DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
ROBERT A. YOUNG BUILDING - 1222 SPRUCE ST.
ST. LOUIS, MISSOURI 63103-2833

16 July 2018

Reply to:
U.S. Army Corps of Engineers
St. Louis District
Environmental Compliance Section (PD-C)
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Sir or Madam:

The St. Louis District, Corps of Engineers has prepared a draft Supplemental Environmental Assessment (SEA) with unsigned Finding of No Significant Impact (FONSI) for a proposed plan that addresses underseepage issues with the Wood River levee system in Madison County, Illinois. It supplements an earlier SEA that was prepared by the St. Louis District in 2011 for reconstruction and design deficiency corrections of the Wood River levee system that were approved in 2011.This document serves to notify the public of the proposed project and requests assistance in identifying the probable environmental impacts of the project alternatives.

The draft SEA and unsigned FONSI are available for public review. The electronic version of these documents are available online at:
http://www.mvs.usace.army.mil/Portals/54/docs/pm/Reports/EA/LowerWoodRiverSEA2018.pdf or you may request a copy of the draft SEA and unsinged FONSI be mailed to you. The unsigned FONSI summarizes the anticipated effects of the project on the environment. The FONSI is unsigned and will be signed only after comments received as a result of this public review have been considered.

The St. Louis District of the U.S. Army Corps of Engineers is proposing to address underseepage using relief well centric plans with areas of minor fill, additional ditching, and upgrading and installing new pump stations. The tentatively selected plan proposes features that would include excavation of approximately 4,000 yd^3 material for ditch cutting; 104 acres of flowage easement; and the installation of 77 relief wells, 2 pump stations 4,000 linear ft collector pipe system; and the placement of 8,700 yd^3 of fill material. Approximately 550 yd^3 of that fill material is proposed to be placed in a forest wetland. Environmental impacts associated with the proposed project and the mitigation required are outlined in the draft SEA.

This document is provided to you for your information and review. Please provide any comments you may have regarding this project to Dr. Alison Anderson of the Environmental Compliance Section, at **telephone** 314-331-8458 or **e-mail** at Alison.M.Anderson@usace.army.mil. Written comments may be sent to the address above, ATTN: Environmental and Planning Branch (PD-C, Anderson). Please respond by close of business on 15 August 2018.

Sincerely,

T C Allen

Teri C. Allen, Ph.D.
Chief, Environmental Compliance Section

Draft Supplemental Environmental Assessment with Unsigned Finding of No Significant Impact (FONSI)

Lower Wood River Levee System Design Deficiency Corrections
Mississippi River, River Miles 195 – 203
Madison County, Illinois

July 2018

U.S. Army Corps of Engineers
St. Louis District
Regional Planning & Environmental Division North
1222 Spruce Street
St. Louis, Missouri 63103-2833
Telephone Number: (314) 331-8458

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July 2018

1 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, St. Louis District, has prepared this Supplemental Environmental Assessment (SEA) to document the environmental impacts associated with design deficiency corrections to the Wood River levee system. The Wood River Drainage and Levee District (Levee District) lies in southwestern Illinois on the left descending bank (LDB) of the Mississippi River flood plain, within Madison County, Illinois, between Mississippi River Miles 195 and 203 above the Ohio River. The levee district is protected by an urban design levee, across the Mississippi River from St. Louis and St. Charles counties in Missouri. About 10,687 acres of former Mississippi River floodplain are confined by this portion of the levee system. The project as intended reduces the risk of flooding from an event up to a 52 ft Mississippi River stage on the St. Louis Gage, which has a current expected annual frequency of greater than 0.2%.

During the Great Flood of 1993, when the levee systems were was tested with a flood event reaching 49.5 ft at the St Louis Gage, uncontrolled underseepage was observed. A detailed review of the original design of the levee system revealed that in many instances, the potential for underseepage control was underestimated. Additional study was needed of the impacts of the original design deficiencies on the ability of the project to reduce flood risks as authorized.

This SEA covers the design deficiency actions within the Lower Wood River levee and has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's Regulations (40 Code of Federal Regulations §1500-1508), as reflected in the USACE Engineering Regulation 200-2-2. It supplements the SEA and Limited Reevaluation Report prepared and completed by the St. Louis District in 2011.

Based on new geotechnical information, as well as construction of features by the Wood River Levee and Drainage District in an effort to meet the 100-year flood protection criteria, the St. Louis District conducted additional underseepage and design deficiency analyses. The new information and additional analyses prompted a re-evaluation of the approved 2011 plan. The alternative solutions to correct the design deficiency are the focus of this SEA.

1.1 AUTHORITY

The Wood River Levee project originally was authorized by the Flood Control Act of 28 June 1938, Flood Control Committee Document No. 1, 75th Congress, and First Session to provide flood protection to urban, agricultural, and industrial areas.

UPPER MISSISSIPPI RIVER BASIN

> "The general comprehensive plan for flood control and other purposes in the Upper Mississippi River Basin, described in Flood Control Committee Document Numbered 1, Seventy-fifth Congress, first session, with such modifications thereof as in the discretion of the Secretary of War and the Chief of Engineers may be advisable, is approved and there is hereby authorized $6,600,000 for reservoirs and $2,700,000 for local flood-protection works on the Upper Mississippi and Illinois Rivers; the reservoirs and local protection projects to be selected and approved by the Chief of Engineers: Provided, That this authorization shall include the enlargement and extension of a system of levees located on the south side of the Sangamon River east of the town of Chandlerville, Illinois, as set forth in House Document Numbered 604, Seventy-fifth Congress, third session."

Projects that address deficiencies with the original project design do not require any additional Congressional authorization, provided that the project meets certain criteria as defined in Engineer Regulation (ER) 1165-2-119. According to ER 1165-2-119, a design or construction deficiency is a flaw in the Federal design or construction of a project that significantly interferes with the project's authorized purposes or full usefulness as intended by Congress at the time of original project development. Corrective action, therefore, falls within the purview of the original project authorization.

1.2 PROJECT LOCATION

The Wood River levee system is part of a larger Metro East levee system (Figure 1) that includes: Metro East Sanitary District (MESD); Chain of Rocks levees; and the Prairie du Pont and Fish Lake levees to the south. Municipalities that are protected by the Wood River levee system include Alton, East Alton, Wood River (city), Hartford, Roxana, South Roxana, and Bethalto. The Wood River levee flood-protected area is traversed by several railroads that service industrial development. Illinois Routes 3, 111, and 143 provide highway access, and Interstate 255 is on the eastern boundary of the Wood River levee flood-protected area.

The Wood River levee system consists of 3 segments: Upper Wood River; Lower Wood River; and Wood River East-West (Figure 1). The Lower Wood River Drainage and Levee District originates at high ground on the left descending bank of the West Fork of Wood River, near Powder Mill Road in East Alton, Illinois. From this point the flank levee extends 1.7 miles to the confluence with the East Fork of Wood River. The levee then continues downstream along the left descending bank of the Wood River for 2.3 miles to the mouth of the Wood River at Mississippi River mile 199.4. At this point the levee becomes a riverfront levee and continues along the left descending bank of the Mississippi for 4.76 miles to the mouth of the Cahokia Creek Diversion Channel at Mississippi River mile 195. There the levee turns and proceeds upstream as a flank levee along the right descending bank (RDB) of the diversion channel for 2.6 miles and then turns and follows the obsolete New York Central railroad tracks for 3.0 miles in a north-easterly direction. The levee then veers north for 0.5 miles to its terminus in South Roxana, Illinois.

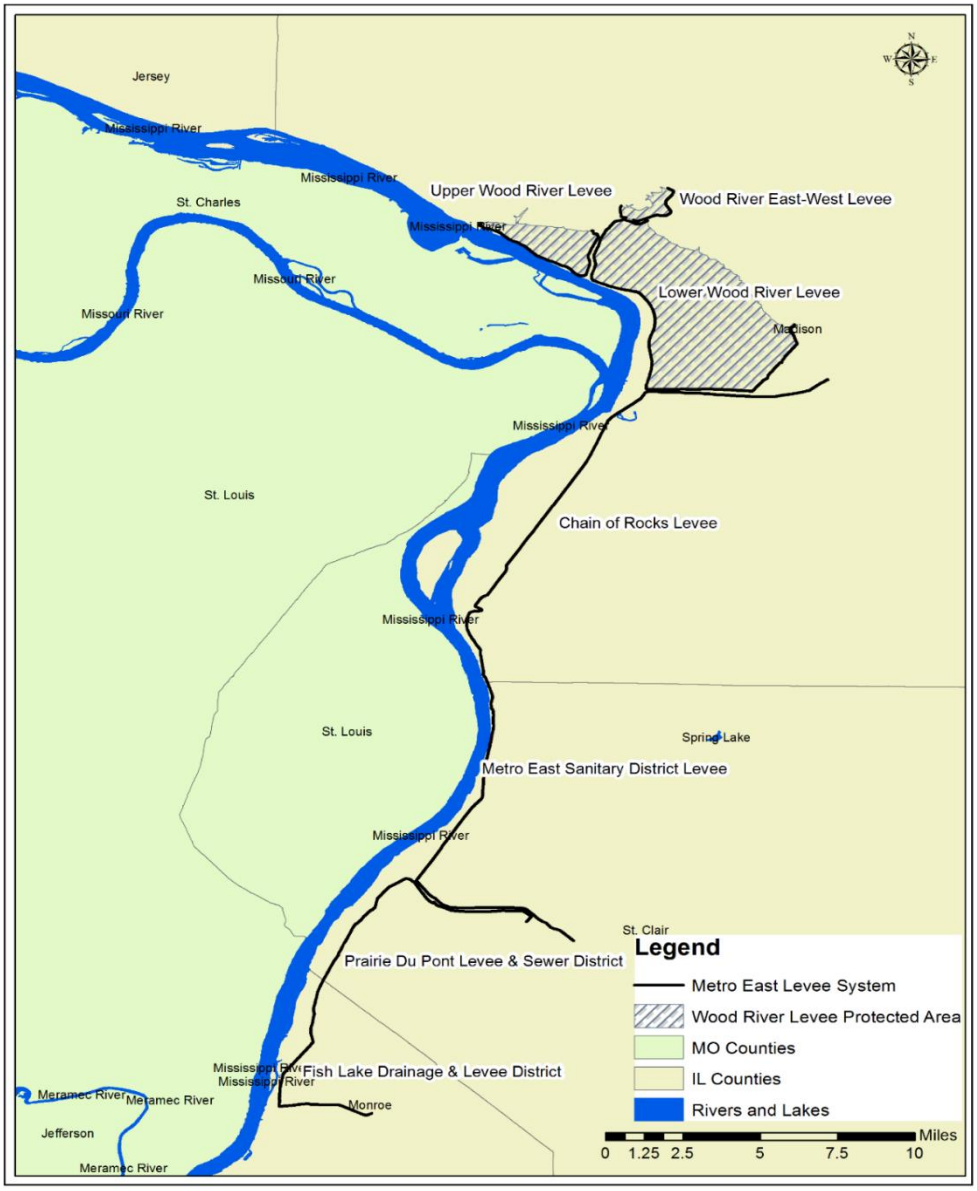

Figure 1: Metro East Levee system in Illinois which consists of Wood River Levee system, Chain of Rocks, Metro East Sanitary District, Prairie Du Pont Levee, and Fish Lake Drainage and Levee District. The Wood River Levee system consists of Upper, Lower, and East-West levees.

1.3 PURPOSE AND NEED

Underseepage is river water that seeps under a levee from the riverside to the landside during a flood. Generally the water seeps through the thick sand and gravel aquifer between the levee and bedrock, but in some locations water can seep through sand or silt lenses located directly under the levee. Levees can fail due to underseepage if significant uncontrolled flow occurs. This failure mechanism occurs when the

underseepage flow carries soil and sand particles with it (piping), creating a void under the levee, and the levee partially collapses into the void allowing the flood to breach the levee and wash it away.

The general purpose of this study is to evaluate design deficiency correction alternatives that would allow the Lower Wood River Levee System to function as initially intended and in a safe and reliable manner. A Limited Reevaluation Report (LRR) was approved in August of 2011 that recommended a permanent solution to the underseepage design deficiency associated with the Wood River Project. However, based on new geotechnical information (i.e., permeability and topography), as well as construction of features by the Wood River Levee and Drainage District in an effort to meet the 100-year flood protection criteria through the Section 408 process, the St. Louis District conducted additional underseepage and design deficiency analyses. The new information and additional analyses prompted a re-evaluation of the approved 2011 plan.

1.4 PRIOR STUDIES, REPORTS, AND RELATED WATER PROJECTS

Information contained in these prior studies and reports are incorporated by reference throughout this Supplemental Environmental Assessment.

Original Project Authority. The Wood River Levee project originally was authorized by the Flood Control Act of 28 June 1938, Flood Control Committee Document No. 1, 75th Congress, and First Session to provide flood protection to urban, agricultural and industrial areas. Much of the construction took place in the 1950s and 1960s.

Grassy Lake Pump Station Authority. The Flood Control Act, approved 27 October 1965 by Public Law 89-298, House Document No. 150, 88th Congress, First Session, modified the project to provide for construction of a pumping station with collector ditches and necessary appurtenant facilities for removal of interior water impounded by the existing levee. This project was never constructed and a Reconnaissance study for the Wood River Drainage & Levee.

District, Illinois - Pump Station, dated January 1998, was approved for Pre-Construction Engineering Design. The purpose of this project is to address interior flooding near the southern end of District through the addition of a 45-cfs pump station as a new feature to the original system. This station was constructed in 2007.

Mel Price Lock and Dam Authority. The Internal Revenue Code of 1954 – Bingo Tax.

Exempt Organizations, Public Law 95-502 (H.R. 85331), October 21, 1978. Title I - Replacement of Locks and Dam 26; Upper Mississippi River System Comprehensive Master Management Plan. This project resulted in pool modifications that authorized the addition of a pump station for the Wood River Levee System.

Design Memorandum (DM) No. 16, Wood River Drainage and Levee District Alteration, March 1985. DM documents changes required to the Upper Wood River Levee System resulting from the Lock and Dam No. 26 (Replacement), Mississippi River, including relocation and increase in size of the Alton Pump Station, main drainage ditch modifications, access road construction, construction and replacement of relief wells, construction of seepage conveyance channels, and protection of the existing levee.

Environmental Assessment, Wood River Drainage and Levee District Alterations, Locks and Dam No. 26 (Replacement), Mississippi River, Alton, Illinois, April 1986. The document described potential impacts associated with alterations described in Design Memorandum No. 16 of March 1985. Finding of No Significant Impact signed (no date).

1993 P.L. 84-99 Memorandum. Memorandum, CELMV-CO-E, dated 9 March 1994, Subject: Project Approval/Funding Request, Final Repairs, Wood River Drainage and Levee District, Madison County,

Illinois. This document provided assessment of system performance failures recommended for emergency repairs, under authority of PL84-99/PL99-662, resulting from the flood of 1993.

Periodic Inspection No. 7. Periodic Inspection No. 7, Levee and Closure Structures, Wood River Flood Protection Project, dated March 1997. This inspection documents system performance deficiencies identified as a result of problems experienced during the 1993 flood.

Environmental Assessment, Proposed Pump Station and Ditch Improvements, Grassy Lake Area, Wood River Drainage and Levee District, Madison County, Illinois. February 1998. The document described potential impacts associated with improvements described in the Grassy Lake Pump Station Reconnaissance study of January 1998. Finding of No Significant Impact signed July 31, 1998.

Reconnaissance 905(b) Report. Wood River Levee, Illinois, Flood Damage Reduction 905b Report dated April 1999. This report was prepared in response to the original project authorization above, and details problems identified during and after the flood of 1993 and recommends project reconstruction be further investigated.

Environmental Assessment, Proposed Reconstruction of the Flood Protection System, Wood River Drainage and Levee District, Madison County, Illinois, July 2005. The document described potential impacts associated with improvements described in the draft Reevaluation Report of December 2004. Finding of No Significant Impact signed by July 27, 2005.

Final General Reevaluation Report, Wood River Levee System Reconstruction Project, Wood River Levee System, Madison County, Illinois, dated March 2006. This report recommends rehabilitation of the levee system and correction of design deficiencies to include installation of additional relief wells and rehabilitation of existing relief wells, pumping plants and select closure structures and replacement or lining of gravity drains. These recommended actions are required to maintain the system's authorized level of protection.

Limited Reevaluation Report, Wood River Levee System Design Deficiency Corrections, Madison County, Illinois, dated August 2011. The LRR recommends rehabilitation of the levee system and correction of design deficiencies to include installation of relief wells, cut-off walls, pump stations, and seepage berms. These recommended actions were required to maintain the system's authorized level of protection. This report recommended 2,875 linear ft of cutoff wall between levee stations 0+00 to 38+90, which was to be built in two phases. The first phase (~1,600 ft) has been constructed while the second phase (~1,200 ft) has been designed.

Supplemental Environmental Assessment, Appendix to Wood River Levee System Design Deficiency Corrections, Madison County, Illinois. This document described potential impacts associated with improvements described in the LRR of August 2011. Finding of No Significant Impact was signed on 31 August 2011.

2017 Wood River Levee Memorandum, Memorandum USACE, MVR-MVS-EC-HH, dated 6 December 2017, Subject: Wood River Levee Climate Change Qualitative Assessment. This document provided the qualitative approach to the assessment of historic and potential climate change vulnerabilities. The historic assessment included a stationarity analysis, monotonic trend analysis, and climate hydrology and watershed vulnerability assessment. Future climate change impact assessments included a climate hydrology and watershed vulnerability assessment.

2017 P.L. 84-99 Memorandum. Memorandum For for Record, dated 29 March 2017, Subject: Environmental Compliance for Repair of the Lower Wood River Drainage and Levee District (D&LD), Mississippi River, Madison County, Illinois. This document provided assessment of system performance failures recommended for emergency repairs, under authority of P. L. 84-99, resulting from the flood of 2015.

2018 P.L. 84-99 Memorandum. Memorandum for Record, dated 29 January 2018, Subject: Environmental Compliance for Repair of the Wood River Lower Levee System, Mississippi River, Madison County, Illinois – Addendum for 2017 Damages. This document provided assessment of system performance failures recommended for emergency repairs, under authority of P.L. 84-99/PL99-662, resulting from the flood of 2015 and 2017.

2 ALTERNATIVES CONSIDERED

This section of the EA describes the alternatives considered and summarizes the alternatives in terms of their environmental impacts. The project area is divided into seven decision reaches based upon similarities in geology and hydraulics. Action alternatives were developed for each reach to address the uncontrolled underseepage, if applicable. The Action Alternatives developed are relief well centric and meets the objective of controlling underseepage flows, however features were designed for different water surface elevations on the St. Louis gage. A No Action Alternative is also considered for all decision reaches. Each of the alternatives were considered within each levee reach.

Features considered in the following sections consist of: 1) pipe and fill; 2) relief wells; 3) ditching; 4) flowage easement/ponding; and 5) pump station. Pipe and fill is used in narrow drainage ditches and involves placing a pipe at the base on the ditch and putting fill around the pipe to the elevation of the surrounding landscape. This allows surface waters to percolate down into the pipe, which transports the water away, in this case to a pump station. Relief wells would be constructed on the protected side of the levee to relieve excessive hydrostatic pressures beneath a levee during high water conditions. Ditching involves removing soil between relief wells to create a linear depression approximately 15 ft wide by 2.5 ft deep. Ditching helps direct flow from the relief wells to a culvert, pump station, or ponding area. A pump station is a permanent physical structure that actively pumps water collected on the landside of the levee over the levee.

2.1 NO ACTION ALTERNATIVE

Under the "no action" alternative, the levee district would continue to perform its operation and maintenance responsibilities with a levee meeting 100-year flood risk reduction, but no new federal action would be taken. Components would continue to age, become out of date, and underseepage would continue to occur. In addition, the existing system would not be in compliance with current authorized flood protection standards. This presents a safety issue. The "no action" alternative would result in no federal action to return the levee and pump stations and other pertinent features to their original degree of protection (i.e., 500-year flood risk reduction), and may compromise the effectiveness of the existing relief wells, pump station, and the levee. Future high-water events increase the possibility that a significant failure could occur under the no action alternative. However, in some decision reaches no underseepage was observed during high river stages; therefore, the no action alternative could be selected.

Features recommended in the 2011 LRR for the Upper Wood River levee are either been constructed or are in the design phase. The non-Federal project sponsor has completed (i.e., designed and/or constructed) some project features recommended in the 2011 LRR for the Lower levee in order to achieve FEMA certification. Environmental compliance for these features was completed as part of the *Supplemental Environmental Assessment, Appendix to Wood River Levee System Design Deficiency Corrections, Madison County, Illinois* (USACE 2011). The 2011 SEA describes potential impacts associated with improvements described

in the LRR of August 2011. Finding of No Significant Impact was signed on 31 August 2011. Therefore, the below features are assumed to be existing conditions for this Supplemental EA:

- Approximately 3,800 linear ft of deep slurry trench cutoff wall (~140 ft deep to bedrock) at the riverside levee toe;
- Placement of filter material and rock in seven drainage ditches;
- Modification of two gravity drain structures

2.2 ALTERNATIVE 1- STANDARDS PLAN

The Standards Plan for Lower Wood River levee underseepage controls for a flood at 54 ft on the St. Louis gage (design flood at 52 ft on the St. Louis gage plus 2 ft of freeboard) consists of the lowest cost alternative for most reaches (Table 1; Figures 2 – 6). This plan is the re-evaluated 2011 plan which incorporates the new geotechnical information and takes into consideration features constructed by the non-Federal project sponsor. This plan was designed to meet all USACE essential levee safety guidelines, however the outcome from this re-design lead to increased project costs. Utilizing the life safety information developed as part of this project, some reaches were already at tolerable risk levels and could be eliminated from alternatives development (see Section 2.3).

Table 1. Relief well and earthwork types by Lower Wood River Levee Reach proposed to address design deficiencies.

