US Army Corps of Engineers
Kansas City District

U.S. Army Corps of Engineers - Kansas City District,
and
Missouri Department of Transportation

Environmental Assessment,
Finding of No Significant Impact,
&
Clean Water Act Section 404 (b)(1) Evaluation

Route MM
Section 14 Emergency Streambank Stabilization Project
Locust Creek, Linn County, Missouri

August 2016

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DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
600 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-2896

Finding of No Significant Impact

Route MM
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Summary

The U.S. Army Corps of Engineers - Kansas City District (USACE), in cooperation with the Missouri Department of Transportation (MoDOT), Northwest District, propose an emergency streambank stabilization project under the authority of Section 14 of the Flood Control Act of 1946 (Public Law 79-526), as amended. The purpose of the project is to address severely eroding banks along Locust Creek near the MoDOT Route MM Bridge west of Browning in Linn County, Missouri. Increased streambank erosion and loss of material near the roadway embankment and bridge threatens the stability of the Route MM Bridge. The left descending bank upstream of the bridge is experiencing erosion because of a migrating bend in Locust Creek. There is no vegetation on the slope and stream bank sloughing is occurring. The current rate of erosion for the banks is estimated to be five to 10 feet per year and with approximately 37 feet between the roadway and the top of the stream bank. Failure of the road is estimated to occur within three to four years with continued erosion continuing to lower the stability of the roadway and bridge. Future high flow events can be expected to accelerate the erosion process even further. Construction for the project is expected to begin in the fall of 2016.

Alternatives

A No - Action alternative and four build alternatives were assessed for individual and cumulative effects. Solely using biostabilization techniques to stabilize the streambanks was determined not to be a feasible option at this site because it would have a high probability of failure.

Alternative 1 – No - Action Alternative: A No - Action alternative is required by the President's Council on Environmental Quality (CEQ) regulations and is to function as

the baseline against with potential impacts will be evaluated. This alternative would result in eventual damage to the Route MM Bridge and require its complete replacement. This would require a traffic detour of approximately 18 miles to use the Route MM Bridge, causing substantial increases in travel times, while a new bridge was constructed. Replacing the bridge would also require bank stabilization. This alternative would be far more expensive, and have greater negative environmental impacts as a result of increasing the size of the project footprint compared to stabilizing the banks at this time to protect the existing bridge.

Alternative 2 – Longitudinal Peak Stone Toe Protection (LPSTP) with Full Slope Revetment (Recommended Plan): The Recommended Plan would consist of LPSTP with tiebacks on the left descending bank in addition to a full slope revetment on the left bridge abutment. The alignment of the LPSTP is set to relocate the left descending bank into alignment with the existing bridge piers. The LPSTP protects the toe of the slope and allows the upper banks to continue to erode until it stabilizes and vegetation is established. The tiebacks prevent erosion from occurring between the LPSTP and the bank and encourage sediment deposition. The revetment at the bridge abutment would provide additional protection during high flow events.

Alternative 3 – Bendway Weirs: This alternative would consist of five bendway weirs on the left descending bank upstream of the bridge with full slope revetment on the left abutment. These weirs would realign the creek flow between the two central bridge piers and stabilize the upstream left descending bank by directing water towards the center of the bridge. The design would also encourage material deposition to stabilize the left descending bank. The revetment at the left bridge abutments would provide additional protection during high flow events. The full slope revetment would be identical to that described in the recommended plan.

Alternative 4 – LPSTP with Bendway Weirs: This alternative would consist of a LPSTP with five bendway weirs on the left descending bank along with stone slope revetment on the left abutment. Although bendway weirs and LPSTP work well alone protecting banks, it has been found that combining the two methods provide added benefits, because bendway weirs deposit sediments on the outside of the bend when LPSTP is in place. Also, these deposits would be landward of the LPSTP and suitable for establishment of vegetation. The full slope revetment would be identical to that described in the recommended plan and alternative 3.

Alternative 5 – Stone Dikes with Full Slope Revetment: This alternative would consist of four stone dikes with toe reinforcement on the left descending bank upstream of the bridge with full slope revetment on the left abutment. The dikes are angled and spaced to reduce the left descending bank exposure to erosive velocities and flow without increasing the velocities and the bridge. They are designed to protect the lower half of the bank and to move the channel flow to its historic location between the center bridge piers. The full slope revetment would be identical to that described in the Recommended Plan, alternative 3, and alternative 4.

Alternatives Evaluation

The five alternatives were evaluated as they relate to bank stability, channel stability, maintenance, and damage potential. Evaluation results were determined from engineering data compiled for the Route MM Bridge Section 14 Emergency Streambank Stabilization Project Feasibility Report. All structural alternatives were determined technically feasible. Additionally, project alternatives were also evaluated with regard to potential natural, cultural, and economic impacts, which are discussed in the Environmental Assessment (EA). Based on these evaluations, Alternative 2 has been determined as the Recommended Plan.

Summary of Environmental Impacts

The Recommended Plan would have no impacts to federally listed threatened or endangered species, or to their designated critical habitat; and would not have negative impacts to sites listed, or eligible for inclusion, on the National Register of Historic Places. The Recommended Plan would result in short-term minor construction related impacts to water quality, fish and wildlife resources, and land use resulting from construction activities and physical disturbance of the creek channel. The majority of the disturbed vegetation would consist of grasses, herbaceous vegetation, and tree saplings with less than a four inch diameter at breast height. Following construction, approximately one acre of disturbed land would be seeded with native grasses, milkweeds, other forbs, and trees. The Recommended Plan would best meet the purpose and need of the project by providing protection to the Route MM Bridge and roadway. It would not result in any significant, long-term adverse impacts to the human environment.

Mitigation Measures

The Recommended Plan would not result in any significant adverse impacts to the human environment. To minimize impacts to migratory birds, the clearing of approximately one acre of mixed shrub and treed habitat would be scheduled during fall/winter 2016; a time of the year when most migratory birds are not present. Also, removing these trees during the winter would serve as to prevent negative impacts to Indiana bat and northern long-eared bat, species that are listed as threatened and endangered under the Endangered Species Act. Best management practices would be implemented during project construction. Once the project is completed, disturbed areas would be seeded with native grasses, milkweed, and forbs to prevent erosion and establishment of invasive species. No additional efforts to avoid, minimize, or mitigate for project impacts are proposed.

Using the Missouri Stream Mitigation Method (MSMM), the overall effect of the Recommended Plan on the aquatic environment would be beneficial as a result of reducing severe erosion along the streambank. The MSMM is used within Missouri to assess the impacts (debits) and benefits (credits) of projects as part of Clean Water Act Section 404 authorizations. Using the MSMM, 1,494.5 debits would be generated as a

result of placing riprap along the streambanks of Locust Creek. A total of 2,165.5 credits would be generated by providing stability to 610 linear feet of streambank along Locust Creek. Therefore, no additional mitigation measures are proposed.

Public Availability

Prior to a decision on whether to prepare an Environmental Impact Statement (EIS), USACE will circulate a Public Notice (Notice) for the Draft EA and Finding of No Significant Impact (FONSI), with a thirty-day comment period, to the public and resource agencies. The Notice will be e-mailed to individuals/agencies/businesses listed on the USACE Regulatory e-mail distribution list. The Notice will state that the Draft EA and FONSI will be available on the USACE webpage and that hard copies are available upon request. USACE document all comments received.

Conclusion

After evaluating the anticipated environmental, economic, and social effects of the proposed activity, it is my determination that the proposed Route MM Section 14 Emergency Streambank Stabilization Project does not constitute a major federal action that would significantly affect the quality of the human environment; therefore, preparation of an EIS is not required.

Date: _____ _____

Douglas B. Guttormsen
Colonel, Corps of Engineers
District Commander

TABLE OF CONTENTS

1.0 Introduction **1**
1.1 Purpose and Need for Action 2
1.2 Project Location 2
2.0 Recommended Plan and Alternatives **2**
3.0 Affected Environment **6**
3.1 Aquatic Resources 5
3.2 Wetlands 7
3.3 Terrestrial Habitat 7
3.4 Fish and Wildlife 7
3.5 Threatened or Endangered Species 7
3.6 Invasive Species 8
3.7 Floodplain 8
3.8 Land Use 8
3.9 Socioeconomics 8
3.10 Cultural Resources 9
4.0 Environmental Consequences (Impacts) **9**
4.1 Aquatic Resources 9
4.2 Wetlands 11
4.3 Terrestrial Habitat 11
4.4 Fish and Wildlife 12
4.5 Threatened or Endangered Species 13
4.6 Invasive Species 14
4.7 Floodplain 15
4.8 Land Use 15
4.9 Socioeconomics 16
4.10 Cultural Resources 17
5.0 Cumulative Impacts **17**
6.0 Mitigation Measures **18**
7.0 Conclusion **19**
8.0 Coordination and Comments **19**
9.0 Agency Compliance with Other Environmental Laws **20**
10.0 References **21**
11.0 List of Preparers **21**
12.0 Appendices **21**
Appendix I - Project Drawings
Appendix II - U.S. Fish and Wildlife Service Coordination
Appendix III - Missouri State Historic Preservation Office Coordination
Appendix IV- Public Notice and Clean Water Act Section 404 (b)(1) Evaluation
Appendix V - Missouri Stream Mitigation Method Worksheets
Appendix VI - Clean Water Act Section 401 Permit
Appendix VII - Public Comments

1.0 Introduction

The U.S. Army Corps of Engineers - Kansas City District (USACE), in cooperation with the Missouri Department of Transportation (MoDOT), Northwest District, propose an emergency streambank stabilization project under the authority of Section 14 of the Flood Control Act of 1946 (Public Law 79-526), as amended. The purpose of the project is to address the severely eroding banks along Locust Creek that are encroaching on the left descending bank bridge abutment and threatening to lead to its eventual failure (Appendix I - Figure 1). Bank identification is determined by their location when looking downstream. The left descending bank upstream of the bridge is experiencing erosion because of the migrating bend in Locust Creek. There is no vegetation on the slope and stream bank sloughing is occurring. The channel of Locust Creek has migrated toward the left descending bank directing the river flow away from the center of the bridge. A series of high flow events is likely to erode the banks further and put the bridge and roadway embankment in a state of immediate risk. The Route MM Bridge is located just west of Browning, in Linn County, Missouri.

Section 14 of the 1946 Flood Control Act (Public Law 79-526), as amended, provides authority for the USACE to plan and construct emergency streambank and shoreline protection projects to protect endangered highways, highway bridge approaches, public facilities such as water and sewer lines, churches, public and private nonprofit schools and hospitals, and other nonprofit public facilities. A Section 14 project may include new streambank or shoreline protection works, or may repair, restore, or modify existing works.

The Route MM Bridge is an approximately 305-foot long structure over Locust Creek with a two lane roadway. Construction of the bridge was completed in 1968. The bridge was originally constructed so the river channel was generally centered under the bridge between Piers 2 and 3. Migration of the river channel has moved the channel approximately 50 ft towards the left descending bank and bridge abutment. Recent MoDot inspections classify the bridge as serviceable, receiving a deck rating of a 6, superstructure rating of a 7, substructure rating of an 8, and a scour rating of an 8. Ratings of 7-9 are excellent, 4-6 are considered acceptable, 3 is considered marginal, and 1-2 are unserviceable. MoDOT has no plans for replacing the bridge in the foreseeable future. With streambank stabilization and normal maintenance the bridge structure would allow for 20 or more years of continued service. The bridge runs through Browning, MO and connects Highway 5 with Highway 139 serving approximately 346 cars daily. The bridge meets all foreseeable traffic needs, and is anticipated to have a remaining lifespan greater than the expected service life of the Section 14 project.

Aerial photographs of the bridge from 1997, 2010, and 2012 were compared and illustrate how much the river has meandered upstream of the bridge (Appendix I - Figure 2). The area of concern is on the left descending bank both north and south of

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Route MM Bridge. These photos show a high water event in 2010 and how the stream has meandered since 1997.

This Environmental Assessment (EA) provides the necessary information to properly and fully assess the information that was developed during the public review of the proposed Route MM Bridge Emergency Streambank Stabilization Project as required under the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S. Code [USC] 4321 et seq.); the CEQ Regulations (40 Code of Federal Regulations [CFR] 1500 – 1508)(CEQ 1992); USACE ER 200-2-2 (33 CFR 230) (USACE, 2008). The proposed action would require individual Section 404 authorization under the Clean Water Act (CWA). Furthermore, an individual Section 401 Water Quality Certification would need to be obtained from the Missouri Department of Natural Resources (MDNR).

1.1 Purpose and Need for Action

The purpose of this project is to address bank instability problems in the vicinity of the Route MM Bridge over Locust Creek that is owned, operated, and maintained by MoDOT. Erosion along the banks of Locust Creek near the Route MM Bridge is threatening to flank the left descending bank bridge abutment, which would lead to its failure. There is no vegetation on the slope and stream bank sloughing is occurring. The current rate of erosion for the banks is estimated to be five to 10 feet per year and there is approximately 37 feet between the roadway and the top of the stream bank. If bank erosion continues at its present rate, failure of the roadway or bridge are estimated to occur within –three to four years. However, a series of high flow events could accelerate the rate of erosion and potential for bridge failure. The MoDOT Northwest District has requested assistance from the USACE to provide emergency streambank stabilization in the vicinity of the Route MM Bridge to prevent failure of the bridge.

1.2 Project Location

The project area is located at the MoDOT Route MM Bridge over Locust Creek, just west of Browning in Linn County, Missouri (Appendix I – Figure 3). It is in Section 7 of Township 60 North, Range 20 West. Locust Creek flows from north to south at the crossing for several hundred yards upstream and downstream of the bridge, which is situated east-west across the stream.

2.0 Recommended Plan and Alternatives

One No - Action alternative and four construction alternatives were assessed for individual and cumulative effects in this document. Solely using biostabilization techniques to stabilize the streambank was determined not to be a feasible option at this site because it would have a high probability of failure (USACE, 2015). If any plantings used for biostabilization were inundated before growing sufficiently, the slopes would be damaged. Additionally, the slopes would have to be graded to 3:1 to insure

stability, which would require extensive excavation and filling (USACE, 2015). The Missouri Department of Conservation (MDC) also noted that many of the rivers in the region are not suitable for biostabilization because of the degree to which the channels are incised (Pitchford and Kerns, 1994).

2.1 Alternative 1 - No - Action Alternative: A No - Action alternative is required by the President's Council on Environmental Quality (CEQ) regulations and is to function as the baseline against with potential impacts will be evaluated. The No-Action alternative would result in no corrective actions being taken to address the current erosion issues associated with Locust Creek and the Route MM Bridge. This alternative would allow the current rate of erosion along the left descending bank to continue to de-stabilize the bank adjacent to the bridge. This alternative would result in eventual damage to the Route MM Bridge and require its complete replacement. Failure of the bridge over Locust Creek would create a detour of approximately 18 miles for local residents, school busses, and emergency vehicles. Replacement of the bridge is a viable alternative; however, it is not economically desirable because the cost of a new bridge and roadway would be significantly more expensive than stabilizing the upstream channel bank. Furthermore, the new bridge would still be susceptible to damage from erosion because replacing the bridge does not solve the bank instability problems upstream of the bridge. Alternative 1 would be expected to cost approximately $1,539,000.

