anchored Soldier Pile and Lagging Wall. (Google, 2019)

Figure 4-6. Example Photograph of Anchored Soldier Pile and Lagging Wall. (USACE Staff, 2019)
Alternative 3 (Secant/Tangent Wall) - This alternative would include construction of drilled shaft/soil mixed columns to form a secant/tangent wall approximately 325 feet in length near the top-of-slope. This is a top-down construction technique where the majority of construction equipment would operate near the top of slope. Installation would require column embedment into the top of rock. Removal of the existing soil nails and wire mesh reinforcement will be required. This alternative would include necessary surface water drainage features, drainage behind and adjacent to the wall, fence removal and re-installation, and temporary traffic diversion during construction and roadway repair. The wall design may require anchorage in the form of an earth/rock anchor or deadman structure. Conceptual generic drawings showing typical features of this approach along with a representative photograph of a constructed project using this technique are provided in Figure 4-7 thru Figure 4-9.

Figure 4-7. Concept Drawing of Alternative 3 - Secant/Tangent Wall. (USACE Staff, 2019)
Figure 4-8. Plan View Alternative 3 - Secant/Tangent Wall. (Google, 2019)

Figure 4-9. Example Photograph of Secant/Tangent Wall. (USACE Staff, 2019)
Alternative 4 (Reinforced Earth Embankment (MSE Wall/Vegetative Reinforced Embankment)) - This alternative would include construction of a reinforced earth embankment approximately 325 feet in length near the top-of-slope consisting of either mechanically stabilized earth with structural facing Mechanically Stabilized Earth (MSE) wall or vegetative reinforced earth embankment. Both of these techniques include geosynthetic reinforced layered structural fill placement extending from the top of bank to a designed lower elevation along the overburden slope. Removal of the existing soil nails and wire mesh reinforcement will be required. This is a bottom-up construction technique that would start at the designated base of slope and then progress upwards. This alternative would include necessary surface water drainage features, drainage behind and adjacent to the wall, fence removal and re-installation, and temporary traffic diversion during construction and roadway repair. Conceptual generic drawings showing typical features of this approach along with a representative photograph of a constructed project using this technique are provided in Figure 4-10 thru Figure 4-12.

Figure 4-10. Concept Drawing of Alternative 4 - Mechanically Stabilized Earth (MSE) Wall. (USACE Staff, 2019)
Figure 4-11. Plan View Alternative 4 - Mechanically Stabilized Earth (MSE) Wall. (Google, 2019)

Figure 4-12. Example Photograph of MSE Wall Installation. (USACE Staff, 2019)
Alternative 5 (Lower Slope Toe Protection combined with Upper Slope Structural Measures) - This alternative would include construction of a lower slope toe revetment at the river’s edge in addition to one of the four upper slope structural alternatives described above. The revetment would consist of either a formed concrete curb structure or riprap and extend approximately 375 feet in length. This alternative would include establishing a key anchorage in the river and tying in the upstream and downstream ends of the revetment within the riverbank materials. Extensive in-water work will be required. Conceptual drawings and photographs of lower toe protection at the base of a slope is provided below in Figure 4-13 thru Figure 4-15.

Figure 4-13. Conceptual Cross Section - Riprap Toe Protection Installation. (USACE Staff, 2019)
Figure 4-14. Plan View – Lower Slope Protection Installation. (USACE Staff, 2019)

Figure 4-15. Example Photograph of Riprap Toe Protection Installation. (USACE Staff, 2019)
4.2.1 Final Array of Alternatives Considered

Those alternatives remaining after the preliminary screening process constitute the array of alternatives considered (Table 4-1). This array of plans reflects the trade-offs between effectiveness and efficiency, environmental impacts, and the conceptual costs of each alternative. Each of the plans would protect the streambank with as minimal adverse environmental impacts as possible, while being generally cost effective.

Table 4-1. Array of Alternatives Considered Comparison

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Alternative Title</th>
<th>Alternative Description</th>
<th>Carried Forward</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAA</td>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>YES</td>
<td>USACE Regulations</td>
</tr>
<tr>
<td>1</td>
<td>Anchored Steel Sheet Pile Wall</td>
<td>Sheet pile embedment to a stable depth</td>
<td>YES</td>
<td>Cost Effective; past success, efficient construction, meet project objectives</td>
</tr>
<tr>
<td>2</td>
<td>Anchored Soldier Pile and Lagging Wall</td>
<td>Socketing soldier piles within competent soil and/or shale bedrock</td>
<td>YES</td>
<td>Meet project objectives, past success</td>
</tr>
<tr>
<td>3</td>
<td>Secant/Tangent Wall</td>
<td>Drilled shaft/soil mixed columns to form a secant/tangent wall</td>
<td>NO</td>
<td>Engineering judgment, technical constraints and complex construction upon further research; construction costs would likely exceed authority limits</td>
</tr>
<tr>
<td>4</td>
<td>Reinforced Earth Embankment (MSE Wall/Vegetative Reinforced Embankment)</td>
<td>Reinforced earth embankment; mechanically stabilized earth with structural facing wall or vegetative reinforced earth embankment.</td>
<td>NO</td>
<td>Engineering judgment, technical constraints and complex construction upon further research; construction costs would likely exceed authority limits</td>
</tr>
<tr>
<td>5</td>
<td>Lower Slope Toe Protection (Combined with Upper Slope Structural Alternative)</td>
<td>Lower slope toe revetment at the river’s edge</td>
<td>NO</td>
<td>Incomplete plan; low engineering resilience and project life span; would not meet project objectives</td>
</tr>
</tbody>
</table>

4.3 Further Screening Criteria of Alternative Plans

Criteria to further evaluate the alternative plans include all significant resources, outputs and plan effects. Alternatives 3, 4 and 5 were initially screened out due to several factors including; technical constraints, complex construction and costs anticipated to exceed authority limits. Alternatives 1 and 2 were compared and evaluated further relative to the four Planning and Guidance evaluation criteria identified in the applicable planning guidance (ER 1105-2-100)
(i.e., completeness, effectiveness, efficiency and acceptability). These four evaluation criteria are defined below as:

- **Completeness** is the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other federal and non-federal entities.

- **Effectiveness** is the extent to which the alternative plans contribute to achieve the planning objectives.

- **Efficiency** is the extent to which an alternative plan is the most cost effective means of achieving the objectives.

- **Acceptability** is the extent to which the alternative plans are acceptable in terms of applicable laws, regulations and public policies.

Other criteria deemed significant by the PDT (meets planning constraints, constructability and environmental) have been included in the evaluation as well. Table 4-2 below presents the comparison of the NAA, and Alternative plans 1 and 2 based upon the PDT’s evaluations, the four criteria from the planning guidance and other critical factors.

**Table 4-2. Criteria Evaluation and Comparison of Alternative Plans**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>No Action Alternative (NAA)</th>
<th>Alternative 1 Anchored Steel Sheet Pile Wall</th>
<th>Alternative 2 Anchored Soldier Pile and Lagging Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prelim ROM Costs</td>
<td>$</td>
<td>$$$</td>
<td>$$$</td>
</tr>
<tr>
<td>Meets Planning Constraints</td>
<td>None. Loss of public infrastructure occurs</td>
<td>Prevents Loss of Infrastructure</td>
<td>Prevents Loss of Infrastructure</td>
</tr>
<tr>
<td>Completeness (Yes, No)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Effectiveness (High, Medium Low)</td>
<td>Low. This plan does not meet study objectives</td>
<td>High. This plan is effective at reducing tolerable risks</td>
<td>High. This plan is effective at reducing tolerable risks</td>
</tr>
<tr>
<td>Efficiency (Cost) 1= Most Efficient 3= Least Efficient</td>
<td>Efficiency: 3 While minimal costs are associated with this plan, it does not reduce risk below Tolerable Risk Guidelines</td>
<td>Efficiency: 1 Due to the lower project costs, this is the most efficient plan for risk reduction.</td>
<td>Efficiency: 2 This plan is effective, but is not as efficient as Alternative 1 due to construction complexity and safety escalations (i.e. resulting in higher expected project costs)</td>
</tr>
<tr>
<td>Acceptability (High, Medium, Low)</td>
<td>Low. This plan does nothing to reduce the incremental risk and is unacceptable in terms of USACE policy.</td>
<td>High. This plan is acceptable in terms of applicable laws, regulations and policies due to minimal environmental impacts.</td>
<td>High. This plan is acceptable in terms of applicable laws, regulations and policies due to minimal environmental impacts.</td>
</tr>
<tr>
<td>Constructability</td>
<td>N/A</td>
<td>High</td>
<td>Medium</td>
</tr>
</tbody>
</table>
### Environmental (High, Medium, Low)

<table>
<thead>
<tr>
<th>Environmental (High, Medium, Low)</th>
<th>High</th>
<th>Medium</th>
<th>Medium</th>
</tr>
</thead>
</table>

## 4.4 Excluded Plans

Based on this further evaluation outlined in Section 4.3 relative to the four criteria from the planning guidance, Alternatives 3, 4 and 5 were eliminated at preliminary in the initial array due to screening factors including technical constraints, complex construction and costs anticipated to exceed authority limits. In the final array, Alternative 2 was eliminated from further consideration due to higher complex construction and safety escalations. As a result, it is expected that higher costs are anticipated. While this alternative would function structurally like Alternative 1 (Anchored Steel Sheet Pile Wall) and meet most project objectives, there are more steps involved with the construction sequence process and additional safety measures compared to Alternative 1 that subsequently impact costs. An expanded explanation of why these plans have been excluded is as follows:

**Alternative 2 (Anchored Soldier Pile and Lagging Wall)** has been eliminated due to increased complex construction discussed below. As a result, higher costs and resulting lower efficiency are expected. This alternative would function structurally like Alternative 1 and meet project objectives. However, there are more steps involved with the construction sequence compared to Alternative 1 that subsequently impact costs. This alternative was discussed with a heavy civil specialty contractor in the Cleveland, Ohio vicinity who provided local experience and input. For example, some uncertainty exists regarding location and depth of the failure surfaces as well as causative processes, consequently, the lagging panels would be extended to a significant depth on the slope to ensure long term integrity and this would require significant laying back of the excavation as well as worker hand positioning of panels adding to safety and cost escalations. Additionally, the soldier piles would conceptually require a cased drill hole for installation with the drilling and socketing advanced into the upper surface of rock, thus increasing time and effort/costs.