Reach	Features	Descriptions
1	-	-
2	Relief wells	52
	Fill	0.26 acres of material placed to the elevation of surrounding landscape (~420 ft)
	Pipe	1,100 ft of pipe to collect relief well flows and direct it to a pump station
	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total length of 2,000 linear ft
	Culvert	One 720 ft culvert connecting existing ponding areas at elevation 415 ft
	Ponding	Water retention area which can hold water to 415 ft elevation
3	Relief wells	15
	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total length of approximately 2,700 ft
	Pipe and fill	Placement of a conveyance pipe and fill material in a maintained drainage ditch approximately 1,200 linear ft
4	-	-
5a	-	-
5b	Relief wells	44
	Flowage easement	5,300 linear ft of drainage easement in an existing ditch
	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total of 6,500 linear ft

	Culvert	7 under-road culverts approximately 40 ft long that would connect existing and new ditches
	Pump station	2
6	Relief wells	56
	Fill Area #1	Fill an area of approximately 5.52 acres to 422 ft elevation leaving 4 ft depression in landscape
	Fill Area #2	Jurisdictional wetland. Fill an area of approximately 16.75 acres to 422 ft elevation leaving 4 ft depression in landscape
	Fill Area #3	Fill an area of approximately 0.81 acres to the level of the surrounding landscape
	RS Clay Blanket #1	Clay material lines inside of depression raising surface elevation 1-3 ft over an area of 13.35 acres
	RS Clay Blanket #2	Clay material lines inside of depression raising surface elevation 1-3 ft over an area of 13.33 acres
	LS Seepage Berm #1	8.63 acres of berm which would add-on to berm constructed by LWR L&D district
	LS Seepage Berm #2	Placement of fill (1.96 acres) to a ditch between railroad tracks and levee.
	Blanket Drain #1	Sand and rock lines inside of depression covering an area of 4.76 acres.
	Blanket Drain #2	Sand and rock lines inside of depression covering an area of 5.03 acres.
7	-	-

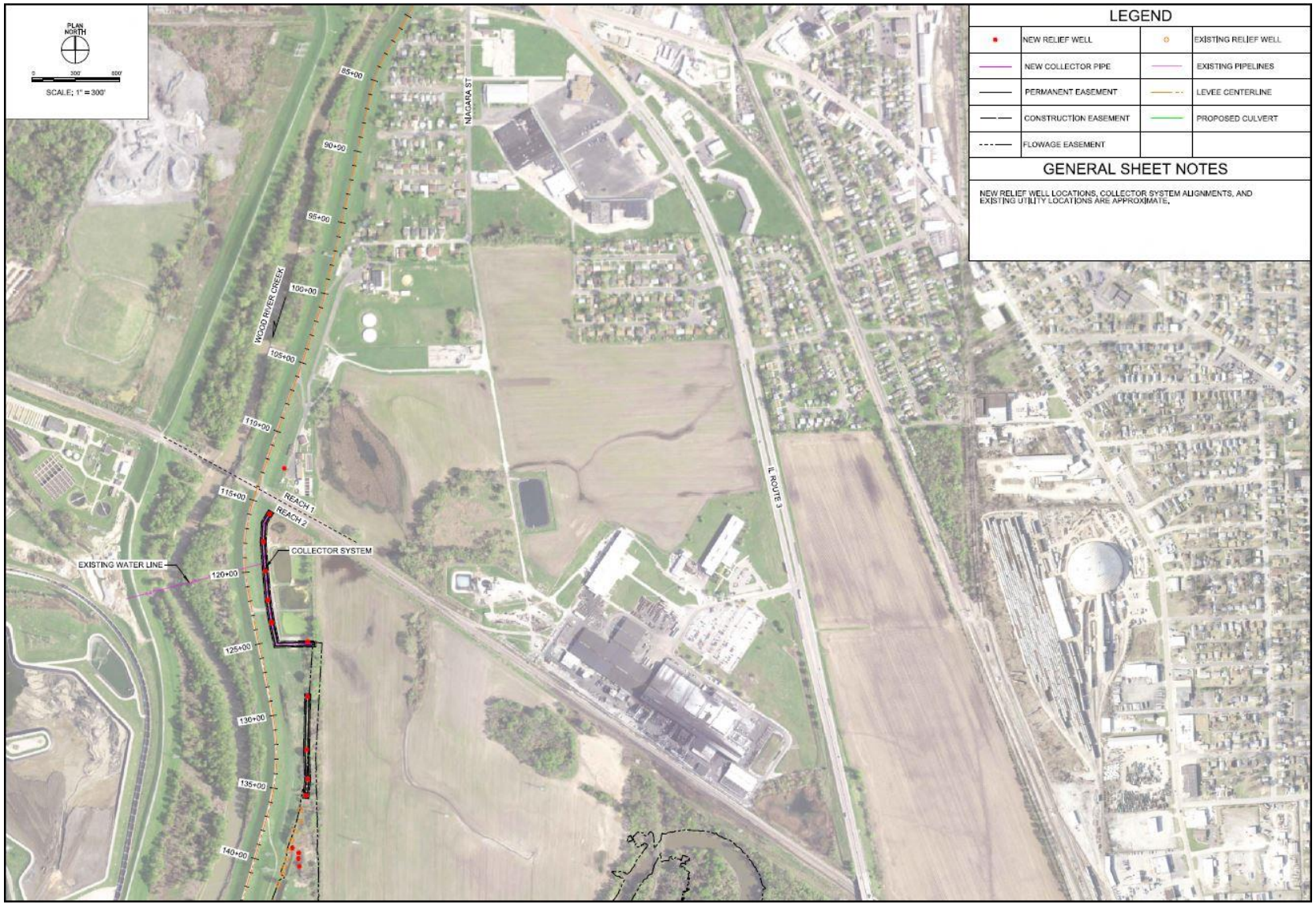

Figure 2. Proposed features for the northern portion of reach 2 for the Standards Plan and Standards Plan with Reach Screening Alternatives.

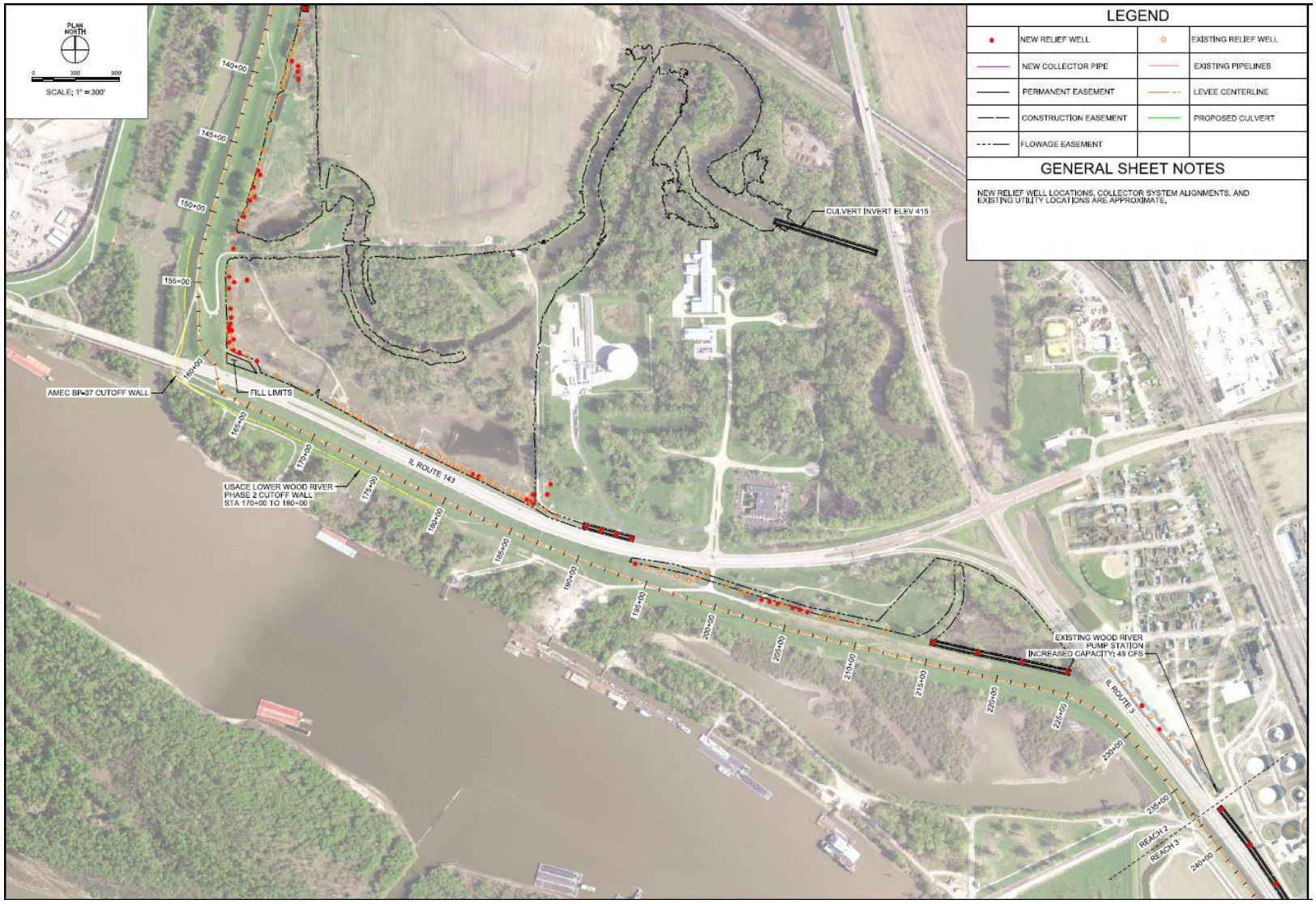

Figure 3. Proposed features for the southern portion of reach 2 for the Standards Plan and Standards Plan with Reach Screening Alternatives.

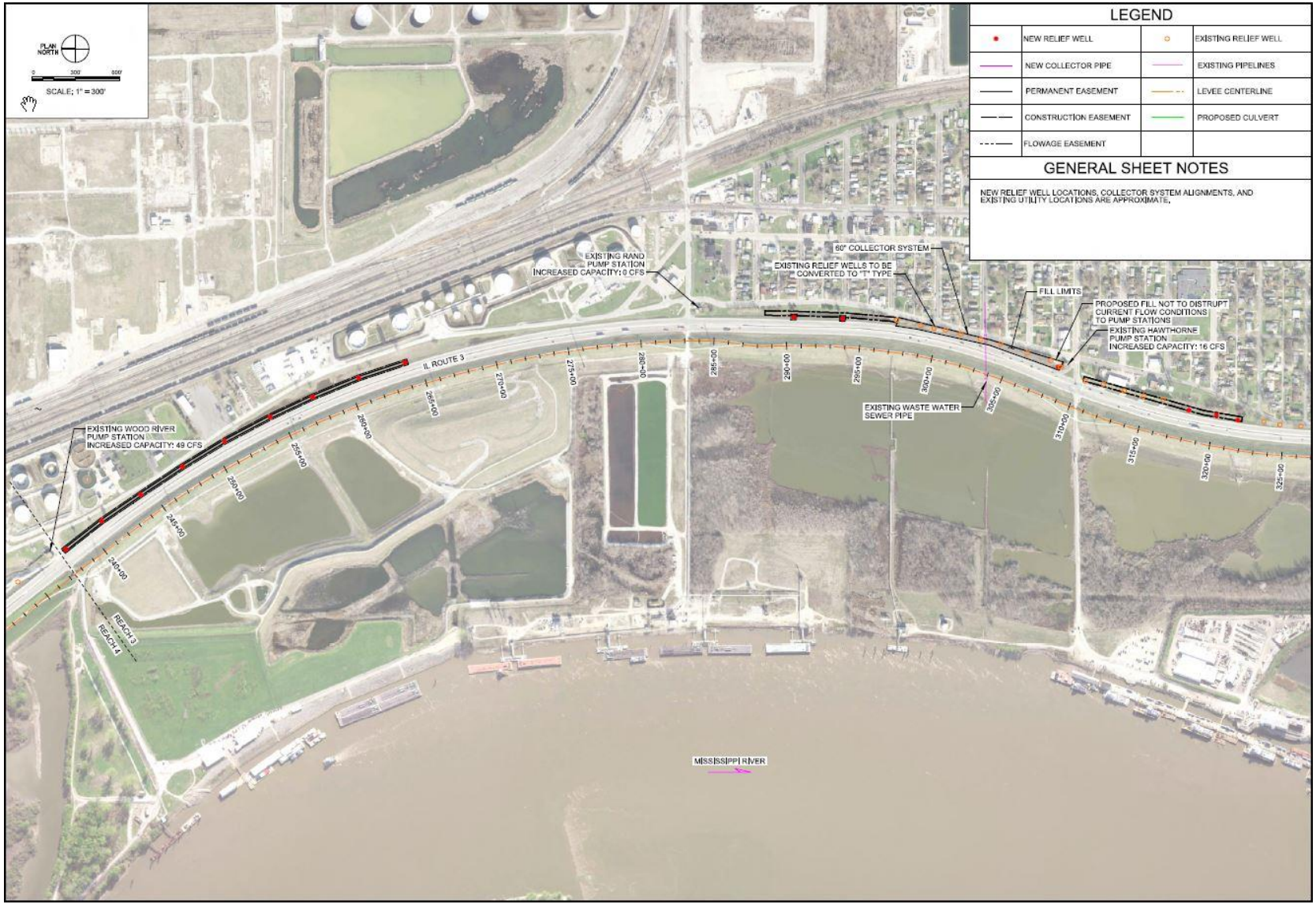

Figure 4. Proposed features for reach 3 for the Standards Plan and Standards Plan with Reach Screening Alternatives.

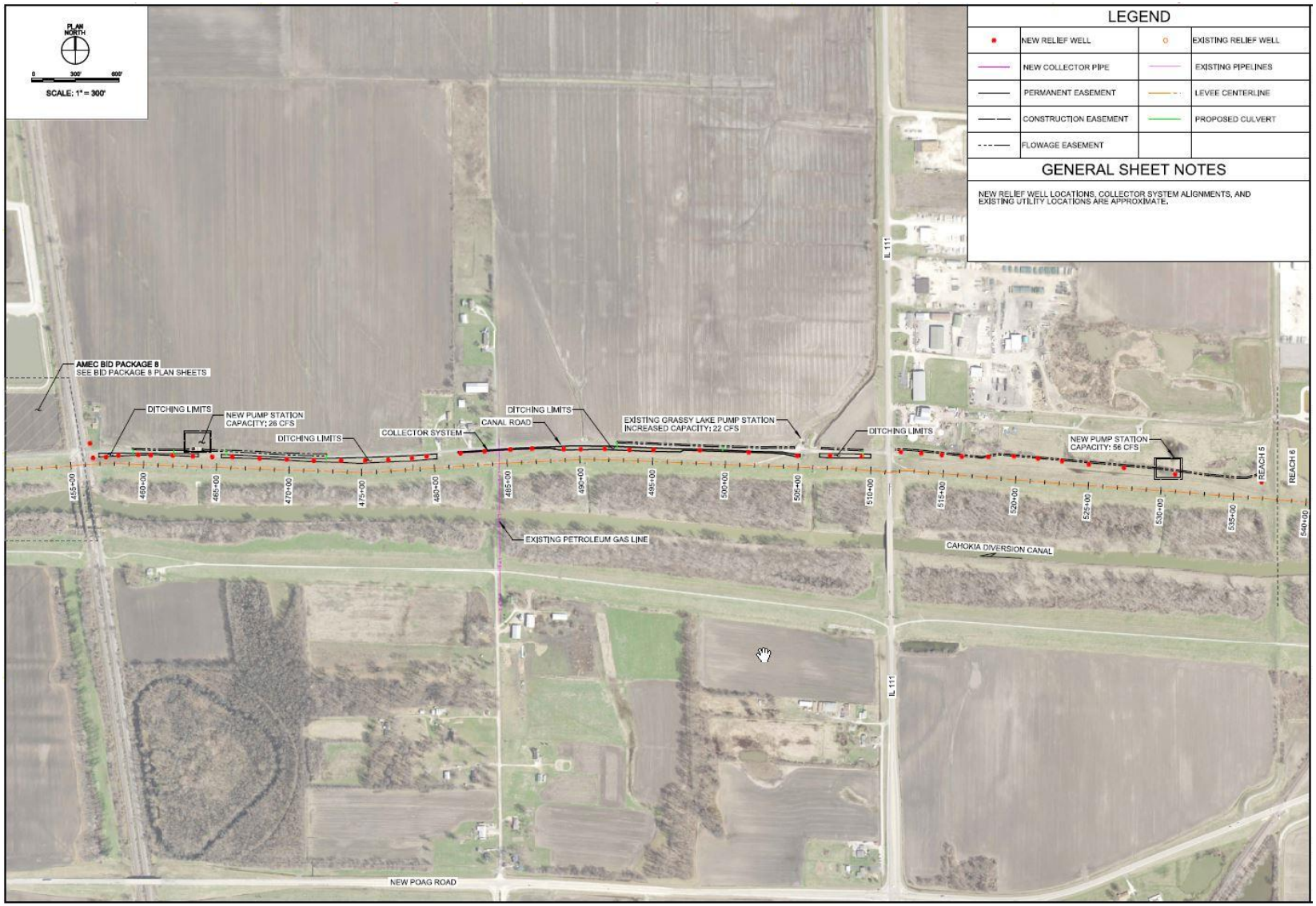

Figure 5. Proposed features for reach 5 for the Standards Plan and Standards Plan with Risk-Informed Screening Alternatives.

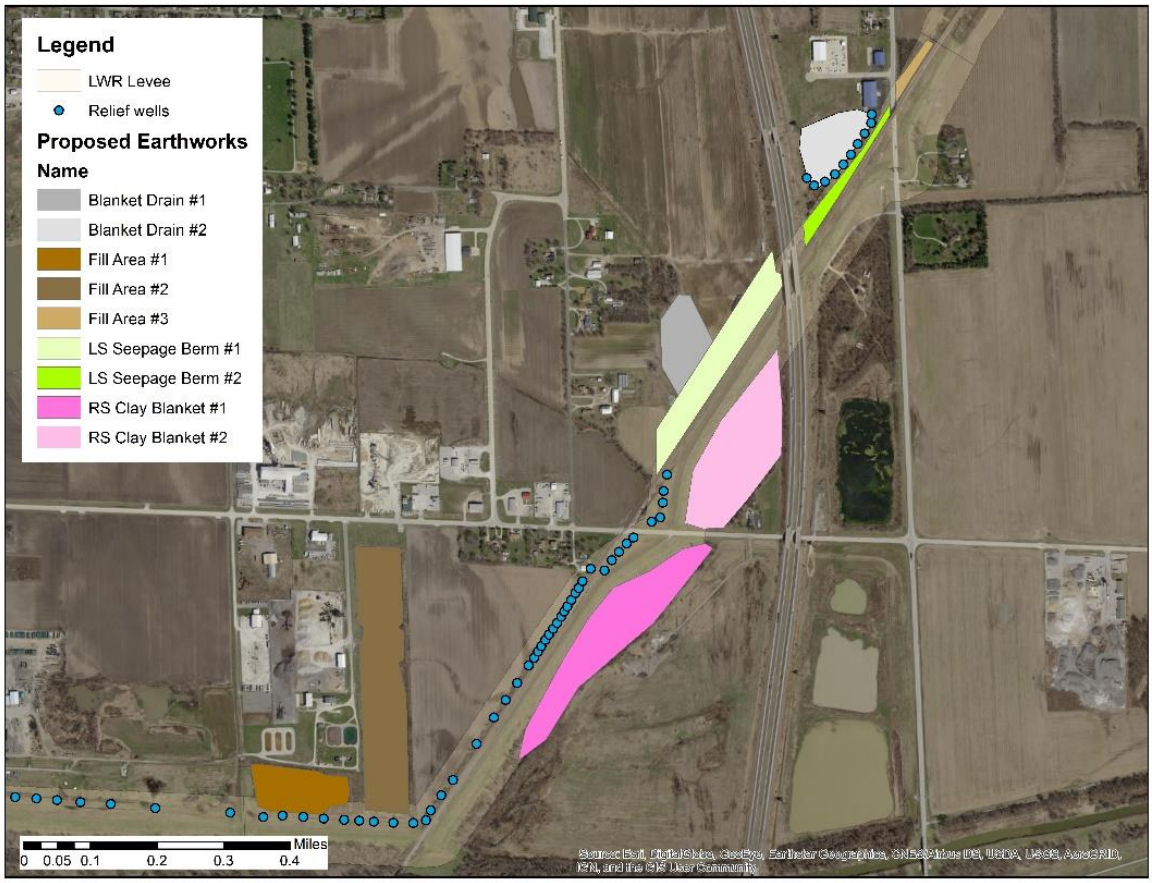

Figure 6. Proposed features in reach 6 for the Standards Plan only.

2.3 ALTERNATIVE 2 – STANDARDS PLAN WITH RISK INFORMED SCREENING

The Standards Plan with Risk Informed Screening was designed by conforming to standard levee design requirements found in EM 1110-2-1913, controlling for a flood at 54 ft on the St. Louis gage, and incorporating life safety risk information. Using this information to address underseepage concerns resulted in the elimination of decision reaches 1, 4, 6 and 7, and a portion of reach 5 (5a), from further consideration as these decision reaches were determined to either 1) not have underseepage at high river stages, or 2) meet levee safety requirements. An overview of the Standards Plan with Risk Informed Screening by decision reach is displayed in Table 2 (Figures 2 – 5). The proposed features in the remaining reaches (2, 3, and 5b) for this alternative are identical to the Standards Plan.

Table 2. Proposed features by Lower Wood River Levee Reach to address design deficiencies.

Reach	Features	Descriptions
1	-	-
2	Relief wells	52
	Fill	0.26 acres of material placed to the elevation of surrounding landscape (~420 ft)
	Pipe	1,100 ft of pipe to collect relief well flows and direct it to a pump station

	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total length of 2,000 linear ft
	Culvert	One 720 ft culvert connecting existing water retention areas at elevation 415 ft
	Ponding	Water retention area which can hold water to 415 ft elevation
3	Relief wells	15
	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total length of approximately 2,700 ft
	Pipe and fill	Placement of a conveyance pipe and fill material in a maintained drainage ditch approximately 1,200 linear ft
4	-	-
5a	-	-
5b	Relief wells	44
	Flowage easement	5,300 linear ft of drainage easement in an existing ditch
	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total of 6,500 linear ft
	Culvert	7 under-road culverts approximately 40 ft long that would connect existing and new ditches
	Pump station	2
6	-	-
7	-	-

2.4 ALTERNATIVE 3 – RISK INFORMED PLAN (TENTATIVELY SELECTED PLAN)

This alternative uses the same reaches outlined in the Standards Plan with Risk Informed screening. However, this alternative considers potential designs to reduce project costs while still meeting an acceptable level of safety as outline in RM 1110-2-1913. An overview of the Risk Informed Plan by decision reach is displayed in Table 3. Based on the information in this Supplemental EA, the risk assessment, and projected project cost, this plan has been identified as the Tentatively Selected Plan (TSP). This alternative differs slightly from the Standards Plan with Risk Informed Screening based on the number and configuration of relief wells, as well as the amount of ditching and flowage easements proposed. The ponding and fill areas in reach 2, the fill area in reach 3, and the pump stations in reach 5 in this alternative are identical to the Standards Plan with Risk Informed Screening.

Table 3. Proposed features by decisions reach to address design deficiencies.