2.2 Alternative 2 – Longitudinal Peak Stone Toe Protection (LPSTP) with Full Slope Revetment (Appendix I - Figure 4) (Recommended Plan): The Recommended Plan would consist of LPSTP with tiebacks on the left descending bank in addition to a full slope revetment on the left bridge abutment. The alignment of the LPSTP is set to relocate the left descending bank into alignment with the existing bridge piers. The LPSTP protects the toe of the slope and allows the upper banks to continue to erode until it stabilizes and vegetation is established. The tiebacks prevent erosion from occurring between the LPSTP and the bank and encourage sediment deposition. The revetment at the bridge abutment would provide additional protection during high flow events. The LPSTP has a total length of 360 feet split into two 180 feet sections by an incoming tributary starting upstream and extending to the stone slope revetment. The LPSTP would be approximately five feet tall with 1.5:1 side slopes. The upstream end of the LPSTP would have a 40-ft buried stone root to prevent flanking of the structure. There would be three tiebacks perpendicular to the LPSTP alignment that run up the bank at a 3:1 slope, each with a five-foot top width. The first tieback would be 29 feet in length and placed approximately 90 feet upstream of the revetment. The second tieback would be 29 feet in length and placed approximately 90 feet downstream of the stone root. The third tieback would be 44 feet in length and tied into the stone root. The incoming tributary upstream of the bridge on the left descending bank, would have rock approximately three feet tall with a 3:1 side slope placed along a portion of the banks. The left descending bank would be lined for approximately 140 ft and the right bank would be lined for approximately 110 ft. The left bridge abutment would be protected by a full slope revetment that extends up to the existing bank height. The revetment would

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be approximately 250 feet in length with 2:1 side slopes with a minimum thickness of 27 inches. The toe would extend approximately 10-ft into the channel. All the rock used would utilize type A gradation. This alternative is expected to have a total project footprint of approximately one and half acres including the necessary staging area. The staging area is approximately a half acre immediately northeast of the Route MM Bridge. Alternative 2 would be expected to cost approximately $884,000. The full stone revetment would be present in all of the construction alternatives and would maintain the same parameters as described in the recommended plan.

2.3 Alternative 3 – Bendway Weirs (Appendix I - Figure 5): This alternative would consist of five bendway weirs on the left descending bank upstream of the bridge with full slope revetment on the left abutment. These weirs would realign the creek flow between the two central bridge piers and stabilize the upstream left descending bank by directing water towards the center of the bridge. The design would also encourage material deposition to stabilize the left descending bank. The revetment at the left bridge abutments would provide additional protection during high flow events. Each bendway weir extends into the channel approximately 40-ft and is approximately 6-ft above the channel bed with a trapezoidal key below the channel bed. They would be spaced approximately 120-ft apart and angled upstream to direct water away from the unstable left bankline as it flows over the crest. Each bendway weir has a flat crest 6-ft wide with 1.5:1 side slopes. Bendway weirs 1, 2, 3, and 5 have weir keys 40-ft in length. Weir 4 has a key 49-ft in length. At weir 1, a buried stone root extends 40-ft into the field to ensure the structures are not flanked during high water. Weir 4 would be slightly shorter in length at 35 ft due to the tributary which enters the left descending bank upstream of the bridge. The incoming tributary upstream of the bridge on the left descending bank, would have rock approximately three ft tall with a 3:1 side slope placed along a portion of the banks. The left descending bank would be lined for approximately 180 ft and the right bank would be lined for approximately 110 ft. The revetment would be identical as the Recommended Plan. Gradation B rock would be used for the bendway weirs and stone roots. Gradation A would be used for the full slope revetment. This alternative is expected to have a total project footprint of approximately one and half acres including the necessary staging area. The staging area is approximately a half acre immediately northeast of the Route MM Bridge. Alternative 3 would be expected to cost approximately $940,000.

2.4 Alternative 4 – LPSTP with Bendway Weirs (Appendix I - Figure 6): This alternative would consist of a LPSTP with bendway weirs on the left descending bank along with stone slope revetment on the left abutment. Although bendway weirs and LPSTP work well alone protecting banks, it has been found that combining the two methods provide added benefits. Because bendway weirs deposit sediments on the outside of the bend, when LPSTP is in place also, these deposits would be landward of the LPSTP and suitable for establishment of vegetation. The LPSTP has a total length of 300 feet starting upstream and extending to the stone slope revetment. The LPSTP would be constructed in a triangular section along the toe of the left descending bank. The LPSTP would be approximately three ft tall and have 1.5:1 side slopes. Each

bendway weir would extend into the channel approximately 40-ft and is approximately six ft above the channel bed with a trapezoidal key below the channel bed. Each bendway weir would be six ft wide with 1.5:1 side slopes. The bendway weirs would be spaced approximately 100 feet apart. Weir 3 would be located at the upstream end of the tributary entering Locust Creek from the east. Weir 4 would be slightly shorter in length due to the tributary which enters upstream. Weir 5 would be locate just upstream of the stone slope revetment. Bendway weirs 1, 2, 3, and 5 have weir keys 40 feet in length. Weir 4 has a key 49 feet in length. The upstream and of the LPSTP would have weir 1 with a buried stone root that extends 40 feet into the field to ensure the structures are not flanked during high water. The incoming tributary upstream of the bridge on the left descending bank, would have rock approximately three ft tall with a 3:1 side slope placed along a portion of the banks. The left descending bank would be lined for approximately 180 feet and the right bank would be lined for approximately 110 ft. The revetment would be identical as the recommended plan. Gradation B rock would be used for the bendway weirs and stone roots. Gradation A would be used for the full slope revetment. This alternative is expected to have a total project footprint of approximately one and half acres including the necessary staging area. The staging area is approximately a half acre immediately northeast of the Route MM Bridge. Alternative 4 would be expected to cost approximately $998,000.

2.5 Alternative 5 – Stone Dikes with Full Slope Revetment (Appendix I – Figure 7): This alternative would consist of stone dikes with toe reinforcement on the left descending bank upstream of the bridge with full slope revetment on the left abutment. The dikes are angled and spaced to reduce the left descending bank exposure to erosive velocities and flow without increasing the velocities and the bridge. They are designed to protect the lower half of the bank and to move the channel flow to its historic location between the center bridge piers. The dikes would be nine feet tall with 1.5:1 side slopes, ending with a rounded tip and spaced approximately 100 feet apart. Each dike would be tied into the bank with a dike root. The stone root at the upstream end is 40 ft in length and each dike root is 40-ft in length. Stone toe reinforcement would extend 25 feet upstream of each dike to protect the eroded bank. The dikes are designed to overtop infrequently to encourage sedimentation at the left descending bank toe. The top width of each dike is six feet to provide launchable material if scour eddies form or bed erosion occurs nearby. Launchable material is stone material placed in such a manner to allow for it to fill in scoured areas on its own as needed in a structure. Each dike would have a 1.5:1 side slope. Each dike would have a partially exposed stone root that runs up the bank to prevent flanking if the surrounding bank is eroded by conditions that exceed the expected design. The incoming tributary upstream of the bridge on the left descending bank, would have rock approximately three ft tall with a 3:1 side slope placed along a portion of the banks. The left descending bank would be lined for approximately 140 ft and the right bank would be lined for approximately 110 ft. The revetment would be identical as the Recommended Plan. Gradation B rock would be used for the bendway weirs and stone roots. Gradation A would be used for the full slope revetment. This alternative is expected to have a total project footprint of approximately one and half acres including the necessary staging

area. The staging area is approximately a half acre immediately northeast of the Route MM Bridge. Alternative 5 would be expected to cost $939,000.

2.6 Alternatives Evaluation

Potential environmental impacts of each of the alternatives are evaluated in Section 4 of this document. None of the alternatives would result in any significant direct, indirect, or cumulative adverse impacts to the human environment. Except for the No - Action/Future Without-Project Condition, each of the alternatives meets the project objectives and project constraints. Each alternative also meets the Principles & Guidelines (P&G) criteria for completeness, effectiveness, efficiency, and acceptability. Completeness: the project would be complete and would not need further efforts outside project scope to function as intended. Effectiveness: the project would receive the level of protection desired. Acceptability: the plans would be in full compliance with applicable laws and policies. Efficiency: all of the plans would provide the level of protection needed to protect Route MM. However, Alternative 2 would be able to provide the same level of protection at the least cost with no additional adverse environmental or human impacts.

3.0 Affected Environment

Locust Creek is a tributary in the middle of the Lower Grand River drainage basin and drains an approximately 381 square miles at the project location. The soils along the banks of Locust Creek in Linn County, Missouri are derived from alluvial deposits consisting of silty and silty-clay loams. In general, the right descending bank has a narrow riparian corridor of moderate to heavy woody vegetative cover with dense undergrowth. Beyond the riparian corridor and adjacent to the left descending bank are predominately agricultural lands. Most of the affected area is adjacent to agricultural fields.

3.1 Aquatic Resources

A records search of the U.S. Environmental Protection Agency (USEPA) Storage and Retrieval and Water Quality Exchange (STORET), and MDNR Water Quality Assessment System were searched for water quality data. The USEPA STORET and MDNR has the Locust Creek listed on the 303(d) due to *E. coli* contamination from an unknown source (USEPA, 2014). Section 303(d) identifies waters that are not meeting water quality standards. No other water quality parameters were at a level of concern. Non-point source pollution has the greatest negative influence upon water quality within the Locust Creek basin. The most common problems are low dissolved oxygen, high levels of turbidity, and organic nutrients; all of which are influenced by excessive runoff and extended low flows (MDC, 2015). The project would impact the left streambank for approximately 610 linear feet.

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3.2 Wetlands

Field reconnaissance was conducted on June 22, 2015, to assess the natural resources within the proposed project area revealed that no wetlands were identified within or adjacent to the project area.

3.3 Terrestrial Habitat

Approximately 60 percent of the Locust Creek watershed is classified as cropland, 32 percent as pastureland, and 5 percent as forested (MDC, 2015). The remaining land cover is composed of developed areas, wetlands, and water. The project boundary is approximately 1.5 acres in size including the staging and access areas and is bordered by agricultural cropland. Within the project boundary, the terrestrial habitat consists of lands that have been previously disturbed by agriculture, road construction, and bank erosion. The staging area would be just north of and adjacent to Route MM on east side of the river. These areas are made up of native and non-native grasses and herbaceous vegetation in previously disturbed habitat. There are very few large trees within the planned project area, most likely due to the disturbed nature of the area.

3.4 Fish and Wildlife

Wildlife that likely utilizes the riparian corridor along Locust Creek includes small mammals such as eastern cottontail rabbit, fox squirrel, opossum, and raccoon. Whitetail deer, red fox, and various other wildlife species are also expected to utilize the area. The creek is also expected to be utilized by various fish, reptiles, and amphibians including chorus frogs, eastern American toads, eastern garter snakes, northern water snakes, common snapping turtles, orange-spotted sunfish, green sunfish, and red shiners. In addition, numerous bird species occur in the area such as downy woodpeckers, wild turkeys, indigo buntings, and American kestrels.

The MDC Resource Assessment and Monitoring Database were searched for any fish and aquatic invertebrate survey's that may have been conducted in the Locust Creek, but no information was found (MDC, 2008).

3.5 Threatened or Endangered Species

There are no federally listed threatened or endangered species known to occur within or adjacent to the proposed project area and anticipated time frame of work. The U.S. Fish and Wildlife Service was consulted and they also concluded that no federally listed species, candidate species, or designated critical habitat are located within or adjacent to the project area (Appendix II).

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3.6 Invasive Species

Invasive species have the potential to displace native plants and animals. According to Executive Order 13122, federal agencies may not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species. Invasive aquatic species that are a concern in Missouri which have the potential to be introduced into new water bodies by contaminated construction equipment include zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena bugensis*), New Zealand mudsnails (*Potamogyrpus antiposarum*), purple loosestrife (*Lythrum salicaria*), and Eurasian watermilfoil (*Myriophyllum spicatum*), among others. Invasive terrestrial species often flourish on land that has recently been disturbed. They may also be transported to new locations on construction equipment. Examples of invasive terrestrial species of concern in Missouri include Johnson grass (*Sorghum halepense*), reed canary grass (*Phalaris arundinacea*), and bromegrass (*Bromus sterilis*). No invasive species were observed within the project area during a June 22, 2015, field assessment.

3.7 Floodplain

The Locust Creek floodplain has been greatly impacted by agricultural practices. A large percentage of the watershed has been converted to cropland, and only a narrow riparian corridor remains along portions of the creek. Given the creeks average drainage and increased runoff due to agriculture, the creek is relatively flashy, that is, creek water levels rise and fall quickly in response to storm events. This has likely contributed to bank erosion and channel instability along Locust Creek.

3.8 Land Use

Over 60 percent of the land within the Locust Creek watershed is cropland (MDC, 2015). Pastureland also comprises a large portion of the watershed, at approximately 32 percent. The area immediately surrounding the project location is cropland.

3.9 Socioeconomics

Linn County is a rural area in northern Missouri and contains several small towns. The county has an estimated population of approximately 12,300, of which, approximately 12,000 identify as white, 200 as Hispanic, and 100 as Black. (U.S. Census Bureau, 2016). The average annual household income for Linn County is approximately $47,000. Educational/health/social assistance, retail trade, agriculture, forestry, fishing, hunting, mining, construction, and manufacturing are the major industries in Linn County (U.S. Census Bureau, 2014). The Route MM Bridge is an important transportation link between the communities of Linn County, Missouri. The average daily traffic count over the bridge is approximately 346 vehicles per day.

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3.10 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (amended June 17, 1999) requires federal agencies to take into account the effects of their undertakings on historic properties. By definition, historic properties are properties eligible for or listed on the National Register of Historic Places. Federal undertakings refer to any federal involvement including funding, permitting, licensing, or approval. Federal agencies are required to define and document the Area of Potential Effect (APE) for undertakings. The APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.

A background review of the project area was conducted using the MDNR Archaeology Viewer (on-line). No sites were identified within the project area. An archeological survey of the project area was previously conducted. The survey found no archeological sites within the proposed project area.

The results of the background review and survey were coordinated by letter with the State Historic Preservation Officer (SHPO) on January 7, 2016 (Appendix III). In that letter, USACE requested concurrence that any proposed work in the project area would have no effect on historical properties and that any work could proceed with any further coordination, unless in the unlikely event that archeological materials were discovered during construction. SHPO concurred with this recommendation in a letter dated January 27, 2016 (Appendix III).

4.0 Environmental Consequences (Impacts)

Primary resources of concern identified during impact evaluation for the No - Action alternative and four build alternatives included: aquatic resources, wetlands, terrestrial habitat, fish and wildlife, threatened and endangered species, invasive species, floodplain, land use, socioeconomics, and cultural resources.

4.1 Aquatic Resources

Alternative 1 – No - Action Alternative: In the short-term, there would be no change in the existing water quality of Locust Creek under this alternative. There would be continued erosion of the stream banks at the proposed project location. If the bridge needed to be replaced, it would likely have a larger construction footprint and have a greater impact to water quality due to construction runoff and disturbance than the other alternatives.

Alternative 2 – LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan would have minor, short-term construction-related impacts to water quality due to activities taking place within the river channel and on the river banks that would temporarily increase creek turbidity and disturbances. This has the potential to

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have secondary impacts on nutrient concentrations, dissolved oxygen, pH, and conductivity. Construction activities with this alternative would occur in a jurisdictional water of the United States and require a CWA Section 404 authorization and CWA Section 401 State Water Quality Certification. A Draft 404 (b)(1) Evaluation (40 CFR 230) has been prepared for this plan and is included as Appendix IV. A CWA State Water Quality Certification would need to be obtained from MDNR. Additionally, the construction contractor would be required to obtain a Section 402 National Pollutant Discharge Elimination System (NPDES) stormwater permit from MDNR. These CWA requirements would need to be met prior to any construction activities. Best Management Practices (BMPs) would be implemented to minimize the incidental fallback of material into the waterway and to minimize the introduction of fuel, petroleum products, or other deleterious material from entering the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching water sources by wind or runoff, fill would be covered, stabilized or mulched, and silt fences would be used as required. Other measures to minimize adverse effects would include using clean rock fill with minimal fines, stabilizing the earthen material with rock, using appropriate construction equipment, minimizing the amount of time that equipment would be in the creek channel, and not placing fill in the creek during unusual high water events. The project would impact the left streambank for approximately 610 linear feet.