**Alternative 3 (Secant/Tangent Wall)** has been eliminated due to cost and technical constraints identified upon further research. This alternative would function structurally similar to Alternative 2 and meet project objectives. However, because of the relatively specialized construction technique, costs become prohibitively higher compared to more traditional techniques like Alternatives 1 or 2. This technique was discussed with a representative of a heavy civil specialty contractor in the Cleveland, Ohio area who indicated among several constraints, the heavier/dry clay soils would limit soil mixing feasibility and the large wide-track deep mixing rigs required are not readily utilized/available in the Cleveland metropolitan area and surrounding region.

**Alternative 4 (Reinforced Earth Embankment (MSE Wall/Vegetative Reinforced Embankment))** has been eliminated due to cost, engineering judgment, as well as constructability challenges. This alternative was also discussed with the heavy civil specialty contractor in the Cleveland, Ohio vicinity who provided local experience and input. Construction of a reinforced earth wall would require a bottom up construction sequence in a relatively limited lateral distance. The base of the wall would need to be established near the rock interface given
that the exact failure surfaces are not well defined, resulting in a relatively high wall. Equipment access and working areas would be constrained and additional safety measures would be likely given the proximity to the steep rock slope. To construct the reinforced structural layers, a significant portion of Bank Street would have to be removed which would require substantial excavation, temporary shoring, and road re-construction as well as require subsequent realignments and replacements of utilities and cross drains.

**Alternative 5 (Lower Slope Toe Protection combined with Upper Slope Structural Measures)** has been eliminated due to the alternative requiring a combination of lower slope toe protection with one of the other upper slope structural alternatives to fully meet project objectives. Sub-components of this alternative in the form of bendway weirs and shotcrete of the rock escarpment face were screened out due to expected low engineering resilience and project life cycle given the high flow/velocity environment as it pertains to the bendway weirs and the wet, annual freeze-thaw environment as it pertains to the shotcrete application. The additional cost to construct the toe revetment is not justified given that each of the upper slope alternative structural components would be constructed a minimum of 50 feet from the lower rock slope crest, therefore creating a significant separation distance from the rock escarpment face and potential future rock weathering as well as destabilizing rock falls and overhangs. Further, results of the subsurface exploration program recently performed at the site (Section 2.2.6, and Appendix A) indicate the exposed Ohio shale units that make up the lower slope of the left bank have moderately competent intact rock properties indicative of relatively slow erosion and undercutting rates. The rock units are more likely to fail episodically en-mass along structural discontinuities such as existing valley parallel joints following development of overhangs. Erosion of the rock face would be expected to take much greater than 50 years to advance close enough to threaten the structural measures proposed as the stabilization remedy. Consequently, the combination of slow rock erosion rates along with a significant set-back distance of the upper slope structural measures suggests the need for lower slope protection is not technically warranted or justified in the context of the project design life given the increased cost of adding this measure to the other structural alternatives. It is also noted that this alternative would also require significant in-water work requiring applicable permitting and construction logistics efforts.

### 4.5 Risk and Uncertainty

This study was undertaken using risk informed decision making to insure that study, implementation, and project outcome risks were taken into account when formulating plans, selecting a plan for implementation, and during feasibility level design efforts. A discussion of risk and uncertainty allows the PDT and project sponsor to assess risks likely to be encountered, as well as the consequences that could result from actions taken (or not taken) and items considered (or not considered) during each stage of the project. The risk and uncertainties for this project were developed using an Abbreviated Cost and Schedule Risk Analysis (CSRA). The analysis identified the 80 percent confidence level project cost and schedule duration. The risks and uncertainties for this project have been summarized in a Cost Engineering Abbreviated CSRA table which can be found in Appendix C.
5 TENTATIVELY SELECTED PLAN (TSP) - RECOMMENDED PLAN

Alternative 1 (i.e., Anchored Steel Sheet Pile Wall) is the most cost effective plan and is the Tentatively Selected Plan (TSP)/Recommended Plan. Alternative 1 is least costly, most efficient, and has the least construction risk associated with the plan and has therefore been tentatively recommended pending completion of the feasibility study. The full cost breakdown for Alternative 1 is included in Appendix C. The following sections describe the requirements and preliminary design associated with the implementation of the recommended plan (Alternative 1) at the Grand River/Bank Street project.

5.1 Tentatively Selected Plan/Recommended Plan Description

Alternative 1 (i.e., Anchored Steel Sheet Pile Wall) has been determined to be least costly, technically appropriate, and to have the least construction risk associated with the plan and has been recommended. There are multiple types of retaining walls along the steep banks of the Grand River near Painesville, Ohio, with anchored steel sheet pile walls constructed at a number of locations to protect roadways adjacent to the slope crest. Based on PDT field reconnaissance of several sheet pile walls close to the project area, they appear to be retaining their integrity and performing well in protection of adjacent infrastructure. To further support the PDT’s recommendation, as part of the alternative evaluation process, USACE had discussions with a Cleveland, Ohio-based heavy civil contractor familiar with retaining wall construction in the region. Various conceptual alternatives were discussed for stabilization of the bank, and based on this contractor’s experience, the contractor concurred that an anchored sheet pile wall was most appropriate for the given site conditions.

This alternative would include construction of a steel sheet pile wall approximately 325 feet in length near the top-of-slope. Installation will require sheet pile embedment to a stable depth within the overburden soils or to the top of rock. As described under Section 4.2, the sheet pile wall is designed to stabilize the upper earth slope as the slow erosion of the shale bluff directly below it would not affect the wall in the foreseeable future given that a significant extent of rock would need to be removed before reaching the wall (i.e. greater than 50 years). This is a top-down construction technique where the majority of construction equipment will operate near the top of slope and on Bank Street. Prior to construction of the wall, removal of the existing soil nails and wire mesh reinforcement from the failed soil-nailing repair work will be required. These costs are included in the cost estimate for the recommended plan.

Site work and ancillary features will include vegetation clearing and removal, surface water drainage features, subsurface drainage behind and adjacent to the wall, fence removal and re-installation, and temporary traffic diversion during construction and roadway repair. The wall design will require anchorage in the form of earth anchors. A photograph of an anchored sheet pile wall along the Grand River and successfully protecting a portion of nearby Madison Avenue (located 0.5 mile from the project site) is provided in Figure 5-1 below.
Site specific preliminary design analyses for the anchored steel sheetpile wall are included within Appendix A (Engineering). Support for an anchored sheet pile wall is provided through the shear and bending stiffness of the vertical wall elements and passive resistance from the soil below the finished excavation grade, as well as lateral resistance provided by the ground anchors to resist horizontal pressures (e.g., earth, water, seismic, etc.) acting on the wall. The preliminary sheet pile design and analyses were completed using USACE Program #X0031, Version #1 CWALSHT, Design/Analysis of Sheet-pile Walls by Classical Methods developed by USACE Computer-Aided Structural Engineering (CASE) Task Group. This program can perform design and analysis of an anchored or cantilevered sheet pile wall and uses classical soil mechanics procedures for determining the required depth of penetration of a new wall or assesses the factors of safety for an existing wall. This program has been used in the past; its performance, reliability and results have been verified when compared to manual computations. The sheet pile wall was designed, under both short term and long term conditions, as an anchored sheet pile wall, using the Free Earth Method results. Input for the design analyses was based on the geotechnical design parameters developed from the February 2019 site investigation and developed structural steel specifications (see Appendix A). A summary of the wall design is presented below and CWALSHT/Structural design and analysis outputs for each case evaluated are presented within Appendix A. As a check of stability of the existing slope under initial construction loading conditions, an analysis using Slope/W was performed. The results of the slope stability analysis are presented in Appendix A and suggest acceptable factors of safety will be present under the modeled construction loading.
Preliminary Sheet Pile Wall Design Primary Features:

- 40-foot long PZ 27 steel sheets;
- Thirty-three, 37 foot long, 1.25-inch diameter grouted steel bar anchors (10-feet on center);
- 22-foot anchor bond length within a 7.25-inch diameter drill hole; and
- 4-inch diameter PVC wall drainage pipes positioned at base of structural backfill placement (20-feet on center).

Figure 5-2 below presents a representative cross section of the preliminary sheet pile wall design and features.

Figure 5-2. Preliminary Design of Anchored Steel Sheet Pile Wall. (USACE Staff, 2020)
5.1.1 Estimated Project Costs and Schedule

The primary basis for economic analyses within USACE dates back to the Flood Control Act of 1936, Public Law 74-738. This law established the criterion of economic benefits exceeding economic costs and the need to consider social (and subsequently other) impacts in the decision making process. The development and practice of benefit-cost analysis in USACE is fundamental for decision making.

USACE Principles and Guidelines (P&G) states that water resource projects must contribute to National Economic Development (NED) consistent with protecting the nation’s environment. One of the four P&G accounts was established to facilitate evaluation and display of effects of alternative plans. The objective of NED is to maximize increases in the net value of the national output of goods and services. Within USACE, NED economic analysis is done by comparing the difference in the value (benefits) produced by the project to the value of the resources (costs) required to produce those goods and services or construct a project. Benefits are increases in the net value of national outputs (goods and services) and vary by type of water resource project. The costs (opportunity costs) are the costs of the resources required or displaced to achieve the plan. The NED objective is maximizing the difference between monetized benefits and costs. Types of benefits for NED projects include reduced property damage, emergency costs and avoiding losses. This project is an NED project, which must include a benefit cost analysis.