Reach	Features	Descriptions
1	-	-
2	Relief Wells	45
	Fill	0.3 acres of material placed to the elevation of surrounding landscape (~550 yd^3)

	Pipe	2,000 ft of pipe to collect relief well flows and direct it to a pump station
	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total of 950 linear ft
	Culvert	One 760 ft culvert connecting existing water retention areas at elevation 415 ft
	Ponding	Water retention area which can hold water to 415 ft elevation
3	Relief Wells	6
	Pipe and Fill	Placement of a conveyance pipe and fill material in a maintained drainage ditch approximately 1,200 linear ft (~8,000 yd^3 of fill)
4	-	-
5a	-	-
5b	Relief wells	24
	Flowage easement	3,800 linear ft of drainage easement in an existing ditch (~4,000 yd^3)
	Ditching	Increase in existing ditch depth by up to 2.5 ft for a total of approximately 3,800 linear ft
	Culvert	4 under-road culverts approximately 40 ft long that would connect existing and new ditches
	Pump station	2
6	-	-
7	-	-

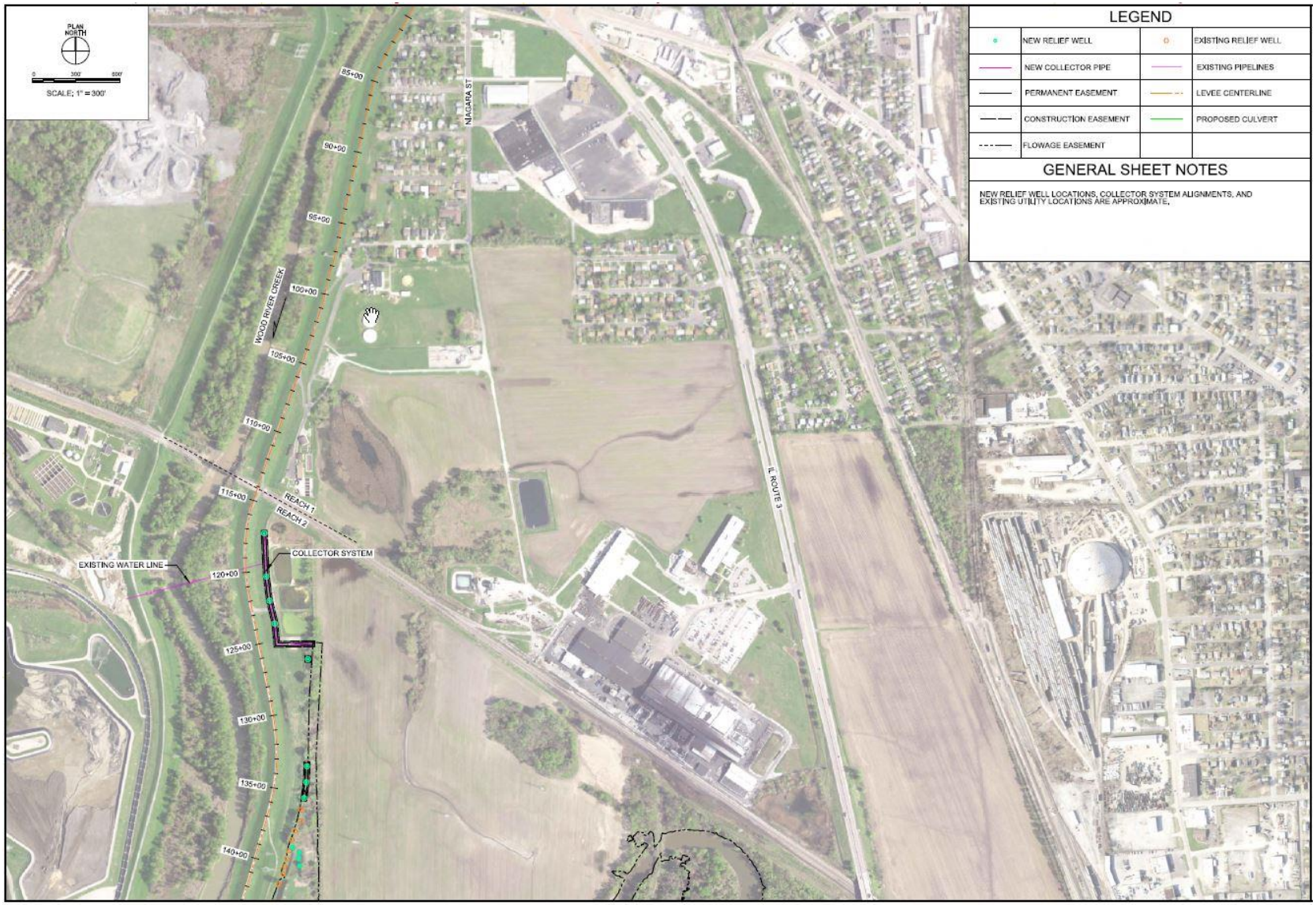

Figure 7. Proposed features in the northern portion of reach 2 for the Risk Informed Plan.

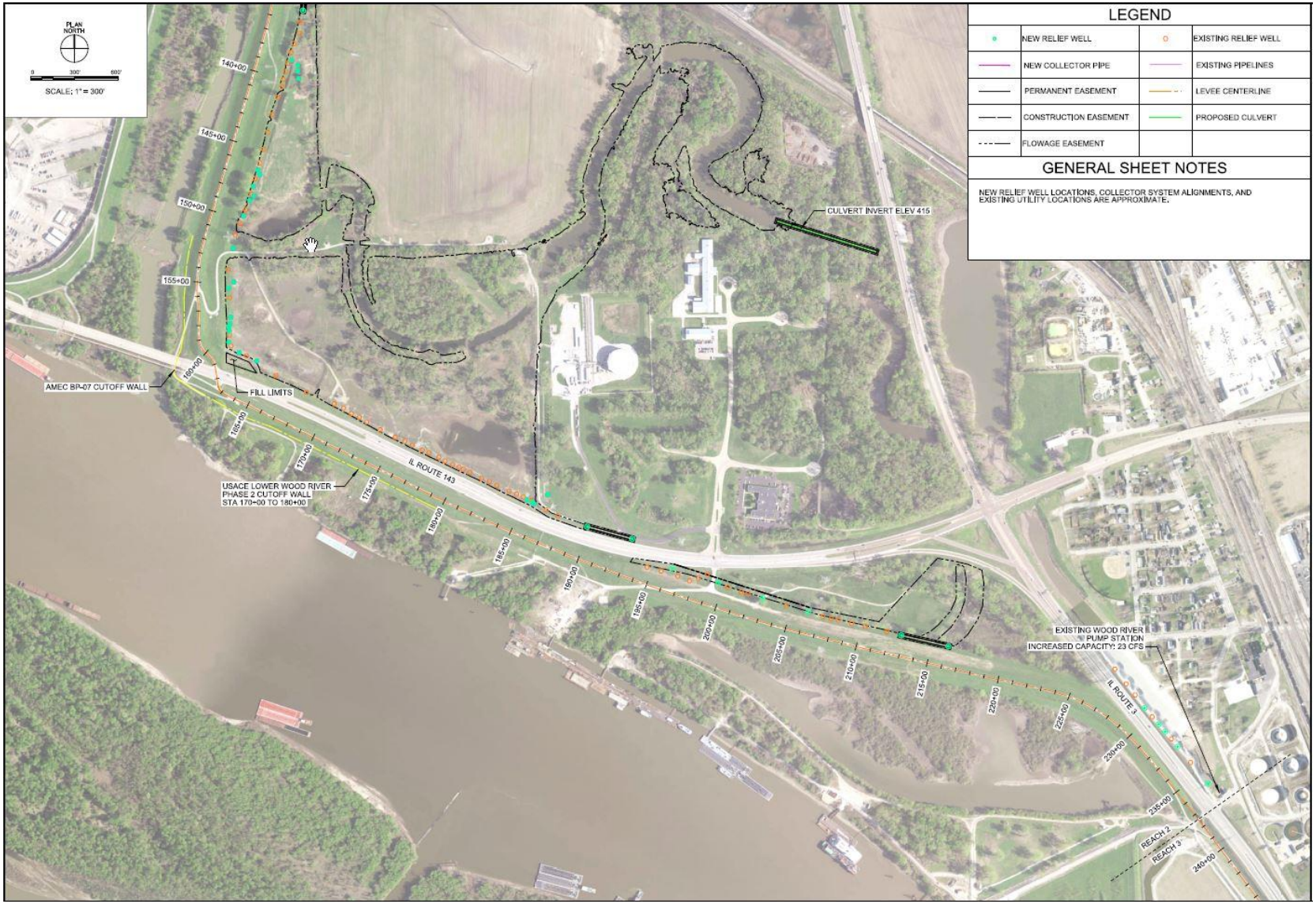

Figure 8. Proposed features in the southern portion of reach 2 for the Risk Informed Plan.

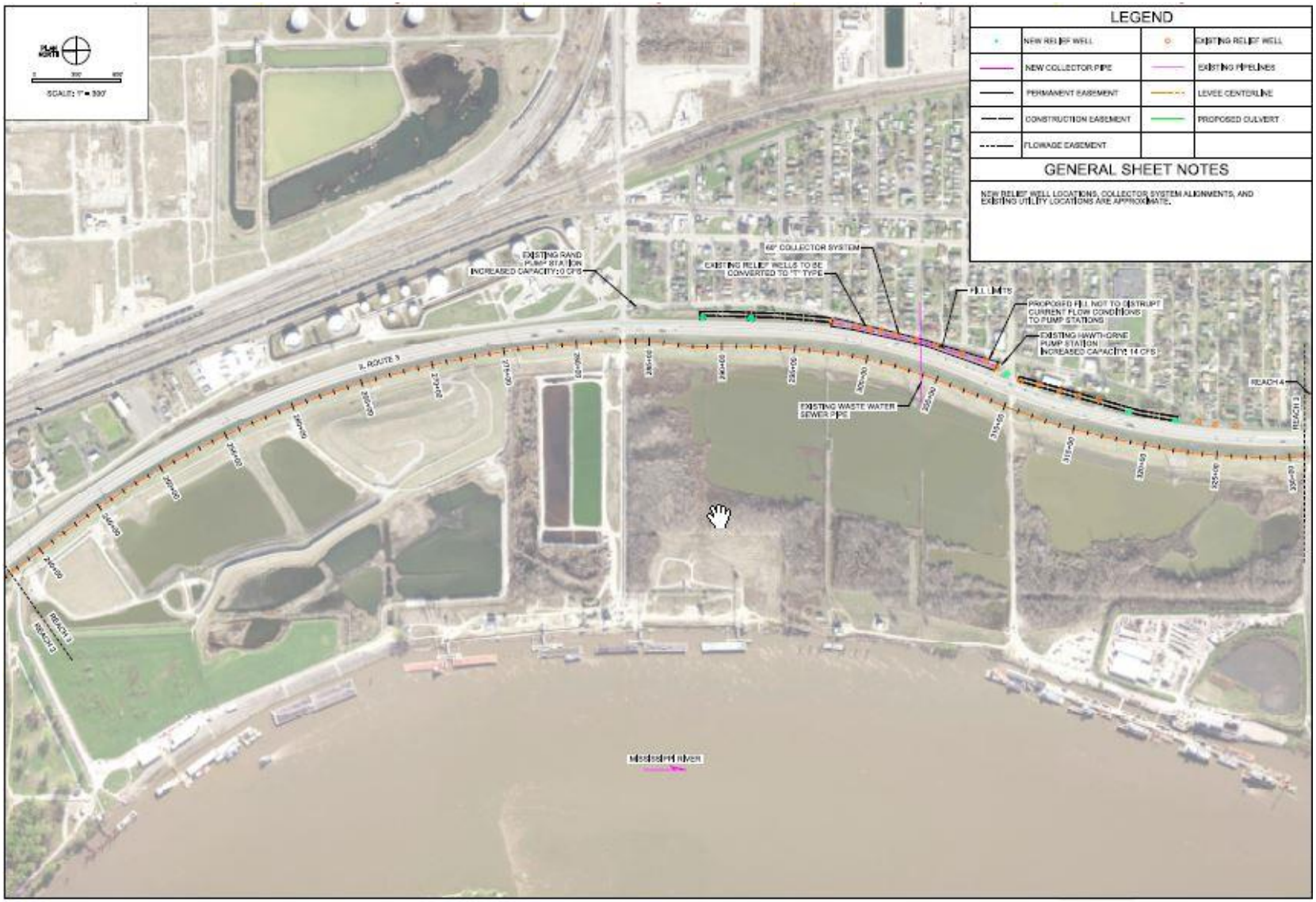

Figure 9. Proposed features in reach 3 for the Risk Informed Plan.

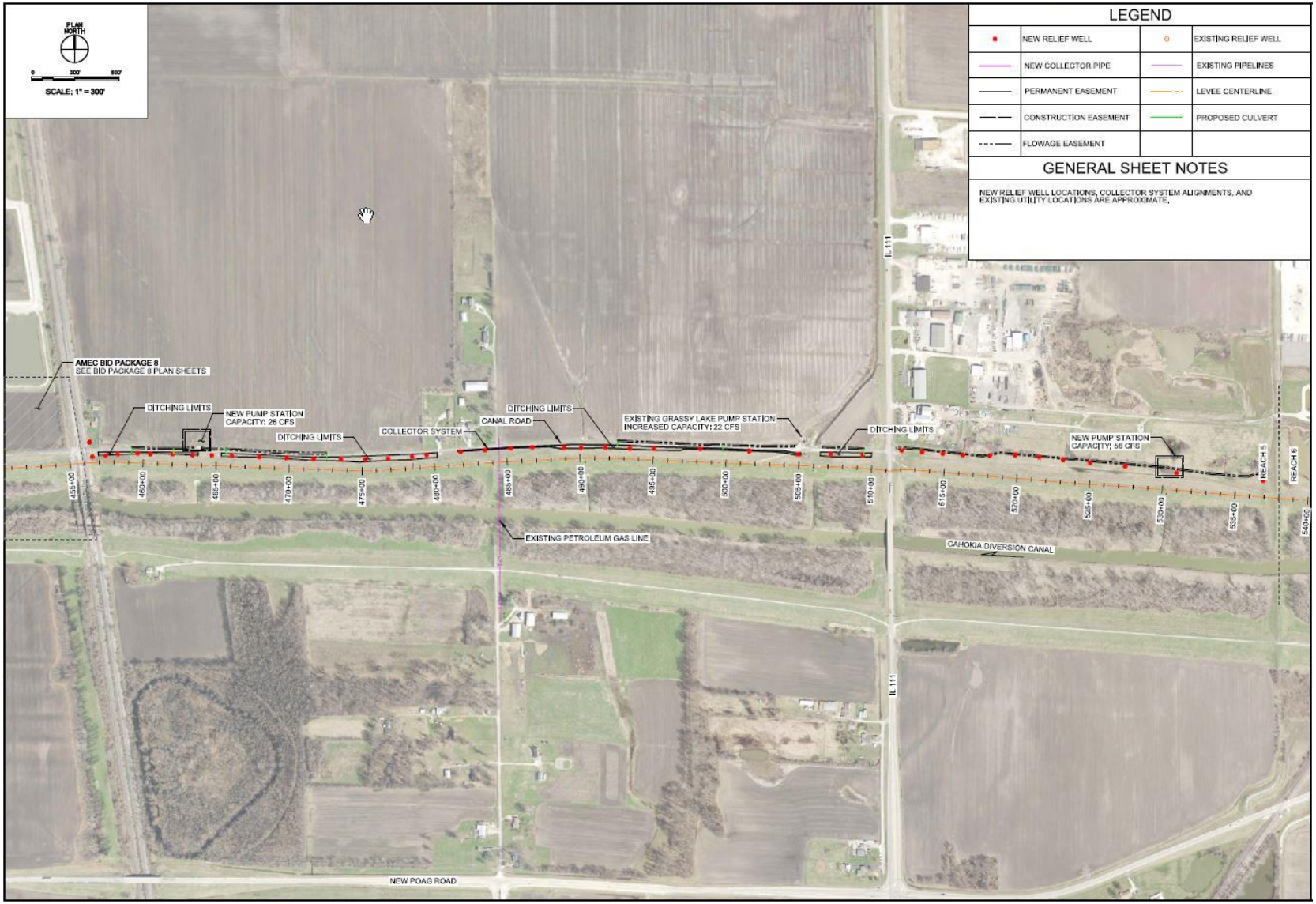

Figure 10. Proposed features in reach 5a for the Risk Informed Plan.

3 AFFECTED ENVIRONMENT

This section describes existing conditions in the proposed project area, which are referred to under the NEPA process as the Affected Environment. The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public.

3.1 TOPOGRAPHY, GEOLOGY, AND LAND USE

The Wood River Drainage and Levee District is situated between the Mississippi River on the west and bluffs on the east. The bluffs are as high as 650 ft above sea level. The floodplain, which is the area between the bluffs and Mississippi River, is characterized by ridge and swale topography, with a maximum natural relief of approximately 35 ft and elevations ranging from 440 to 405 ft.

The line of bluffs that define the eastern boundary of the levee district consists of relatively soft shales and sandstones. However, bedrock is not exposed as the bluffs are mantled with deposits of glacial drift overlain with loess. The drift is commonly an unsorted deposit of pebbly clay, very plastic clay, sandy clay, and occasional lenses of sand or gravelly sand. The loess that blankets the summit and faces of the bluffs consists of windblown silts and lean clays locally 50+ ft thick. Adjacent to the bluffs, a series of sand and gravel deposits form terraces that stand an average of 30 ft above the level of the surrounding plain. These terraces are remnants of an aggraded fill resulting from glacial melt deposits.

Wood River (stream), a tributary of the Mississippi River, divides just west of East Alton. The deepest part of the bedrock surface ranges in depth from 160 to 170 ft beneath the valley fill with an average thickness of 130 ft of overlying alluvial deposits. Immediately above the bedrock surface is a stratum consisting of coarse gravels and sands with occasional boulders. Overlying this stratum is a thick section of medium to fine sands. The surface deposits are complex and varied as they result from filled lakes and swamps, abandoned meander loops, and flood water deposition. The surface materials range from heavy plastic clays to fine sands. In addition, industrial waste and artificial deposits are also found as part of the surface deposits.

Anthropogenic land use alterations have drastically changed this area since the construction of the levee. According to the 2011 National Land Cover Database (NLCD 2011; Figure 11), urban development, which consists primarily of industrial development, now comprises the majority (71%) of the Lower Wood River leveed area. However, there are small sections of agricultural lands (~18%) with few areas of forest (<1%), wetland (<1%), and open water (~1%) habitats. According to the National Wetland Inventory database, the Lower Wood River leveed area contains emergent wetlands (205.3 acres) and forested/shrub wetlands (185.3 acres) as well as pond (133.1 acres), lake (79.3 acres), and riverine (19.3 acres) habitat types. Further descriptions of the agricultural and natural land covers are discussed more in Sections 3.10 and 3.11, respectively.

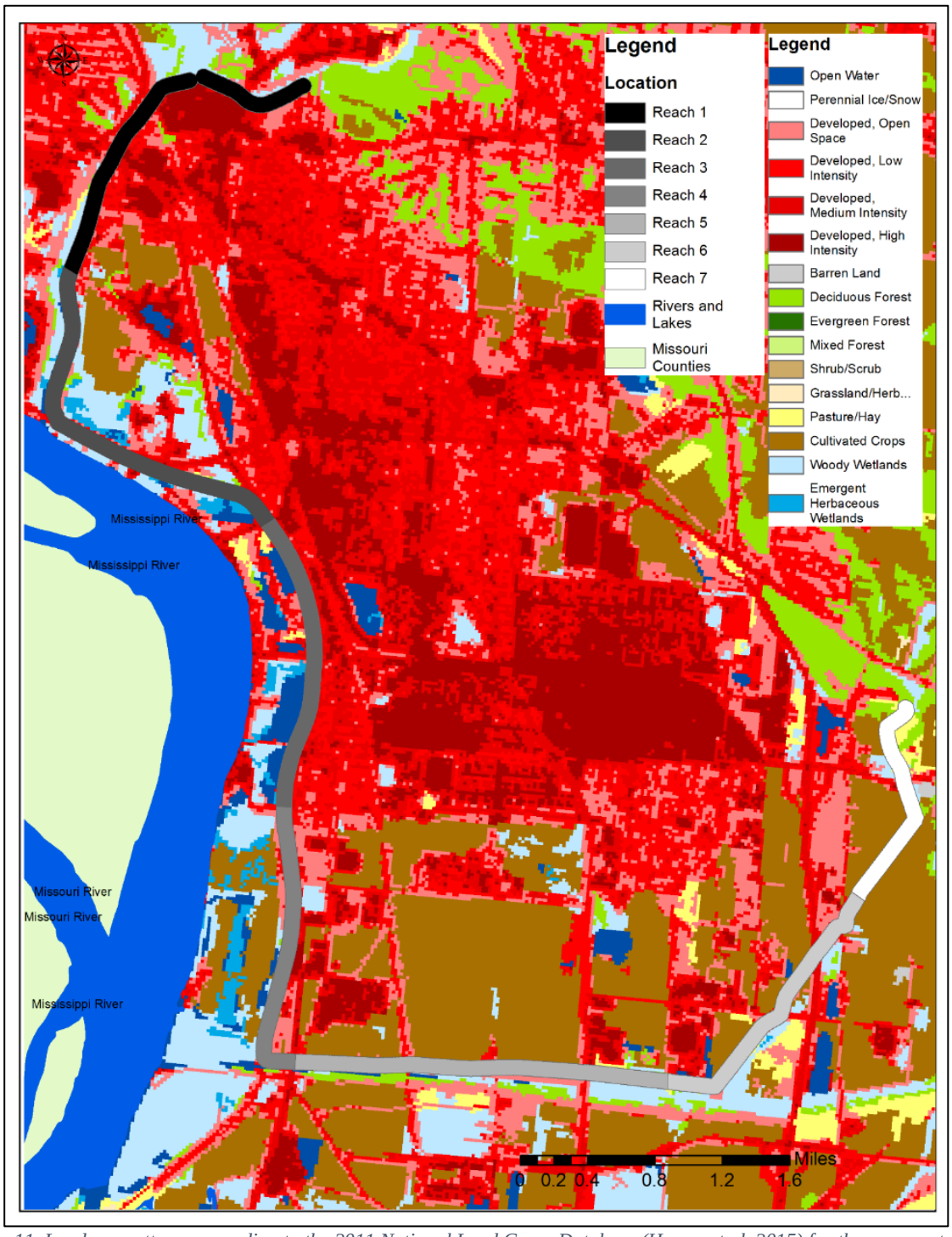

Figure 11. Land use patterns according to the 2011 National Land Cover Database (Homer et al. 2015) for the area protected by the Lower Wood River levee.

3.2 HYDROLOGY AND HYDRAULICS

The Wood River Levee System is intended to provide protection against a 52 ft Mississippi River stage on the St. Louis gage, which has a current expected frequency of greater than 500 years. For the design flow of

1,300,000 cfs, the height of protection is based upon confinement by industrial and urban area projects with a design flood profile having a flow-line elevation of 443.4 ft, m.s.l. at the upper end (opposite river-mile 202.7); elevation 442.7 ft, m.s.l, at the mouth of Wood River creek; and elevation 441.4 ft, m.s.l, at the lower end (Cahokia Creek Diversion Channel) of the levee district. Levee grade freeboard is 2 ft above water surface profile by design. The flood of record occurred during the summer of 1993 when the St. Louis gage recorded 49.58 ft. River elevations were above flood stage from 3 April to 7 October. Peak flow was estimated at 1,080,000 cfs. The frequency of that event in the project area was 175 years. The project endured two other significant flood events; 43.3 ft on the St. Louis gage in 1973, and 41.9 ft on the St. Louis gage in 1995. For the flank levees, a net grade equal to the main stem design flood elevation plus 2-ft freeboard was projected back along the tributaries.