The Missouri Stream Mitigation Method (MSMM) is used within Missouri to assess the impacts (debits) and benefits (credits) of projects as part of CWA Section 404 authorizations. This method has been publicly vetted and approved for use by the USACE Regulatory Offices within the State of Missouri. Completion of the MSMM worksheets demonstrated that the Recommended Plan would result in an overall net benefit to the environment. The Recommended Plan generated 1,494.5 debits resulting from the addition of armor to the river banks. A total of 2,165.5 credits would be generated by restoring streambank stability along 610 linear feet of Locust Creek. The MSMM worksheets are located in Appendix V. Once construction has been completed, the water quality of Locust Creek would return to its current state. No significant adverse long-term impacts to water quality would occur as a result of this alternative.

Alternative 3 - Bendway Weirs: Similar to the Recommended Plan, this alternative would have minor, short-term construction-related impacts to water quality similar to the Recommended Alternative. The MSMM for this alternative was the same as the Recommended Plan. Construction activities would occur in jurisdictional waters of the United States. A CWA Section 404 authorization and a CWA Section 401 State Water Quality Certification would be required prior to any construction. Additionally, the construction contractor would be required to obtain a Section 402 NPDES stormwater permit from MDNR. BMPs, as described in the Recommended Plan, would also be implemented. This alternative would not result in any significant long-term impacts to water quality.

Alternative 4 - LPSTP with Bendway Weirs: As with the other alternatives, this plan would also result in minor, short-term construction-related impacts to water quality similar to the Recommended Alternative. The MSMM for this alternative was the same as the Recommended Plan. A CWA Section 404 authorization and a CWA Section 401 State Water Quality Certification would be required prior to any construction. It would be the construction contractor's responsibility to obtain a Section 402 NPDES stormwater permit prior to the start of construction. BMPs, as previously described would also be implemented during construction. No significant adverse long-term impacts to water quality would occur as a result of this alternative.

Alternative 5 - Stone Dikes with Full Slope Revetment: This alternative would also result in minor, short-term construction-related impacts to water quality similar to the Recommended Alternative. The MSMM for this alternative was the same as the Recommended Plan. As with the other alternatives, a CWA Section 404 authorization and a CWA Section 401 State Water Quality Certification would be required prior to any construction. It would be the construction contractor's responsibility to obtain a Section 402 NPDES stormwater permit prior to the start of construction. BMPs, as previously described, would also be implemented during construction. No significant adverse long-term impacts to water quality would occur as a result of this alternative.

4.2 Wetlands

Alternative 1 – No - Action Alternative: The No - Action alternative would not have any impact on wetlands. There are no wetlands in or adjacent to the project site.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan alternative would not have any impact on wetlands. There are no wetlands in or adjacent to the project site.

Alternative 3 - Bendway Weirs: This alternative would not have any impact on wetlands. There are no wetlands in or adjacent to the project site.

Alternative 4 - LPSTP with Bendway Weirs: The LPSTP alternative would not have any impact on wetlands. There are no wetlands in or adjacent to the project site.

Alternative 5 - Stone Dikes with Full Slope Revetment: This alternative would not have any impact on wetlands. There are no wetlands in or adjacent to the project site.

4.3 Terrestrial Habitat

Alternative 1 – No - Action Alternative: The No - Action alternative would have minor long-term impacts to the terrestrial habitat along Locust Creek. The streambanks would continue to erode, which would continue to impact existing vegetation along the banks. If the bridge needed to be replaced, it would have an increased impact on terrestrial

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habitat compared to other alternatives due to the larger construction footprint needed for bridge construction.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan would result in minor, short term impacts to the terrestrial habitat along Locust Creek. These impacts would result from the removal of herbaceous vegetation, grasses and some trees from along the banks, necessary for accessing the river during construction. The areas disturbed during project construction would be planted with native grasses, milkweeds, and other forbs once the project is complete. As sediment and slope material fill in behind the structures, natural establishment of vegetation would also occur.

Staging and material storage areas would be located on the north side of Route MM east of Locust Creek adjacent to the existing bridge. Again, these locations would be planted with native vegetation following project construction. The staging and material storage locations would be the same for Alternatives 2 – 5. All four construction alternatives would impact approximately 1.5 acres of terrestrial habitat.

Alternative 3 - Bendway Weirs: This alternative would have a similar project footprint as the Recommended Plan and have minor, short-term impacts to the terrestrial habitat along Locust Creek. The areas disturbed during project construction would be planted with native vegetation once the project is complete. As sediment and slope material fill in behind the structures, natural establishment of vegetation would also occur.

Alternative 4 - LPSTP with Bendway Weirs: This alternative would have a similar project footprint as the Recommended Plan and have minor, short-term impacts to the terrestrial habitat along Locust Creek. The areas disturbed during project construction would be planted with native vegetation once the project is complete. As sediment and slope material fill in behind the structures, natural establishment of vegetation would also occur.

Alternative 5 - Stone Dikes with Full Slope Revetment: This alternative would have a similar project footprint as the Recommended Plan and have minor, short-term impacts to the terrestrial habitat along Locust Creek. The areas disturbed during project construction would be planted with native vegetation once the project is complete. As sediment and slope material fill in behind the structures, natural establishment of vegetation would also occur.

4.4 Fish and Wildlife

Alternative 1 – No - Action Alternative: The No - Action alternative would not directly impact any fish and wildlife resources. Indirectly, continued erosion along the streambanks could contribute to negatively impact species in the river that are not tolerant of turbid conditions. If the bridge needed to be replaced, it would likely have a

DRAFT

greater impact on fish and wildlife than the other alternatives because of a larger construction footprint and longer duration to complete.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): This plan would have minor, short-term impacts to fish and wildlife in Locust Creek. Short-term impacts to the aquatic community may result from the direct displacement of individual organisms, smothering of immobile organisms, and an increase in turbidity, during project construction. These impacts may affect individual organisms in the river, but would be unlikely to have a significant impact on the overall population of any particular species within the river.

There would be minor, short-term impacts to terrestrial wildlife during project construction as a result of noise and land disturbance. Additionally, individual organisms would be displaced that utilize the approximate 1.5 acres of vegetation that is within the project footprint. The project is scheduled to start in the fall so there should be no impact to nesting birds along the creek. Following project construction, the cleared area would be replanted with native herbaceous vegetation and grasses. This would result in a minor short-term impact to wildlife within the project area. No significant long-term adverse impacts to fish and wildlife would occur under this alternative.

Alternative 3 - Bendway Weirs: This plan would have similar impacts to fish and wildlife as described for the Recommended Plan. No significant long-term impacts to fish and wildlife would occur under this alternative.

Alternative 4 - LPSTP with Bendway Weirs: This plan would have similar impacts to fish and wildlife as described for the Recommended Plan. No significant long-term impacts to fish and wildlife would occur under this alternative.

Alternative 5 - Stone Dikes with Full Slope Revetment: This plan would have similar impacts to fish and wildlife as described for the Recommended Plan. No significant long-term impacts to fish and wildlife would occur under this alternative.

4.5 Threatened or Endangered Species

Alternative 1 – No - Action Alternative: The No - Action alternative would not result in any impacts to federally listed threatened or endangered species.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan would not likely adversely affect any federally listed threatened or endangered species, candidate species, or designated critical habitat. No federally listed threatened or endangered species, candidate species, or designated critical habitats are located within or adjacent to the project area.

Alternative 3 - Bendway Weirs: As with the Recommended Plan, this alternative would not likely adversely affect any federally listed threatened or endangered species,

candidate species, or designated critical habitat. No federally listed threatened or endangered species, candidate species, or designated critical habitats are located within or adjacent to the project area.

Alternative 4 - LPSTP with Bendway Weirs: As with the other alternatives, this alternative would not likely adversely affect any federally listed threatened or endangered species, candidate species, or designated critical habitat.

Alternative 5 - Stone Dikes with Full Slope Revetment: As with the other alternatives, this plan would not likely adversely affect any federally listed threatened or endangered species, candidate species, or designated critical habitat.

4.6 Invasive Species

Alternative 1 – No - Action Alternative: The No - Action alternative would not result in the introduction of any invasive species.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan is not expected to introduce any invasive species to the project site. It is also not expected to contribute to the spread invasive species from the project site. The construction contractor would be required to ensure that all construction equipment has been cleaned and is free from soil residuals, egg deposits from plant pests, noxious weeds, plant seeds, and aquatic nuisance species prior to its use on the project. Disturbed land areas would be replanted with native plant species to minimize the likelihood that invasive plants would become established.

Alternative 3 – Bendway Weirs: This alternative is not expected to introduce any invasive species to the project site. Precautions to prevent the introduction of invasive species as described in the Recommended Plan would also be used for this alternative. Conversely, is not expected to contribute to the spread invasive species from the project site.

Alternative 4 – LPSTP with Bendway Weirs: As with the other alternatives, this plan is not expected to introduce any invasive species to the project site. Precautions to prevent the introduction of invasive species as described in the Recommended Plan would also be implemented under this alternative. Conversely, is not expected to contribute to the spread invasive species from the project site.

Alternative 5 – Stone Dikes with Full Slope Revetment: This alternative is not expected to introduce any invasive species to the project site. Precautions to prevent the introduction of invasive species as described in Recommended Plan would also be used for this plan. Conversely, is not expected to contribute to the spread invasive species from the project site.

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4.7 Floodplain

Alternative 1 – No - Action Alternative: The No - Action alternative would result in continued erosion of the descending bank and channel, modifying the existing floodplain and threatening the stability of the Route MM Bridge and roadway.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan would not be expected to impact peak flows, flood flow volume, water velocities, or the flashiness of Locust Creek. This alternative is designed to prevent erosion and protect the Route MM Bridge and roadway. Based on the expertise gained in similar, previous projects, it is not anticipated to result in impacts to the floodplain.

Alternative 3 - Bendway Weirs: As with the Recommended Plan, this alternative would not change the peak flows, flood flow volume, water velocities, or the flashiness of the creek. This alternative is designed to prevent erosion and protect Route MM Bridge and roadway. It is not anticipated to result in any additional development of the floodplain. Based on the expertise gained in similar, previous projects, it is not anticipated to result in impacts to the floodplain.

Alternative 4 - LPSTP with Bendway Weirs: As with the Recommended Plan, this alternative would not change the peak flows, flood flow volume, water velocities, or the flashiness of the creek. This alternative is designed to prevent erosion and protect Route MM Bridge and roadway. It is not anticipated to result in any additional development of the floodplain. Based on the expertise gained in similar, previous projects, it is not anticipated to result in impacts to the floodplain.

Alternative 5 - Stone Dikes with Full Slope Revetment: As with the Recommended Plan, this alternative would not change the peak flows, flood flow volume, water velocities, or the flashiness of the creek. This alternative is designed to prevent erosion and protect Route MM Bridge and roadway. It is not anticipated to result in any additional development of the floodplain. Based on the expertise gained in similar, previous projects, it is not anticipated to result in impacts to the floodplain.

4.8 Land Use

Alternative 1 – No - Action Alternative: The No - Action alternative could potentially have minor, long-term impacts to land use in the vicinity of Locust Creek in Linn County, Missouri and the Route MM Bridge if the bridge were to fail due to the erosion along the banks of Locust Creek and were not replaced. If the bridge failed and were replaced, it would likely result in minor, short-term impacts to land use in the immediate area.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan would have minor, short-term impacts to land use. In total, approximately 1.5 acres of habitat would be impacted during construction. Currently,

most of the project area is undeveloped. However, during construction the approximately 0.5 acres of adjacent cropland would be impacted to gain access to the project site and staging equipment.

Alternative 3 - Bendway Weirs: This alternative would have a similar project footprint as the Recommended Plan. It would also result in similar minor, short-term impacts to existing land use.

Alternative 4 - LPSTP with Bendway Weirs: This alternative would have a similar project footprint as the Recommended Plan. It would also result in similar minor, short-term impacts to existing land use as described for the Recommended Plan.

Alternative 5 - Stone Dikes with Full Slope Revetment: As with the other alternatives, the project footprint would be similar to the Recommended Plan. It would also result in similar minor, short-term impacts to existing land use as previously described.

4.9 Socioeconomics

Alternative 1 – No - Action Alternative: If the Route MM Bridge or roadway were to fail, it would need to be replaced. This would cost approximately twice as much as the Recommended Plan. Furthermore, traffic would need to be detoured approximately 15 miles while a new bridge is constructed, creating a moderate, short-term economic impact to the local area. This alternative is expected to cost $109,000 per year over a 20 year period of analysis.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): The Recommended Plan has an approximate annual cost of $62,000 and an annual benefit of $109,000 yielding an annual net benefit of $47,000 over a 20 year period of analysis. A functioning Route MM Bridge and roadway are necessary to maintain the existing economic conditions of the region. Due to the location and nature of this project, it is not expected to disproportionately impact any racial or economic groups.

Alternative 3 - Bendway Weirs: The annual benefit of this alternative is $43,000, which was calculated from an annual cost of approximately $66,000 and benefit of $109,000, which is a lower annual net benefit over a 20 year period of analysis compared to the Recommended Plan. A functioning Route MM Bridge and roadway are necessary to maintain the existing economic conditions in the area. Due to the location and nature of this project, it is not expected to disproportionately impact any racial or economic groups.

Alternative 4 - LPSTP with Bendway Weirs: The annual benefit of this alternative is $39,000, which was calculated from an annual cost of approximately $70,000 and benefit of $109,000, which is a lower annual net benefit over a 20 year period of analysis compared to the Recommended Plan. A functioning Route MM Bridge and roadway are necessary to maintain the existing economic conditions in the area. Due to

DRAFT

the location and nature of this project, it is not expected to disproportionately impact any racial or economic groups.

Alternative 5 - Stone Dikes with Full Slope Revetment: The annual benefit of this alternative is $43,000, which was calculated from an annual cost of approximately $66,000 and benefit of $109,000, which is a lower annual net benefit over a 20 year period of analysis compared to the Recommended Plan. A functioning Route MM Bridge and roadway are necessary to maintain the existing economic conditions in the area. Due to the location and nature of this project, it is not expected to disproportionately impact any racial or economic groups.

4.10 Cultural Resources

Alternative 1 – No - Action Alternative: The No - Action alternative would not impact any cultural resources.

Alternative 2 - LPSTP with Full Slope Revetment (Recommended Plan): Because no historic properties were identified within the project area, this alternative would have no effect on historic properties.

Alternative 3 - Bendway Weirs: As with the Recommended Plan, this alternative would have no effect on historic properties.

Alternative 4 - LPSTP with Bendway Weirs: As with the other alternatives, this alternative would have no effect on historic properties.

Alternative 5 - Stone Dikes with Full Slope Revetment: As with the other alternatives, this alternative would have no effect on historic properties.

5.0 Cumulative Impacts

The CEQ Regulations defines cumulative impacts as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or 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 (CEQ, 1997). The cumulative impacts addressed in this document consist of the impacts of multiple actions that result in similar effects on the natural resources. The geographical areas of consideration are actions located within/along the Locust Creek channel within three miles of the project area.

Past Actions: A review of USACE Regulatory Branch records for CWA Section 404 regulatory actions indicate that there are no other projects along Locust Creek within three miles of the project area that have required permitting in the last five years. No other projects are known to have occurred in the area.

DRAFT

Present and Future Actions: There are no other known on-going or proposed construction projects along Locust Creek. Large portions of Locust Creek have been straightened and channelized in the past. The stretch of Locust Creek that is crossed by the Route MM Bridge is in a portion of the river that is relatively unchannelized. The watershed is rural in nature and is primarily used for agriculture. Approximately 60 percent of the watershed is currently used as cropland and approximately 32 percent is used as pastureland.

Cumulative Impact Assessment: Only resource categories that would result in at least minor impacts as a result of implementing the Recommended Plan are considered for the cumulative impact assessment. The Recommended Plan would not result in any cumulative impacts to resources based on the assessment of the projects impacts and other known past or future projects.