A benefit cost analysis estimate for the Recommended Plan has been prepared to an equivalent price level of October 2019 prices and conditions and is summarized below in Table 5-1. Estimated Relocation Costs Avoided is presented in Table 5-2. Additional information on costs and benefit-cost ratio can be found in Appendices C and F, respectively.

**Table 5-1. Estimated Economic Costs for Recommended Plan**

<table>
<thead>
<tr>
<th>TSP/NED Plan (Alternative 1)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Project Cost based upon $3,568,000 “first (constant dollar basis) cost” (at 2.750% for 50-year project life)</td>
<td>$132,200</td>
</tr>
<tr>
<td>Annual Operations and Maintenance Cost</td>
<td>$5,000</td>
</tr>
<tr>
<td>Total Annual Economic Cost</td>
<td>$137,200</td>
</tr>
</tbody>
</table>

*Costs are subject to change as a result of Agency Technical Review (ATR). Partial Payment factor based on 50 year project life and a 2.75% annual interest rate. Annual Maintenance taken as $5,000 annually. Annual Maintenance is the City’s responsibility. Maintenance would be limited to clearing brush/woody vegetation from around the wall, checking and replacing any riprap or surface water control materials that become displaced, and making sure that graded areas receiving topsoil, erosion control matting and seeding are maintained to establish and maintain adequate vegetative cover. As a result, this would be estimated to cost the City an estimated $5,000 per year.
Current economic guidance, ER-1105-2-100 states that the costs used in the economic evaluation will be based on constant dollar costs (Appendix D, D3-NED Cost Evaluation Procedures, pD5). The Recommended Plan “constant dollar costs”, associated with a fully funded project cost of $3,788,000, is $3,568,000. Thus when performing the economic evaluation for this project, project costs are placed at constant dollar costs of $3,568,000. The usage of these constant dollar costs of $3,568,000 resulted in average annual costs of $137,200. This includes $5,000 for annual maintenance.

**ECONOMIC JUSTIFICATION FOR SELECTED ALTERNATIVE**

Benefits for the project consist of local community costs avoided. These costs avoided consist of road replacement/realignment costs avoided, utility relocation costs avoided (waterlines, sanitary sewer lines, storm drain lines, gas lines and telephone lines), road and utility rights of way land acquisition costs avoided, and private residential property home relocation or demolition costs avoided. The derivation of these average annual benefits are provided below.

**Table 5-2. Estimated Road Relocation Costs Avoided**

<table>
<thead>
<tr>
<th>Local Community Road Relocation Costs Avoided (Benefits)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Project Cost based upon $4,750,300 road relocation cost (at 2.750% for 50-year project life)</td>
<td>$176,000</td>
</tr>
<tr>
<td>Annual Operations and Maintenance Cost</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Annual Economic Cost</td>
<td>$176,000</td>
</tr>
</tbody>
</table>

The benefits for the project are the lesser of:

1. The least cost relocation alternative; or
2. The value of the infrastructure benefits forgone if no corrective action is taken.

The BCR of the protection alternative is based on the comparison of the annual cost of the relocation alternative with the annual cost of the Recommended Plan. The BCR calculations are summarized below. Additional economic analysis is detailed in Appendix F.

**BCR =** \[
\frac{\text{Annual Economic Cost of Relocation Alternative}}{\text{Annual Economic Cost of Recommended Plan}}
\]

**BCR =** \[
\frac{$176,000}{$137,200} = \text{BCR of 1.28 to 1}
\]

Economic Analysis in accordance with Engineering Regulation 1105-2-100 (Appendix F, paragraph F-23d), the Recommended Plan is considered to be justified if it is the least cost of all
alternative streambank protection plans and is less than the cost to relocate the threatened facilities. Alternative 1 meets these criteria and is therefore justified.

The schedule is currently being developed with a target date of executing a Project Partnership Agreement (PPA) in 2021. The following tables (Table 5-2 and 5-3) include the Federal and non-Federal apportionment of the estimated total project costs and the key milestones for the project:

**Table 5-3. Estimated Project Costs and Apportionment**

<table>
<thead>
<tr>
<th></th>
<th>FY 2020</th>
<th>FY 2021</th>
<th>FY 2022</th>
<th>FY 2023</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasibility Study Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FED Share</td>
<td>$130,000</td>
<td>$25,000</td>
<td></td>
<td></td>
<td>$155,000</td>
</tr>
<tr>
<td>Non-Fed</td>
<td>$130,000</td>
<td>$25,000</td>
<td></td>
<td></td>
<td>$155,000</td>
</tr>
<tr>
<td>Design and Implementation Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Analyses, Plans and Specs</td>
<td>$300,000</td>
<td>$100,000</td>
<td>$28,000</td>
<td>$428,000</td>
<td></td>
</tr>
<tr>
<td>Project Management</td>
<td>$150,000</td>
<td>$120,000</td>
<td>$40,000</td>
<td>$310,000</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td>$3,038,000</td>
<td></td>
<td>$3,038,000</td>
<td></td>
</tr>
<tr>
<td>LERRDs</td>
<td>$13,000</td>
<td></td>
<td></td>
<td>$13,000</td>
<td></td>
</tr>
<tr>
<td>Federal Share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Fed cash/WIK (Utilities)</td>
<td></td>
<td></td>
<td>$75,000</td>
<td>$75,000</td>
<td></td>
</tr>
<tr>
<td>Non-Fed LERRD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Project Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fed Share</td>
<td>$130,000</td>
<td>$325,950</td>
<td>$2,166,450</td>
<td>$44,200</td>
<td>$2,666,600</td>
</tr>
<tr>
<td>Non-Fed Share</td>
<td>$130,000</td>
<td>$187,050</td>
<td>$1,091,550</td>
<td>$23,800</td>
<td>$1,432,400</td>
</tr>
</tbody>
</table>

Note: *Non-Fed Share accounts for WIK credit of $75,000 in FY 2022
### Table 5-4. Key Project Milestones

<table>
<thead>
<tr>
<th>MILESTONE</th>
<th>DURATION (WORKING DAYS)</th>
<th>START</th>
<th>END</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive Initial Funds</td>
<td>0</td>
<td>MAY 2017</td>
<td>MAY 2017</td>
</tr>
<tr>
<td>Federal Interest Determination (FID) Report Review (CW170)</td>
<td>90</td>
<td>AUG 2017</td>
<td>SEP 2017</td>
</tr>
<tr>
<td>Execute Feasibility Cost Share Agreement (CW130)</td>
<td>30</td>
<td>JUN 2018</td>
<td>JUN 2018</td>
</tr>
<tr>
<td>Review Plan</td>
<td>60</td>
<td>JUN 2018</td>
<td>JUN 2018</td>
</tr>
<tr>
<td>Planning Charrette (25% DPR)</td>
<td>45</td>
<td>MAR 2019</td>
<td>MAR 2019</td>
</tr>
<tr>
<td>FAAM Briefing (CW060)</td>
<td>110</td>
<td>AUG 2019</td>
<td>AUG 2019</td>
</tr>
<tr>
<td>75% DPR</td>
<td>100</td>
<td>FEB 2020</td>
<td>FEB 2020</td>
</tr>
<tr>
<td>ATR</td>
<td>40</td>
<td>MAR 2020</td>
<td>MAY 2020</td>
</tr>
<tr>
<td>Cost Certification</td>
<td>30</td>
<td>MAR 2020</td>
<td>MAY 2020</td>
</tr>
<tr>
<td>MDM (includes 72 day review) (CW190)</td>
<td>50</td>
<td>JUN 2020</td>
<td>AUG 2020</td>
</tr>
<tr>
<td>Document After Public Review</td>
<td>35</td>
<td>OCT 2020</td>
<td>DEC 2020</td>
</tr>
<tr>
<td>100% DPR (MSC Review Ready) (CW160)</td>
<td>0</td>
<td>DEC 2020</td>
<td>DEC 2020</td>
</tr>
<tr>
<td>Final Review/Approval (60 Days) (CW170)</td>
<td>50</td>
<td>DEC 2020</td>
<td>APR 2021</td>
</tr>
<tr>
<td>PPA Submit to LRD (CW080) – MSC Resp. Code (72 day)</td>
<td>0</td>
<td>JAN 2021</td>
<td>JAN 2021</td>
</tr>
<tr>
<td>PPA Approval (CW090)</td>
<td>72</td>
<td>JAN 2021</td>
<td>MAR 2021</td>
</tr>
<tr>
<td>PPA District Commander Signature (Executed) (CW130)</td>
<td>5</td>
<td>MAR 2021</td>
<td>APR 2021</td>
</tr>
<tr>
<td>Receive D&amp;I Funds</td>
<td>46</td>
<td>APR 2021</td>
<td>JUN 2021</td>
</tr>
<tr>
<td>Complete Plans and Specs</td>
<td>93</td>
<td>JUN 2021</td>
<td>NOV 2021</td>
</tr>
<tr>
<td>Contract Award</td>
<td>0</td>
<td>FEB 2022</td>
<td>FEB 2022</td>
</tr>
<tr>
<td>Construction Complete</td>
<td>250</td>
<td>FEB 2022</td>
<td>DEC 2022</td>
</tr>
<tr>
<td>Project Closeout</td>
<td>120</td>
<td>DEC 2022</td>
<td>JUN 2023</td>
</tr>
</tbody>
</table>
5.1.2 Non-Federal Sponsor Responsibilities

The non-federal sponsor, the City of Painesville, has expressed continued interest in participating in this project and has acknowledged their responsibilities as outlined below. The non-federal sponsor, in coordination with USACE, executed an FCSA in June 2018 and they delivered $200,000 as part of their share of the feasibility phase of the project pursuant to the requirements of ER 1105-2-100 (Appendix F, Section II). The non-federal sponsor has been working to secure further non-federal cost share funds and anticipates they will be able to work with USACE to prepare and execute a PPA for the design and implementation phase of the project. The non-federal sponsor has also been working to identify potential in-kind service opportunities.