The levee district relies on many pumping stations that discharge storm water, seepage, and sewage flow to the Mississippi River. The interior drainage system relies on two methods of conveyance, open drainage ditches and combined sewers. Open drainage ditches feed two of the levee and drainage district's seven pump stations, these are Lakeside and Homegarden. Sewer fed pump stations must pump effluent irrespective of interior rainfall events whenever gravity flow is impeded by high river stages.

A relatively large wetland complex is located within decision reach 2 along the landside of the levee immediately downriver of the confluence of the Mississippi River and Wood River (stream). This area supports roughly 75 acres of mainly open water wetlands and mudflats that are surrounded by wetland forest. Historically, this area contained a meandering Wood River (stream) prior to levee construction. Wetland hydrology consists of surface runoff from adjacent levee-protected land as well as groundwater inflow during time when the Mississippi River is high. The trunks of the large cottonwood trees in this forested wetland exhibit staining from season ponding of stormwater, and these marks are about 10 ft above the ground which corresponds to a surface water elevation of approximately 419 ft.

3.3 WATER QUALITY

3.3.1 Surface Water

The East and West Forks of Wood River join together forming the upper boundary of the Lower Wood River leveed area before discharging into the Mississippi River. The Cahokia Creek Diversion Channel bounds the south side of the Lower Wood River leveed area. The Mississippi River borders the riverfront levee for its entire length. Small man-made impoundments are scattered in the uplands, and a number of lake-like water bodies occur in the bottomland, most of which are clustered along the riverside or protected side of the main levee. This project area is within the Mississippi South Central River HUC12 watershed. The Illinois Environmental Protection Agency (IEPA) samples surface waters within HUC12 watersheds on a 4-year rotation to meet Section 305(b) requirements of the Clean Water Act (1976). IEPA reports the resource quality of its waters in terms of the degree to which the beneficial uses of those waters are supported and the reasons (i.e., causes and sources) beneficial uses may not be supported.

According to the IEPA (2016a), impaired uses and causes for impairment (within parentheses) for these waterways include:

1. Mississippi River - fish consumption (mercury, polychlorinated biphenyls), primary contact recreation (fecal coliform), and public water supplies (manganese);
2. Cahokia Creek Diversion Channel – aquatic life (phosphorus total);
3. Wood River– aquatic life (total suspended solids) and primary contact recreation (fecal coliform);

4. West Fork Wood River – aquatic life (Sedimentation/Siltation); and
5. East Fork Wood River – aquatic life (sedimentation/siltation, water temperature) and aesthetic quality (bottom deposits)

3.3.2 Groundwater

The bottomland portion of the Wood River leveed area is underlain by a sand and gravel aquifer that has historically supplied groundwater for industrial purposes. The municipalities of East Alton, Bethalto, Wood River, and Hartford have community water supply facilities that currently withdraw from these groundwater sources. In order to protect groundwater quality in this area, the Southern Groundwater Protection Planning Region was established by the IEPA in Madison County and three adjacent counties to the south. The 2011 Wood River Supplemental EA identified areas with groundwater quality concerns. In the vicinity of the East Alton community water supply, there is a plume of groundwater contamination coming from two sites that consist of leaking underground storage tanks, and the contaminants include various volatile organic compounds (IEPA 2016b). The IEPA's Bureau of Land is implementing a groundwater contamination response strategy for East Alton (IEPA 2016b). There is also dissolved and free phase hydrocarbon contamination under portions of the northern part of the Village of Hartford. The dissolved plume is currently under investigation by the IEPA.

3.4 RECREATION AND AESTHETICS

Madison County Transit supports a system of recreational trails in Madison County that are used for walking, running, roller-blading, and cycling (MCT 2010). The Confluence Trail follows the top of the riverfront levee along the Mississippi River. This trail extends nine miles from the Cahokia Creek Diversion Channel at the south to Alton at the north, and passes by the Melvin Price Locks and Dam. The trail is crossed at a number of locations by public and private roads. A two-mile extension branches off at Wood River Creek and follows the creek upstream to about Illinois Route 3. A second trail, the Watershed Trail, occurs in the southeast portion of the Lower levee system and was built along an abandoned rail corridor.

Aesthetic resources are represented by those aspects of the natural and human environment that are pleasant or pleasing to people, especially to look at. For many people aesthetic resources include the natural channel of the Mississippi River, undeveloped open spaces such as agricultural lands, natural habitats, and some development, such as residential areas. The project area's industrial areas are expected to be aesthetically attractive to relatively few people.

3.5 VEGETATION AND WETLANDS

The project area falls within an area commonly referred to at the American Bottoms. The American Bottoms is an expansive floodplain of the Mississippi River extending from Alton, Illinois, south to the Kaskaskia River. The floodplain lies just south of the confluence of three great rivers, the Missouri, Illinois, and Mississippi Rivers, and is bounded by a nearly continuous bluff on the east and the Mississippi River to the west. The area is currently by being protected from flooding by a levee and drainage canal system with many remaining wetlands and oxbow lakes. Historically, this area was primarily used for agriculture due to its rich fertile soils.

A variety of aquatic, wetland, and terrestrial natural communities are found in the project area. Aquatic resources include the Mississippi River, Cahokia Creek Diversion Channel, and Wood River. The Mississippi River is an aquatic resource of major significance, and provides habitat to numerous species of

invertebrates, fish, and birds. Because much of the levee district is highly developed, existing biological resources are relatively limited landside of the levee system.

Wetlands subject to Section 404 of the Clean Water Act are concentrated along the Mississippi River, mainly riverside but also landside of the levee. Relatively small scattered wetlands occur on the historic floodplain within the levee-protected area. Wetlands also occur in a narrow band along the Diversion Channel, where they are bordered by the waterway's flank levees. However, the majority of the wetlands occur in the northwest vicinity of the leveed area at the confluence of the Wood and Mississippi Rivers. Many of these wetland and terrestrial natural communities have limited ecological importance because they are relatively small and fragmented as a result of past and ongoing development. According to the National Wetland Inventory (NWI; USFWS 2017), there are approximately 205 acres and 185 acres of emergent and forested wetland, respectively (Figure 12). Some man-made ponds and open water wetlands also occur in the levee-protected area and according to the NWI there are approximately 133 acres of freshwater pond, 79 acres of lake, and 19 acres of river habitats. The NWI is a relatively course inventory of wetland habitats so, the Upper Mississippi River Restoration Program's Long-Term Resource Monitoring (LTRM) land cover database (USGS 2011) was also used to assess the wetland habitats in this region.

Most wetlands consist of either forested or herbaceous (emergent) habitats. Typical tree species in forested wetlands include cottonwood, black willow, silver maple, green ash, mulberry, and dogwood. Hard mast species such as oaks and pecans are often absent. Groundcover is related to site wetness, and may not be present at all, may be discontinuous and consists of various sedges, forbs, and grasses, or may be dense and support a diversity of herbaceous plant species. Wetland hydrology consists of surface runoff from adjacent levee-protected land as well as groundwater inflow during times when the Mississippi River is high.

Terrestrial habitats occur in the vicinity of Wood River (stream) and at scattered locations on the levee-protected floodplain, and consist of nonwetland floodplain and upland forests. Old field habitat is also present along the levee system and consists of areas previously cleared of trees or formerly developed sites. Maintained grassy areas occur along the sideslopes of the levee system and adjacent highways.

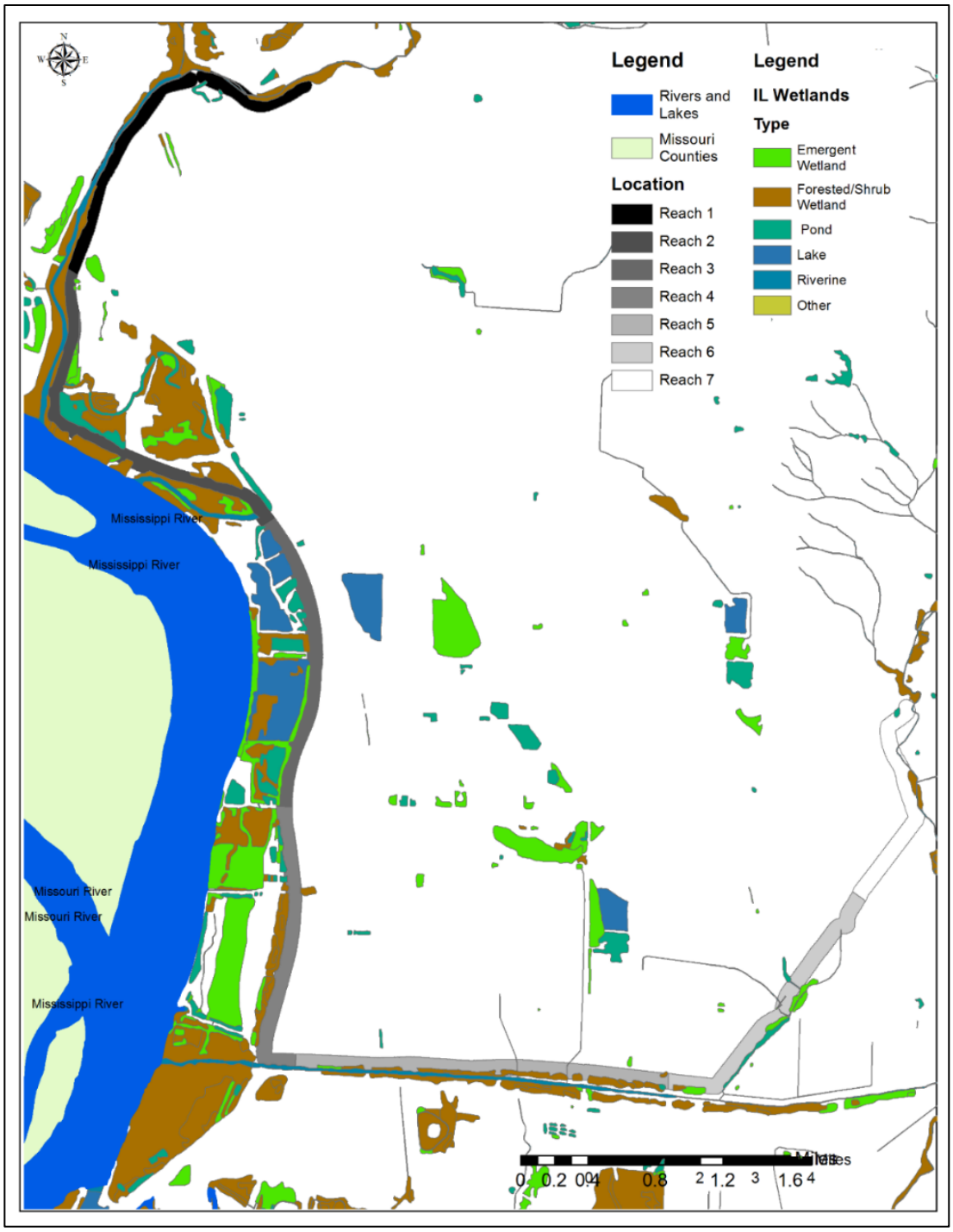

Figure 12. Wetland types within the Lower Wood River Levee protected area according to the National Wetland Inventory.

3.6 AQUATIC HABITATS

The Mississippi River borders the riverfront levee for its entire length and provides ample habitat for aquatic organisms. However, channelization, urbanization, industrialization, and the need to control flooding within the floodplain have disrupted the flow of water across the project area leaving fragmented and highly altered aquatic habitats. The East and West Forks of Wood River join together forming the upper boundary of Lower Wood River leveed area before discharging into the Mississippi River. Prior to levee construction, the Wood River channel meandered within the floodplain prior to joining with the Mississippi River (Figure 13). However, sometime prior to 1934, this meander was cut-off and the lower portion of the Wood River was channelized. Remnants of the stream channel are still present south of the Wood River. In this area, accumulated surface water and underseepage water is only conveyed at high interior ponding levels along a series of ditches and ponds and through a pump station to the Mississippi River.

The Cahokia Creek Diversion Channel, completed in 1909, bounds the south side of the Lower Wood River leveed area. Prior to diversion, Cahokia Creek was the principal stream in the floodplain and meandered across the floodplain until it emptied into the Mississippi River approximately 20 miles south of its current confluence. As other levee systems were constructed and new development occurred, other creeks and streams in the area were channelized and diverted to the Mississippi River. In general, channelized streams provide little habitat for aquatic organisms. Typically, the species that live in these types of habitats are tolerant of poor water quality, high turbidity, silt substrate, and increased water temperatures.

There are small man-made impoundments and a number of lake-like water bodies scattered in the levee protected area, most of which are clustered along the riverside of the main levee. Traces of historic oxbow lakes, such as Grassy Lake and Smith Lake, are still evident. However, overtime these waterbodies and their associated wetlands, have been altered for agricultural use or urban development.

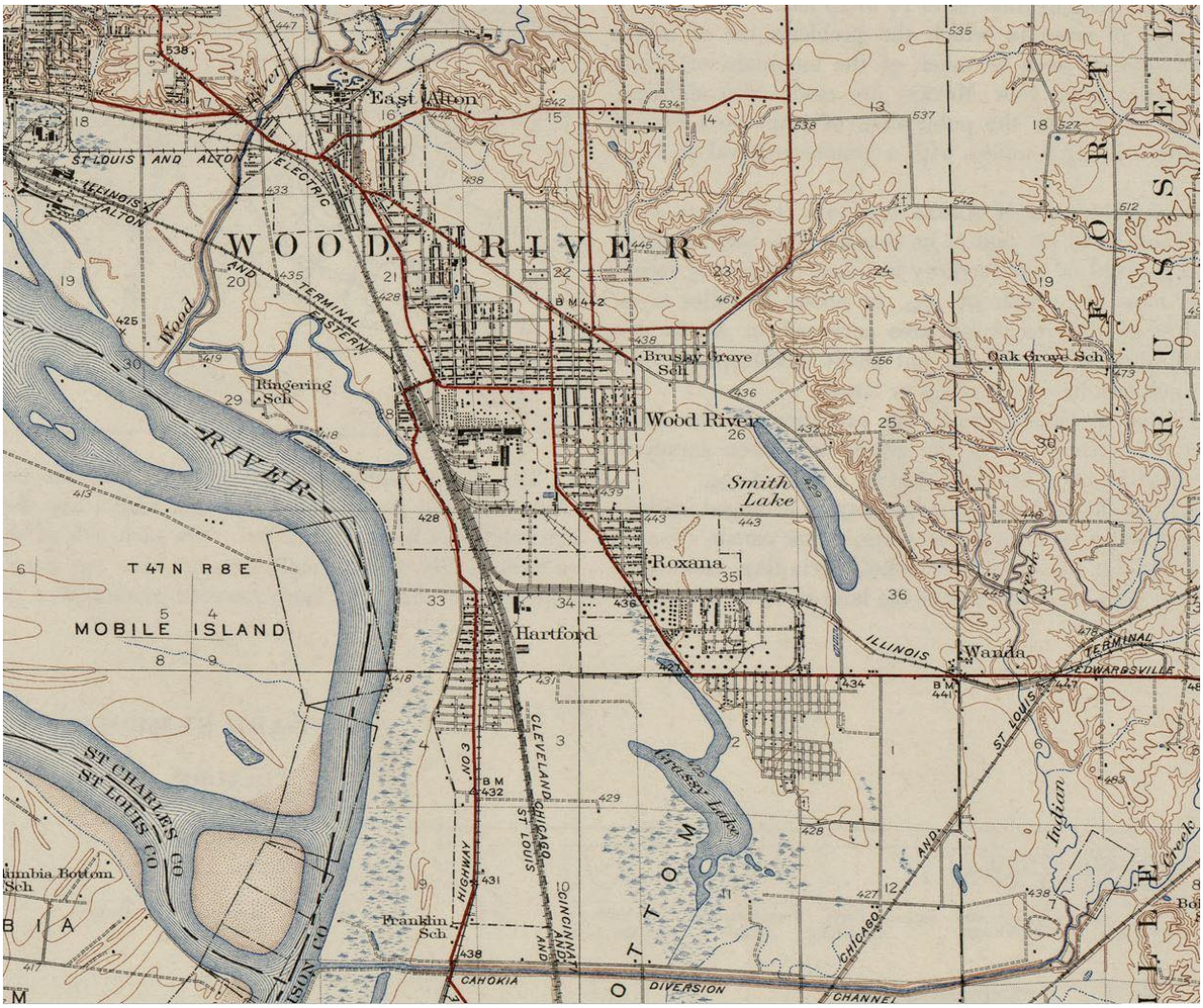

Figure 13. U.S.G.S Topographic map from 1934 of the Wood River area prior to levee construction.

3.7 FISH AND WILDLIFE

A variety of animal species use the urbanized project area. Most wildlife species are adapted to human disturbance or tolerant of fragmented habitats or poor water quality, and consist of a variety of amphibians, reptiles, birds, and mammals. For example, fishes observed in open water wetlands are tolerant of high turbidity, and include such species as mosquitofish (*Gambusia affinis*) and common carp (*Cyprinus carpio*). The open water and herbaceous wetlands serve as resting and feeding areas for some migratory ducks and geese. Wading birds that typically feed in shallow ponded areas or ditches include the great blue heron (*Ardea herodias*) and great egret (*Ardea alba*). Wild turkey (*Meleagris gallopavo*) may also be seen as well as red-winged blackbirds (*Agelaius phoeniceus*). Larger mammals include raccoon (*Procyon lotor*), common opossum (*Didelphis marsupialis*), and white-tailed deer (*Odocoileus virginianus*).

3.8 THREATENED AND ENDANGERED SPECIES

3.8.1 Federally Listed Species

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District obtained a listing of federally threatened or endangered species currently classified or proposed for classification that may occur in Madison County, Illinois in the vicinity of the Lower Wood River levee system (USFWS 2017; Consultation Code: 03E8100-2017-SLI-0684). Eight listed species may occur within Madison County, IL (Table 4). The following discussion addresses the potential presence and life requirements of these eight listed species.

Table 4. List of federally listed threatened and endangered species potentially occurring within the proposed project area.

Common Name	Scientific Name	Listing Status	Habitat
Indiana Bat	*Myotis sodalis*	Endangered	Caves and mines (hibernacula); small stream corridors with well-developed riparian woods, upland forests (foraging)
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Caves and mines (hibernacula); small stream corridors with well-developed riparian woods, upland forests (foraging)
Least Tern	*Sterna antillarum*	Endangered	Sparsely vegetated sand and gravel bars on large rivers (nesting)
Eastern Massasauga	*Sistrurus catenatus*	Threatened	Floodplain forests, marshlands, bogs, and old fields
Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	Large rivers
Spectaclecase	*Cumberlandia monodonta*	Endangered	Large rivers in areas sheltered from the main flow of the river current
Decurrent False Aster	*Boltonia decurrens*	Threatened	Disturbed alluvial soils
Eastern Prairie Fringed Orchid	*Platanthera leucophaea*	Threatened	Mesic to wet prairies

Indiana Bat. Indiana Bats hibernate in caves, or mines, only during the winter months. Hibernation season is from 1 October to 31 March. During the active season (1 April to 30 September), they roost in forest and woodland habitats. A wide variety of summer habitats are suitable for Indiana Bats such as forested/wooded habitat and non-forested habitats such as emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures. Roosting habitats for this species include live trees and/or snags with at least 5 inches diameter at breast height (dbh) that have exfoliating bark, cracks, crevices, and/or hollows. Tree species used as roosts often include, but are not limited to, shagbark hickory, white oak, cottonwood, and maple trees.

Northern Long-eared Bat. Northern Long-eared Bats hibernate in caves, or mines, only during the winter months. In Missouri, hibernation season is from 1 August to 31 May. During the active season (1 June to 31 July), they roost in forest and woodland habitats. A wide variety of summer habitats are suitable for Northern Long-eared Bats such as forested/wooded habitat and non-forested habitats such as emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures. Roosting habitats for this species

include live and/or snags at least 3 inches diameter at breast height (dbh) and have exfoliating bark, cracks, crevices, and/or hollows. Tree species used as roosts often include, but are not limited to, shagbark hickory, white oak, cottonwood, and maple trees. Northern Long-eared Bats have also been observed roosting in human-made structures such as buildings, barns, bridges, and bat houses.

Least Tern. Nesting colonies of the least tern have been recorded in southern Illinois from Jackson and Alexander Counties (Herkert 1992). The least tern has occasionally been observed in the Metro-East area at Horseshoe Lake during spring migration (McMullen 2001). No known natural nesting habitat of the least tern occurs within the study area or adjacent reach of the Mississippi River. This bird forages for small fish in shallow water areas along the river and in backwater areas, such as side channels and sloughs. Foraging and nesting habitat are located in close proximity to each other. From late April to August, least terns nest on sparsely vegetated alluvial or dredge spoil islands and sand/gravel bars in or adjacent to rivers, lakes, gravel pits and cooling ponds. They nest in colonies with conspecifics and sometimes with the piping plover (Charadrius melodus). Nesting locations usually are at the higher elevations and away from the water's edge. Dams, reservoirs, and other changes to river systems have eliminated a great amount of the historic least tern habitat. Narrow forested river corridors have replaced historical wide channels dotted with sandbars that are preferred by the terns. Furthermore, recreational activities on rivers and sandbars disturb the nesting terns, which can cause them to abandon their nests.

Eastern Massasauga Rattlesnake. This federally threatened rattlesnake is known to occur from the historic floodplain of the Mississippi River in the Metro East area near Horseshoe Lake, to the south of the Wood River Levee and Drainage District. The massasauga, or swamp rattler, historically lived in prairies of the Midwest, apparently in the wetter areas, and today inhabits old fields, floodplain forests, marshlands, and bogs. It is active from April through October, and often suns on clumps of grass, in branches of small shrubs, or near crayfish burrows. It feeds on small rodents, and overwinters in crayfish burrows, hibernating until spring.

Pallid Sturgeon. This fish is found in the Mississippi River downstream of its confluence with the Missouri River, which is about 4 miles downriver from of the Melvin Price Locks and Dam. The entire stretch of river below the mouth of the Missouri River is considered potential habitat. Pallid sturgeon are most frequently caught over a sand bottom, which is the predominant bottom substrate within the species' range on the Missouri and Mississippi Rivers. Pallid sturgeon have been found in water 1.2 to 7.6 meters deep with velocities of 0.33 to 90 centimeters per second (USFWS 1993). These data probably better reflect where data have been collected rather than actual habitat preferences. Recent tag returns have also shown that the species may be using a range of habitats in off-channel areas, including tributaries of the Mississippi River.