Aquatic Resources: Recommended Plan would have minor, short-term construction-related impacts to water quality due to activities taking place within the river channel and on the river banks. During construction, downstream waters would see an increase in turbidity. There are no past or foreseeable future actions known within three miles of the project area, so no cumulative impacts are expected.

Fish and Wildlife Resources: This plan would have minor, short-term impacts to fish and wildlife in Locust Creek. Short-term impacts to the aquatic community may result from the direct displacement of individual organisms, and an increase in turbidity, during project construction. These impacts may affect individual organisms in the creek, but would be unlikely to have a significant impact on the overall population of any particular species within the creek. There are no past or foreseeable future actions known within three miles of the project area, so no cumulative impacts are expected.

Land Use: The Recommended Plan would have minor, short-term impacts to land use. In total, approximately 1.5 acres of habitat would be impacted during construction. Currently, most of the project area is undeveloped. There are no past or foreseeable future actions known within three miles of the project area, so no cumulative impacts are expected.

6.0 Mitigation Measures

Locations that are filled and/or disturbed that are not agricultural, would be seeded with native milkweeds and native herbaceous and woody vegetation following construction to stabilize the soil. Construction would most likely occur during fall/winter of 2016, which would minimize impacts to water quality and fish and wildlife because of reduced biological activity during this time of the year. The Recommended Plan would have an overall positive benefit to the aquatic environment, as determined by the MSMM. The MSMM is used to determine compensatory mitigation for CWA Section 404 within the state of Missouri. This method has been publicly vetted and approved for use by the

USACE Regulatory Offices within the state of Missouri. Using the MSMM, a total of 1,494.5 debits were generated by armoring the stream bank. A total of 2,165.5 credits were generated by providing streambank stability along 610 m of Locust Creek. Therefore, no additional mitigation measures are proposed.

7.0 Conclusion

All of the proposed “action” alternatives would adequately address the bank instability of Locust Creek adjacent to the Route MM Bridge. The four alternatives would all be expected to have similar impacts to the environment. However, none of the other alternatives can yield the same level of protection for Route MM and environmental impacts as Alternative 2, the Recommended Plan. The Recommended Plan would have no impacts to federally listed threatened or endangered species, or their designated critical habitat, and would not have negative impacts to sites listed, or eligible for inclusion, on the National Register of Historic Places. Temporary, short-term construction impacts to aquatic resources, fish and wildlife resources, and land use would be related to noise, and physical disturbance of the creek channel and riparian corridor. No wetlands would be impacted. Approximately 1.5 acres of native herbaceous vegetation, milkweeds and grasses would be planted upon project completion. The Recommended Plan would best meet the purpose and need of the project by providing protection to the Route MM Bridge and roadway. It would not result in any significant, long-term adverse impacts to the human environment.

8.0 Coordination and Comments

USACE will circulate a Public Notice for the Draft EA and FONSI dated XXXX, 2016, for a thirty-day public comment period. This Public Notice will also be e-mailed to individuals/agencies/businesses listed on the USACE Regulatory e-mail distribution list. USACE will address and record any comments (Appendix VII).

DRAFT

9.0 Agency Compliance with Other Environmental Laws

Compliance with other environmental laws is listed below.

Federal Polices	Compliance
Archeological Resources Protection Act, 16 U.S.C. 470, et seq.	Not Applicable
Clean Air Act, as amended, 42 U.S. C. 7401-7671g, et seq.	Full Compliance
Clean Water Act (Federal Water Pollution Control Act), 33 U.S.C. 1251, et seq.	Full Compliance
Coastal Zone Management Act, 16 U.S.C. 1451, et seq.	Not Applicable
Endangered Species Act, 16 U.S.C. 1531, et seq.	Full Compliance
Environmental Justice (Executive Order 12898)	Full Compliance
Estuary Protection Act, 16 U.S.C. 1221, et seq.	Not Applicable
Farmland Protection Policy Act, 7 U.S.C. 4201, et. seq.	Full Compliance
Federal Water Project Recreation Act, 16 U.S.C. 4601-12, et seq.	Full Compliance
Fish and Wildlife Coordination Act, 16 U.S.C. 661, et seq.	Full Compliance
Floodplain Management (Executive Order 11988)	Full Compliance
Invasive Species (Executive Order 13122)	Full Compliance
Land and Water Conservation Fund Act, 16 U.S.C. 4601-4, et seq.	Not Applicable
Marine Protection Research and Sanctuary Act, 33 U.S.C. 1401, et seq.	Not Applicable
Migratory Bird Treaty Act, 16 U.S.C. 703 – 712, et. seq.	Full Compliance
National Environmental Policy Act, 42 U.S.C. 4321, et seq.	Full Compliance
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470a, et seq.	Full Compliance
Protection & Enhancement of the Cultural Environment (Executive Order 11593)	Full Compliance
Protection of Wetlands (Executive Order 11990)	Full Compliance
Rivers and Harbors Act, 33 U.S.C. 403, et seq.	Full Compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	Full Compliance
Wild and Scenic River Act, 16 U.S.C. 1271, et seq.	Not Applicable

NOTES:

a. Full compliance. Having met all requirements of the statute for the current stage of planning (either preauthorization or post authorization).
b. Partial compliance. Not having met some of the requirements that normally are met in the current stage of planning.
c. Noncompliance. Violation of a requirement of the statute.
d. Not applicable. No requirements for the statute required; compliance for the current stage of planning.

DRAFT

10.0 References

Council on Environmental Quality (CEQ). 1992. Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR Parts 1500-1508, in accordance with 40 CFR 1507.3.

CEQ. 1997. January, 1997. Considering Cumulative Effects Under the National Environmental Policy Act. Executive Office of the President, Washington, D.C. pp ix-x, 28-29 and 49-57.

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Missouri Department of Conservation. 2015. Missouri Watershed Map. http://mdc.mo.gov/your-property/greener-communities/missouri-watershed-inventory-and-assessment/locust-creek

Pitchford, Greg, and Kerns, Harold. 1994. Grand River Watershed Inventory and Assessment. Missouri Department of Conservation.

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U.S. Environmental Protection Agency. 2014. Water Assessment, Tracking & Environmental Results. http://iaspub.epa.gov/apex/waters/f?p=131:9:::NO:::

11.0 List of Preparers

This EA and draft FONSI were prepared by Mr. Rick Morrow, Biologist, with cultural resource assistance provided by Mr. Timothy Meade, Archeologist. The address of the preparers is: U.S. Army Corps of Engineers, Kansas City District; PM-PR, Room 529, 601 E. 12th Street, Kansas City, Missouri 64106.

12.0 Appendices

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APPENDIX I

PROJECT FIGURES & DRAWINGS

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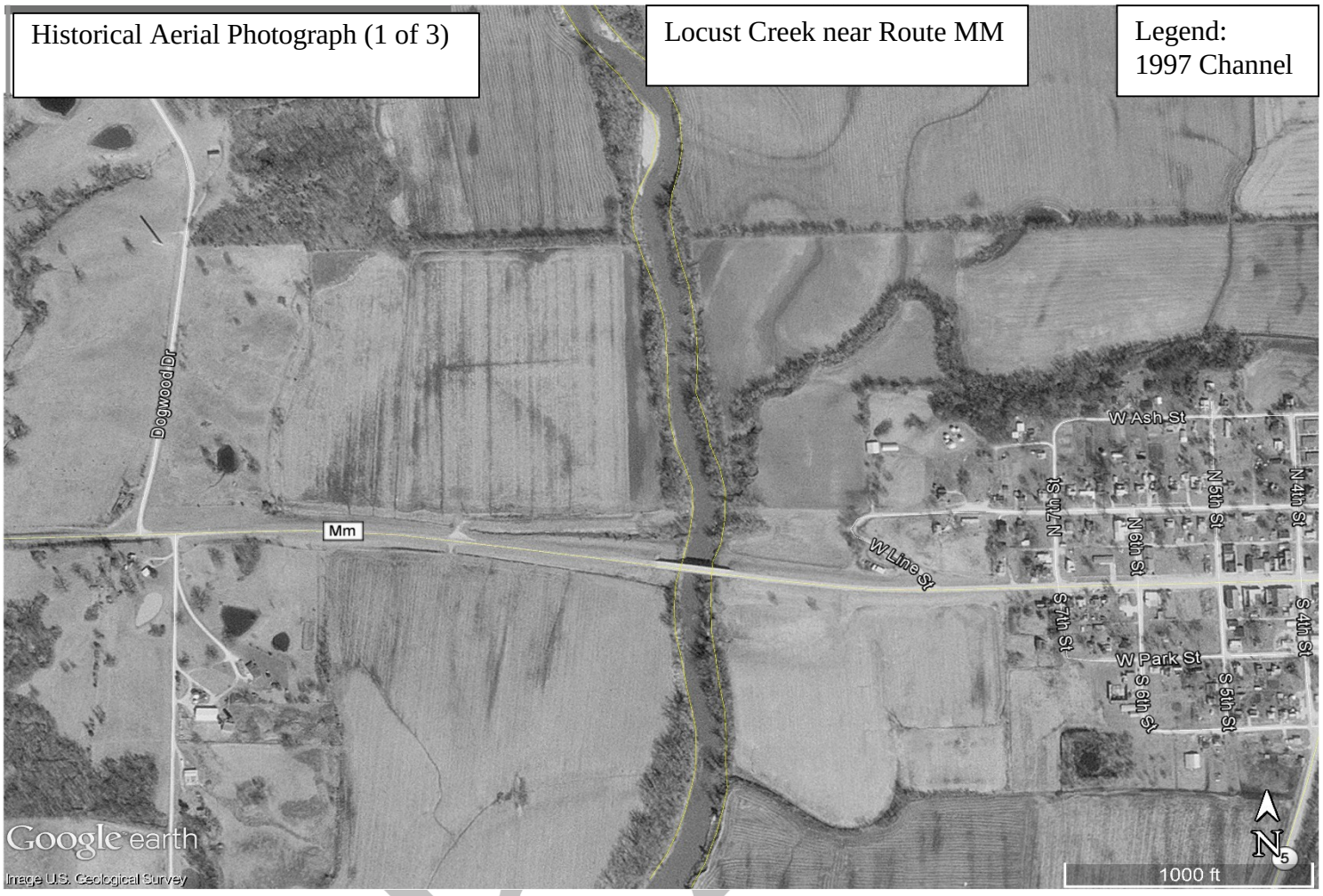
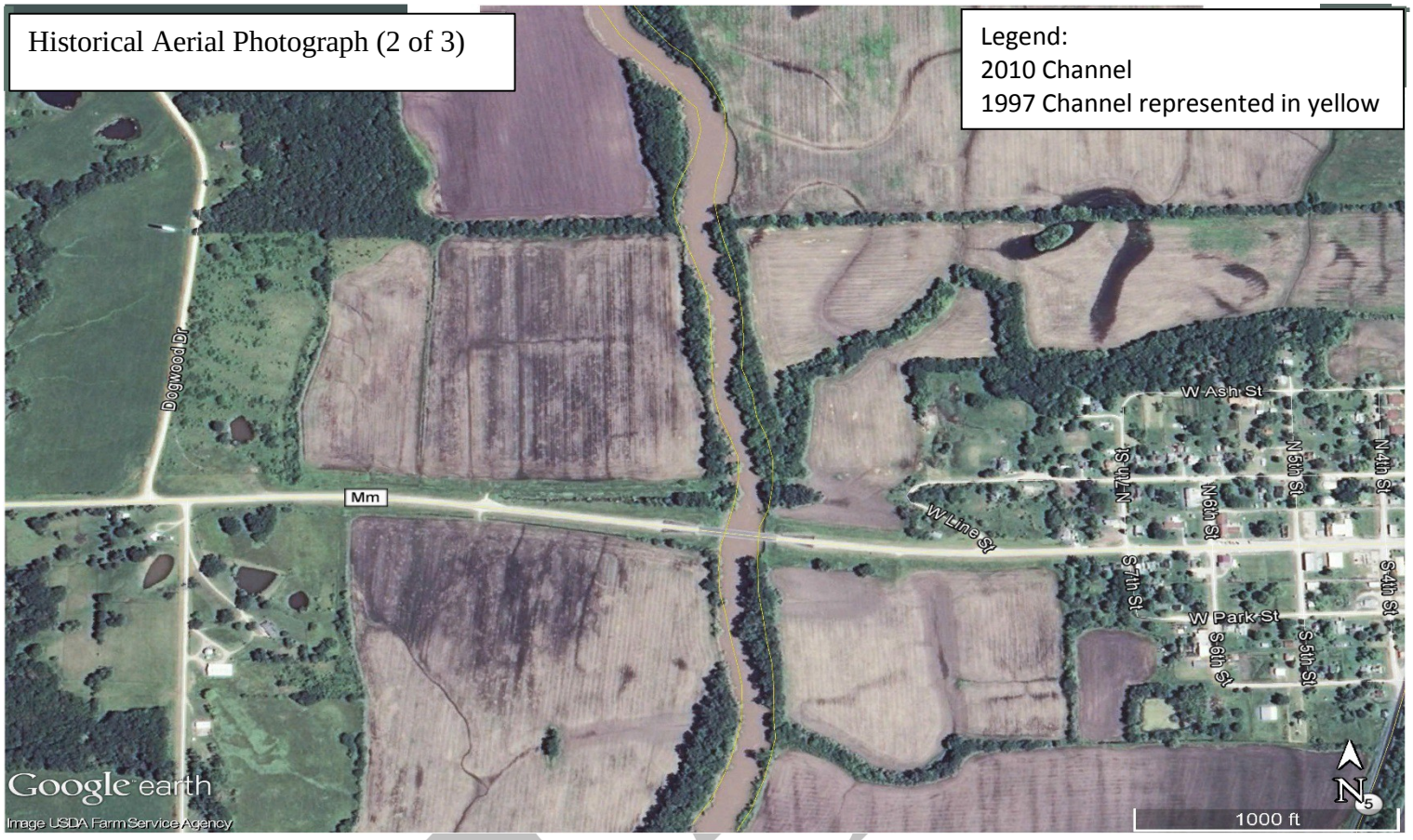
Figure 1 – Looking upstream. Erosion encroaching on left bridge abutment.