The city has actively participated in the development of alternatives and the selection of the Recommended Plan. The PDT has actively reached out to the city throughout the feasibility phase, including providing exhibits of the alternatives considered. In addition, the non-federal sponsor has met with PDT members on several occasions at the project site to discuss treatment alternatives. Once the project has been completed, the city will accept the project along with their operations and maintenance responsibilities and will receive an Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R) Manual from USACE in order to maintain its function.

The non-federal sponsor, has expressed the desire for implementing the project and sponsoring project construction in accordance with the items of local cooperation that are set forth in the Implementation Requirements chapter of this report Section 8. Other non-federal documentation may include a Letter of Intent, any legislation/legal actions that allow the non-federal sponsor to execute a PPA, and a statement of their acknowledged responsibilities with respect to the OMRR&R costs upon completion of the project.
6 ENVIRONMENTAL EFFECTS OF RECOMMENDED PLAN

This section presents a detailed analysis of the anticipated environmental effects of the screened alternatives including the recommended plan (Alternative 1) and the No Action Plan. Alternative 2, evaluated in the final array (in Section 4.4 of this report) is expected to be very similar to the recommended plan. Therefore, Alternatives 1 and 2 are evaluated together in this section. The environmental impacts are not assessed in this section other than to state here that Alternative 1 impacts would have been more substantial than Alternative 2 because it would require work within the Grand River as well as access to the site from the forested area across the river. The project has been evaluated for engineering and economic feasibility, environmental and social acceptability, and for best meeting the project planning objectives.

6.1 Physical Environment

6.1.1 Surface Water and Other Aquatic Resources

6.1.1.1 Streams and Rivers

No Action
With the likely and eventual failure of the existing bank, sediment and rock from the streambank would erode into the waterway temporarily causing turbidity. This would adversely impact localized water quality and effect the overall health of the Grand River in the immediate downstream area. Although a normal process for river systems, allowing this to occur would jeopardize the homes and utilities along the top of bank.

Alternatives 1 and 2
The new sheet pile wall would safeguard the adjacent surface waters from any adverse impacts resulting from bank failure at this location. None of these alternatives would involve in-water work within the Grand River. Through the use of construction best management practices, no adverse impacts on water quality are expected to the Grand River with any of these alternatives. The USEPA commented on May 21, 2019 regarding concerns about some of the alternatives’ potential impacts to aquatic resources (Appendix G).

6.1.1.2 Groundwater

No Action
Ground water is present and currently flowing over a perched horizon within the project area. No long term effects are expected to this public interest factor with the selection of the no action plan.

Alternatives 1 and 2
The alternatives all have plans to allow groundwater to continue flowing through the constructed structure so no long term effects are expected. There may be localized short-term effects during construction.

6.1.1.3 Floodplains
No Action
As a result of the likely failure of the existing bank if nothing is done to stabilize the slope, sediment and rock from the slope would erode into the waterway causing rock and soil to begin depositing within the Grand River. This may occur gradually over years or through a series of more substantial slope failures. This may lead to increased flood level elevations in the immediate area.

Alternatives 1 and 2
There will be no effect on floodplains with the implementation of any of these alternatives as no work will be occurring in the Grand River or its 100-year floodplain.

6.1.1.4 Wetlands

All Alternatives
After a review of the USFWS National Wetland Inventory maps, soil associations, and on-site field inspection, there are no wetlands present or adjacent to the project site. Therefore, the No Action Alternative and Alternatives 1, 2, 3 and 4 will have no effect on wetlands.

6.1.1.5 Water Quality

No Action
As a result of the likely failure of the existing bank if nothing is done to stabilize the slope, sediment and rock from the slope would erode into the waterway causing rock and soil to begin depositing within the Grand River. This may occur gradually over years or through a series of more substantial slope failures. Although this is a natural riparian corridor situation, it would adversely impact localized water quality in the Grand River on a periodic basis.

Alternatives 1 and 2
The new sheet pile wall would safeguard the adjacent surface waters of the Grand River from adverse impacts resulting from slope failure at this location. Additionally, since the project would require no in-water work and the eventual contractor would be required to follow all applicable best management practices, no adverse impacts are anticipated to water quality with any of the alternatives.

6.1.2 Vegetation

No Action
Long-term direct adverse effects will occur to vegetation as the toe of the slope continues to erode creating a cascading effect up slope. This will eventually lead to total bank failure and adversely impact existing vegetation in the area.

Alternatives 1 and 2
A minor amount of long-term beneficial effects on vegetation would result from slope stabilization at the project area. The prevention of erosion and slope failure would allow for natural re-vegetation at the site. The NEPA scoping for this project indicated that site access may be necessary from the other side of the Grand River, including impacts to forested areas on
the opposite bank for site access. The recommended plan, however, will not require such access since all work may be accomplished from the top of the bank near Bank Street. Accordingly, only minor and temporary impacts to vegetation at the top of the bank are expected during construction.

6.1.3 Wildlife

6.1.3.1 Reptiles and Amphibians

No Action
The habitat and species present surrounding the project area is indicative of what would be present in urban and suburban neighborhoods. No reptiles or amphibians are expected to occur within the failure area. The continued failure of the slope could result in some minor impacts to reptilian and amphibian habitats potentially present at the base of the slope near the Grand River. Such impacts would be associated smothering and turbidity from the sloughing of material into the Grand River.

Alternatives 1 and 2
Implementation of this project will have no negative effects on reptiles and amphibians during or following construction activities. The stabilization of the bank will prevent the erosion of the bank into the Grand River.

6.1.3.2 Birds and Mammals

No Action
Avifauna and mammals present surrounding the project area are indicative of what would be present within a mixed urban and suburban neighborhood, with neotropical songbird stopovers during the spring and fall. The eventual failure of the existing slope could result in some minor impacts to vegetation in the area which could reduce the habitat value to birds and mammals.

Alternatives 1 and 2
The implementation of this project would have a localized and temporary negative effect on habitat within the project area due to the potential for tree removal during construction. However, the stabilization of the slope will prevent the loss of any other habitat that would be associated with future slope failure.

6.1.3.3 Invasive and Exotic Species

No Action
The continued erosion and potential failure of the slope could create a niche for invasive and exotics species to colonize the area since they thrive in disturbed environments.

Alternatives 1 and 2
Comments provided by the USEPA in May 2019 point out that the project could result in the introduction of non-native and invasive plant species into the area (Appendix G). They recommended the enactment of best practices to minimize this risk. The project will result in only a minor and localized negative risk of colonization from invasive and exotic species due to
disturbance during and immediately following construction. However, construction best management practices and a planting plan will be used to ensure only native species are planted and colonize the area after construction has ended in accordance with Executive Order 13112 (Invasive Species). Additionally, the risk of introducing such species to the area is substantially reduced since no in-water activity is required and site access is not necessary from the opposite side of the Grand River (i.e., reduces amount of disturbed area).

6.1.4 Threatened and Endangered Species

No Action
No impacts would be anticipated to any federally endangered or threatened species if no action is taken to address the destabilized slope.

Alternatives 1 and 2
Coordination was completed with the USFWS in accordance with Section 7 of the Endangered Species Act. The proposed project is not anticipated to have any negative effects on federally threatened or endangered species. The USFWS concurred with this determination on January 16, 2020 so long as seasonal clearing restrictions for trees are observed (Appendix G). Suitable roosting trees for Indiana bat and northern long-eared bat may not be removed during the following time frames without first completing bat surveys: November 15 to March 31 for Indiana bat and June 1 – July 31 for northern long-eared bat. Based on a review of the NEPA scoping document, the USEPA provided a number of comments relative to habitat and threatened and endangered species. However, since there is no longer any in-water work proposed as part of this project and full site access can now be gained from the top of the bank, all such risks have been avoided.

The ODNR recommended that impacts to mussels be avoided if any in-water work is planned in any stream that meets the criteria listed in the 2018 Ohio Mussel Survey Protocol. If they cannot be avoided, they further recommend that a professional mussel survey be conducted and the information provided to ODNR for further coordination. No in-water work is proposed as part of this project. Therefore, due to the project type and location, no impacts to freshwater mussel species are anticipated. Additionally, and because of a lack of suitable habitat, no impact to any of the other state-listed threatened or endangered species listed in Section 2.6 are expected as a result of this project.

6.1.5 Recreational, Scenic, and Aesthetic Resources

6.1.5.1 Recreation

No Action/Alternatives 1 and 2
There would be no effect to recreation in the area whether the project was implemented or not. Due to safety concerns with such a steep slope in the project area, public access to the streambank for recreational purposes is not permissible.

The ODNR Division of Parks and Watercraft recommended the following conditions be observed if the project will involve in-water work on the Grand River, a state scenic river (Appendix G):
The river should be kept open to boating traffic as much as feasible and safely passible during construction; 
If a closure is needed or the project area becomes unsafe during construction, a portage should be established for paddlers and marked for safe passage; 
Appropriate signage should be placed upstream and downstream; and 
The ODNR should be notified at least two weeks in advance of construction.

Since the project will not involve any in-water work prior to, during or after construction, there will be no impact to recreational watercraft on the Grand River.

6.1.5.2 Scenic and Aesthetic Resources

No Action
Long-term moderate adverse effects on aesthetics and visual resources may result from implementing the selection of the No Action Alternative. Continued erosion at the site would increase the unsightly appearance of the area and detract from the aesthetics, especially if it begins to impact the road and utilities at the top of the slope. Additionally, without further stabilization of the slope, the other retaining walls in the area may begin to fail decreasing the aesthetics in the area.