Spectaclecase. The Spectaclecase is a freshwater mussel that can grow up to 9 inches in length with an elongated and somewhat flattened shell. This mussel was historically found in at least 44 streams of the Mississippi, Ohio, and Missouri River basins. Spectaclecase mussels are found in large rivers in areas sheltered from the main flow of the river current, such as beneath rock slabs, between boulders, and under tree roots. Adult mussels can be found in clusters in firm mud flats and often spend their lives completely, or partially, buried within river substrates. Sedimentation, population fragmentations, pollution, and channelization are the primary contributors to the decline of this species. Populations of Spectaclecase mussels have not been recently observed on the mainstem of the Upper Mississippi River below Lock and Dam 25.

Decurrent False Aster. The Decurrent False Aster is a perennial floodplain plant of open, wetland habitats, and its distribution includes Madison and St. Clair Counties, Illinois. Historically it occurred in wet prairies, shallow marshes, and shores of rivers, creeks, and lakes on the floodplain of the Illinois and Mississippi Rivers (Schwegman and Nyboer 1985). Currently it is found most often in old agricultural fields and along roadsides and lake shores where alluvial soils have been disturbed (USDOT 2000). This plant is an early successional species that requires either natural or human disturbance to create and maintain suitable habitat. In the past, the annual flood/drought cycle of the Illinois and Mississippi rivers provided the natural disturbance required by this species. Annual spring flooding created open, high-light habitat and reduced competition by killing other less flood-tolerant, early successional species. Field observations indicate that in "weedy" areas without disturbance, the species is eliminated by competition within 3 to 5 years (USFWS 1990, USFWS 2001). *Boltonia decurrens* has high light requirements for growth and seed germination (Smith et al. 1993, Smith et al. 1995), and shading from other vegetation is thought to contribute to its decline in undisturbed areas. Seeds of this plant can be dispersed by flooding, or carried by wind and animals. Records of this plant occur to the south of the Wood River Drainage and Levee District in the Metro East area. These sites "are predominantly located on old or mowed fields, in wetlands, or on the edges of active fields, farm facilities, golf courses, or a railroad" (USDOT 2000).

Eastern Prairie Fringed Orchid. Also known as the prairie white fringed orchid, this species formerly occurred over much of north and central Illinois, including Madison County, but is now confined to the northeast corner of the state (Herkert 1991). This plant is found in mesic to wet prairies located on uplands and in river valleys. It may be present wherever prairie remnants are encountered. There are no known prairie remnants on the historic floodplain of the Mississippi River in the Wood River leveed area.

3.9 BALD AND GOLDEN EAGLE

Bald Eagles (*Haliaeetus leucocephalus*) winter along the major rivers of Illinois and Missouri, and at scattered locations some remain throughout the year to breed. Perching and feeding occurs along the edge of open water, from which eagles obtain fish. The bald eagle was removed from the List of Endangered and Threatened Species in August 2007, but it continues to be protected under the Bald and Golden Eagle Protection Act and by the Migratory Bird Treaty Act. Recommendations to minimize potential project impacts to the bird and nests are provided by the U.S. Fish and Wildlife Service in the agency's National Bald Eagle Management Guidelines publication (USFWS, 2010). The guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. Specifically, construction activity is prohibited within 660 ft of an active nest during the nesting season, which in the Midwest is generally from late January through late July. There is one known nest in the vicinity of the Wood River Flood Protection Project and Mel Price Locks and Dam. Its last known use was in 2018.

3.10 CULTURAL AND TRIBAL RESOURCES

Congress has passed legislation for the preservation of cultural resources beginning with the Antiquities Act of 1906. Generically defined, cultural resources are objects or sites representing human occupation of the land. A cultural resource may be an historic old building, a prehistoric site, a battlefield, a statue, or any other object or location. The legislative history for historic preservation expresses the intent of Congress to ensure that the nation's rich heritage is preserved and that Federal agencies consider the

effects or their actions upon cultural resources. The National Historic Preservation Act of 1966 (NHPA, or the Act), as amended, specifically requires every Federal agency to consider the effects of an undertaking or project upon cultural resources and outlines a process to ensure the same. However, the statute does not mandate the preservation of all cultural properties. Rather, the statute provides for protection of "historic properties or resources," which are legally defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register [of Historic Places], including artifacts, records, and material remains related to such a property or resource" (Section 301 of NHPA). In addition, the Act states that "properties of traditional religious and cultural importance" to Native American tribes or Native Hawaiian organizations may be eligible for inclusion on the National Register (Section 101(d)(6)(A) of the Act). The intent of the Act is to preserve those historic properties that represent significant events, people, achievements, or have the ability to provide information about prehistory. Additional legislation, executive orders, and regulations have refined and clarified the goals and procedures of historic preservation.

The study area is located within the American Bottoms, an area of Mississippi River floodplain extending from Alton on the north, south to the mouth of the Kaskaskia River, near the city of Chester. This area is known for its abundant and significant prehistoric, colonial, and historic cultural resources. Cahokia Mounds, a World Heritage site, lies southeast of the project area. The levees addressed in the present study lie along the Mississippi River, Wood River, and the Cahokia Diversion Canal, constructed to channelize and divert Cahokia Creek and its tributaries to the Mississippi.

The records of the Illinois Historic Preservation Agency (IHPA), the State Historic Preservation Office (SHPO) for Illinois were reviewed to determine the extent of previous research in the project area. The records indicate that there have been multiple survey investigations for parts of the project area, but not for the entire footprint. This analysis has taken in account the design changes since the 2011 LRR, as documented in this report. The levee system itself has not been formally evaluated on its eligibility for the National Register of Historic Places.

3.11 SOCIOECONOMICS AND TRANSPORTATION

The Wood River Levee systems is an integral part of a larger levee system in southwestern Illinois which includes the Chain of Rocks and Alton to Gale levee systems. Collectively, these systems provide protection to over 300,000 people both residing and employed behind these levees. The Wood River Levee system protects major industrial and commercial businesses as well as residential and agricultural lands. The levee protected area has a population of approximately 23,106, of which some 9,930 are employed. Municipalities that are protected by the Wood River Levee include Alton, East Alton, Wood River, Hartford, Roxana, South Roxana, and Bethalto. The Township of Hartford is the most low-lying and flood-prone critical infrastructure within the levee district. Within Hartford there are churches, schools, a fire department, a post office, many residential structures, farmland, and portions of the Phillips 66 Wood River Refinery.

Madison County Assessors data (2012) was obtained from the assessor's office to update appraised structure values for structures located in the Wood River Levee System. Engineering News-Record Construction Cost Index factors were applied to update the Madison County Assessors price levels from 2012 to 2018 (Table 5). The highest value structure in the Lower Wood River Levee system is the Phillips 66 Wood River Refinery. The 2012 Madison County Assessors data estimated the value of the refinery at

$1.3 billion (FY17 dollars). The refinery represents approximately 51% of the total structure value inside the Wood River Levee system. The Phillips 66 refinery complex was evaluated in detail given its value of the levee system, including a field interview to better understand operation distribution data, petroleum storage quantities, the layout of the refinery complex, and the estimated fragility and value of petroleum related infrastructure such as storage tanks, motors, pumps, switch rooms, and control rooms.

Table 5. 2012 Wood River structure inventory taken from the Madison County Assessor's office and updated for 2018 values.

Area	Building Category	Number of Structures	2018 Average Structure Value
Lower Wood River (RM 197.0)	**Residential**	9,179	$115,580
	Commercial	553	$294,907
	Industrial	491	$6,281,079
	Public	9	$306,492
	Agricultural	4	$8,399

The Phillips 66 Wood River Refinery is approximately 2,200 acres in size, stretching to the east and west of Illinois Highway 111. The Main Property and the North Property are on the east side of Illinois Highway 111 and would not become inundated with water during a Flood of Record (1993) flood event. This area is where the majority of the refinery's economic value is located. The three segments (West Property, Distilling West, Southwest Tank Farm) located on the west side of Illinois Highway 111 may become inundated with water during a Flood of Record (1993) flood event. There are 26 low lying storage tanks in this area at or below elevation 428, which corresponds to 4.5 ft of water during Flood of Record (1993) flood event.

The crude oil tanks identified vary in amount of oil stored over time. During a field interview conducted in August 2016 with Phillips 66, the technical facility manager estimated that on any given day, a crude oil storage tank may have a 20% chance of experiencing an internal volume low enough that a significant flood could exert enough buoyancy force to float the storage tank off its foundation. The storage tanks are located close to a mile from the levee, and therefore the tanks would experience low flood velocities, meaning there is a remote chance that a storage tank would hit an object and rupture.

As with many other communities in the nation this region is undergoing economic shifts away from such industries such as steel manufacturing. Even though Alton Steel is still in production, Laclede Steel closed in 2000 making way for other service related industries such as Schiber Truck Company that transports waste in 38 states, Kenan Advantage Group that is North America's largest tank truck transport, and National Maintenance and Repair that repairs barges and marine and other motors. In addition, Olin Corporation still has both their Brass and Winchester Ammunition Divisions located in the proposed project area. In addition to industrial development, the Wood River Levee protected area also contains sewage treatment plants, lumber yards, a vinegar manufacturer, and numerous other commercial and residential entities. In addition to the vast industrial and commercial development, the Wood River Levee system protects residential and agricultural lands. The estimated population within the leveed area, according to 2010 HAZUS data, is 24,761 people during the daytime and 20,703 during the nighttime. The median income of the area averages approximately $41,500, which is below the state and county averages (U.S. Census Bureau 2015).

Traffic in the vicinity of the Lower Wood River Levee consists of highway, local, and river traffic. Traffic on the river varies from barge traffic carrying grain, slag, coiled steel, farming chemicals, and other goods, to small recreational pleasure craft. Operations and maintenance associated with the Lower Wood River Levee currently has no influence on navigation or recreation on the Mississippi River. However, within the Lower Wood River Levee protected area, there is substantial traffic along Illinois Highways 3, 111, and 255. Illinois Highway 3 runs directly adjacent and parallel to the Lower Wood River Levee and has been inundated with water during flood events, which inhibits traffic during those events. Individuals within the levee protected area also experience heavy traffic involving commercial transport vehicles traveling to and from the Phillips 66 Wood River Refinery, farm equipment, and haul trucks traveling to and from barge terminals. The flood-protected area is also traversed by several railroads that service industrial development.

3.12 HAZARDOUS, TOXIC, AND RADIOACTIVE MATERIALS

The U.S. Army Corps of Engineers (USACE) regulations (ER 1165-2-132 and ER 200-2-3), and District policy requires procedures be established to facilitate early identification and appropriate consideration of potential hazardous, toxic, or radioactive waste (HTRW) in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting HTRW Initial Hazard Assessments (IHA). USACE specifies that these assessments follow the process/standard practices for conducting Phase I Environmental Site Assessments (ESA) published by the American Society for Testing and Materials (ASTM). This assessment was prepared using the following ASTM Standards:

- E1527-13: Standard Practice for Environmental Site Assessments – Phase I Environmental Site Assessment process
- E1528-06: Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (interview questionnaires)
- E2247-08 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property

The purpose of a Phase I Environmental Site Assessment is to identify, to the extent feasible in the absence of sampling and analysis, the Recognized Environmental Conditions (RECs) in connection with a given property(s), within the scope of the U.S. Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, commonly known as Superfund) and petroleum products.

Within the Lower Wood River levee system, some industrial sites in the riverfront area are contaminated with wastes. Those in the State Site Remediation Program include Explorer Pipeline Company, Koch Pipeline Company, The Premcor Refining Group, Inc., Clark Oil Refinery, and Shell Oil Company. Sites under the Resource Conservation and Recovery Act (RCRA) program include BP, Conoco-Phillips, and Olin Corporation. CERCLA sites in the area include Laclede Steel Company, Clark Oil Refinery, Owens Illinois Inc., and Chemetco. These combined sites occupy thousands of acres of the floodplain, with Shell Oil being the largest with 2,220 acres.

The area around the Lower Wood River Levee is highly industrialized. The upper portion of the levee Reach 1 and a portion of Reach 2 runs along Wood River (stream). This area is characterized by industries such as Olin Winchester, GBC Metals and Beall Manufacturing. Reach 2 runs south along

Wood River (stream) from the railroad tracks near the Waste Water Treatment facility to the confluence of Wood River (stream) and the Mississippi River and then southeast along Illinois Highway 143 and Illinois Route 3 to the Amoco Cutoff Road. This Reach is adjacent to Alton landfill, Koch fertilizer, and Amoco and BP refineries. Reach 3 runs southeast along Illinois Route 3 from the Amoco Cutoff Road to West 7th Street. This Reach is characterized by Amoco, Wood River Treatment Plant, Premcor, and the Hartford Plume. Reach 4 runs south along Illinois Route 3 from West 7th Street to the confluence of the Mississippi River and Cahokia Creek. This Reach is characterized by Buckeye Refining, and Conoco-Philips. Reach 5 runs along Cahokia Creek from Illinois Route 3 to Cemetery Road. This Reach is adjacent to Buckeye Refining and agricultural land. Reach 6 runs along Cahokia Creek from Cemetery Road and then turns north to Wanda Road. Dynamic Enviro and agricultural land is adjacent to this Reach. Reach 7 the last reach runs north from Wanda Road and then turns northwest at Indian Creek to Old Alton Edwardsville Road. The majority of this Reach is composed of agricultural land with the exception of a cement plant on the east side of Indian Creek.

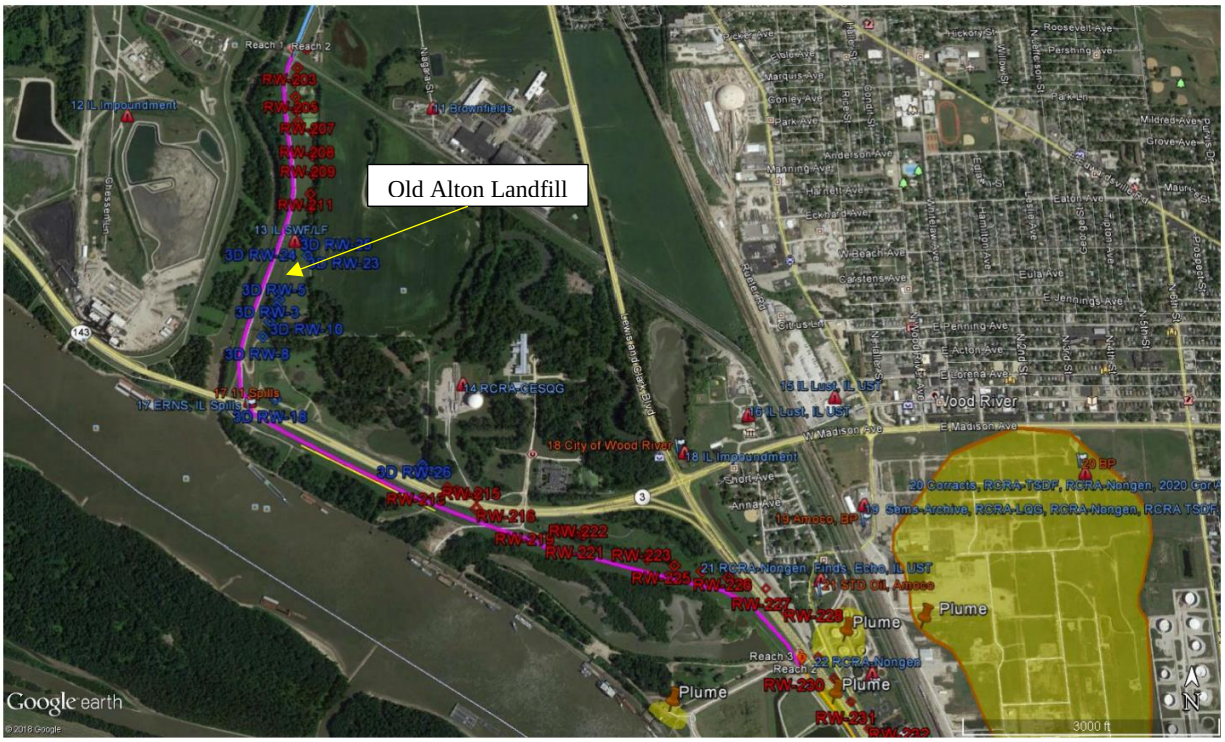

Figure 14. Two areas of potential RECs located in Reach 2. The Old Alton Landfill is located in the upper portion of the reach and a hydrocarbon plume (highlighted yellow area) is located in the lower portion of the reach.

Phase I Environmental Site Assessments (ESA) were completed for the Wood River Drainage and Levee District design deficiency corrections project in February 2018. These Phase I ESAs were conducted in conformance with the scope and limitations of ASTM Practice E 1527. Available information indicate main areas of potential concern. There are two areas of potential RECs located in Reach 2 (Figure 14). The first area is the Old Alton Landfill located in the upper portion of Reach 2 along Wood River (stream). The IEPA has issued a temporary construction easement in this area for the construction of relief wells. The second area of potential RECs is in the lower portion of Reach 2 along Illinois Highway 3. There is the potential to encounter a hydrocarbon plume emulating from refineries in the Wood River

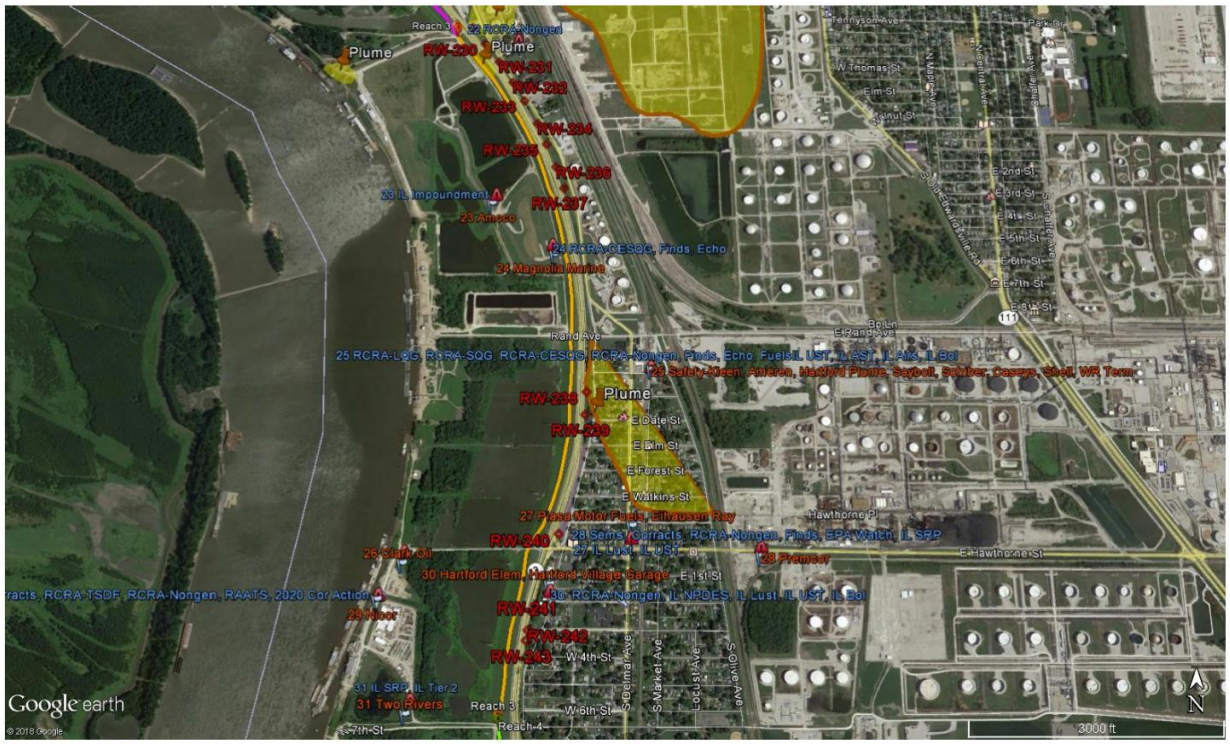

Figure 15. Area of potential RECs located in Reach 3. The same hydrocarbon plume (highlighted yellow area) mentioned in reach 2 is also located along reach 3.

(city), Hartford, and Roxana areas. There is also a potential in Reach 3, as far south as Hawthorne Street, to encounter the same plume (Figure 15). Construction other than surface grading in this area should be avoided if possible. If construction other than surface grading cannot be avoided, then a Phase II Environmental Site Assessment should be completed prior to any work.

Phase I ESAs were previously done in this area in May 2008 and an amended Phase I in 2009. Phase II Environmental Site Assessment was conducted in 2011 on the east side of Illinois Highway 3, in the area between Elm and Forest Streets. At that time, the assessment indicated no contaminants in the immediate vicinity of the relief well proposed as part of the 2011 LRR. However, in a meeting with IEPA on 4 January 2018, they indicated that the plume is still migrating toward the Mississippi River and there is a potential to encounter this plume.

3.13 AIR QUALITY AND NOISE

The EPA has set National Ambient Air Quality Standards for six principal pollutants with set standards aimed at providing public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. The six principal pollutants and their corresponding criteria are listed in Table 6.

Table 6. Six pollutants and their standard criteria designated by the U.S. EPA.

Pollutant	Averaging time	Criteria	Form
Carbon monoxide	8 hours	9 ppm	Not to be exceeded more than once per year
	1 hour	35 ppm	

Lead	Rolling 3 month	0.15 µg/m^3	Not to be exceeded
Nitrogen dioxide	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	1 year	53 ppb	Annual Mean
Ozone	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution ($PM_{2.5}$)	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years
	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
Sulfur dioxide	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

The project area is located within the Metropolitan St. Louis Interstate Air Quality Control Region (AQCR). This AQCR covers the following counties in Missouri: Franklin, Jefferson, St. Charles, St. Louis, and St. Louis City; and the following counties in Illinois: Madison, Monroe, and St. Clair. Areas within the AQCR are further defined according to the attainment status of criteria pollutants (Figure 16). The Metropolitan St. Louis AQCR is in attainment for most of the criteria pollutants, including particle pollution ($PM_{2.5}$), sulfur dioxide, carbon monoxide, nitrogen dioxide, and lead (U.S. EPA 2017). The Metro-East is in nonattainment area for ozone (8-hr). There is an area in Madison County, IL near the Chain of Rocks levee that is classified as nonattainment for lead (U.S. EPA 2017). Within the Wood River Levee system, there is a portion of the Upper Wood River Levee protected area, near Alton, IL, that is a nonattainment for sulfur dioxide. However, the Lower Wood River Levee protected area is only in nonattainment for ozone (8-hr). Ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on nitrogen oxides (NOx) and volatile organic compounds (VOC's) in the air. There are many sources of these gases. Some common sources include gasoline vapors, chemical solvents, fuel combustion products, and some consumer products (USACE, 2003).