Historical Aerial Photograph (1 of 3)
Locust Creek near Route MM
Legend:
1997 Channel
Dogwood Dr
Mm
W Line St
W Ash St
N 7th St
N 6th St
N 5th St
N 4th St
S 7th St
S 6th St
S 5th St
S 4th St
W Park St
Google earth
Image U.S. Geological Survey
1000 ft
N

DRAFT


Historical Aerial Photograph (2 of 3)
Legend:
2010 Channel
1997 Channel represented in yellow
Dogwood Dr
Mm
W Line St
W Ash St
N 5th St
N 4th St
N 6th St
S 7th St
S 6th St
S 5th St
S 4th St
W Park St
Google earth
Image USDA Farm Service Agency
1000 ft
N

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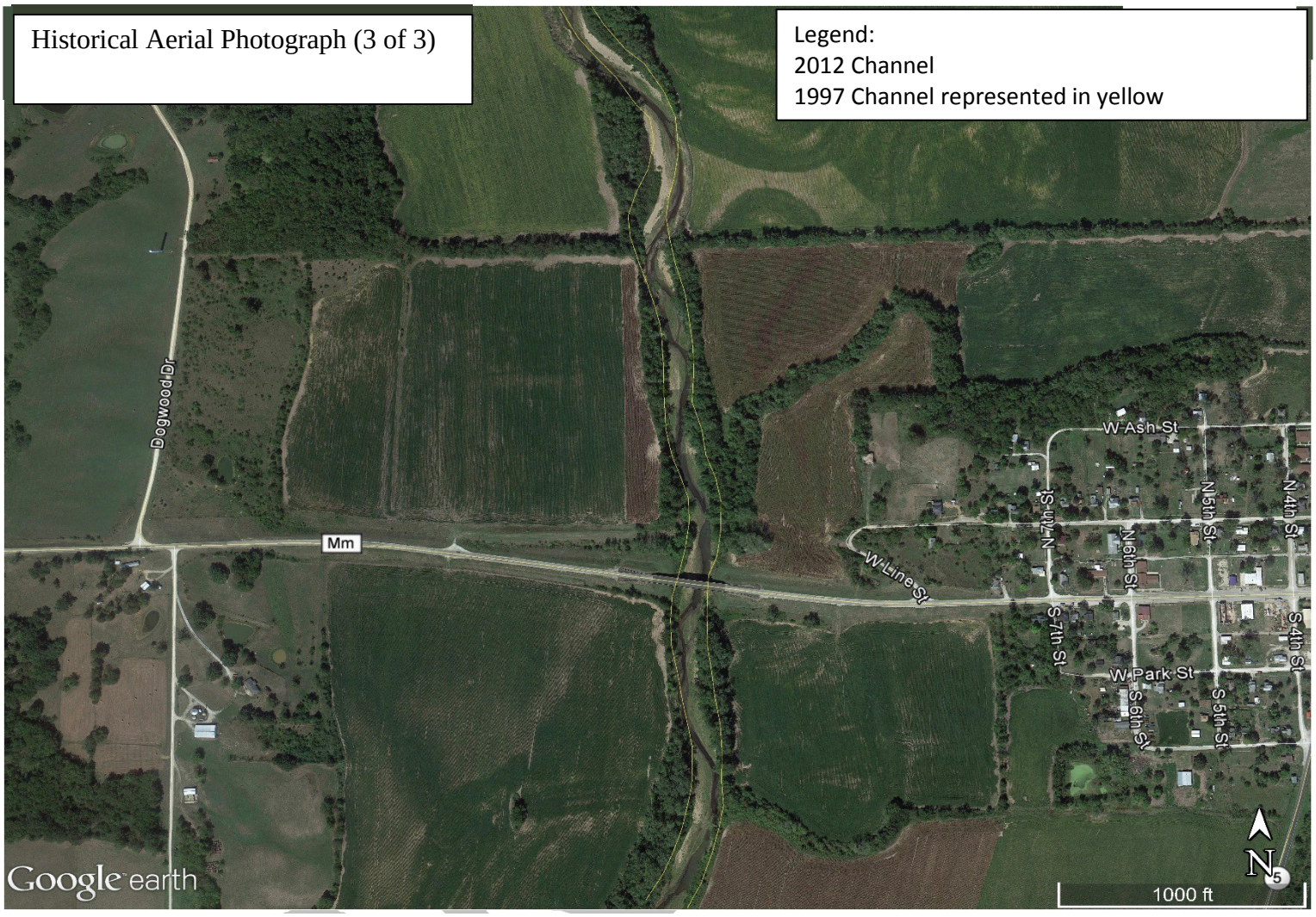