Alternatives 1 and 2
The Grand State Scenic River occurs within a one-mile radius of the project location. Additionally, bank erosion and slope failure are normal processes within a riparian corridor such as that of the Grand River. Accordingly, some could consider the existing bank and steep slope within the project location to be aesthetic in itself. Since the proposed project aims only to stabilize the top of the existing slope, the majority of the bank and slope will remain as it currently exists. Additionally, with the re-establishment of vegetation following construction, any visual obtrusiveness of the sheet pile wall (which will be mostly below ground) should be minimized. No in-water work is proposed as part of this project.

6.1.6 Cultural Resources

No Action
Taking no action to stabilize the slope would have no effect on any eligible or currently-listed sites for the National Register of Historic Properties. There are no sites listed or known to be currently eligible for listing on the National Register within the project area. The residential properties are located within the Bank Street Historic District, identified by the Lake County Historical Society. These properties are not identified on the National Register of Historic Properties. Pursuant to the City of Painesville Zoning Ordinance, all work being done in any of the designated Historic Preservation Districts are required to follow the regulations set forth in Chapter 1133, Historic Preservation District. USACE has coordinated with the City’s Planning Department to ensure compliance.
Alternatives 1 and 2
No historic properties are within the designated area of potential effect (APE) for this project. Therefore, the USACE has determined that no currently listed or potentially eligible properties will be affected by the proposed project. The Ohio Historic Preservation Office concurred with this determination in a letter dated May 14, 2019 (Appendix G).

6.1.7 Air Quality and Climate Change

6.1.7.1 Air Quality

No Action
No effects on air quality would result from selection of the No Action Plan.

Alternatives 1 and 2
Short-term minor adverse effects on air quality would be expected with the implementation of the recommended plan. These effects would be primarily from air emissions from heavy equipment (e.g., plate compactors, air compressors, cranes, loaders, and pile drivers) during project construction. The USEPA commented in a letter dated May 21, 2019 that diesel emissions were classified in 2002 as likely carcinogens and can lead to other health problems as well (Appendix G). They also made the following project recommendations:

- Require construction contractors to use best practices, as appropriate. This may include, but is not limited to, dust suppression measures, limiting idling times, and soliciting bids that require zero-emission technologies or advanced emission control systems.
- Prior to construction, consider requiring a construction traffic management plan to ensure that trucks and heavy machinery avoid areas where children congregate. This would also be used to route construction traffic away from schools, daycare facilities, and parks when possible, and use crossing guards when they cannot be avoided.

There are no schools, daycare facilities or parks nearby the project area the above recommendations will be considered during the projects final design phase. Due to the short duration of the project construction and the small project area, construction-related increases in emissions are not expected to exceed de minimis levels, the greenhouse gas threshold in the draft Counsel on Environmental Quality (CEQ) guidance, or contribute a violation of any federal, state or local air regulations.

6.1.7.2 Climate Change and Greenhouse Gases

No Action
The no action alternative will have no impacts to climate change since there would be no federal action.

Alternatives 1 and 2
The proposed alternatives are not expected to have any long term adverse impacts to climate change. Short-term emissions are expected during construction due to the operation of construction equipment as outlined in the previous section. The USEPA recommended that a discussion be included herein of the reasonably foreseeable effects that climate change might
have on the proposed project and project area. Most of the effects related to climate change that are believed possible to occur in the next 50 years are related to temperature and precipitation (e.g., higher average temperatures and more frequent, higher intensity rainfall events). It’s generally acknowledged, however, that this is difficult to predict in the Great Lakes region with various models offering widely varying predictions. Since the proposed project would occur at the top of a tall bluff and not involve any surface waters, there is no impact that climate change is anticipated to have on the project site post construction.

It is acknowledged, however, that more frequent and higher intensity rainfall events over time could result in more frequent bank full discharge events in the Grand River which could increase natural erosion rates along the riverbank. The USACE completed a cursory parametric analysis of peak stream flows in the Grand River near Painesville, Ohio between 1975 and 2015. This analysis showed maximum annual flows during this time ranging roughly between 5,000 cubic feet per second and 18,000 cubic feet per second, with the only outlier being an extreme flow of 35,000 cubic feet per second recorded in 2005-2006. This analysis indicated no statistically significant trend of increased peak annual flows during this time. Any risk of increased flows attributable to climate change affecting this project is further minimized by the bedrock composition of the lower slope which will increase the slope’s resistance to riverine erosion. Were this slope instead composed of any type of soil, sand or gravel, then this would present a much greater risk to the long-term stability of the proposed project.

6.2 Socio-Economic Impacts

6.2.1 Noise

No Action
The No Action Alternative would result in no effect on ambient noise levels.

Alternatives 1 and 2
The recommended plan would result in only short-term, minor effects on ambient noise levels from the operation of construction equipment. Generally, energy-equivalent noise levels at public works construction sites range from 75 to 89 dBA (A-weighted decibels). The single vehicle noise output of a heavy truck, similar to those that could be used to haul construction materials to the project site, ranges from 80 to 90 dBA (the peak noise level of a loud motorcycle at 20 feet is 110 dBA) (Canter, 1996).

For the purposes of this evaluation, adjacent land uses have been used to estimate noise levels and potential impact on ambient conditions at the project site. Since land uses in the vicinity of the site include residential and wooded areas, increased noise levels during project construction may be a concern. Sound intrusions generated during project construction would likely be masked by ambient traffic noise that normally occurs along the adjacent park roadways. Nevertheless, to minimize any project-induced impacts, the eventual construction contractor would be required to use methods and devices to control noise emitted by their equipment. Such considerations may also be included within the construction traffic management plan discussed in Section 6.1.7.1.

No long-term effects on ambient noise levels are expected because of the recommended plan.
6.2.2 Hazardous, Toxic Substances

No Action
No adverse environmental or health effects related to hazardous wastes or materials, toxic substances, or petroleum products are expected from the No Action Alternative. There is no evidence of recognized environmental conditions within the project area.

Alternatives 1 and 2
Short-term minor adverse effects related to petroleum products could occur from the implementation of the Recommended Plan. The use of construction equipment may result in minor spills of fuel, oil, lubricants, and solvents. The implementation of a Spill Prevention, Control, and Countermeasures Plan and best management practices would help prevent, control, and clean up any accidental release. No long-term effects concerning hazardous materials and petroleum products are expected. An Environmental Site Assessment was conducted for this site and there are no concerns with any potential contamination at the site (Appendix E).

6.2.3 Demographics, Land Use, Socioeconomic and Environmental Justice

6.2.3.1 Demographics, Associated Land Use and Developments, & Public Facilities and Services

No Action
There may be a mid- to long-term adverse impact to the demographics of the adjacent residential area if the No Action plan is selected. This may result from the continued failure of the slope which could further threaten Bank Street and the utilities in the vicinity. Such future impacts could affect property values, impede traffic patterns, and reduce the general attractiveness of the area for homes and businesses.

Alternatives 1 and 2
The proposed project at Bank Street would have no short-term impact on regional demographics. The assurance of slope stability over the long-term, however, would help to preserve the adjacent community in terms of property values and public safety. There may also be short-term adverse effects related to road closures along Bank Street during construction. This may result in the need to temporarily reroute emergency services and waste collection around the project area. However, this will lead to a long-term benefit due to the stabilization of the bank and reduced threats to the loss of Bank Street. Such considerations may also be included within the construction traffic management plan discussed in Section 6.1.7.1.

6.2.3.2 Water and Sewer Facilities

No Action
The continued bank failure would begin to threaten the utilities in the right-of-way of Bank Street, adjacent to the project area. Water, sanitary sewer, and storm sewer lines would all be effected if the bank failed into the right-of-way.
Alternatives 1 and 2
No water or sewer facilities or infrastructure will be effected during construction. No relocation of water or sewer lines are proposed in these alternatives.

6.2.3.3 Environmental Justice (EO 12898)

No Action
There would be no impact related to environmental justice associated with the No Action Alternative as there would be no federal action.

Alternatives 1 and 2
The proposed project would not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations. The data used to determine the potential for disproportionate effects to low income and/or minority populations within the vicinity of the site was accessed via the USEPA EJSCREEN web tool and based on 2010 U.S. Census Bureau tract data for percent of the population that are a minority, as well as, percent of the population that are below poverty within a one mile radius of the site (USEPA, 2019).

Percent minority and percent below poverty within the vicinity of the proposed project is 39 percent and 47 percent, respectively. Based on this information, it has been determined that the project area does reside within an Environmental Justice Community.

6.2.3.4 Protection of Children (EO 13045)

No Action
Adverse impacts to health and safety concerns for children (and for anyone) are a potential concern with the selection of the No Action Alternative. The continued failure of the slope could create safety concerns in the area of Bank Street on top of the slope.

Alternatives 1 and 2
The USEPA commented on May 21, 2019 by pointing out that Executive Order 13045 directs federal agencies to prioritize and assess environmental health and safety risks that may disproportionately affect children and to ensure that its policies, programs and activities address these risks. Because of the presence of nearby residences, there is a potential for children to be present in the project vicinity (Figure 1-4). Although the project is adjacent to a residential area (across the street), it is not a location designated for public access. None-the-less, precautions will be taken during construction to exercise care that no pedestrians (adults or children) are put at risk by construction activities. Such considerations will also be included within the construction traffic management plan discussed in Section 6.1.7.1.

6.2.4 Transportation

No Action
If no action is taken to prevent the slope from further failure, this will adversely impact transportation on Bank Street (Figure 1-3). This failure could lead to the closure of Bank Street and cut access to approximately 20 households.
Alternatives 1 and 2
Construction of the alternatives would occur using land based equipment. Equipment and materials would be transported to the site and staged in one lane on the river side of Bank Street. Bank Street would incur limited disruptions from the proposed construction activities due to the single lane closure during construction. Lane closures will be coordinated with the City of Painesville. Therefore, there would be minimal and temporary impacts to transportation and traffic during construction.