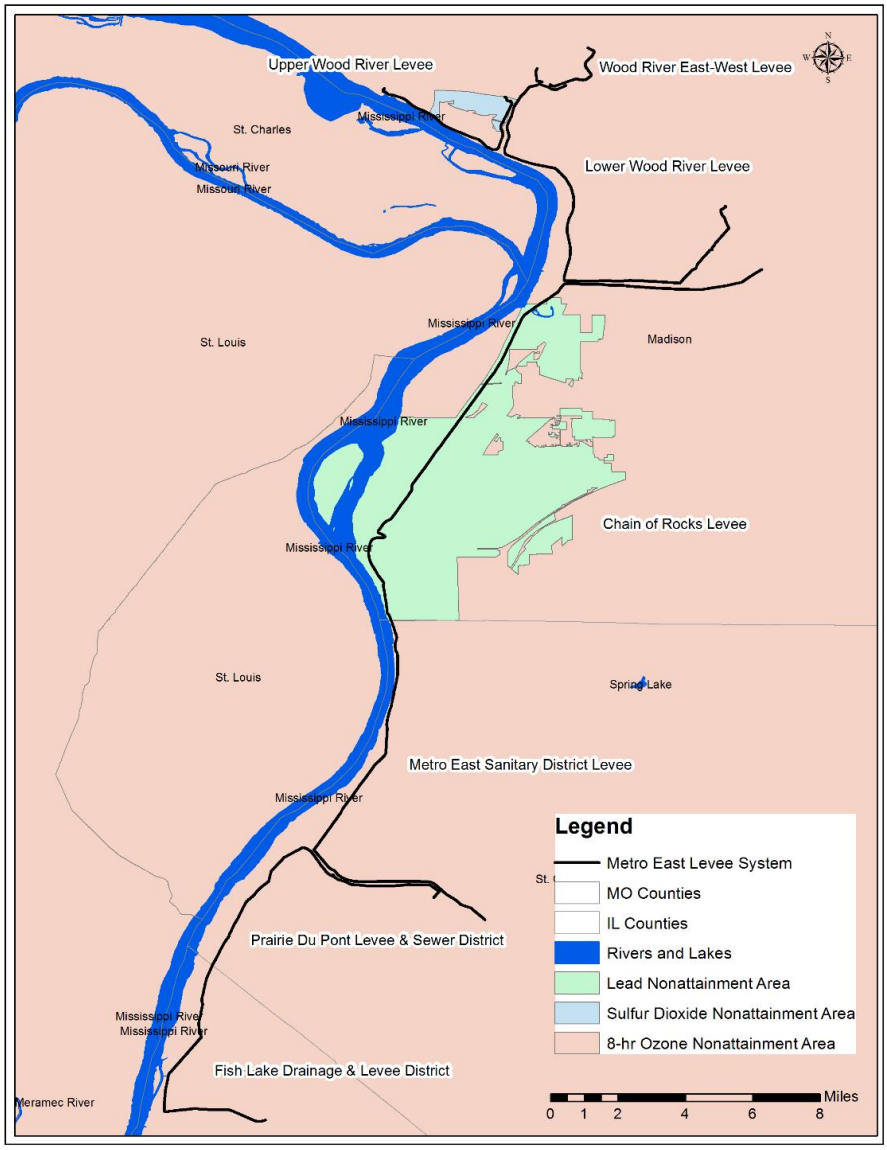

Figure 16. Nonattainment areas for three principal pollutants for the Metro East Levee Districts.

The Metro-East area includes industrial, transportation, recreational, residential, retail and agricultural zones. These areas are dispersed in pockets of varying sizes and density, and each makes its own contribution to the noise characteristics of the region. Agricultural and open space areas typically have noise levels in the range of 34-70 decibels (dB) depending on their proximity to transportation arteries. Noise associated with transportation arteries such as highways, railroads, etc., would be greater than those in rural areas. Other sources of noise include operations of commercial and industrial facilities, and operation of construction and landscaping equipment. In general, urban noise emissions do not typically exceed about 60 dB, but may attain 90 dB or greater in busier urban areas or near high volume transportation arteries.

In the upper drainage and levee district, most noise is generated by traffic using Illinois Highway 143 and other nearby routes in Alton and East Alton. Noise generated by tows passing through Melvin Price Locks and Dam intermittently is shielded to some degree by the levee. Industrial or commercial facilities are located adjacent to the Wood River levee in some areas, while others are in a rural setting where the only source of noise may be agricultural equipment. Areas sensitive to noise include some residential areas near the Riverfront levee at Wood River and Hartford, and a few scattered homes along the South Flank levee.

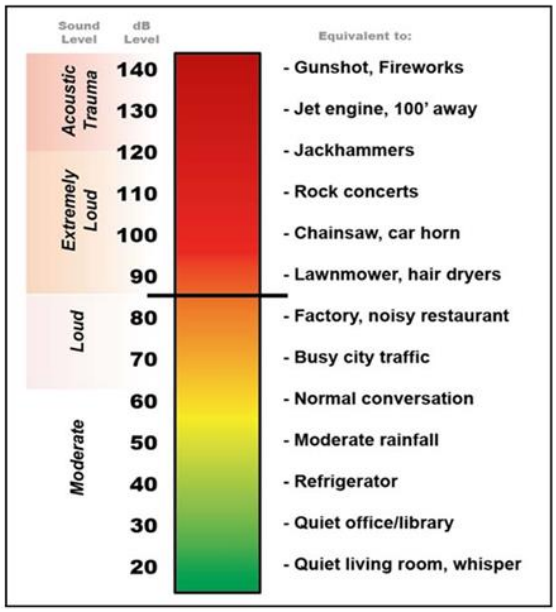

Figure 17. Sound and decibel (dB) levels of a variety of sources that may occur within the Lower Wood River leveed area.

3.14 PRIME FARMLAND

According to the digital soil survey of Madison County (NRCS 2016), roughly 71% of the Lower Wood River protected area is considered "not prime farmland" (Table 7). Only 16.65% of the area is considered prime farmland, which is concentrated in the southwest and southeast corners of the protected area as well as along the Wood River flank levees and along the northern boundary of the protected area (Figure 18). There are approximately 1,224 acres (9.6% of area), which are clustered within the prime farmland areas, that would be considered prime farmland if the area was drained. Farmland of statewide importance also occur within the Lower Wood River leveed area (~63 acres). However, this area makes up a small percentage (<1%) of the total acreage in the protected area.

Table 7. Summary of prime farmland classification for the Lower Wood River leveed area.

Farmland Classification	Area (acres)	% Area
Not prime farmland	9067.84	71.01
All areas are prime farmland	2126.65	16.65
Farmland of statewide importance	62.86	0.49
Prime farmland if drained	1224.86	9.59

Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	242.94	1.90
Prime farmland if protected from flooding or not frequently flooded during the growing season	43.92	0.34
Grand Total	12769.06	100

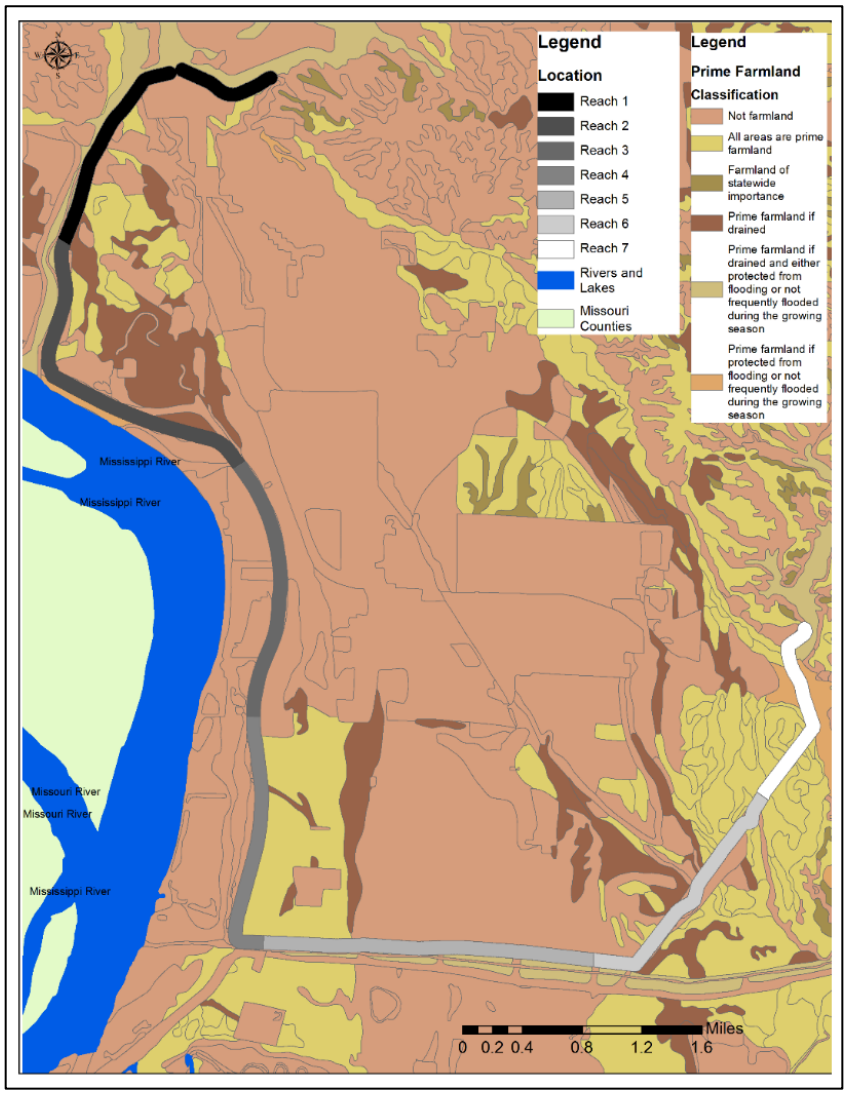

Figure 18. Prime farmland soil classification for the Lower Wood River leveed and surrounding areas.

4 ENVIRONMENTAL CONSEQUENCES

The discussion of impacts (environmental consequences) detail those resources that could be impacted, directly or indirectly, by the no action alternative and the action alternatives. Direct impacts are those that would take place at the same time and place (40 CFR§1508.8(a)) as the action under consideration. Indirect impacts are those that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)).

4.1 TOPOGRAPHY, GEOLOGY, AND LAND USE

4.1.1 No Action Alternative

Scattered borrow activities on either side of the levee system are expected to continue, as earthen material taken from such areas is useful for a variety of construction purposes. Minor filling activities are expected for site development. Effects of a levee failure on topography within the levee protected area include the formation of localized scour holes and the broad deposition across the ground of sand and finer sediments by flood waters.

Changes in the land use patterns of the area may occur as a result of continued inundation due to underseepage. Depending on the magnitude and duration of inundation, trees and other vegetation may die off and agricultural fields may no longer be appropriate for farming. Additionally, levee failure or the risk of levee failure, may influence existing and future development in the region.

4.1.2 Standards Plan

The proposed relief wells would be largely confined to the existing levee right of way, which consists of maintained grassy turf. However, the proposed earthworks (i.e., fill areas, clay blanket, seepage berms, and blanket drain) in reach 6 would be located outside the existing levee right of way, and would permanently replace approximately 8.4 acres of open water wetland, 4.8 acres of cropland, 15.6 acres of emergent wetland, 11.2 acres of forested wetland, and 11.4 acres of bottomland hardwood forest (Table 8). Impacts to wetlands and agricultural are discussed in more detail in sections 4.5 and 4.14, respectively. Impacts due to construction may temporarily alter land-use, however these impacts would be limited in duration and the land would be returned to its pre-construction state.

Table 8. Land use types, in acres, which may be impacted as a result of the proposed features in the Standards Plan.

Reach	Developed	Grassland	Agriculture	Open Water Wetland	Emergent Wetland	Forested Wetland	Bottomland Hardwoods
1	–	–	–	–	–	–	–
2	0.03	0.40	–	–		0.60	–
3	1.26	–	–	–	–	–	–
4	–	–	–	–	–	–	–
5	0.04	2.76	0.12	–	1.0	–	–
6	–	–	4.78	8.37	15.57	10.6	11.4
7	–	–	–	–	–	–	–
Total	1.33	3.16	4.90	8.37	16.57	11.2	11.4

4.1.3 Standards Plan with Risk Informed Screening

Installation of relief wells at the proposed new locations would require the creation of shallow ditches, enlarging existing ditches, or installation of subsurface collector systems along the landside of the levee tow to direct relief well water to the nearest pump station. This action alternative would not cause any changes to the geology.

Changes to land use would occur as a result of the implementation of this plan. These changes could include the permanent conversion of agricultural, residential, and wetlands to land used for infrastructure (Table 9). Most of the proposed relief wells would be largely confined to the existing levee right-of-way, which consists of maintained turf grass. Impacts to wetlands and agricultural are discussed in more detail in sections 4.5 and 4.14, respectively. Impacts due to construction may temporarily alter land-use, however these impacts would be limited in duration and the land would be returned to its pre-construction state.

Table 9. Land use types, in acres, which may be impacted as a result of the proposed features in the Standards Plan with Risk Informed Screening alternative.

Reach	Developed	Grassland	Agriculture	Open Water Wetland	Emergent Wetland	Forested Wetland	Bottomland Hardwoods
1	–	–	–	–	–	–	–
2	0.03	0.40	–	–		0.6	–
3	1.26	–	–	–	–	–	–
4	–	–	–	–	–	–	–
5	0.04	2.76	0.12	–	1.0	–	–
6	–	–	–	–	–	–	–
7	–	–	–	–	–	–	–
Total	1.33	3.16	0.12	–	1.0	0.6	–

4.1.4 Risk Informed Plan (Tentatively Selected Plan)

Installation of relief wells at the proposed new locations would require the creation of a shallow ditches, enlarging existing ditches, or installation of subsurface collector systems along the landside of the levee tow to direct relief well water to the nearest pump station. This action alternative would not cause any changes to the geology.

Changes to land use would occur as a result of the implementation of this plan (Table 10). These changes could include the permanent conversion of agricultural, residential, and wetlands to land used for infrastructure. Impacts to wetlands and agricultural are discussed in more detail in sections 4.5 and 4.14, respectively. This plan and the Standards Plan with Risk-Informed Screening are similar in terms of their impacts to land use. The larger features (i.e., pump stations and fill areas) are similar in footprint between the two plans and also have the greatest impacts to the landscape. Impacts due to construction may temporarily alter land-use, however these impacts would be limited in duration and the land would be returned to its pre-construction state.

Table 10. Land use types, in acres, which may be impacted as a result of the proposed features in the Risk Informed Plan.

Reach	Developed	Grassland	Agriculture	Open Water Wetland	Emergent Wetland	Forested Wetland	Bottomland Hardwoods
1	–	–	–	–	–	–	–

2	0.15	1.04	–	–	–	0.6	–
3	1.32	–	–	–	–	–	–
4	–	–	–	–	–	–	–
5	0.04	2.13	0.83	–	1.0	–	–
6	–	–	–	–	–	–	–
7	–	–	–	–	–	–	–
Total	1.51	3.17	0.83	–	1.0	0.6	–

4.2 HYDROLOGY AND HYDRAULICS

4.2.1 No Action Alternative

In regard to surface flows carried by the project area's interior drainage system to the Mississippi River, in 2000, Madison County adopted a comprehensive storm water management ordinance (USACE 2003). This ordinance requires new developments to implement permanent facilities on site for the temporary detention of stormwater before release to downstream tributaries. Because of these factors, no significant changes in hydrologic characteristics of the Mississippi River. Landside ponding areas are expected to continue to pond interior surface water and underseepage water. For example, interior surface runoff and underseepage water would continue to pool to elevation 419 ft NVGD in the Reach 2 wetland area. The levee district would continue to rely on many pumping stations to discharge storm water, seepage, and sewage flow to the Mississippi River.

4.2.2 Standard Plan, Standards Plan with Risk Informed Screening, & Risk Informed Plan (Tentatively Selected Plan)

All action alternatives would correct the hydrologic problem of uncontrolled flood water underseepage into the protected areas. However, during elevated Mississippi River stages, groundwater would flow up the existing and proposed relief wells to the ground's surface on the landside of the levee. This relief well water would be collected and conveyed to the nearest pump station via shallow ditches or collector systems. Under all alternatives, the ponding elevation in Reach 2 would be reduced to elevation 415 ft NVGD by conveying any water over 415 ft NVGD through a series of culverts and ditches to a pump station.

4.3 WATER QUALITY

4.3.1 No Action Alternative

The surface water quality within the project area has a wide variety of impairments. There is a general increasing trend in population and commercialization/industrialization within the project area. Based upon this trend, surface water quality would most likely have additional impairment loads placed upon it over time. Downstream receiving waters would then have increased impairment loads, which decreases water quality within those regions. Degrading water quality could result in a decreased amount of designated uses (USACE 2003).

The land use planning strategy in Madison and St. Clair counties includes adopting strict stormwater/watersheds management standards, working with various governmental entities to upgrade aging storm water drainage facilities in the Mississippi River floodplain, and extending public water and sewer facilities (USACE 2003). These efforts are expected to result in some improvements in surface water quality, including within the watershed that drains into the upper levee and drainage district and the landside ponding area.

Based on the general increasing trend in population, commercialization and industrialization within the project area (USACE 2003), it is likely that overall groundwater quality will decline slightly over time due to the infiltration of surface water with declining quality. In addition, the groundwater hydrocarbon plume will continue to migrate toward the Mississippi River.

4.3.2 Standards Plan, Standards Plan with Risk Informed Screening, & Risk Informed Plan (Tentatively Selected Plan)

The proposed project features are not expected to cause short term impacts to surface water quality. Proper stormwater pollution prevention practices would be employed in construction areas where the ground surface is disturbed. If it becomes necessary to pump out groundwater or precipitation that fills relief well holes during construction, proper environmental protocols would be followed (e.g., any contaminated water would be tested and treated/properly disposed of if conditions warrant). In addition, the proposed actions would fill portions, or entire, water retaining depressions (i.e., wetlands and ponds). These actions would require the St. Louis District to obtain a permit from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act for the placement of fill in a wetland.

With regard to permitting requirements, the St. Louis District would need to receive a water quality certification issued under Section 401 of the Clean Water Act for the proposed actions from the IEPA. Similarly, because proposed construction activities would disturb a relatively large ground surface area and could potentially affect water quality due to land erosion, the St. Louis District would also need to receive a National Pollutant Discharge Elimination System (NPDES) permit from the IEPA under Section 402 of the Clean Water Act. Issuance of these authorizations would need to precede the commencement of any work. The permit conditions contained in these authorizations specifying standard erosion control measures and any other measures deemed specific to the proposed action would be implemented to protect water quality.

The primary post-construction concern with water quality is the discharge of groundwater seepage to surface water via relief wells. These relief well flows would discharge into an existing ditch system that would flow to a pump station, where the water would be discharged to the Mississippi River.

4.4 RECREATION AND AESTHETICS

4.4.1 No Action Alternative

As urban growth continues in the project area, the demand for open space preservation and the development of recreational opportunities is expected to increase. The future land use plans for Madison and St. Clair counties document these needs (USACE 2003).

The Metro East area, including that portion located on the floodplain of the Mississippi River, is expected to experience increasing industrial, commercial, and residential development (USACE 2003). Much of the industrial and commercial development is expected to occur along major transportation routes. Within

the Wood River drainage and levee district, the semi-rural character of remaining agricultural land within the lower protected area is expected to gradually diminish as this urbanization progresses. The overall aesthetics of the project area are expected to progressively change.

4.4.2 Standards Plan, Standards Plan with Risk Informed Screening, & Risk Informed Plan (Tentatively Selected Plan)

Construction activities associated with proposed relief well construction under both plans are not expected to affect the use of the Confluence Trail on top of the riverfront levee. Heavy construction equipment would be in the vicinity of the trail during the construction period, however coordination between the St. Louis District and trail officials would occur in the early design phase to ensure that appropriate measures are included in the contract specifications to ensure the safety of trail users. Recreational use of the trail is expected to continue. Recreational use of the Mississippi River channel would not be affected.

The aesthetics of the project area would be temporarily impacted by the presence of construction equipment, removal of vegetation in limited areas, and the creation of noise, fumes, and dust during the construction phase. Once construction is complete, the aesthetics of certain areas would change slightly. In decision reaches where new relief wells are proposed, aesthetic changes would be limited to the visual appearance of new wells, as any disturbed ground would be reseeded with native vegetation. In addition, the majority of the proposed relief wells would be installed in areas with existing relief wells present. Permanent tree removal would be required in areas where increased ditch capacity is needed or in areas that require pipe and fill because some of the existing ditches have not been maintained and natural tree regeneration has occurred. Areas with proposed culverts would be backfilled to the original ground surface and the pre-construction condition would be re-established. Overall, once the proposed features are constructed, they would likely blend in with the existing levee system and surroundings.

4.5 VEGETATION AND WETLANDS

4.5.1 No Action Alternative

The existing land use planning strategy in Madison County includes the protection of wetlands by avoiding their destruction, establishment of wetlands retention areas as temporary storage areas for surface drainage, development of new wetlands via wetland banking, and the guiding of new development to non-environmentally sensitive areas, including enterprise zones for industrial development (USACE 2003).

However, due to past and ongoing development, current ecological problems for the project area's biological resources, including forested and emergent wetlands and bottomland hardwoods, are expected to continue. These problems include fragmentation and degradation resulting from altered hydrologic regimes that depart from natural conditions, the addition of sediments and agricultural chemicals or urban runoff, encroachment by exotic plant species, and the prevalence of disturbance-tolerant native plant species in local plant communities (USACE 2003).

4.5.2 Standards Plan

The Standards Plan would result in the direct losses of about 38 acres of various wetland and terrestrial habitats (Table 11). In addition, approximately 8.4 acres of aquatic habitat (open water) would be directly impacted. The majority of the impacts to open water habitats are a direct result of the placement of fill

material for Fill Area #1 and Blanket Drain #2. Both of these actions will not result in the complete fill of these areas; instead they will reduce the overall surface area of the aquatic habitat and substantially reduce depth in the remaining areas. In addition, these open water habitats are primarily man-made ponds.

Table 11. Direct impacts of proposed features for each reach to habitats of environmental importance.

Design Reach	Open Water Wetland	Emergent Wetland	Forested Wetland	Bottomland Hardwoods
2			0.60	
5		1.0		
6	8.37	15.57	10.8	11.4
Total	**8.37**	**16.57**	**11.40**	**11.4**

Compensatory mitigation would be required for the 34.54 acres of wetland losses, as required under Section 404 of the Clean Water Action, and for the 11.5 acres of bottomland hardwood forest losses, as required by the USACE Planning Guidance Notebook.

According to a habitat assessment conducted for this project, the habitats affected by the proposed earthworks are currently of moderate to low quality (Table 12). The U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP; USFWS 1976) is widely used to assess project alternatives using numerical models and equations to evaluate the quality and quantity of particular habitats for select wildlife species. The qualitative component of the analysis is known as the habitat suitability index (HSI) and is rated on a 0 to 1 scale, with higher values indicating better habitat. The HSI for a particular habitat type is determined by selecting values that reflect present and future project area conditions from a series of abiotic and biotic metrics. Future values were determined using management plans, historical conditions, and best professional judgment.