Figure 2 – Comparison of aerial photographs

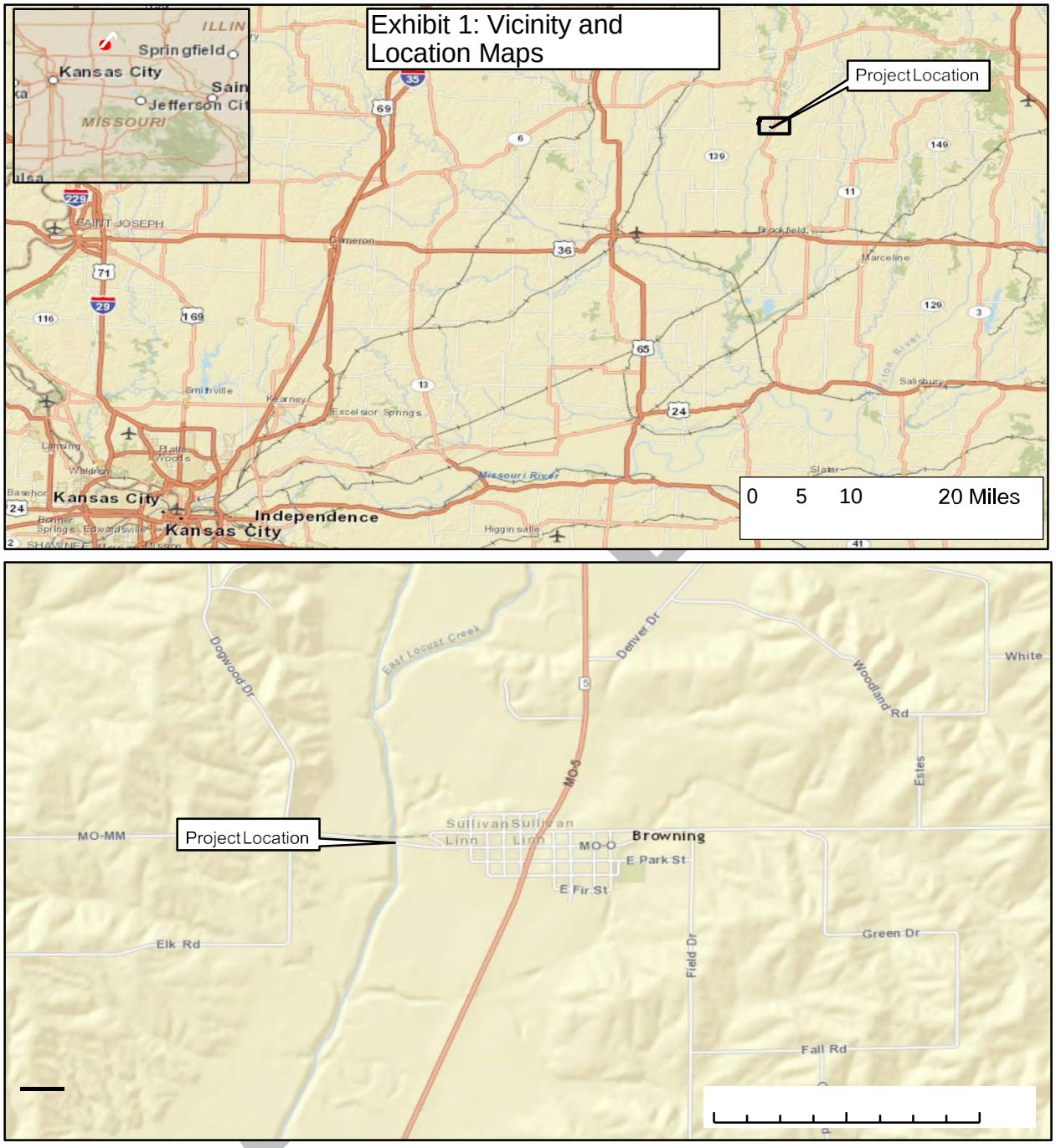


Figure 3 – Project location

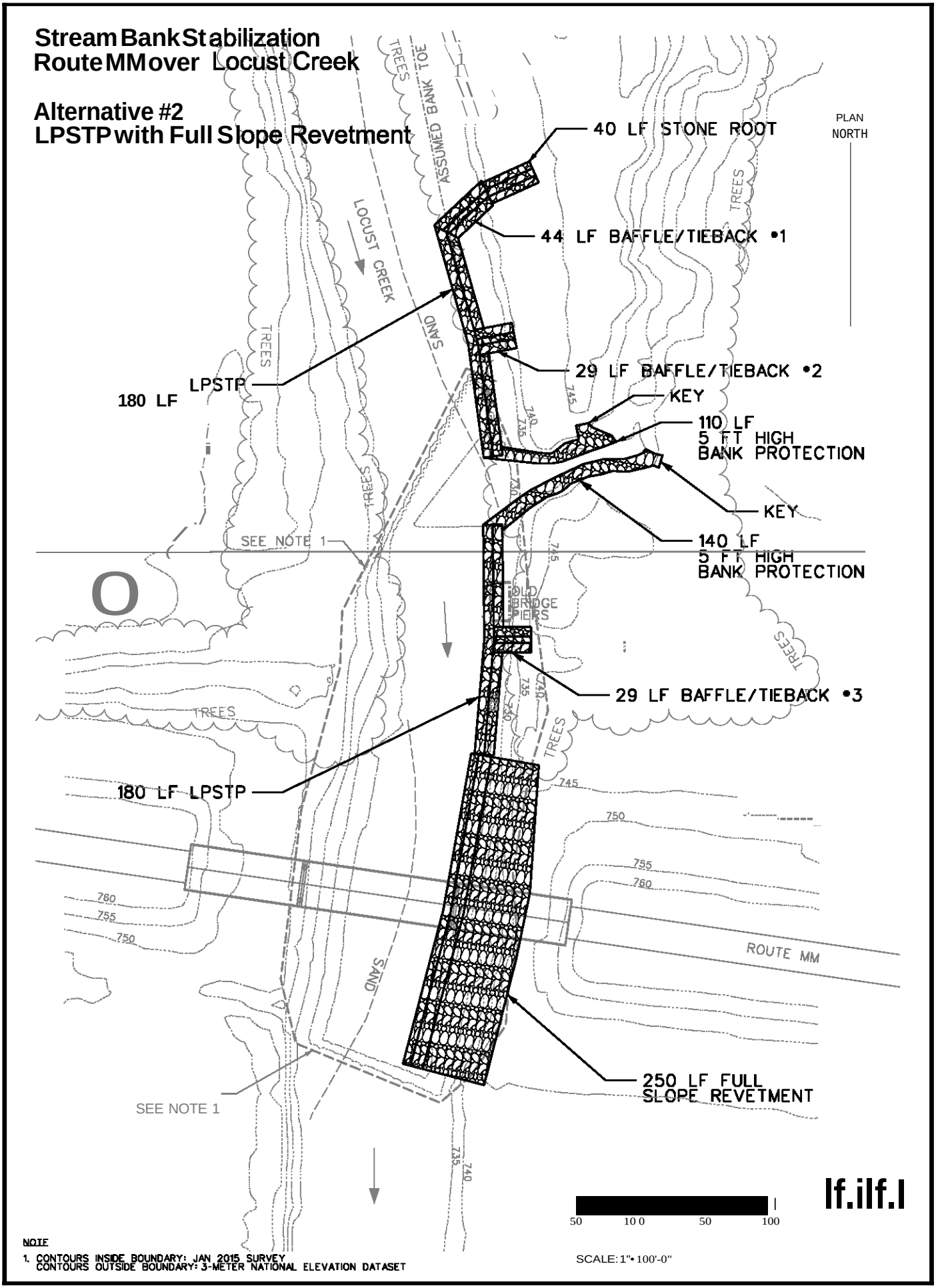


Figure 4 - Alternative #2

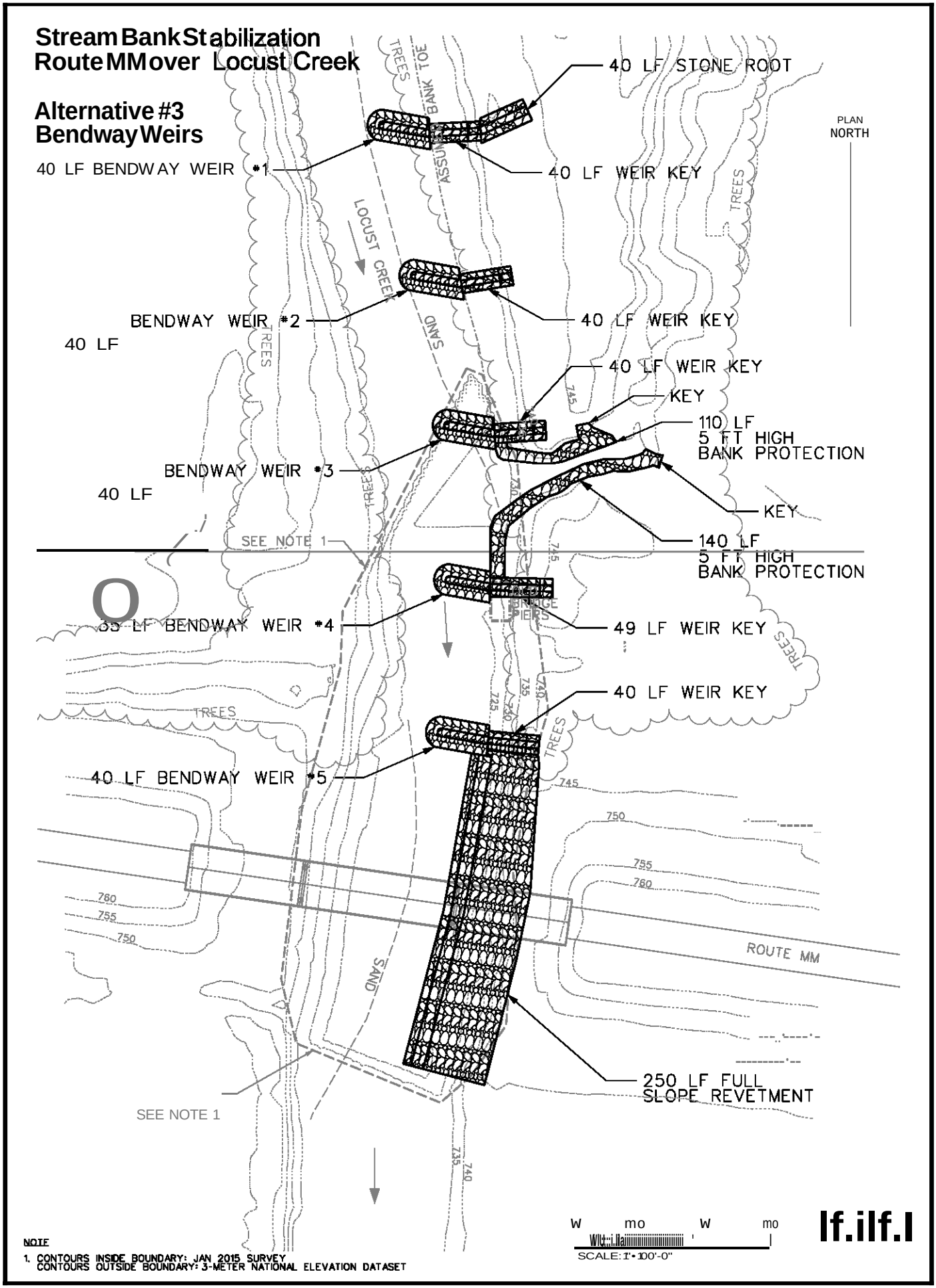


Figure 5 - Alternative #3

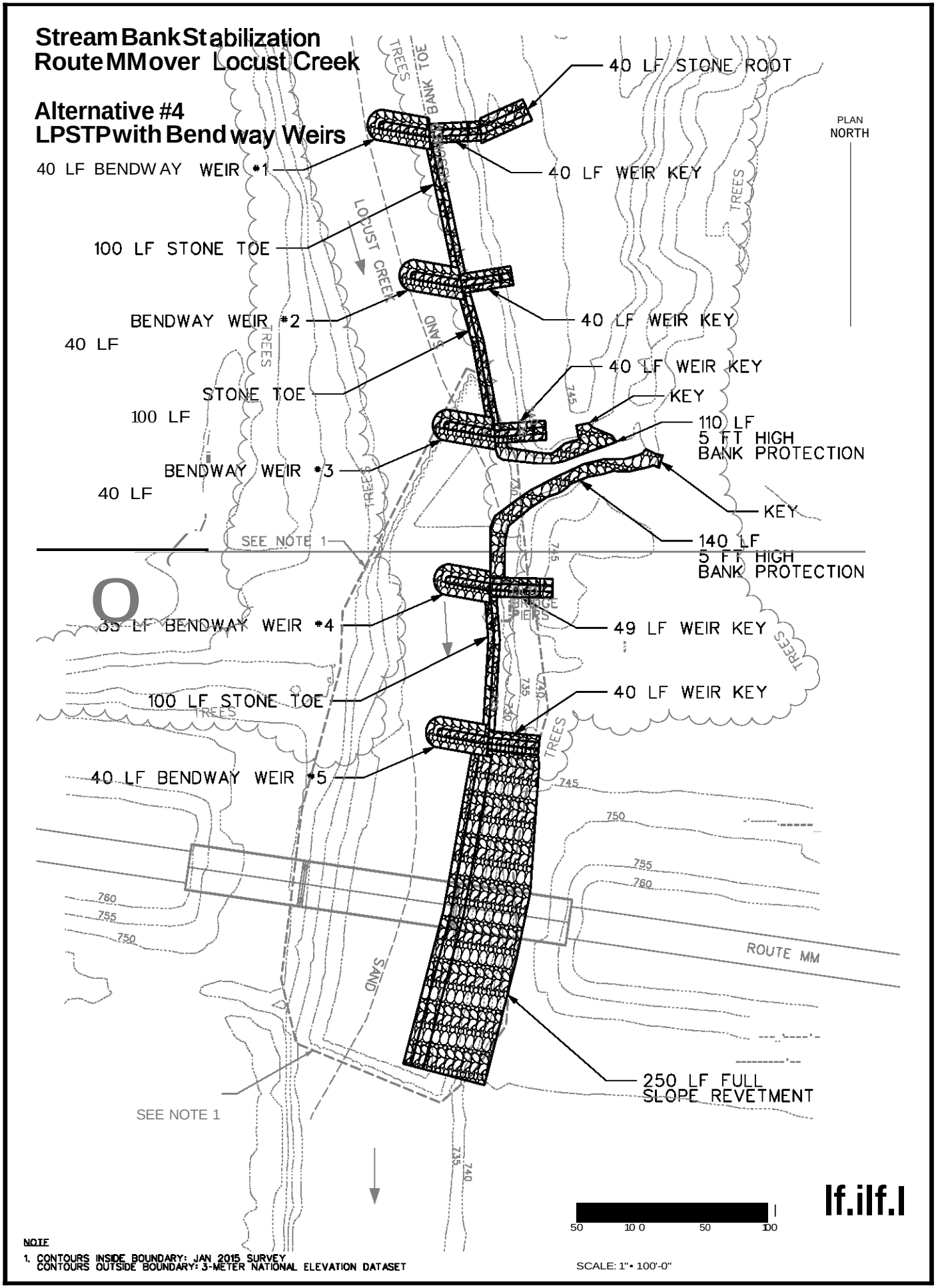


Figure 6 - Alternative #4

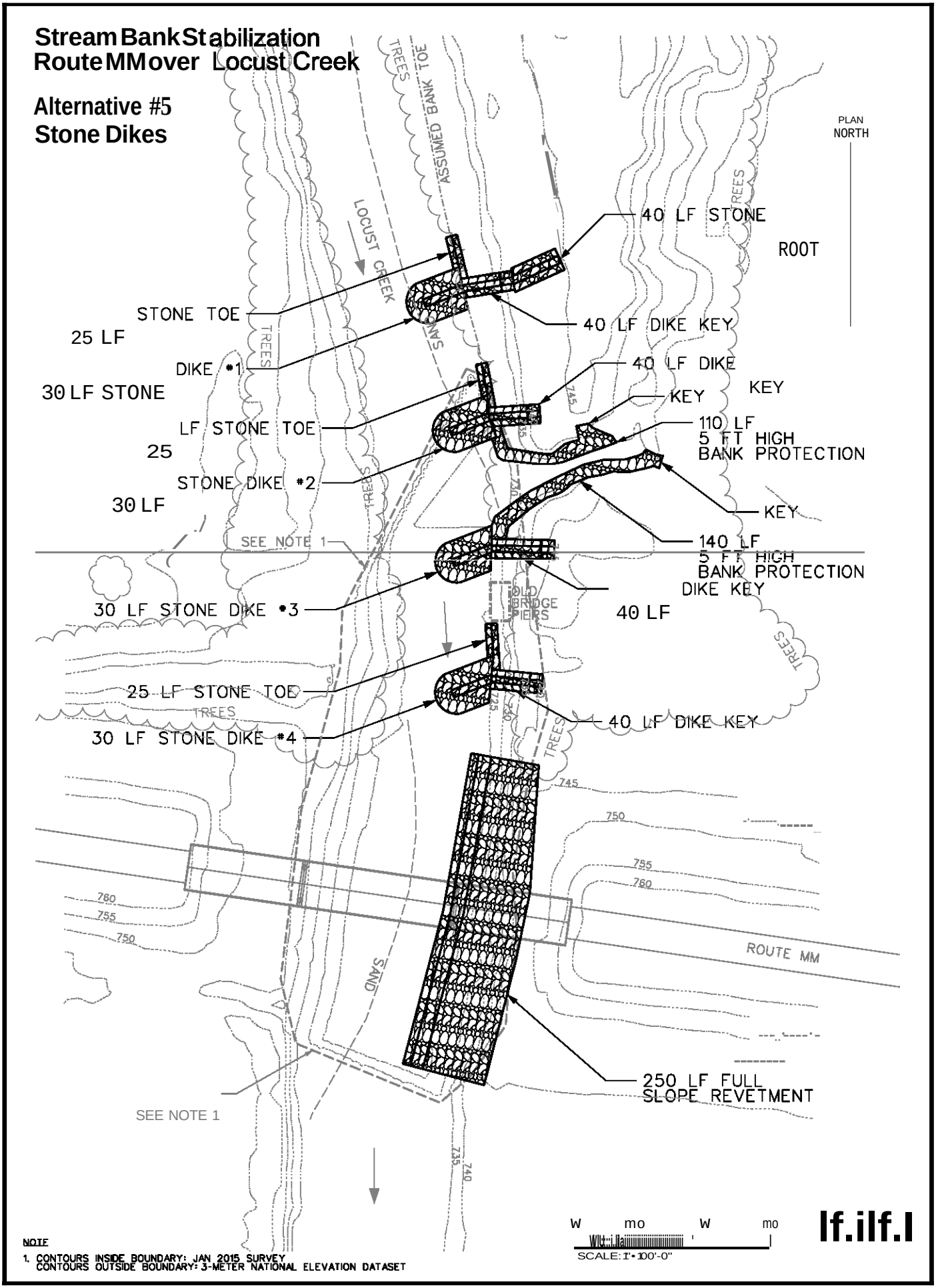


Figure 7 - Alternative #5

APPENDIX II

U.S. FISH AND WILDLIFE SERVICE COORDINATION

DRAFT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Columbia Ecological Services Field Office
101 PARK DEVILLE DRIVE, SUITE A
COLUMBIA, MO 65203
PHONE: (573)234-2132 FAX: (573)234-2181

Consultation Code: 03E14000-2016-SLI-0817 February 05, 2016
Event Code: 03E14000-2016-E-00703
Project Name: Route MM, Locust Creek, Emergency Streambank Stabilization Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system in order to provide information on natural resources that could be affected by your project. The response is provided by the U.S. Fish and Wildlife Service (Service) under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact our office if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. **Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days.** This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, please visit species profiles at http://www.fws.gov/midwest/endangered/section7/s7process/lifehistory.html. Indiana bats, gray bats, and northern long-eared bats occur throughout Missouri and the information below may help in determining if your project may affect these species.

Gray bats - Gray bats roost in caves or mines year-round and use forest riparian areas for foraging. If your project will impact caves or mines or will involve tree removal around these areas (particularly within stream corridors, riparian areas, or associated upland woodlots), gray bats could be affected.

Indiana and northern long-eared bats - These species hibernate in caves or mines only during the winter. The rest of the year they roost under loose tree bark in tree crevices or cavities during the day and forage around tree canopies of floodplain, riparian, and upland forests at night. Trees which should be considered potential roosting habitat include those exhibiting loose or shaggy bark, crevices, or hollows. Tree species often include, but are not limited to: shellbark or shagbark hickory, white oak, cottonwood, and maple. If your project will impact caves or mines or will involve clearing forested habitat containing suitable roosting habitat, Indiana bats or northern long-eared bats could be affected. If your project will involve removal of over 5 acres of forested habitat, you may wish to complete a Summer Habitat Assessment prior to contacting our office in order to expedite the consultation process. The Summer Habitat Assessment Form is available in Appendix A of the most recent version of the Range-wide Indiana Bat Summer Survey Guidelines, located at www.fws.gov/midwest/Endangered/mammals/inba/ under the heading Summer Survey Guidance.

If no suitable habitat for any federally-listed, candidate, or proposed species is present, and no species or their critical habitat will be affected, then no further consultation or coordination is required. However, if any of the following apply, please contact our office for further consultation:

1. Designated critical habitat is present within the project area,
2. Suitable habitat for listed, candidate, or proposed species is present within the project area (see above for habitat descriptions for bat species), or
3. You determine that project activities may affect these species or their critical habitat (e.g., project occurs upstream or within a distance such that the species or habitat could be affected).

The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. For additional conservation measures that may benefit species identified in the enclosed list, please contact our office.

Other Considerations

Bald and Golden Eagles - Although the bald eagle has recently been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden

Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside of the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts and these can be found at http://www.fws.gov/habitatconservation/communicationtowers.html.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines, In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. In order to minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee's and the Service at http://www.aplic.org/uploads/files/2634/APPguidelines_final-draft_Aprl2005.pdf. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas known to support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow guidelines located at http://www.fws.gov/windenergy. In addition, please refer to the Service's Eagle Conservation Plan Guidance, located at http://www.fws.gov/windenergy/eagle_guidance.html, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

Next Steps

Should you determine that project activities may impact any of the natural resources described herein, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header.

If you have not already done so, please contact the Missouri Department of Conservation (Policy Coordination, P. O. Box 180, Jefferson City, MO 65102) for information concerning Missouri Natural Communities and Species of Conservation Concern.

We appreciate your concern for threatened and endangered species and please feel free to contact our office with questions or for additional information.

Amy Salveter

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Route MM, Locust Creek, Emergency Streambank Stabilization Project

Official Species List

Provided by:

Columbia Ecological Services Field Office
101 PARK DEVILLE DRIVE
SUITE A
COLUMBIA, MO 65203
(573) 234-2132

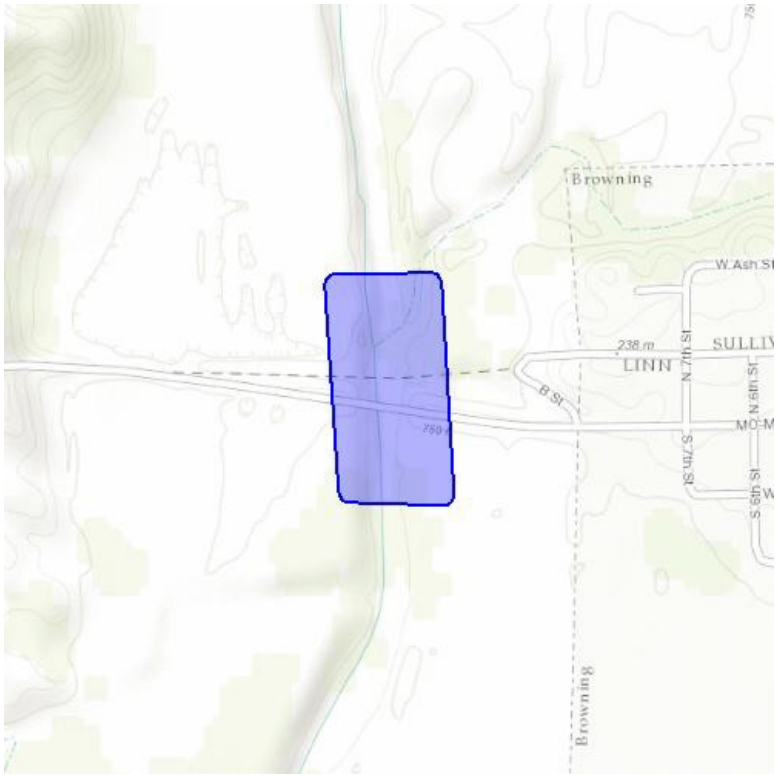
Consultation Code: 03E14000-2016-SLI-0817
Event Code: 03E14000-2016-E-00703

Project Type: BRIDGE CONSTRUCTION / MAINTENANCE

Project Name: Route MM, Locust Creek, Emergency Streambank Stabilization Project
Project Description: Emergency streambank stabilization project adjacent to Route MM bridge over Locust Creek in Linn County, MO. The project would remore approximately 1.5-acres of trees and grasses. A bat survey was done on June 22, 2015. Any necessary tree clearing would be done between November 1 and March 31.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-93.17286290505461 40.034434985687774, -93.17311478372392 40.03717644348194, -93.173096482172 40.03725828765057, -93.17297880712582 40.037326044004914, -93.17123000684809 40.037334258291715, -93.17115676545168 40.03731347651948, -93.17109257329713 40.03720747794457, -93.17087799657595 40.0343858122207, -93.17089331996934 40.034311648265636, -93.17094565915416 40.03425691520114, -93.17101906415606 40.03423829251843, -93.17273031350756 40.03429168756781, -93.17282601705061 40.034334873607186, -93.17286290505461 40.034434985687774)))

Project Counties: Linn, MO | Sullivan, MO

Endangered Species Act Species List

There are a total of 4 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Flowering Plants	**Status**	**Has Critical Habitat**	**Condition(s)**
Mead's milkweed *(Asclepias meadii)*	Threatened		
Mammals			
Gray bat *(Myotis grisescens)* Population: Entire	Endangered		
Indiana bat *(Myotis sodalis)* Population: Entire	Endangered		
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Appendix A: FWS National Wildlife Refuges

There are no refuges within your project area.

Appendix B: FWS Migratory Birds

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no otherwise lawful activities. For more information regarding these Acts see:
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/bald-and-golden-eagle-protection-act.php

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to:
http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

For information about conservation measures that help avoid or minimize impacts to birds, please visit:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

To search and view summaries of year-round bird occurrence data within your project area, go to the Avian Knowledge Network Histogram Tools at:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

Migratory birds of concern that may be affected by your project:
There are 22 birds on your Migratory birds of concern list.

Species Name	Bird of Conservation Concern (BCC)	Seasonal Occurrence in Project Area
Acadian Flycatcher *(Empidonax virescens)*	Yes	Breeding

Bald eagle *(Haliaeetus leucocephalus)*	Yes	Year-round
Bell's Vireo *(Vireo bellii)*	Yes	Breeding
Black-billed Cuckoo *(Coccyzus erythropthalmus)*	Yes	Breeding
Black-crowned Night-Heron *(Nycticorax nycticorax)*	Yes	Breeding
Blue-winged Warbler *(Vermivora pinus)*	Yes	Breeding
Dickcissel *(Spiza americana)*	Yes	Breeding
Field Sparrow *(Spizella pusilla)*	Yes	Breeding
Henslow's sparrow *(Ammodramus henslowii)*	Yes	Breeding
Kentucky Warbler *(Oporornis formosus)*	Yes	Breeding
Least Bittern *(Ixobrychus exilis)*	Yes	Breeding
Loggerhead Shrike *(Lanius ludovicianus)*	Yes	Year-round
Northern Flicker *(Colaptes auratus)*	Yes	Year-round
Peregrine Falcon *(Falco peregrinus)*	Yes	Breeding
Pied-billed Grebe *(Podilymbus podiceps)*	Yes	Breeding
Red-headed Woodpecker	Yes	Year-round

(Melanerpes erythrocephalus)		
Rusty Blackbird *(Euphagus carolinus)*	Yes	Wintering
Short-eared Owl *(Asio flammeus)*	Yes	Wintering
Swainson's hawk *(Buteo swainsoni)*	Yes	Breeding
Upland Sandpiper *(Bartramia longicauda)*	Yes	Breeding
Willow Flycatcher *(Empidonax traillii)*	Yes	Breeding
Wood Thrush *(Hylocichla mustelina)*	Yes	Breeding

Appendix C: NWI Wetlands

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of

this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following NWI Wetland types intersect your project area in one or more locations. To understand the NWI Classification Code, see http://wetlandsfws.usgs.gov/Data/interpreters/wetlands.aspx.