6.2.5 Health and Human Safety

No Action
If no action is taken to correct the on-going slope failure, the continued erosion of the slope could lead to the closure of Bank Street, encroachment on residential properties, and disruption of adjacent utilities. Closure of Bank Street could also lead to significant effects on residential properties due to likely delays to first responders for emergency calls on Bank Street.

Alternatives 1 and 2
All of the alternatives would improve safety at the site by stabilizing the streambank and slope thereby protecting Bank Street and adjacent infrastructure. There would likely be slight safety concerns at and near the project site during construction, especially due to lane closure and proximity to residences. This consideration should be included within the construction traffic management plan discussed in Section 6.1.7.1. Therefore, alternatives 1 and 2 are anticipated to have a long term beneficial impacts on health and safety of the project area.

6.3 Cumulative Effects

The Council on Environmental Quality (CEQ) defines cumulative impact as:

“The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). This analysis follows the 11-step process outlined by the CEQ in their 1997 publication Considering Cumulative Effects Under the National Environmental Policy Act (Table 6-1. CEQ 11-Step Process).
Table 6-1. CEQ 11-Step Process

<table>
<thead>
<tr>
<th>Environmental Impact Assessment Components</th>
<th>CEA Steps</th>
</tr>
</thead>
</table>
| I. Scoping                                | a. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.  
b. Establish the geographic scope for the analysis.  
c. Establish the time frame for the analysis.  
d. Identify other actions affecting the resources, ecosystems, and human communities of concern. |
| II. Describing the Affected Environment   | a. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses.  
b. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.  
c. Define a baseline condition for the resources, ecosystems, and human communities. |
| III. Determining the Environmental Consequences | a. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.  
b. Determine the magnitude and significance of the cumulative effects.  
c. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.  
d. Monitor the cumulative effects of the selected alternative and adapt management. |

Evaluations of cumulative impacts include consideration of the proposed action along with known past and present actions, as well as reasonably foreseeable future actions. In assessing cumulative effects, the key determinant of importance or significance is whether the incremental effect of the proposed action will alter the sustainability of resources when added to other present and reasonably foreseeable future actions. The overall cumulative impact of the proposed project is considered to be environmentally, socially, and economically beneficial for the City of Painesville and the Grand River watershed.

**Scoping**

1. Significant Cumulative Effects Issues

This assessment of cumulative impacts will focus on potential local impacts associated with the proposed project and any past, present or future non-USACE actions within the vicinity of the proposed project. A list of prior studies and reports completed by USACE and others is listed in Section 1.4 of this report. Coordination was completed with the non-federal project sponsor, the City of Painesville, and other stakeholders and interests relative to the existence of any significant cumulative effects issues for this project. No issues were identified. The prior reports outlined in Section 1.4 are only of past studies that have been completed for the same project area and nearby.
In general, cumulative impacts resulting from implementation of the preferred alternative are expected to be beneficial for the local watershed, transportation, protection of infrastructure, human health and safety, and for the regional ecosystem. The reduction of bank instability within the Grand River watershed may over time increase water quality and aquatic life uses. Implementation of the preferred alternative would decrease slope erosion.

There are other social, environmental, and economic benefits associated with the proposed project. Decreased erosion and slope failure along Bank Street will prevent the loss of water, sanitary sewer, and storm sewer pipes along the right-of-way of Bank Street. Additionally, the road will not be at risk of collapse.

2. Geographic Scope

This analysis will consider the impacts associated with the construction of emergency streambank protection near Bank Street. The project is located within the City of Painesville along the Grand River. This analysis will be relative to any cumulative impacts of this project and any related activities within the Grand River watershed.

3. Time Frame

This analysis considers known past, present and any reasonably foreseeable future actions by the USACE or others on a local scale in the project vicinity of a 50-year period of analysis.

4. Actions Affecting Resources of Concern

This analysis of cumulative effects of the proposed action will focus on the impacts resulting from the emergency bank stabilization along Bank Street. There are no other past or current projects or actions known to be occurring within the geographic scope of this analysis other than what is listed in Section 1.4 of the main report and summarized above. It should be acknowledged, however, that many factors unrelated to this project may affect resources within the project study area. These factors can be a result of natural events such as favorable or adverse weather conditions, including climate change and major storm systems that may influence precipitation, and run-off at the project location and within the Grand River watershed.

Affected Environment

5. Significant Resources

Only two comments were received during the NEPA scoping for this project, from the USEPA and ODNR. The other two comments within Appendix G of this report were the result of Section 7 Endangered Species Act consultation with the USFWS and the Ohio SHPO for compliance with the National Historic Preservation Act. To date there has not been any significant resource concerns expressed. In terms of existing natural and socio-economic resources within the study area, this information is presented in detail in Section 2 of this
DPR/EA. There are no significant effects anticipated for any of the resources listed in this section other than positive.

6. Resource Capacity to Withstand Stress and Regulatory Thresholds

Current stresses to existing resources relate primarily to the localized slope failure and its impact to the environmental and socio-economic factors discussed in Sections 2 and 6. Erosional and slope failure events deposit sediments and stone within the river channel which can eventually transport them downstream to Fairport Harbor and Lake Erie. This can result in greater regional impacts to the human and natural environment related to water quality. However, there are no known regulatory thresholds in regard to water quality that are noted to have been violated following past erosion events.

7. Baseline Conditions

Section 2 of the main report (Affected Environment) describes the status of significant resources that may be affected by this potential project.

Environmental Consequences & Mitigation

8. Cause and Effect Relationships

Cause and effect relationships associated with this proposed project are consistent with those that would be expected for this type of project. The primary direct cause of effects are a result of the actual construction of a structure to prevent erosion and slope failure within the project area. These relationships between the project and resources of concern are discussed in greater detail, where applicable, in Section 6 of the main report (Environmental Impacts).

9. Magnitude and Significance of Resource Impacts

The overall cumulative impact of the proposed project is considered to be environmentally, socially, and economically beneficial for the City of Painesville, the local vicinity, and water quality in the Grand River. There are no adverse cumulative impacts noted for this project. There are no other related or associated past projects in the direct project area other than those outlined in this analysis. There are social, environmental, and economic benefits associated with the proposed project.

10. Actions to Reduce Cumulative Impacts

Adverse cumulative effects were largely avoided or reduced through the avoidance and minimization that occurred during the screening of alternatives performed during the planning process (e.g., avoidance of in-stream impacts, avoidance of site access from opposite side of the Grand River). See Section 3.4 of this report for greater details on this screening process and criteria. The primary cumulative impact remains an overall decrease in localized erosion and bank failure within the Grand River watershed.
11. Monitoring of Cumulative Impacts

Since there is little uncertainty with the conclusion that there are no expected adverse cumulative effects associated with this project, a specific monitoring plan for cumulative effects is not required at this time. However, an adaptive management approach will be taken during the Design and Construction Phases of the project if any unanticipated cumulative effects concerns become evident. This could also be a component to the eventual Operations Manual once the project is turned over to the non-federal project sponsor.
7 MITIGATION OF ADVERSE EFFECTS

The Recommended Plan is expected to have no significant adverse effects to terrestrial resources, aquatic resources, and the human environment. Therefore, no compensatory mitigation is required.
8 IMPLEMENTATION REQUIREMENTS

8.1 Project Partnership Agreement (PPA)

The first $100,000 of the feasibility phase for a Section 14 project is funded at full federal expense and the balance ($500,000) is cost shared 50/50 with a non-federal sponsor. A Federal Cost Share Agreement (FCSA) was executed in June 2018 to fund the $500,000 feasibility study and the city has been meeting their obligation.

The relevant USACE policy requires the sponsor to perform or ensure performance of investigations to identify the existence and extent of any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulated substances. This policy also stipulates that Civil Works funds are not to be spent on response to the presence of CERCLA-regulated substances within the lands, easements, and rights-of-ways required for the project. Any costs of investigations to identify the potential for CERCLA-regulated substances and to configure the project to avoid areas impacted by CERCLA-regulated substances are included in the Total Project Cost and are shared between the non-federal sponsor and the USACE. However, if hazardous substances regulated under CERCLA are found to exist in, on, or under any lands, easements, or rights-of-way that USACE has determined are required for project, any cleanup or response costs must be borne 100 percent by the non-federal sponsor. Such costs, including any studies and investigations necessary to determine an appropriate response to the contamination, may not be shared with the federal government and are not included in the Total Project Cost.

Initially, the city provided a Letter of Intent (LOI) in May 2016 requesting federal assistance under the Section 14 authority. Prior to submittal of the Federal Interest Determination Report, the non-federal sponsor submitted a new LOI in September 2017 reaffirming their interest in the project. The USACE and the city will need to enter into a PPA. This PPA would define federal and non-federal responsibilities for implementing, operating and maintaining the project. The USACE is scheduled to start development of the PPA in August 2020 following approval of this DPR/EA. The PPA is currently scheduled to be executed in March 2021. Following execution of the PPA, all efforts related to design and implementation will be cost shared 65 percent federal and 35 percent non-federal.

The schedule for project implementation assumes receipt of construction funding in fiscal years 2021/2022. Funding availability will be based on national priorities, magnitude of the federal commitment, economic and environmental feasibility, level of local support, willingness of the non-federal sponsor to fund its share of the project cost and budget constraints that may exist at the time of funding.