Table 12. Habitat suitability index (HSI) scores for all impacted habitat types. Scores represent current (TY 0) and future conditions for target years (TY) 1, 10, 25, and 50 (life of project).

Habitat	Species	TY 0	TY 1	TY 5	TY 10	TY 25	TY 50
Open water wetland	Bullfrog	0.73	0.73	0.74	0.74	0.76	0.77
Emergent wetland	Slider turtle	0.42	0.42	0.45	0.47	0.51	0.56
Forested wetland	Mink	0.85	0.85	0.90	0.91	0.91	0.91
Bottomland hardwood	Fox squirrel	0.63	0.63	0.75	0.88	0.85	0.83

Following the requirements of the Clean Water Act, all appropriate and practicable steps have been take to first avoid impacts to aquatic resources, then to minimize the impacts, and as a last resort to mitigate the impacts. At most locations, alternatives other than earthworks (e.g., seepage berms) were the lowest cost alternative and the associated environmental impacts were avoided. In a few locations where berms and other earthworks were included in the Standards Plan, factors other than cost savings were sufficient to justify not avoiding environmental impacts.

The proposed mitigation would create a total of 13.5, 10.0, 11.0 acres of emergent, forested, and open water wetlands, respectively, and would preserve 11.0 acres of bottomland hardwood forest (Table 13).

Table 13. Calculation of mitigation acres required for each habitat units impacted for all habitat types.

Habitat	Acres Impacted	AAHUs Loss	AAHU Mitigated	Acres Mitigated
Open water wetland	8.37	6.31	6.17	11.0
Emergent wetland	15.57	7.82	7.95	13.50
Forested wetland	10.60	9.56	9.90	10.00
Bottomland hardwood	11.40	9.45	9.68	11.00

4.5.3 Standards Plan with Risk Informed Screening & Risk Informed Plan (Tentatively Selected Plan)

Compensatory mitigation would be required for the 1.6 acres of wetland losses (1 acre emergent and 0.6 acre forested), as required under Section 404 of the Clean Water Action. Because the fill areas and pump station locations are similar between the Standards Plan with Risk Informed Screening and the Risk Informed Plan (TSP), their impacts to wetlands are also similar. The similarity of the mitigation requirements for these alternatives resulted in one mitigation calculation for emergent wetlands and one for forested wetlands. A draft compensatory mitigation for the Tentatively Selected Plan is included as an appendix to this SEA (Appendix II). A Section 404(b)(1) evaluation for the discharge of fill material into waters of the U.S. as part of the Tentatively Selected Plan is contained in Appendix I. The excavation of material as part of the increased ditching is expected to produce *de minimis* levels of fill.

According to a habitat assessment conducted for this project, the habitats affected by the proposed earthworks are currently of moderate to low quality (Table 14). The U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP; USFWS 1976) is widely used to assess project alternatives using numerical models and equations to evaluate the quality and quantity of particular habitats for select wildlife species. The qualitative component of the analysis is known as the habitat suitability index (HSI) and is rated on a 0 to 1 scale, with higher values indicating better habitat. The HSI for a particular habitat type is determined by selecting values that reflect present and future project area conditions from a series of abiotic and biotic metrics. Future values were determined using management plans, historical conditions, and best professional judgment.

Table 13. Existing conditions (TY0) and future impacts to wetland habitat within the project area based on HSI scores.

Habitat	Species	Alternative	TY 0	TY 1	TY 5	TY 10	TY 25	TY 50
Emergent wetland	Slider turtle	Mitigation	0.00	0.38	0.56	0.56	0.60	0.60
Forested wetland	Mink	Mitigation	0.00	0.52	0.64	0.7	1.0	1.0

Following the requirements of the Clean Water Act, during the development of project alternatives, all appropriate and practicable steps were taken to first avoid impacts to aquatic resources, then to minimize the impacts, and as a last resort to mitigate the impacts. At most locations, relief wells were the lowest cost project feature that keeps environmental impacts to a minimum.

A total of 1.5 acres of emergent and 1.75 of forested wetlands would be required to offset the unavoidable impacts to wetlands (Table 15). See Appendix II for the compensatory draft mitigation plan and detailed habitat evaluation procedures.

Table 14. Mitigation that would be required if proposed plan were implemented.

Habitat	Acres Impacted	AAHU Loss	Acres Mitigated	AAHU Mitigated
Emergent wetland	1.0	0.75	1.50	0.78
Forested wetland	0.60	1.56	1.75	1.60

4.6 AQUATIC HABITATS

4.6.1 No Action Alternative

The surface water quality within the project area has a wide variety of impairments. There is a general increasing trend in population and commercialization/industrialization within the project area. Based upon this trend, surface water quality would most likely have additional impairment loads placed upon it over time. Downstream receiving waters would then have increased impairment loads, which decreases water quality within those regions. Degradation in water quality may reduce the suitability of the remaining aquatic habitats for the few organisms that can tolerant the poor existing conditions. However, without the proposed federal project, there is an increased likelihood that levee failure could occur. Increased connectivity between the Mississippi River and its floodplain would be ecologically beneficial in many cases. However due to the large amounts of industrial manufacturing of chemicals and petroleum products within the leveed area, connectivity between the floodplain and the Mississippi River in this vicinity would result in an environmental catastrophe.

4.6.2 Standards Plan

Approximately 8.4 acres of aquatic habitat (open water) would be directly impacted. The majority of the impacts to open water habitats are a direct result of the placement of fill material in Reach 6. These fill actions would not result in the complete fill of these areas; instead they would reduce the overall surface area of the aquatic habitat and substantially reduce depth in the remaining areas. Even though these open water habitats are primarily man-made ponds, the currently provide important habitat for aquatic species in an area that is limiting in quality aquatic habitats. Most of the impacts associated with other features would be short-term and construction related. Construction related noise and localized turbidity may affect any fish species that can tolerant living in the proposed project area. However, these impacts would be temporary and would not occur once construction was complete. The proposed relief wells and increased ditching associated with these plans may increase the amount of water in ditches and other water holding areas, however these impacts would be dependent on rain-events and surface runoff.

4.6.3 Standards Plan with Risk Informed Screening & Risk Informed Plan (Tentatively Selected Plan)

Maintenance of the levee and on-going anthropogenic activities have limited suitable habitats available for fish and other aquatic organisms due to the altered hydrology and conversion of aquatic habitats to non-aquatic uses. Most of the impacts associated with either alternative would be short-term and construction related. Construction related noise and localized turbidity may affect any fish species that can tolerant living in the proposed project area. However, these impacts would be temporary and would not occur once construction was complete. The proposed relief wells and increased ditching associated with these plans may increase the amount of water in ditches and other water holding areas, however these impacts would be seasonal.

4.7 FISH AND WILDLIFE

4.7.1 No Action Alternative

Due to past and ongoing development, current ecological problems for the project area's biological resources, including forested and emergent wetlands and bottomland hardwoods, are expected to continue. The presence of tolerant fish and wildlife are expected to continue and would remain consistent with the existing conditions.

4.7.2 Standards Plan with Risk Informed Screening & Risk Informed Plan (Tentatively Selected Plan)

Maintenance of the levee and on-going anthropogenic activities have limited suitable habitats available for fish and wildlife due to the altered hydrology, conversion of aquatic habitats to non-aquatic uses, and conversion of forested areas to development and farmland. The construction of relief wells, pump stations, and increased ditching may temporarily disturb animals from those areas due to increases in turbidity and noise, however once construction was complete, these areas would be comparable to the existing conditions.

4.8 THREATENED AND ENDANGERED SPECIES

4.8.1 Federally Listed Species (Biological Assessment)

This section, along with Section 3.11, represents the St. Louis District's Biological Assessment of the project's effects on federally-listed species that may occur within the project area. This Biological Assessment is prepared in accordance with Section 7(c) of the Endangered Species Act of 1973, as amended.

4.8.1.1 No Action Alternative

The status of threatened and endangered species that may occur within the project area is expected to remain the same, including their listing designations.

4.8.1.2 Standards Plan, Standards Plan with Risk Informed Screening, & Risk Informed Plan (Tentatively Selected Plan)

Indiana Bat. Since tree clearing activity would take place, field surveys for potential roost trees will be conducted by the St. Louis District along the levee prior to any construction activities. If any Northern Long-eared Bat or potential roost trees are identified, the U.S. Fish and Wildlife Service will be notified

and a course of action will be established. Therefore, the St. Louis District has determined that the proposed action *"may affect, but not likely to adversely affect"* the Indiana Bat.

Northern Long-eared Bat. Since tree clearing activity would take place, field surveys for potential roost trees will be conducted by the St. Louis District along the levee prior to any construction activities. If any Northern Long-eared Bat or potential roost trees are identified, the U.S. Fish and Wildlife Service will be notified and a course of action will be established. Therefore, the St. Louis District has determined that the proposed action *"may affect, but not likely to adversely affect"* the Northern-long Eared Bat.

Least Tern. The proposed action would not affect any known Least Tern nesting habitat, any habitats along the Mississippi River, or any sand or gravel bars within or adjacent to water bodies. Therefore, the St. Louis District has determined that the proposed action would have *"no effect"* on the Least Tern.

Eastern Massasauga Rattlesnake. Although suitable habitat for this snake, which consists of emergent and forested wetlands and old fields, occurs on the Mississippi River floodplain, the Eastern Massasauga is not known to currently occur in the Metro-East area of Madison County, Illinois. Therefore, the St. Louis District has determined that the proposed action would have *"no effect"* on the Eastern Massasauga Rattlesnake.

Pallid Sturgeon. This fish is found in the Mississippi River downstream of its confluence with the Missouri River, which is adjacent to the Lower Wood River Levee protected area. The entire stretch of river below the mouth of the Missouri River is considered potential habitat. Construction and maintenance for this project would be confined to a levee constricted floodplain. Therefore, the St. Louis District has determined that the proposed action would have *"no effect"* on the Pallid Sturgeon.

Spectaclecase. Since the construction and maintenance for this project would be confined to a levee constricted floodplain, the St. Louis District has determined that the proposed action would have *"no effect"* on the Spectaclecase.

Decurrent False Aster. Records of this plant occur to the south of the Wood River Drainage and Levee District in the Metro East area. These sites "are predominantly located on old or mowed fields, in wetlands, or on the edges of active fields, farm facilities, golf courses, or a railroad" (USDOT 2000). Populations of this plant are not known from the Wood River levee district. However, suitable habitat consisting of open wet areas does occur in the vicinity of the levee. Because of the opportunistic nature of this species to colonize open moist or wet areas that experience natural or man-made disturbances, its ability to disperse over shorter distances by seeds carried by wind or animals, and the approximate 9 years before the project would be implemented, field surveys for this plant would be conducted by the St. Louis District along the levee prior to any construction activities. If any individual plants or colonies are identified, the U.S. Fish and Wildlife Service will be notified and a course of action will be established. Therefore, the St. Louis District has determined that the proposed action *"may affect, but not likely to adversely affect"* the decurrent false aster.

Eastern Prairie Fringed Orchid. Also known as the prairie white fringed orchid, this species formerly occurred over much of north and central Illinois, including Madison County, but is now confined to the northeast corner of the state (Herkert 1991). This plant is found in mesic to wet prairies located on uplands and in river valleys. It may be present wherever prairie remnants are encountered. There are no known prairie remnants on the historic floodplain of the Mississippi River in the Wood River levee

protected area. Therefore, the St. Louis District has determined that the proposed action would have *"no effect"* on the Eastern Prairie Fringed Orchid.

4.9 BALD AND GOLDEN EAGLE

There is one known nest in the vicinity of the Wood River levee system and Mel Price Locks and Dam. It was last used in 2018. Because the proposed action is expected to take several years to complete, and there is the potential for conditions to change along the levee system over time with regard to nest trees, the District would continue to evaluate potential impacts to the bald eagle as design plans are developed, and would coordinate in this regard with the U.S. Fish and Wildlife Service.

4.10 CULTURAL AND TRIBAL RESOURCES

Of all the action alternatives considered, each may have a negative effect upon any cultural resources. Because the current effort is not a guarantee that any construction will be performed, compliance efforts have been postponed until approval to proceed and the appropriate funds are received. Pending that approval and funding, the USACE has reached agreement with the Illinois Historic Preservation Agency (IHPA), regarding its NHPA Section 106 responsibilities and has executed a Programmatic Agreement (PA) specifying how USACE will address preservation concerns within the project area. The PA was signed on August 29/30, 2011. A PA is a contract between the signatories specifying the procedures to be followed to achieve compliance with historic preservation laws. In addition, USACE contacted 29 tribal organizations of which one, the Osage Nation, indicated a desire to be a concurring party to the PA with the IHPA. The PA outlines and ensures the completion of all compliance activities prior to the start of construction. For any site identified within the project APE, a determination of eligibility (DOE) for the National Register of Historic Places must be submitted to the Illinois SHPO for concurrence. For archaeological sites determined eligible, a data recovery plan would be formulated and carried out under the stipulations of the PA for the mitigation of adverse effects. As a result of completing those activities, any adverse effects on historic properties within the project area will be mitigated.

Since the development of the PA in 2011, a number of periodic project updates have been sent to the signatories and concurrent parties. The most recent update notifying the parties of the supplemental LRR report and EA was in January 2018. Further consultations will take place in order to take into consideration the design changes outlined in the supplemental reports and archaeological studies undertaken since the initial study.

Cultural resources deemed eligible for listing on the National Register are subject to federal and state law regarding their protection and/or preservation. In the case of a project effecting such resources, a federal agency involved in the project, in consultation with the Illinois Historic Preservation Agency (IHPA), is responsible for the mitigation of any adverse effects. As previously noted, the USACE has executed a Programmatic Agreement with IHPA to ensure that all relevant laws and regulations are followed.

The PA includes the IHPA and the USACE, with the Osage Nation as a concurring party. The PA addresses the issues necessary to ensure compliance with provisions of the National Historic Preservation Act of 1966 as amended (P.L. 89-665, 16 U.S.C. 470 et seq.), the Illinois State Agency Historic Resources Preservation Act (20 ILCS 3420), and the Illinois Historic Preservation Act (20 ILCS 3410). The provisions of the PA are consistent with Federal statutes and the provisions of the Illinois Municipal

Code (65 ILCS 5), specifically Article 11 Division 48.2 Preservation of Historical and Other Special Areas and other relevant State statutes.

4.10.1 No Action Alternative

As development continues to expand within the project area, including the floodplain of the Mississippi River, archaeological resources not in public ownership or protection are increasingly vulnerable to commercial and residential development (USACE, 2003).

4.10.2 Standards Plan

Within the Standards Plan maximum earthwork footprint (along with a 50 foot buffer for temporary work areas) five archaeological sites have been previously recorded: 11MS67, 11MS108, 11MS178, 11MS1600, and MS1348. Their current status in the IL SHPO database if outlined in Table 14. Due to the design changes and the resulting changing project Area of Potential Effect this list is not the same as in the PA signed in 2011, although two sites are in both sets.

Table 15. Known Archaeological Sites within proposed Area of Potential Effect.

Site No.	Name	Initial Rec	Component	IL SHPO Database Status
11MS67	Wagon Wheel	1962	Archaic, Woodland	Phase 2 tested with portions deemed ineligible for NR. Recommended for Phase 2.
11MS108	Linkeman	1962	Archaic, Woodland	NSPRA Burial Law
11MS178	S. Shafer	1962	Archaic, Woodland	Recommended for Phase 2
11MS1348	Retention Basin North	1994	Archaic	Recommended for Phase 2
11MS1600	N/A	1995	Historic Frontier, Early Industrial	Not Reviewed

A number of the sites have been previously Phase 1 and/or Phase 2 archaeologically tested, however, all five may require additional research in order to assess the potential effects of this undertaking upon them. The levee system itself has not been formally evaluated on its eligibility for the National Register of Historic Places.

4.10.3 Standards Plan with Risk Informed Screening & Risk Informed Plan (Tentatively Selected Plan)

All the sites listed above that might be adversely effected by the Standards Plan are located in reach six (6) of the levees system. During plan formulation, however, a "no action" alternative was selected for that reach in both the other alternatives (the Standards Plan with Risk Informed Screening and the Risk Informed Plan), so therefore those sites will not be affected by either of them.

The work outlined for the two alternatives consists mainly of relief wells, culverts, and pump stations. Most of this work is located within the footprint of the existing levee and will therefore not result in any adverse effects on cultural resources. Some Phase I archeological survey work, however, may be required for the pump stations and some culverts to identify any unknown cultural resources that might be adversely effected. No known archaeological or historical sites will be effected.

4.11 SOCIOECONOMICS AND TRANSPORTATION

4.11.1 No Action Alternative

Even with FEMA-certified structural levee protections in place (the Metro East Levee System); there is still a risk of flooding in the study area. The FEMA-certified protection from a 100-year flood event, which is the current flood risk reduction level for the Lower Wood River levee protected area, is loosely defined as the levee system provides protection from a computed level flood event having a probability of occurrence of 1.0 percent, or 1 chance (year) out of 100 (years), which is where the '100-year' label comes from (i.e., once in 100 years). However, the specific definition is the FEMA-certified levee system in place, would provide protection against a computed level flood event having that 1.0 percent probability of occurrence in any given year.

Hypothetically, if this 100-year or 1.0 percent level flood event occurred last year, there is still a 1.0 percent probability of this same level flood event happening this year, next year and every year thereafter. The risk of a 1.0 percent probability flood event is a very rare risk, yet every year that 1.0 percent risk of occurrence exists, as well as the risk of even rarer percentage probability, higher level flood events. It is the primary responsibility of local municipalities to control urban and rural growth and development within the project levee system's districts. However, USACE, in cooperation with Madison County, will continue performing and be open to additional outreach initiatives with communities and municipalities about non-structural flood risk management measures that can help protect property and financial investments before a flood disaster happens.

There are many non-structural measures that could be implemented and steps that could be taken by the counties, residents and business-owners to help reduce damage to homes, business and other financial investments within the floodplain to provide additional protection against such risk. Such measures include elevating homes and businesses with foundation walls, piers, posts/columns, piles, and fill; non-structural floodwalls and levees; non-structural floodwalls and levees with closures; dry flood-proofing and wet flood-proofing; flood warnings such as sirens and posted signage; flood warning preparedness instruction; public service announcements about the risk of flooding; purchasing flood insurance; and possible relocation and buyout and acquisition options (USACE, 2010b).

It is reasonable to expect the project area to experience some increase in economic growth and development due to the 100-year flood risk protection from the levee system because future plans depend on the levee repair keeping FEMA from de-certifying the levee districts; however, there is no indication that a rapid or significant increase in development will arise "solely due to" the current protection of the levee or that an increase in economic growth and development will arise "in addition to" the growth and developments already slated to occur.

However, as the levee system's features continue to degrade as a result of flood events and to exceed their performance life, the system's ability to operate as originally intended under future flood events becomes an even greater concern. If the no action alternative is selected, design deficiency problems could cause interior flooding that could impact industries, infrastructure and interrupt the transportation system. The probability of failure would increase under the no action alternative. Public safety would continue to be jeopardized.

Costs to repair or rebuild sections of Lower Wood River levee in the event of failure were based on estimates developed by the Upper Wood River levee PDT for a Limited Baseline Condition Risk

Assessment, dated July 2015. The costs were generated using inputs from the risk cadre and district cost estimating personnel. Emergency levee repair following a breach would require construction of a cofferdam, sand dredging, and clay blanket repair. The cost of these emergency activities for a pool record flood at stage 438.5 is estimated at $22,973,000. Before providing a permanent repair, the levee district would have to drain back below elevation 410. Dewatering costs related to this effort are estimated at $3,286,000. After the dewatering, plans and specs would be prepared for a permanent solution. Contracting would solicit a bid and the cost of a permanent solution is estimated at $23,577,000 to fix a pool record breach where approximately 1,000 ft of levee would have to be fixed to its original design. In addition to fixing the levee, Route 143 would have to be reconstructed at an estimated cost of $785,000.

The total repair costs associated with a levee breach with 25% contingency at pool of record is estimated at $48,100,000. After accounting for the frequency of flood events and the probability of failure for the levee, the average annual cost of repairing the levee is $47,600.

4.11.2 Standards Plan, Standards Plan with Risk Informed Screening, & Risk Informed Plan (Tentatively Selected Plan)

In the long-term, the increased flood-risk reduction may lead to increased development in the levee-protected area. The creation of jobs that could reasonably be expected to occur, or continue, once the 500-year flood event level of protection is restored would invariably lead to or complement other types of development such as single-family and multi-family housing, commercial and service industry, retail, and further industrial developments.

Job creation would bring more people to the area, and more people would create a demand for services, thereby creating a demand for new, improved, and/or expansion of infrastructure. Examples of infrastructure include roads and bridges, recreation and open spaces (e.g., parks, sports facilities, and community gardens), public or institutional facilities (e.g., hospitals, airports, and cultural attractions), utility and sewer capacity, and health and human services.

In the short-term, an increase in the local economy may occur as the result of increased construction in the area. However, localized traffic patterns may be temporarily affected due to construction related road closures. Ponding elevations during high water events are proposed to be reduced under this plan, so the impacts to traffic and roads may be lessened.

4.12 HAZARDOUS, TOXIC, AND RADIOACTIVE MATERIALS

4.12.1 No Action Alternative

Remediation efforts would continue at the known sites within the Lower Wood River Drainage and Levee District that are under the State Site Remediation Program; the Resource Conservation and Recovery Act program; and Comprehensive Environmental Response, Compensation, and Liability Act program. Illinois EPA would continue to monitor the Old Alton Landfill and the hydrocarbon plume.

4.12.2 Standards Plan, Standards Plan with Risk Informed Screening, & Risk Informed Plan (Tentatively Selected Plan)

Portions of the Lower Wood River levee system contain sites of interest which pose potential environmental concerns due to the industrial nature of the levee-protected area. Based on plume maps and preliminary data obtained from the IEPA, a potential exists to encounter HTRW in two decision reaches

(Reach 2 and 3). Contamination in the plume area exists in both gaseous soil contamination and liquid petroleum products. A Phase II ESA would be conducted prior to the construction of proposed features to ensure constructions of features, mainly relief wells, in these decision reaches would avoid known underground contamination. The potential contaminants are non-CERCLA in nature, so any mitigation or disposal expense would be cost-shared with the nonfederal sponsor. The St. Louis District would continue working with regulatory agencies and local stakeholders to monitor the plume status and mitigate and project impacts resulting from the presence of HTRW.

4.13 AIR QUALITY AND NOISE

4.13.1 No Action Alternative

Because the St. Louis metropolitan area is a nonattainment area for ozone, control strategies resulting in reduced emissions have been implemented across the region. Control measures targeted at transportation include physical improvements in regional transportations systems and management strategies to reduce hydrocarbons and carbon monoxide emissions from motor vehicles (EWGCG, 2010a).

Industrial, commercial, and residential development on the floodplain of the Mississippi River is expected to increase within the levee and drainage district. The land use planning strategy in Madison County includes the formation of residential and agricultural zoning districts, and applying zoning and subdivision regulations to reduce non-managed growth in agricultural areas (USACE 2003). Because of increasing development, noise levels are expected to increase, but these increases are expected to be associated with land use type.