Wetland Types	**NWI Classification Code**	**Total Acres**
Freshwater Forested/Shrub Wetland	PFO1A	10.3
Freshwater Forested/Shrub Wetland	PFO1C	5.36
Riverine	R2UBGx	315.0

APPENDIX III

MISSOURI STATE HISTORIC PRESERVATION OFFICE COORDINATION

DRAFT

DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
600 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-2896

January 7, 2016

REPLY TO
ATTENTION OF

Environmental Resources Section
Planning Branch

Dr. Toni M. Prawl
Director and Deputy State Historic Preservation Officer
State Historic Preservation Office
Department of Natural Resources
P. O. Box 176
Jefferson City, Missouri 65102-0176

Dear Dr. Prawl:

The U.S. Army Corps of Engineers, Kansas City District, in cooperation with the Missouri Department of Transportation, is planning an emergency stream bank erosion stabilization project under the authority of Section 14 of the Flood Control Act of 1946 (PL 79-526), as amended on the Route MM Bridge at Locust Creek west of Browning in Linn County. The project will be undertaken with federal funds. This letter initiates Section 106 consultation for the project.

The proposed stream bank stabilization project is situated along Locust Creek, a channelized, north south stream in the vicinity of the project. Increased stream bank erosion near the Route MM roadway embankment and bridge has put the stability of the riverbank bridge in jeopardy. The current rate of erosion for the banks is estimated to be 5 to10 feet per year and with approximately 37 feet between the roadway and the top of the stream bank remaining total failure is estimated to occur within the next three to four years. Any further erosion and loss of embankment will continue to lower the stability of the roadway and bridge. The proposed project would stabilize the left bank of Locust Creek using Longitudinal Peaked Stone Toe Protection (LPSTP) with tie backs and a full slope revetment on the left abutment. The LPSTP has a total length of 360 feet that would be split by a tributary stream. The upstream end of the LPSTP will have a buried 40 foot stone root to prevent flanking of the structure. Other features would include There will be three baffles, two 29 feet and one 44 feet in length, installed perpendicular to the LPSTP alignment. Rock would also be placed along a 140 foot segment of the left bank and 110 foot segment on the right bank. No borrow material would be required for the project. A schematic of the project is included as an attachment.

A background review of the project area was conducted using the Missouri Department of Natural Resources Archaeology Viewer on-line. The review found no sites recorded within one mile of the project area. The northern portion of the proposed project

was surveyed in 1989 as part a proposed waterworks improvement project for the City of Browning. The remainder of the project area to the south has not been professionally surveyed. However, the area has been previously disturbed by the construction of the original alignment of Route MM and subsequent realignment of the bridge and roadway (see attached maps).

Given that no archeological sites are recorded in the area and the project area has been partially surveyed and heavily disturbed by past creek channelization and road construction, it is unlikely that the project would affect historic properties. Therefore, we request your concurrence that the proposed project will have no effect on historical properties and that the project be allowed to proceed with no further consultation with your office. In the unlikely event that archeological materials are discovered during construction, work in the area of discovery will cease and the discovery investigated by a qualified archeologist. The findings on the discovery would be coordinated with your office and appropriate federally recognized Native American tribes.

Thank you for your consideration in this matter. If you have any questions or have need of further information please contact me at (816) 389-3138 or at Timothy.M.Meade@usace.army.mil.

Sincerely,

Timothy Meade
District Archeologist

Enclosure

CULTURAL RESOURCE ASSESSMENT
Section 106 Review

CONTACT PERSON/ADDRESS

Timothy Meade, District Archeologist
Corps of Engineers, Kansas City District
600 Federal Building
Kansas Citv, Missouri 64106-2896

C:

Amber Tucker, EPA
Mike Meinkoth, MoDOT

PROJECT:
ll Streambank Erosion Stabilization, Route MM Bridge at Locust Creek West of Browning

FEDERAL AGENCY
COE

COUNTY:
ll LINN

The State Historic Preservation Office has reviewed the information submitted on the above referenced project. Based on this review, we have made the following determination:

D After review of initial submission, the project area has a low potential for the occurrence of cultural resources. A cultural resource survey, therefore, is not warranted.

X Adequate documentation has been provided (36 CFR Section 800.11). There will be "no historic properties affected" by the current project.

An adequate cultural resource survey of the project area has been previously conducted. It has been determined that for the proposed undertaking there will be "no historic properties affected".

For the above checked reason, the State Historic Preservation Office has no objection to the initiation of project activities. PLEASE BE ADVISED THAT, IF THE CURRENT PROJECT AREA OR SCOPE OF WORK ARE CHANGED, A BORROW AREA IS INCLUDED IN THE PROJECT, OR CULTURAL MATERIALS ARE ENCOUNTERED DURING CONSTRUCTION, APPROPRIATE INFORMATION MUST BE PROVIDED TO THIS OFFICE FOR FURTHER REVIEW AND COMMENT. Please retain this documentation as evidence of compliance with Section 106 of the National Historic Preservation Act, as amended.

By: 'L

Toni M. Prawl,Ph.D., Deputy State Historic Preservation Officer

January 27. 2016
Date

MISSOURI DEPARTMENT OF NATURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
P.O. Box 176, Jefferson City, Missouri 65102
For additional information, please contact Judith Deel,(573) 751-7862. Please be sure to refer to the project number: 007-Ll-16

APPENDIX IV

PUBLIC NOTICE
AND
CLEAN WATER ACT SECTION 404(B)(1) EVALUATION

DRAFT

PUBLIC NOTICE

US Army Corps
of Engineers
Kansas City District

Project No. 2016-001-CW
Issue Date: August 3, 2016
Expiration Date: September 2, 2016

30-Day Notice

JOINT PUBLIC NOTICE: This public notice is issued jointly with the Missouri Department of Natural Resources, Water Pollution Control Program. The Missouri Department of Natural Resources will use the comments to this notice in deciding whether to grant Section 401 water quality certification. Commenters are requested to furnish a copy of their comments to the Missouri Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102.

APPLICANT: Kansas City District, Corps of Engineers
635 Federal Building
Kansas City, Missouri 64106-2896

PROJECT LOCATION (As shown on the attached drawings)**:** The project area is located at the MoDOT Route MM, Locust Creek Bridge on Locust Creek, just west of Browning in Linn County, Missouri. It is in Section 7 of Township 60 North, Range 20 West. Locust Creek generally flows north to south for several hundred feet upstream and downstream of the bridge, which is situated east to west across the river.

AUTHORITY: Section 14 of the Flood Control Act of 1946 (Public Law 79-526), as amended, and Section 404 of the Clean Water Act (33 USC 1344).

ACTIVITY (As shown on the attached drawings)**:** The U.S. Army Corps of Engineers - Kansas City District, in cooperation with the Missouri Department of Transportation, propose an emergency streambank stabilization project along Locust Creek in Linn County, Missouri. The purpose of the project is to address severely eroding banks along Locust Creek that are threatening to damage and flank the left bridge abutment of the Route MM Bridge and lead to its potential failure. The left bank upstream of the bridge is experiencing erosion because of the migrating bend in Locust Creek. There is limited vegetation on the slope and stream bank sloughing is occurring. The channel of Locust Creek has migrated toward the left bank directing the river flow away from the center of the bridge. High flow events have accelerated the rate of erosion on the left bank and the unstable creek bend is expected to damage the left abutment and potentially flank the bridge in 3 – 4 years. If the river experiences high flow events before the project is constructed, bridge damage and failure is likely.

The plan would consist of Longitudinal Peak Stone Toe Protection (LPSTP) with tiebacks on the left bank in addition to a full slope revetment on the left bridge abutment. The alignment of the LPSTP is set to relocate the left bank into alignment with the existing bridge piers. The LPSTP protects the toe of the slope and allows the upper banks to continue to erode until it stabilizes and vegetation is established. The tiebacks prevent erosion from occurring between the LPSTP and the bank and encourage sediment deposition. The revetment at the bridge abutment will provide additional protection during high flow events. The LPSTP has a total length of 360-ft split into two sections by an incoming tributary starting upstream and extending to the stone slope revetment. The LPSTP will be approximately 5-ft tall with 1.5:1 side slopes. The upstream end of the LPSTP will have a 40-ft buried stone root to prevent flanking of the structure. There will be three tiebacks perpendicular to the LPSTP alignment that run up the bank at a 3:1 slope, each with a 5-ft top width. The first tieback will be 29-ft in length and placed approximately 90-ft upstream of the revetment. The second tieback will be 29-ft in length and placed approximately 90-ft downstream of the stone root. The third tieback will be 44-ft in length and tied into the stone root.

The incoming tributary upstream of the bridge on the left bank, will have rock approximately 3-ft tall with a 3:1 side slope placed along a portion of the banks. The left bank will be lined for approximately 140-ft and the right bank will be lined for approximately 110-ft.
The left bridge abutment will be protected by a full slope revetment that extends up to the existing bank height. The revetment will be approximately 250-ft in length with 2:1 side slopes with a minimum thickness of 27-inches. The toe will extend approximately 10-ft into the channel. All the rock used will utilize type A gradation.

Direct project related impacts to waters of the U.S. would result from contouring the existing stream banks and placing clean rock fill along the left bank of Locust Creek. Fill would be placed along approximately 610 linear feet of the river. Contouring the stream banks would result in approximately 975 cubic yards of earthen fill material being placed below the ordinary high water mark. Additionally, about 2,600 cubic yards of clean rock fill with minimal fines would be placed below the ordinary high water mark. These quantities have been increased by 20% from the preliminary design calculations to represent the maximum amount of fill that would be placed below the ordinary high water mark.

WETLANDS/AQUATIC HABITAT: No wetlands would be impacted as a result of this project. The Missouri Stream Mitigation Method (MSMM) is used within Missouri to assess the impacts (debits) and benefits (credits) of projects as part of CWA Section 404 authorizations. This method has been publicly vetted and approved for use by Corps Regulatory Offices within the state of Missouri. Completion of the MSMM worksheets demonstrated that the Recommended Plan would result in an overall net benefit to the environment. The Recommended Plan generated 1,494.5 debits resulting from the addition of armor to the river banks. A total of 2,165.5 credits would be generated by restoring streambank stability along 610 linear feet of Locust Creek. MSMM worksheets have been prepared (Appendix V). A DRAFT Section 404 (b)(1) Evaluation (40 CFR 230) has been prepared (Appendix IV).

APPLICANT'S STATEMENT OF AVOIDANCE, MINIMIZATION, AND COMPENSATORY MITIGATION FOR UNAVOIDABLE IMPACTS TO AQUATIC RESOURCES: The applicant proposes to minimize impacts to downstream receiving waters by incorporating on-site best management practices. Unavoidable impacts of the project are proposed will be off-set by the total net benefit of the project as referenced above by the MSMM worksheets.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1968, as amended: The Corps has made a preliminary determination that the proposed project would not result in significant degradation of the human environment and therefore the proposed project would support a Finding of No Significant Impact (FONSI). The Corps has prepared a Draft Environmental Assessment (EA) for the project; this draft document may be requested as described below under "Additional Information" and is available for review at the Corps of Engineers office and on line at the Corps' web page at: http://www.nwk.usace.army.mil/regulatory/CurrentPN/currentnotices.htm. The Corps will utilize comments received in response to this Public Notice and the Draft EA to complete our evaluation of the project for compliance with the requirements of NEPA, and other Federal, state, and local regulations, including this review for project compliance with the requirements of Section 404 of the Clean Water Act. The Corps has made a preliminary determination that the project as proposed would not be contrary to the public interest and is in compliance with the Section 404(b)(1) Guidelines (Appendix IV of Draft Environmental Assessment).

ADDITIONAL INFORMATION: Additional information about this application may be obtained by contacting Mr. Rick Morrow, Biologist, U.S Army Corps of Engineers, Kansas City District, ATTN: Environmental Resources Section, 601 East 12th Street, Kansas City, Missouri 64106, by email at rick.morrow@usace.army.mil, or by telephone at (816) 389-3073. All comments to this public notice should be directed to the above address on or before September 2, 2016.

CULTURAL RESOURCES: The proposed project has been reviewed in compliance with the National Historic Preservation Act of 1966 (Public Law 89-665) including a check of the National Register of Historic Places and supplements thereto. No sites were identified within the project area. A site inspection of the project area confirmed the low potential for archeological sites in the area. The results of the research and survey were coordinated by letter with State Historic Preservation Officer (SHPO). In that letter, the Corps requested concurrence that any proposed work in the project area would have no effect on historical properties and that any work could proceed without any further coordination, unless in the unlikely event that archeological materials were discover during construction. SHPO concurred with this recommendation.

ENDANGERED SPECIES: In compliance with the Endangered Species Act, a preliminary determination has been made that the described work will not affect species designated as threatened or endangered or adversely affect critical habitat. The U.S. Fish and Wildlife Service concurred with this determination in previous correspondence.

FLOODPLAINS: This activity is being reviewed in accordance with Executive Order 11988, Floodplain Management, which discourages direct or indirect support of floodplain development whenever there is a practicable alternative. By this public notice, comments are requested from individuals and agencies that believe the described work will adversely impact the floodplain.

WATER QUALITY CERTIFICATION: Section 401 of the Clean Water Act (33 USC 1341) requires that all discharges of dredged or fill material must be certified by the appropriate state agency as complying with applicable effluent limitations and water quality standards. This public notice serves as an application to the state in which the discharge site is located for certification of the discharge. The discharge must be certified before Department of the Army authorization can be issued. Certification, if issued, expresses the state's opinion that the discharge will not violate applicable water quality standards.

PUBLIC INTEREST REVIEW: The decision to issue authorization will be based on an evaluation of the probable impact including the cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and, in general, the needs and welfare of the people. The evaluation of the impact of the activity on the public interest will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency under authority of Section 404(b) of the Clean Water Act (33 USC 1344). The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny an authorization for this proposal. To make this decision, comments are used to address impacts on endangered species, historic properties, water quality, general environmental effects, and other public interest factors listed above. Comments are used in preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

COMMENTS: This notice is provided to outline details of the above-described activity so this District may consider all pertinent comments prior to determining if issuance of an authorization would be in the public interest. Any interested party is invited to submit to this office written facts or objections relative to the activity on or before the public notice expiration date. Comments both favorable and unfavorable will be accepted and made a part of the record and will receive full consideration in determining whether it would be in the public interest to issue the Department of the Army authorization. Copies of all comments, including names and addresses of commenters, may be provided to the applicant. Comments should be mailed to the address shown on page 1 of this public notice.

PUBLIC HEARING: Any person may request, in writing, prior to the expiration date of this public notice, that a public hearing be held to consider this application. Such requests shall state, with particularity, the reasons for holding a public hearing.

NOTE: This public notice is posted on the Kansas City District Regulatory web page and can be viewed at the following address:

http://www.nwk.usace.army.mil/Media/Public-Notices/Planning-Public-Notices/

Route MM, Locust Creek Bridge
Section 14 Emergency Streambank Stabilization Project
Locust Creek, Linn County, Missouri

Section 404(b)(1) Evaluation

1. Introduction

This Section 404(b)(1) Evaluation is for the Route MM, Locust Creek Bridge Section 14 Emergency Streambank Stabilization Project, Locust Creek, Linn County, Missouri. This evaluation meets the requirements found in 40 CFR 230, Section 404(b)(1): Guidelines for Specification of Disposal Sites for Dredged and Fill Material.