The USACE would officially request the sponsor to acquire any necessary real estate immediately after signing of the PPA. Advertisement of the construction contract would follow certification of the real estate. Final acceptance and transfer of the project to the non-federal sponsor would follow delivery of an O&M manual and as-built drawings. The estimated schedule for project implementation is shown in Table 8-1 below.
Table 8-1. Implementation Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasibility Study</td>
<td></td>
</tr>
<tr>
<td>Complete Feasibility Study (Signed FONSI)</td>
<td>MAR 2021</td>
</tr>
<tr>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>PPA Signed</td>
<td>MAR 2021</td>
</tr>
<tr>
<td>Plans and Specifications Complete</td>
<td>AUG 2021</td>
</tr>
<tr>
<td>Approval of New Construction Start</td>
<td>OCT 2021</td>
</tr>
<tr>
<td>Real Estate Acquisitions Completed</td>
<td>N/A</td>
</tr>
<tr>
<td>Advertise Construction Contract</td>
<td>NOV 2021</td>
</tr>
<tr>
<td>Completion of Construction</td>
<td>DEC 2022 (est.)</td>
</tr>
</tbody>
</table>

It is anticipated that this project will require its own PPA for Design and Implementation. This PPA will be required from the city (non-federal sponsor), under which the sponsor will need to agree with the following stipulations:

1. Provide 35 percent of the separable project costs allocated to environmental restoration as further specified below:
   a) Provide the non-federal share of all complete planning and design work upon execution of the PPA.
   b) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or ensure the performance of all relocations determined by the government to be necessary for the construction and O&M of the project
   c) Provide or pay to the government the cost of providing all features required for the construction and O&M of the project
   d) Provide, during construction, any additional costs as necessary to make its total contribution equal to 35 percent of the separable project costs allocated to environmental restoration.

2. Contribute all project costs in excess of the federal statutory limitation of $5,000,000

3. Hold and save the United States free from damages due to construction of or subsequent maintenance of the project except those damages due to the fault or negligence of the United States or its contractors

4. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs

5. Perform or cause to be performed such investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S. Code 9601 through 9675, that may exist in, on, or under lands, easements, or rights-of-way necessary for the construction, and O&M of the project, except that the non-federal sponsor shall not perform investigations of lands,
easements, or rights-of-way that the government determines to be subject to navigation servitude without prior written direction by the government

6. Assume complete financial responsibility for all necessary cleanup and response costs for CERCLA-regulated material located in, on, or under lands, easements, or rights-of-way that the government determines necessary for the construction and O&M of the project

7. To the maximum extent practicable, conduct OMRR&R of the project in a manner that will not cause liability to arise under CERCLA

8. Prevent future encroachment or modifications that might interfere with proper functioning of the project


10. Comply with all applicable federal and state laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964, P.L. 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 CFR, Part 300, as well as Army Regulation 600-7 entitled “Non-Discrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army”

11. Do not use federal funds to meet the non-federal sponsor’s share of total project costs unless the federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute

No local betterments will be included as part of the recommended plan.

8.2 Real Estate

A USACE real estate evaluation, including any necessary land acquisition, must be conducted for the project in accordance with ER 405-1-12. A Real Estate Plan (REP) has been prepared for the project in Appendix B. The REP includes estimated land values and costs associated with the acquisition of lands, easements, and rights-of-way, relocations and disposal areas (LERRDs) required for construction and operation and maintenance of the Recommended Plan. It also identifies any facility/utility relocations necessary to implement the project.

8.2.1 Real Lands, Easements, Rights-Of-Way, Relocations and Disposal Areas

The City of Painesville owns the properties involved in the construction of the project. Parcel 1 is the 325 LF streambank property and Parcel 2 is a right-of-way area on Bank Street and on either end of Parcel 1 that will be a Temporary Work Area Easement. In the City’s LOI, the City acknowledged its’ requirements to provide the real estate required to construct and maintain the project. The land (streambank protection) required for the project is approximately 0.75 acres total. In addition, 0.61 acres of Temporary Work Area Easement is on a portion of Bank Street
and at each end of Parcel 1 is needed. Access for construction will be across the temporary work area easement via Bank Street. See Figure 8-1 below for the Real Estate Plan Map.

![Real Estate Plan Map](image)

**Figure 8-1. Real Estate Plan Map. (USACE Staff, 2019)**

Under Section 14 authority, it is the responsibility of the local sponsor to maintain the project after construction. Estimated average annual operation and maintenance, repair, replacement and rehabilitation (OMRR&R) costs for Alternative 1 for the Grand River/Bank Street project is approximately $5,000. In the LOI, the City indicated that it is aware of these requirements and that they are willing and capable of meeting them.

The recommended plan (Alternative 1) consists of an Anchored Steel Sheet Pile Wall. The project site should be monitored for erosion of soil areas in front of the wall so necessary corrective action such as mulching/seeding can be undertaken as needed. Maintenance of the retaining wall is not expected.

**8.3 Monitoring and Adaptive Management**

Not Applicable for Section 14 projects.

**8.4 Operation, Maintenance, Repair, Replacement and Rehabilitation**

The non-federal sponsor has operation and maintenance responsibilities and will receive an OMRR&R Manual from USACE required to assure the continued functionality of the recommended treatment. These responsibilities will include inspecting the project and correcting
adverse conditions, such as preventing vandalism. As indicated previously in this report, annual maintenance is the City’s responsibility. Maintenance would be limited to clearing brush/woody vegetation from around the wall, checking and replacing any riprap or surface water control materials that become displaced, and making sure that graded areas receiving topsoil, erosion control matting and seeding are maintained to establish and maintain adequate vegetative cover. As indicated in Table 5-1, this would be estimated to cost the City an estimated $5,000 per year. All operation and maintenance responsibilities will be given to the city in perpetuity after completion of construction.
9 COMPLIANCE WITH ENVIRONMENTAL PROTECTION STATUTES AND EXECUTIVE ORDERS

The following is a list of the applicable, relevant, and appropriate federal statutes, executive orders and memorandum that were considered for the proposed project, and a description of the project’s compliance with each.


The project’s potential for impacting cultural resources has been evaluated in accordance with Engineer Regulation (ER) 1105-2-50 and 36 CFR 800. There are no known historic properties or cultural resources within the project’s area of potential effect. The USACE has consulted with the Ohio SHPO. In a letter dated May 14, 2019, the Ohio SHPO concurred with the USACE “no effect” determination and no further coordination is required.

9.2 Clean Air Act, as Amended (42 USC 7401 – 7671g)

Project coordination was initiated with the USEPA through the public scoping process (Appendix D). Comments were received from the USEPA on May 21, 2019 (Appendix G). The USEPA recommended adherence to construction best-practices (e.g. clean diesel technology) to cut down on localized air quality issues. Lake County is designated as a nonattainment area for 8-hour ozone and 1-hour sulphur dioxide. As indicated in this EA, no significant adverse impacts to air quality would be expected due to project implementation due to the short duration of construction and adherence to best-practices. Review copies of this EA have been sent to the Regional Administrator of the USEPA providing the opportunity for further comment relative to the Clean Air Act.

9.3 Clean Water Act, as Amended (33 USC 1251 et seq.)

No in-water work is proposed as part of this project. The eventual construction contractor will be required to adhere to proper storm water erosion and control requirements administered by the state (e.g., Section 402 of this act). Therefore, the project will be in full compliance with this Act.

9.4 Coastal Zone Management Act of 1972, as Amended (16 USC 1451 – 1464)

The project location does not fall with the Coastal Zone Management area.

9.5 Endangered Species Act of 1973, as Amended (16 USC 1531 et seq.)

Consultation with the USFWS relative to the possible presence of threatened or endangered species or their critical habitats within the affected area was initiated on April 30, 2019. The USFWS Information for Planning and Consultation (IPaC) review indicated that there are six federally listed threatened or endangered species whose range occurs near the project area. In a letter dated January 16, 2019, the USFWS concurred with the USACE “no effect” determination on the species, as long as the eventual contractor adheres to the seasonal tree clearing environmental windows (Appendix G).
9.6 National Environmental Policy Act (42 USC 4321 – 4347)
Project coordination was initiated with agencies and interests via the scoping process on April 30, 2019. This draft EA and FONSI have been prepared in accordance with the Council on Environmental Quality's "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act," 40 CFR 1500-1506; and USACE Regulation ER 200-2-2, "Environmental Quality: Policy and Procedures for Implementing NEPA.” With the circulation of this draft EA and FONSI, the proposed project is in partial compliance with the Act. Full compliance will be attained once the public review period has been concluded, no significant adverse impacts are identified, and the FONSI is signed.

9.7 Fish and Wildlife Coordination Act (16 USC 661 et seq.)
Not applicable to the proposed project due to the emergency nature of the project authority. However, coordination was still completed with the USFWS per the NEPA scoping document. The only comments received from this office was in January 2020 with respect to the USACE effects determination on threatened and endangered species (Section 9.5).

9.8 Wild and Scenic Rivers Act (16 USC 1271, et seq.)
Not applicable to the proposed project due to this portion of the Grand River not being designated as a Wild or Scenic River. Additionally, there is no in-water work associated with the recommended plan.

9.9 Federal Water Project Recreation Act; and Land and Water Conservation Act (16 USC 460l-12 – 4601-22, 662)
In planning the proposed project, full consideration has been given to these statutes. The project location does not currently offer any public recreation or land conservation services. This will also be true for the with-project condition. Accordingly, the proposed project will not fall within the scope of these statutes. Review copies of this EA have been provided to the U.S. Department of the Interior in regard to recreation, and fish and wildlife activities for conformance with the comprehensive nationwide outdoor recreation plan formulated by the Secretary of the Interior.

9.10 Watershed Protection and Flood Prevention Act
Based on evaluation of the project, no significant adverse impacts to watershed protection or flood prevention are expected. The project site is outside of the Grand River floodplain and will, over the long term, reduce the amount of sedimentation into the river resulting from bank erosion.

9.11 Executive Order 11990, Protection of Wetlands, May 24, 1977
There are no wetlands within the project area and this project is therefore in compliance with this Executive Order.

9.12 Executive Order 11988, Flood Plain Management, May 24, 1977
No work from the proposed project is occurring within the 100-year floodplain. Therefore, this project is therefore in compliance with this Executive Order.
9.13 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994; Executive Order 12948, Amendment to Executive Order 12898, January, 30, 1995
The proposed project would not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations.

9.14 Analysis of Impacts on Prime and Unique Farmlands, CEQ Memorandum, 30 August 1976
Since the proposed project would not affect prime or unique farmlands in any manner, the recommended action is in compliance with this memorandum.
10 PUBLIC INVOLVEMENT

In order to characterize the affected environment and to assess the environmental impacts of the proposed action, information has been obtained from existing literature and through coordination with federal, state, and local agencies and tribes per the list below. A NEPA scoping document was distributed to these individuals on April 30, 2019. Comments were received from the USEPA, USFWS, Ohio SHPO and Ohio DNR (Appendix G).

Federal:

Federal Emergency Management Agency
U.S. Coast Guard
U.S. Department of Agriculture:
    Farm Service Agency
    Forest Service
    Natural Resource Conservation Service
    Wildlife Services
U.S. Department of Commerce:
    National Oceanic and Atmospheric Administration
U.S. Department of Energy
U.S. Department of Health and Human Services
U.S. Department of Homeland Security
    United States Coast Guard
U.S. Department of Housing and Urban Development
U.S. Department of the Interior:
    Fish and Wildlife Service
    National Park Service
    Office of Environmental Project Review
U.S. Department of State
U.S. Department of Transportation:
    Federal Highway Administration
    Federal Railroad Administration
U.S. Environmental Protection Agency

State:

Ohio Environmental Protection Agency
Ohio Department of Health
Ohio Department of Natural Resources
Ohio Lake Erie Commission
Ohio Sea Grant
Ohio State Farm Service Agency Office
Ohio State Historic Preservation Office
Local:

City of Painesville
Grand River Water Committee
Lake County
Lake County Board of Commissioners
Lake County Engineer
Lake County General Health District
Lake County Historical Society
Lake County Soil and Water Conservation District
Office of Lake County Planning & Community Development
Painesville Township Offices

Individuals/Organizations:

League of Ohio Sportsmen
NE Ohio Areawide Coordinating Agency
NE Ohio Four Co. Regional Planning and Development Organization
Ducks Unlimited
Sierra Club
The News Herald
Trout Unlimited

Indian Nations:

Miami Tribe of Oklahoma
Seneca Nation of Indians, Cattaraugus Territory
Seneca-Cayuga Tribe of Oklahoma
Tonawanda Seneca Nation
Delaware Tribe of Indians
Delaware Nation
11 RECOMMENDATION

I have considered all significant aspects of the problems and opportunities as they relate to the construction of the Grand River-Bank Street Section 14 Emergency Streambank and Shoreline Erosion Protection Project. Those aspects include environmental, social and economic effects, as well as engineering feasibility.

I recommend the following plan:

The recommended plan (i.e., Alternative 1- Anchored Steel Sheet Pile Wall) would have an investment cost of approximately $3,788,000 (October 2019 price level). The project would result in a benefit to cost ratio of 1.28 to one and provide average annual net benefits in the amount of $176,000.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch.

A PPA will be required from the non-federal sponsor, under which the sponsor will agree to:

1. Provide 35 percent of the separable project costs allocated to flood risk management, and all betterments as defined in the PPA and further specified below:
   a) Provide the non-federal share of all complete planning and design work upon execution of the PPA,
   b) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or ensure the performance of all relocations determined by the government to be necessary for the construction and O&M of the project,
   c) Provide or pay to the government the cost of providing all features required for the construction and O&M of the project,
   d) Provide, during construction, any additional costs as necessary to make its total contribution equal to 35 percent of the separable project costs allocated to environmental restoration, and
   e) Provide any incremental costs above the implementation costs of the NED plan.

2. Contribute all project costs in excess of the federal statutory limitation of $5,000,000.

3. For so long as the project remains authorized, assume responsibility for OMRR&R of the completed project or the functional portion of the project at no cost to the government and in
accordance with applicable federal and state laws and any specific directions prescribed by the government in the OMRR&R manual and any subsequent amendments thereto.

4. Give the government a right to enter, at reasonable times and in a reasonable manner, upon land that the local sponsor owns or controls for access to the project for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project.

5. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the WRDA of 1986, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resource project or separable element thereof until the non-federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.

6. Hold and save the United States free from damages due to construction, or subsequent maintenance, of the project except those damages due to the fault or negligence of the United States or its contractors.

7. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs.

8. Perform or cause to be performed such investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S. Code 9601 through 9675, that may exist in, on, or under lands, easements, or rights-of-way necessary for the construction, and O&M of the project, except that the non-federal sponsor shall not perform investigations of lands, easements, or rights-of-way that the government determines to be subject to navigation servitude without prior written direction by the government.

9. Assume complete financial responsibility for all necessary cleanup and response costs for CERCLA-regulated material located in, on, or under lands, easements, or rights-of-way that the government determines necessary for the construction and O&M of the project.

10. To the maximum extent practicable, conduct OMRR&R of the project in a manner that will not cause liability to arise under CERCLA.

11. Prevent future encroachment or modifications that might interfere with proper functioning of the project.

inform all affected persons of applicable benefits, policies, and procedures in connection with said acts.

13. Comply with all applicable federal and state laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964, P.L. 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 CFR, Part 300, as well as Army Regulation 600-7 entitled “Non-Discrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army.”

14. Provide 35 percent of that portion of any total cultural resource preservation, mitigation, and data recovery costs attributable to environmental restoration that are in excess of one percent of the total amount authorized to be appropriated for environmental restoration.

15. Do not use federal funds to meet the non-federal sponsor’s share of total project costs unless the federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

ELI S. ADAMS
LTC EN
District Commander
12 REFERENCES


Ohio Department of Natural Resources (ODNR). 1980. Glacial Geology of Lake County, Ohio.


USACE. 1977. Section 14 Reconnaissance Report for the Grand River along Bank Street in Painesville, Ohio (USACE, August 1977) \coe-lrbnv002buf.lrb.ds.usace.army.mil\ds1\LIBRARY\Index\Painesville index.htm


The following acronyms are used in this DPR/EA:

AAC – Average Annual Costs
AAHU – Average Annual Habitat Unit
AAIC – Average Annual Investment Cost
AAO&M – Average Annual Operations and Maintenance
AAR – After Action Review
AOC – Area of Concern
APE – area of potential effects
ASTM – American Society for Testing Materials
BCR – Benefit Cost Ratio
BMP – Best Management Practice
Bpf – Blows per Foot
CAP – Continuing Authorities Program
CASE – Computer-Aided Structural Engineering
CE-ICA – Cost Effectiveness-Incremental Cost Analysis
CERCLA – Comprehensive Environmental Response Compensation Liability Act
CEQ – Council on Environmental Quality
CFR – Code of Federal Regulations
CO₂ – Carbon dioxide
CSO – Combined Sewer Overflow
CSRA – Cost Schedule Risk Analysis
CY – Cubic Yard
DELT - deformities, eroded fins, lesions, and tumors
DPR – Detailed Project Report
DPR/EA – Detailed Project Report/Environmental Assessment
EA – Environmental Assessment
E&D – Engineering and Design
ER – Engineer Regulation
EO – Executive Order
ERP – Environmental Restoration Program
EV – emergent vegetation
FCD – Federal Consistency Determination
FCSA – Federal Cost Share Agreement
FEMA – Federal Emergency Management Agency
FID – Federal Interest Determination
FMP – Fill Management Practices
FONSI – Finding of No Significant Impact
FQAI – Floristic Quality Assessment Index
FWCAR – Fish and Wildlife Coordination Act Report
FY – Fiscal Year
GHG – Greenhouse gas
HTRW – Hazardous, Toxic or Radioactive Waste
HUC – Hydrologic Unit Code
IDC – Interest During Construction
IJC – International Joint Commission
IPCC – Intergovernmental Panel on Climate Change
IWR – Institute for Water Resources
LERRDs - Lands, Easements, Relocations and Rights of Ways
LF – Linear feet
LOI – Letter of Intent
LRB – Buffalo District, U.S. Army Corps of Engineers
LWD – Low Water Datum
MGD – million gallons per day
MSE – Mechanized Stabilized Earth
NAA – No Action Alternative
NAAQS – National Ambient Air Quality Standards
NED – National Economic Development
NEPA – National Environmental Policy Act
NER – National Ecosystem Restoration
NLCD – National Land Cover Dataset
NPL – National Priorities List
NRCS – National Resources Conservation Service
NRI – Nationwide Rivers Inventory
NYSDEC – New York State Department of Environmental Conservation
NYSDOS – New York State Department of State
NYSHPO – New York State Historic Preservation Office
NWI – National Wetlands Inventory
O&M – Operations and Maintenance
OEPA – Ohio Environmental Protection Agency
ODNR - Ohio Department of Natural Resources
OSHPO - Ohio State Historic Preservation Office
OMRR&R – Operation, Maintenance, Repair, Rehabilitation, and Replacement
ORC – Ohio Revised Code
OSHA - Occupational Safety and Health Administration
P&G – Principles and Guidelines
PAH - polycyclic aromatic hydrocarbons
PCB – polychlorinated biphenyls
PDT – Project Delivery Team
PED – Planning, Engineering and Design
P.L. – Public Law
PPA – Project Partnership Agreement
PWI – Project Work Item
QHEI – Qualitative Habitat Evaluation Index
RAC – Remedial Advisory Committee
RAP – Remedial Action Plan
REC – Recognizable Environmental Concerns
RSM – Regional Sediment Management
SAV – Submergent Aquatic Vegetation
S&A – Supervision and Administration
SHPO – State Historic Preservation Office
SPT – Standard Penetration Test
TMACOG - Toledo Metropolitan Area Council of Governments
TSP – Tentatively Selected Plan
TTL – TTL Associates
USACE – U.S. Army Corps of Engineers
USCS – United Soil Classification System
USDA – U.S. Department of Agriculture
USEPA – U.S. Environmental Protection Agency
USFWS – U.S. Fish and Wildlife Service
WHO – World Health Organization