2. Project Description

a. Location: The project area is located at the MoDOT Route MM Bridge on Locust Creek, just west of Browning in Linn County, Missouri. It is in Section 7 of Township 60 North, Range 20 West. Locust Creek generally flows north to south for several hundred feet upstream and downstream of the bridge, which is situated east to west across the river.

b. General Description: The U.S. Army Corps of Engineers - Kansas City District, in cooperation with the Missouri Department of Transportation, Northwest District, propose an emergency streambank stabilization project along Locust Creek in Linn County, Missouri. The purpose of the project is to address severely eroding banks along Locust Creek that are threatening to damage and flank the left bridge abutment of the Route MM Bridge and lead to its potential failure. The left bank upstream of the bridge is experiencing erosion because of the migrating bend in Locust Creek. There is limited vegetation on the slope and stream bank sloughing is occurring. The channel of Locust Creek has migrated toward the left bank directing the river flow away from the center of the bridge. High flow events have accelerated the rate of erosion on the left bank and the unstable river bend is expected to damage the left abutment and potentially flank the bridge in 3 – 4 years. If the river experiences high flow events before the project is constructed, bridge damage and failure is likely.

The plan would consist of Longitudinal Peak Stone Toe Protection (LPSTP) with tiebacks on the left bank in addition to a full slope revetment on the left bridge abutment. The alignment of the LPSTP is set to relocate the left bank into alignment with the existing bridge piers. The LPSTP protects the toe of the slope and allows the upper banks to continue to

erode until it stabilizes and vegetation is established. The tiebacks prevent erosion from occurring between the LPSTP and the bank and encourage sediment deposition. The revetment at the bridge abutment will provide additional protection during high flow events. The LPSTP has a total length of 360-ft split into two 180-ft sections by an incoming tributary starting upstream and extending to the stone slope revetment. The LPSTP will be approximately 5-ft tall with 1.5:1 side slopes. The upstream end of the LPSTP will have a 40-ft buried stone root to prevent flanking of the structure. There will be three tiebacks perpendicular to the LPSTP alignment that run up the bank at a 3:1 slope, each with a 5-ft top width. The first tieback will be 29-ft in length and placed approximately 90-ft upstream of the revetment. The second tieback will be 29-ft in length and placed approximately 90-ft downstream of the stone root. The third tieback will be 44-ft in length and tied into the stone root.

The incoming tributary upstream of the bridge on the left bank, will have rock approximately 3-ft tall with a 3:1 side slope placed along a portion of the banks. The left bank will be lined for approximately 140-ft and the right bank will be lined for approximately 110-ft.

The left bridge abutment will be protected by a full slope revetment that extends up to the existing bank height. The revetment will be approximately 250-ft in length with 2:1 side slopes with a minimum thickness of 27-inches. The toe will extend approximately 10-ft into the channel. All the rock used will utilize type A gradation.

Direct project related impacts to waters of the U.S. would result from contouring the existing stream banks and placing clean rock fill along both banks of Locust Creek. Fill would be placed along approximately 610 linear feet of the river. Contouring the stream banks would result in approximately 975 cubic yards of earthen fill material being placed below the ordinary high water mark. Additionally, about 2,600 cubic yards of clean rock fill with minimal fines would be placed below the ordinary high water mark. These quantities have been increased by 20% from the preliminary design calculations to represent the maximum amount of fill that would be placed below the ordinary high water mark.

c. Authority: This activity is regulated by the U.S. Army Corps of Engineers under Section 14 of the Flood Control Act of 1946 (Public Law 79-526), as amended, and Section 404 of the Clean Water Act (33 USC 1344).

3. Review of Compliance (§ 230.10 a-d)

a. No practicable alternative to the proposed project would have a less adverse impact on the aquatic ecosystem while providing a suitable level of bank protection to minimize the threat of damage to the Route MM, Locust Creek Bridge. Additional information on the impacts of various alternatives to waters of the U.S. can be found in Section 4 of the Draft EA.

b. The proposed project does not appear to violate any applicable state water quality standards, or applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act. The proposed project is not likely to jeopardize the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, to result in the likelihood of the destruction or adverse modification of critical habitat. Furthermore, the proposed project would not violate the requirements of any federally designated marine sanctuary.

c. The proposed project would not cause or contribute to significant degradation of waters of the U.S. This includes no adverse effects on human health, life stages of organisms' dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values.

d. Appropriate and practical steps have been taken which will minimize potential adverse impacts on the aquatic ecosystem.

4. Technical Evaluation Factors (Subparts C-F)

a. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

1) Substrate: Placement of riprap structures along 610 linear feet of Locust Creek to armor the streambank would bury the existing sand and silt substrate. It is necessary to bury the existing substrate with riprap because it is highly erosive and is threatening the stability of the Route MM Bridge. The proposed project would result in a minor, long-term impact to the existing substrate along a relatively short section of Locust Creek.

The Missouri Stream Mitigation Method was used to determine any compensatory mitigation that would be necessary to offset any potential negative impacts resulting from armoring the banks. The Missouri Stream Mitigation Method has been publicly vetted and approved for use by Corps Regulatory Offices within the state of Missouri. Using this method, a total of 1,494.5 debits were generated by protecting the streambanks using riprap structures. A

total of 2,165.5 credits were generated by providing streambank stability along this same stretch of Locust Creek. Therefore, no additional mitigation measures are proposed.

2) **Suspended particulates/turbidity:** The proposed plan would result in minor short-term impacts to suspended particulates and an increase in turbidity during project construction. This would result from disturbing the existing sand/silt substrate in the channel and along the streambanks. Long-term, the eroding streambanks would be stabilized as a result of the project, therefore reducing the amount of particulates that enter Locust Creek. No long-term negative impacts are expected.

3) **Water:** The project would not result in any long-term negative impacts to water quality. The project may result in minor short-term construction related impacts to water quality due to activities taking place within the river channel and on the banks. These activities would result in increased suspended particulates and increased turbidity. This has the potential to have secondary impacts on nutrient concentrations, dissolved oxygen, pH, and conductivity. These impacts would be minimized by using Best Management Practices (BMPs) to minimize the amount of runoff, and land/channel disturbance that would occur during project construction. Furthermore, project construction is tentatively scheduled for mid/late fall time period which would further minimize the impact to water quality because of cooler temperatures and reduced biological activity during this time of the year.

4) **Current patterns and water circulation:** Earthen fill material and clean rock fill would be used to protect the streambanks from erosion and would redirect the flow of water toward the center of the Route MM Bridge. Any changes to the direction or velocity of water flow and circulation would be minor. It is not anticipated that this would result in any significant changes to the location, structure and dynamics of the aquatic community, or the rate and extent of the mixing of dissolved and suspended components of the water body.

5) **Normal water fluctuations:** There are no anticipated changes to normal water fluctuations that would result from the proposed project. The project would not result in any changes to inundation periods or water level modifications during flood events, or during periods of baseflow.

6) **Salinity Gradients:** The proposed project would not impact any salinity gradients. Locust Creek is a freshwater system and this would not change as a result of the project.

b. Potential Impacts to the Biological Characteristics of the Aquatic Ecosystem (Subpart D)

1) **Threatened and endangered species:** There are no federally listed threatened or endangered species known to occur within or adjacent to the proposed project area. The U.S. Fish and Wildlife Service was consulted and it was determined that no Federally-listed species, candidate species, or designated critical habitat are located within or adjacent to the project area. See Appendix II of the Environmental Assessment.

2) **Fish, crustaceans, mollusks, and other aquatic organisms in the food web:** The project would not result in significant adverse impacts to aquatic organisms. Minor short-term impacts to the aquatic community may result from the smothering of immobile organisms, direct displacement of organisms, and an increase in turbidity, during project construction. The impacts may affect individual organisms in a small stretch of Locust Creek, but would be unlikely to have a significant impact on the overall population of any particular species within the waterbody. Long-term, there would be a positive impact to the aquatic community by reducing the amount of sediment entering the river. Construction is tentatively scheduled to occur in fall 2016, a time of the year when there is less biological activity. No significant adverse long-term impacts are anticipated.

3) **Other wildlife:** Wildlife associated with aquatic ecosystems includes resident and transient mammals, birds, reptiles, and amphibians. There would be minor, short-term impacts to these types of wildlife as a result of removing herbaceous vegetation, grasses and small trees. All disturbed land areas, not in agricultural production, would be seeded with native grasses as part of project construction. Noise from construction equipment may also create a short-term negative impact to wildlife. Construction is tentatively scheduled to occur in fall 2016, a time of the year when there is less biological activity. No significant adverse long-term impacts are anticipated.

c. Potential Impacts on Special Aquatic Sites (Subpart E)

1) **Sanctuaries and Refuges:** No sanctuaries or refuges were identified in or adjacent to the project area.

2) **Wetlands:** No wetlands were identified in or adjacent to the project area.

3) **Mud flats:** No mud flats would be impacted by the proposed project.

4) **Vegetated shallows:** No vegetated shallows would be impacted by the proposed project. No rooted aquatic vegetation is located within the project area.

5) **Coral reefs:** The project area does not provide the necessary environmental conditions to support corals.

6) **Riffle and pool complexes:** Because of the low gradient and sandy/silt nature of the channel substrate of Locust Creek, a stable riffle and pool complex does not exist.

d. Potential Effects on Human Use Characteristics (Subpart F):

1) **Municipal and private water supplies:** The project would not impact any municipal or private water supplies.

2) **Recreational and commercial fisheries:** The project would not affect the suitably of any recreational or commercial fisheries. The project area is relative small size and is not anticipated to negatively impact fish habitat.

3) **Water-related recreation:** The project would not impair or destroy any resources which support recreation activities.

4) **Aesthetics:** The project may result in minimal impacts to the aesthetics of the area as a result of using riprap to construct bank stabilization structures. This impact will be minimized by planting native vegetation in the areas disturbed by the construction process and it is expected that over time, these structures will become vegetated as well.

5) **Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves:** The project would not impact any of the above mentioned property types.

5. EVALUATION OF DREDGED OR FILL MATERIAL (Subpart G)

a. **General evaluation of dredged or fill material:** Fill material placed below the ordinary high water mark would consist of earthen fill material obtained from the existing streambanks, and clean rock fill with minimal fines obtained from a commercial source. There is no reason to believe that the streambanks would contain any chemical, biological, or other pollutants. Additionally, prior experience indicates that commercially available rock fill would be free from chemical, biological, or other pollutants.

b. **Chemical, biological, and physical evaluation and testing:** The fill material meets the testing exclusion based on the fact that it would consist of local earthen materials, and clean rock fill obtained from a commercial source. There is no reason to believe that the earthen material or the clean rock fill would be a carrier of harmful contaminants.

6. DISPOSAL SITE DELINEATION (§230.11 f)

The fill locations would consist of portions of Locust Creek adjacent to the Route MM, Locust Creek Bridge. Local earthen material and clean rock fill with minimal fines would be used to stabilize the river banks in order to protect the integrity of the bridge. The amount of fill that would be used has been determined to be the minimum amount necessary to provide the desired level of protection to the bridge. The depth of the water, the current velocity, direction, and variability, the degree of turbulence, and the rate of discharge at the disposal site has been considered in determining the acceptability of the mixing zone.

7. ACTIONS TO MINIMIZE ADVERSE EFFECTS (SUBPART H)

The construction contractor would be required to obtain a Section 402 NPDES stormwater permit from Missouri Department of Natural Resources. As part of the NPDES permit, Best Management Practices (BMPs) would be required to minimize the incidental fallback of material into the waterway and to minimize the introduction of fuel, petroleum products, or other deleterious material from entering the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching water sources by wind or runoff, fill would be covered, stabilized or mulched, and silt fences would be used as required. Additional measures to minimize adverse effects would include using clean rock fill with minimal fines, stabilizing the earthen material with rock, using appropriate construction

equipment, minimizing the amount of time that equipment would be in the river channel, and not placing fill in the river during unusual high water events.

8. FACTUAL DETERMINATIONS (§230.11)

A review of the information in items 4 through 7 of this report indicates that there is minimal potential for long-term environmental effects of the proposed discharge. Additionally, there are not expected to be any cumulative or long-term secondary impacts as a result of the project.

9. FINDINGS (§230.12)

The proposed Route MM, Locust Creek Bridge, Section 14 Emergency Streambank Stabilization Project has been evaluated and determined to be in compliance with Clean Water Act Section 404(b)(1) guidelines, with the inclusion of appropriate and practical conditions to minimize pollution and adverse effects on the aquatic ecosystem. Furthermore, the project would result in an overall net benefit to the aquatic ecosystem, as determined by the Missouri Stream Mitigation Method.

Prepared by: _____ _____

Mr. Rick Morrow Date
Biologist
Planning Branch

Reviewed by: _____ _____

Mr. Jason Farmer Date
Chief, Environmental Resources Section
Planning Branch

Approved by: _____ _____

Douglas B. Guttormsen Date
Colonel, Corps of Engineers
District Commander

APPENDIX V

MISSOURI STREAM MITIGATION METHOD WORKSHEETS

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ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Ephemeral 0.1	Intermittent 0.4	Perennial 0.8
Priority Area	Tertiary 0.1	Secondary 0.4	Primary 0.8
Existing Condition	Functionally Impaired 0.1	Moderately Functional 0.8	Fully Functional 1.6
Duration	Temporary 0.05	Recurrent 0.1	Permanent 0.3

Activity	Clearing 0.05	Utility Crossing/Bridge Footing 0.15	Below Grade Culvert 0.3	Armor 0.5	Detention 0.75	Morphologic Change 1.5	Impoundment (dam) 2.0	Pipe 2.2	Fill 2.5

Linear Impact	<100' 0.0	100'-200' 0.05	201'-500' 0.1	501'-1000' 0.2	>1000 linear feet (LF) use 0.1 for each 500' of impact

Factor	Dominant Impact Type 1	Dominant Impact Type 2	Dominant Impact Type 3	Dominant Impact Type 4	Dominant Impact Type 5
Stream Type Impacted	.8				
Priority Area	.1				
Existing Condition	.8				
Duration	.05				
Activity	.5				
Linear Impact	.2				
Sum of Factors M=	2.45				
Linear Feet of Stream Impacted in Reach LF=	610				
M x LF	1494.5				

Total Mitigation Credits Required for Locust Creek* = (M x LF)= 1494.5

*This value may be applied to mitigation at a mitigation bank at a 1:1 ratio, when the impact area is within the service area of an approved mitigation bank. An increased multiplier will be used at the Corps discretion when an impact occurs outside of the service area of an approved mitigation bank, or when mitigation is proposed through an in-lieu fee program.

In-Stream Work

Stream Channel/Stream Restoration or Enhancement and Relocation Worksheet

Stream Type	Ephemeral	Intermittent	Perennial Stream			
			<15'	15' - 30'	30' - 50'	>50'
	0.05	0.4	0.4	0.6	0.8	1
Priority Area	Tertiary 0.05	Secondary 0.2	Primary 0.4			

Net Benefit		Stream Channel Restoration / Stream Enhancement			
		Relocated Stream w/In-Stream Features 0.5	Moderate 1.2	Good 2.4	Excellent 3.5

Control / Site Protection	Corps approved site protection without third party grantee 0.1	Corps approved site protection recorded with third party grantee, or transfer of title to a conservancy 0.4

Mitigation Construction Timing	Schedule 1 0.3	Schedule 2 0.1	Schedule 3 0

Factors	Net Benefit 1	Net Benefit 1	Net Benefit 1	Net Benefit 1
	Locust Creek			
Stream Type	1			
Priority Area	.05			
Net Benefit	2.4			
Control / Site Protection	.1	.		
Mitigation Construction Timing	0	.		
Sum Factors = M	3.55			
Stream Length in Reach = LF do not count each bank separately	610			
Credits C = M x LF	2165.5			

Total Channel Restoration/Relocation Credits Generated = 2165.5

APPENDIX VI

CLEAN WATER ACT SECTION 401 PERMIT

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APPENDIX VII

PUBLIC COMMENTS

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