4.13.2 Standards Plan, Standards Plan with Risk Informed Screening, & Risk Informed Plan (Tentatively Selected Plan)

Construction of the proposed project may cause a temporary increase in noise in the project vicinity. Construction would require heavy equipment to operate in the area, such as excavators, and these machines would generate noise during construction. This effect would only occur during the construction period, and so is anticipated to be temporary and minor. Effects of the increased noise would be comparable to an increase in industrial traffic and therefore is not anticipated to impact the quality of life in the surrounding area. Once the proposed project is complete, no increased effects due to noise would occur.

4.14 PRIME FARMLAND

Farmland impacts were assessed by geospatial analysis of the Madison County digital soil survey (NRCS 2016), which classifies the county's soils by capability for agriculture. Assessments of the effects on prime farmland soils does not yet include staging and disposal areas, which have yet to be identified. Temporary staging areas of construction equipment and materials would be established within existing levee right-of-ways to the maximum extent practicable. Use of these areas would be temporary and existing cropland would be avoided to the extent practicable during the identification of potential sites.

To evaluate the potential impacts to agricultural land and initiate compliance with the federal Farmland Preservation Act and the Illinois Farmland Preservation Act, the proposed actions would be coordinated with the Natural Resource Conservation Service (NRCS) and the Illinois Department of Agriculture (IDOA) using Form AD-1006, Farmland Conversion Impact Rating, if applicable. This rating utilizes a

300 point scale to assess the relative value of the potentially affected farmland. Those areas rated above 225 points should be kept in agricultural use.

4.14.1 No Action Alternative

The existing land use planning strategy in Madison and St. Clair Counties includes the conservation of agricultural lands, including preservation of crop lands for specialty crops (e.g., horseradish). This is to be accomplished by strengthening the downtown areas and the residential neighborhoods of municipalities in the vicinity of the project area to reduce the premature conversion of agricultural lands outside of those municipalities. Agricultural lands would remain a significant form of land use, but increasingly, these lands are expected to be converted to other uses (USACE 2003).

4.14.2 Standards Plan

The features of the Standards Plan would impact 4.8 acres of actual cropland. However, construction of these features would affect other areas considered to consist of prime farmland soils, and would result in the conversion of about 15 acres of such lands to nonagricultural use, which is primarily located in reach 6. These proposed features would not affect any areas considered to support soils of statewide importance, nor would they effect the production of horseradish, a locally important crop. Mitigation for proposed actions under this plan would require the conversion of approximately 34.5 acres of cropland to nonagricultural use.

4.14.3 Standards Plan with Risk Informed Screening

Features proposed under this plan would impact 1.8 acres of actual cropland, which is primarily located in decision reach 5. However, construction of these features would affect other areas considered to consist of prime farmland soils, and would result in the conversion of about 1.0 acres of such lands to nonagricultural uses, which is primarily located in decision reach 2. Mitigation for all the proposed actions under this plan would require the conversion of approximately 3.5 acres of cropland to nonagricultural use.

4.14.4 Risk Informed Plan (Tentatively Selected Plan)

Features proposed under this plan would impact 1.8 acres of actual cropland, which is primarily located in decision reach 5. However, construction of these features would affect other areas considered to consist of prime farmland soils, and would result in the conversion of about 0.5 acres of such lands to nonagricultural uses, which is primarily located in decision reach 2. Mitigation for all the proposed actions under this plan would require the conversion of approximately 3.5 acres of cropland to nonagricultural use.

5 ENVIRONMENTAL JUSTICE

Environmental justice refers to fair treatment of all races, cultures and income levels with respect to development, implementation and enforcement of environmental laws, policies and actions.

Environmental justice analysis was developed following the requirements of:

- Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations," 1994)
- "Department of Defense's Strategy on Environmental Justice" (March 24, 1995).

The purpose of environmental justice analysis is to identify and address, as appropriate, human health or environmental effects of the proposed action on minority and low-income populations. Following the above directives, the methodology to accomplish this includes identifying minority and low-income populations within the study area by demographic analysis. Census Block Group statistics from the 2010 Census Data and 2016 American Community Survey (U.S. Census Bureau 2015) estimates were utilized for this analysis.

According to the 2010 census data for Madison County, Illinois, racial composition is approximately 11.8 percent non-caucasian, while racial composition within Wood River, East Alton, Roxana, South Roxana, and Hartford are approximately 3.7, 4.8, 2.1, 4.1, and 3.4 percent, respectively.

According to 2016 American Community Survey 5-Year Estimates, the percentage of families whose income in the past 12 months was below the poverty level in Madison County, Illinois, was 15.8%. For the project area the percentage of families whose income in the past 12 months was below the poverty level in Wood River, East Alton, Roxana, South Roxana, and Hartford are approximately 12.4, 14.6, 19.0, 29.0, and 13.4 percent, respectively. The South Roxana poverty level exceeds the 20 percent poverty guideline.

Based on the available descriptions of the project and work site locations, the South Roxana portion of the project includes low-income communities. However, since this project is intended to reduce flood risks within the leveed area, including the South Roxana area, no detrimental environmental justice issues are anticipated.

6 CLIMATE CHANGE

U.S. Army Corps of Engineers Memorandum (2017) contains a complete description of the climate change analysis performed as required by USACE Engineering Construction Bulletin (ECB) 2016-15, Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs and Projects (U.S. Army Corps of Engineers 2016).The USACE, Institute of Water Resources (IWR) published a Recent US Climate Change and Hydrology Literature Applicable to the U.S. Army Corps of Engineers Missions of the Upper Mississippi Region 07 in 2015. The synopsis evaluated trends in temperature, precipitation, and stream flow as well as the general consensus of the trending parameters. The USACE IWR (2015) found a general consensus for a moderate to large upward trending in average temperature, minimum temperatures, average precipitation, extreme precipitation, and streamflow in the Upper Mississippi Region as shown in (Figure 19). There is a reasonable consensus that maximum air temperatures have decreased slightly in the recent past in the region. The analysis concludes that, generally, the Upper Mississippi Basin – Kaskaskia / Meramec HUC4 watershed (ID 0714) and the St. Louis, MO gage station are likely unaffected by historic or projected climate change impacts.

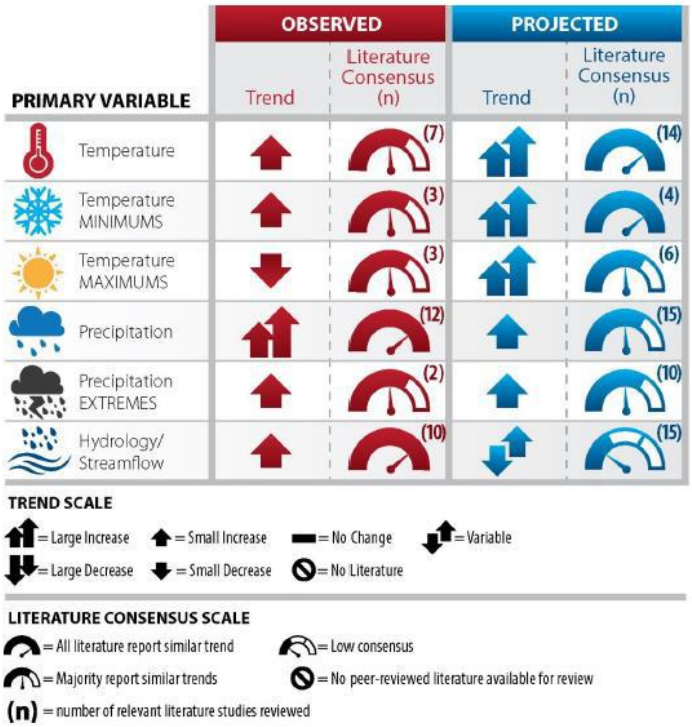

Figure 19. Summary matrix of observed and projected climate trends and literary consensus (from USACE IWR 2015).

7 CUMULATIVE EFFECTS

This chapter identifies possible cumulative effects of the considered alternatives when combined with past trends and other ongoing or expected future plans and projects.

The discussion of cumulative effects considers the effects on the resource that result from the incremental impact of the action being considered 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 taken place over a period of time (40 CFR §1508.7).

7.1 CUMULATIVE EFFECTS OVERVIEW

Cumulative effects result from the proposed action when added to other past, present, and reasonably foreseeable projects or actions. Cumulative effects are not caused by a single project, but include the effects of a particular project in conjunction with other projects (past, present, and future) on the particular resource. Cumulative effects are studied to enable the public, decision-makers, and project proponents to consider the "big picture" effects of a project on the community and the environment. In a broad sense, all impacts on affected resources are probably cumulative; however, the role of the analyst is to narrow the focus of the cumulative effects analysis to important issues of national, regional, or local significance (CEQ 1997).

The Council on Environmental Quality (CEQ) issued a manual entitled *Considering Cumulative Effects Under the National Environmental Policy Act* (1997). This manual presents an 11-step procedure for addressing cumulative impact analysis (Table 12). The following subsections are organized by the three main components – scoping, describing the affected environment, and determining the environmental consequences.

Table 16. CEQ's 11-step approach for assessing cumulative effects.

Component	Steps
Scoping	1. Identify resources
	2. Define the study area for each resource
	3. Define time frame for analysis
	4. Identify other actions affecting the resources
Describing the Affected Environment	5. Characterize resource in terms of its response to change and capacity to withstand stress
	6. Characterize stresses in relation to thresholds
	7. Define baseline conditions
Determining the Environmental Consequences	8. Identify cause-and-effect relationships
	9. Determine magnitude and significance of cumulative effects
	10. Assess the need for mitigation of significant cumulative effects
	11. Monitor and adapt management accordingly

7.2 SCOPING FOR CUMULATIVE EFFECTS

7.2.1 Bounding Cumulative Effect Analysis

Cumulative effect analysis requires expanding the geographic boundaries and extending the time frame to encompass additional effects on the resources, ecosystem, and human communities of concern.

7.2.1.1 Identifying Geographic Boundaries

The geographic boundaries for each resource were determined by the distribution of the resource itself, and the area within that distribution where the resource could be affected by the project in combination with other past, present, and reasonably foreseeable actions. The geographic limits for this analysis include those portions of Madison County that are protected by the Wood River levee system. To establish the temporal frame for analysis, the most commonly used practice is the length of the project life. The project life for this design deficiency corrections project is 50 years.

7.2.1.2 Identifying Timeframe

The timeframe for the cumulative effects analysis for each resource begins when past actions began to change the status of the resource from its original condition, setting the long-term trend currently evident and likely to continue into the reasonably foreseeable future. For all resources, the timeframe began in approximately 1930 when the Wood River area began to be altered by the channelization of rivers and prior to the construction of the levee, and ends in 2068 (end of 50 year period of analysis for project).

7.2.2 Identifying Past, Present, and Reasonably Foreseeable Future Actions

Chapter 3 of this Environmental Assessment describes the condition of each resource in terms of their existing conditions and provides historical context for how the resource got to its current state.

Information from discussions with resource managers, and online searches were used to assess the existing conditions of the identified resources. In order to identify present and reasonably foreseeable actions, information from resources managers and online resources were complied. "Reasonably foreseeable actions" were defined as actions or projects with a reasonable expectation of actually happening, as opposed to potential developments expected only on a basis of speculation. The following criteria were applied to determine reasonably foreseeable actions:

- Actions on an agency's list of proposed actions
- Actions where scoping has started
- Actions already permitted
- Actions where budgets have been requested

Flood control or flood damage reduction activities in the Metro East area began soon after European settlement. Initial attempts to keep Mississippi River floodwaters out of the area were unsuccessful because early levees were relatively low and constructed in a piece-meal fashion. Earthen embankments constructed to bear a system of railroad tracks that converged on East St. Louis from different directions proved more effective. Flood control activities in the area between the river and bluff, interior to riverside levees, began with minor ditch systems to drain low areas of ponded water. About 90 years ago, Cahokia Creek, which entered what is now the lower portion of the Wood River levee district, was diverted from its historic course to the Mississippi River using a shorter man-made route (Cahokia Creek Diversion Channel). The existing urban river front levee built about 50 years ago has protected the bottoms from Mississippi River overflows.

The Wood River Levee and Drainage District – Lock and Dam No. 26 (Mel Price Lock and Dam) Replacement project completed in the late 1980s included relocation and increase in the size of the Alton pump station by constructing East Alton No. 1 pump station, main drainage ditch modification, access road construction, replacement of relief wells, and construction of seepage conveyance channels. According to the Mel Price Lock and Dam EA (USACE 1986), a total of 48.5 acres of terrestrial/wetland habitat were to be impacted by construction activities. A total of 19.2 acres of woody and 29.3 acres of herbaceous vegetation were to be cleared. Of this acreage, 6 acres was to be permanently lost by construction of the pump station, parking lot, concrete seepage conveyance channels and relief wells. The remaining 42.5 acres were expected to revegetate soon after construction was complete.

The Grassy Lake pump station in the lower portion of the Wood River levee district was constructed in 2007. This small facility did not impact any significant natural resources (USACE 1998).

The Corps ongoing Wood River Levee System Reconstruction Project is intended to rehabilitate the riverfront and flank systems that have protected the area from river overflow and interior flooding for many years. The project includes replacing 163 of 170 existing relief wells and installing 60 new relief wells as a deficiency correction under the existing project authorization. Additional reconstruction and replacement is proposed for various components of 26 closure structures, 38 gravity drains, and 7 pump stations. These recommended actions are required to maintain the system's authorized level of protection. The EA for this project stated that no significant impacts were anticipated on natural resources, including fish and wildlife and forest resources (USACE 2005).

The Design Deficiency Corrections for the East St. Louis, Illinois, Flood Protection Project would correct deficiencies or flaws in the levee system's underseepage and through-seepage designs. Major features of

the approved Tentatively Selected Plan include 369 new relief wells; 2,410 linear ft of seepage berms; 12,300 linear ft of slurry trench cutoff wall through the levee and to bedrock; 2,640 linear ft of shallow (40 ft deep) cutoff wall at the riverside levee toe; 3,640 linear ft of clay filled cutoff trench; and 1,320 linear ft of 5 ft thick riverside clay blanket. The EA for this project described direct losses of about 8.6 acres of habitats, including about 7.7 acres of emergent and forested wetlands and about 0.9 acres of bottomland forest. With the inclusion of a compensatory mitigation plan as part of the overall plan, the EA also stated these direct impacts would not have a significant impact on biological resources (USACE 2010c, 2011).

Probable future projects associated with flood risk reduction in the drainage and levee district would consist of maintaining the existing flood protection system, and possibly building new smaller projects affecting more localized areas. Future ecosystem restoration projects are possible (USACE 2003), but most likely would involve small-scale habitat restoration projects. Such projects most likely would not make any large-scale changes to the interior flood control system for environmental purposes.

7.3 CUMULATIVE EFFECTS BY RESOURCE

The remainder of this chapter describes the results of the cumulative effects analysis for each of the resources outlined in this Environmental Assessment (Chapters 3 & 4). The potential cumulative effects of addressing the existing scour hole on each resources was identified (Table 13). If a resource was not identified to have a cumulative effect, then this resource was not discussed in detail within this section. The cumulative effects analysis discusses future conditions as follows:

- Without the project – No Corps Action
- With the project – Action Alternative

Table 17. Checklist for identifying potential cumulative effects of addressing the underseepage.

Resource	Without Project	With Project	Past Actions	Other Present Actions	Other Future Actions	Project's Incremental Cumulative Impact
Vegetation & Wetlands	◆	S	H	◆	S	◆
Aquatic Habitat	◆	◆	H	◆	◆	◆
Geology &Land use	◆	◆	H	◆	◆	◆
Wildlife & Fisheries	◆	S[1]	H	◆	◆	◆
IL Species of Concern	◆	◆	M	◆	◆	◆
Threatened & Endangered Species	◆	◆	M	◆	◆	◆
Water Quality	S	S[1]	H	◆	◆	◆
HTRW	◆	◆	◆	◆	◆	◆
Historic & Cultural Resources	◆	◆	H	◆	◆	◆
Socioeconomics & Transportation	H	S[1]	+	+	+	+
Recreation & Aesthetics	S	S[1]	S	◆	◆	◆
Air Quality & Noise Levels	◆	S[1]	M	◆	◆	◆

KEY: ◆ = no change	S = slight adverse effect	S^1 = temporary, slight adverse effect
M = moderate adverse effect	H = high adverse effect	+ = beneficial effect

7.3.1 Socioeconomics & Transportation

Past actions have greatly improved the transportation and productions of commodity items throughout Madison County, thus increasing the local economies. The construction of the Wood River Levee system and establishment of other flood control measures, have altered the hydrology of the floodplain. Reliable flood control has aided the industrial development and the production of agricultural resources (e.g., crops and fertilizer). The predominance of agriculture within the watershed is likely to remain into the foreseeable future.

No Action Alternative: The unresolved underseepage could lead to the failure of the levee. The failure of the levee would have catastrophic results, ultimately affecting the local and national economies.

Considered Action Alterative: No negative cumulative impacts would be expected from the considered action alternative, combined with other present actions by others, and reasonably foreseeable actions. The proposed project should have positive long-term benefits to the socioeconomics and transportation within the county.

8 COORDINATION

Notification of this Draft Environmental Assessment and unsigned Finding of No Significant Impact was sent to officials, agencies, organizations, and individuals for public review and comment (Table 14). Additionally, an electronic copy is available during the public review period on the USACE St. Louis District's website at:

http://www.mvs.usace.army.mil/Portals/54/docs/pm/Reports/EA/LowerWoodRiverSEA2018.pdf

Please note that the Finding of No Significant Impact is unsigned and will only be signed into effect after careful consideration of the comments received as a result of this public review. In addition, to ensure compliance with the National Environmental Policy Act, Endangered Species Act, and other applicable environmental laws and regulations, coordination with these entities and individuals will continue, as required, throughout the execution of the scour repairs.

Table 14. A letter regarding the availability of a draft Environmental Assessment and unsigned FONSI for the proposed design deficiency resolution was sent to the following entities:

Matt Mangan Acting Field Supervisor U.S. Fish and Wildlife Service Marion Illinois Suboffice 8588 Route 148 Marion, IL 62959	Adam Rawe Resource Planner Impact Assessment Section Illinois Department of Natural Resources 1 Natural Resources Way Springfield, IL 62702
Sierra Club Illinois Chapter 70 E Lake Street, Suite 1500 Chicago, IL 60601	The Nature Conservancy Chicago Office 8 South Michigan Avenue Suite 900 Chicago, Illinois 60603

Traci McCauley Natural Resources Illinois Department of Agriculture 801 Sangamon Ave. P.O. Box 19281 Ag Bldg – FL 001 Springfield, IL 62794	Rachel Leibowitz Illinois State Historic Preservation Office Illinois Department of Natural Resources 1 Natural Resources Way Springfield, IL 62702
William R. Haine State Senator 56th District 311C Capitol Building Springfield, IL 62706	Daniel V. Beiser State Representative House District 111 269-S Stratton Office Building Springfield, IL 62706
Richard Durbin U.S. Senator IL 711 Hart Senate Building Washington, D.C. 20510	Tammy Duckworth U.S. Senator IL 524 Hart Senate Office Building Washington, D.C. 20510
Mike Bost U.S. House of Representatives 12th Congressional District of Illinois 1440 Longworth House Office Building Washington, DC 20515	Ivan Dozier State Conservationist NRCS Illinois State Office 2118 W. Park Court Champaign, IL 61821
Ronald Moore Izaak Walton League of America-Illinois Division 55 Ridgecrest Drive Decatur, IL 62521-5425	Heartlands Conservancy 406 East Main Mascoutah, Illinois 62258
Federal Emergency Management Agency 536 South Clark Street, 6th Floor Chicago, IL 60605 312-408-5500	Illinois Environmental Protection Agency 1021 N Grand Ave E Springfield, IL 62702
Kenneth Westlake Office of Enforcement and Compliance Assurance U.S. EPA-Region 5 77 W. Jackson Blvd. Chicago, IL 60604	Advisory Council on Historic Preservation 401 F Street NW, Suite 308 Washington, DC 2001-2637
Steven Chard Illinois Department of Agriculture Bureau of Land and Water Resources P.O. Box 19281 Springfield, IL 62794	Belleville News-Democrat P.O. Box 427 120 South Illinois Belleville, IL 62220
Arthur Asadorian County Board District 21 3316 Colgate Pl Granite City, IL	Helen Hawkings County Board 16 2600 Angela Dr. Granite City, IL

Robert Pollard County Board District 12 99 Whitelaw Ave East Alton, IL	Chrissy Dutton County Board District 15 205 Canterbury St. Bethalto, IL

Table 19. Notice of this SEA for public review was also sent to the following Tribal Leaders:

Title	Name (First, Middle, Last)	Tribe	Street Address	Street Address 2	St	Zipc
Governor	Edwina Butler-Wolfe	Absentee-Shawnee Tribe	2025 S. Gordon Cooper Drive		OK	74810-
Chairman	John Barret	Citizen Potawatomi Nation	1601 S. Gordon Cooper Drive		OK	74801
President	Deborah Dotson	Delaware Nation of Oklahoma	P.O. Box 825		OK	73005
Chief	Chester Brooks	Delaware Tribe of Indians	5100 Tuxedo Boulevard		OK	74006
Chief	Glenna J. Wallace	Eastern Shawnee Tribe of Oklahoma	P.O. Box 350		MO	64865
Chairman	Harold Frank	Forest County Potawatomi	P.O. Box 340		WI	54520
Chairman	Kenneth Meshigaud	Hannahville Indian Community	N 14911 Hannahville B-1 Road		MI	49896-9
President	Wilford Cleveland	Ho-Chunk Nation of Wisconsin	P.O. Box 667		WI	54675
Chairman	Tim Rhodd	Iowa Tribe of Kansas and Nebraska	3345 Thrasher Road, #8		KS	66094
Chairman	Bobby Walkup	Iowa Tribe of Oklahoma	Route 1, Box 721		OK	74059
Chairman	Lester Randall	Kickapoo Tribe of Indians of Kansas	P.O. Box 271		KS	66439
Chairman	David Pacheco	Kickapoo Tribe of Oklahoma	P.O. Box 70		OK	74851
Chairman	D.K. Sprague	Match-e-be-nash-she-wish Potawatomi	2872 Mission Dr.		MI	49344
Chief	Douglas Lankford	Miami Tribe of Oklahoma	202 S. Eight Tribes Trail	P.O. Box 1326	OK	74355
Chairman	Jaime Stuck	Nottawaseppi Band of Huron Potawatomi	2221—1 & 1/2 Mile Road		MI	49052
Chief	Craig Harper	Peoria Tribe of Indians of Oklahoma	118 S. Eight Tribes Trail	P.O. Box 1527	OK	74355
Chairman	John P. Warren	Pokagon Band of Potawatomi	P.O. Box 180	58620 Sink Road	MI	49047
Chairwoman	Liana Onnen	Prairie Band Potawatomi Nation	Government Center	16281 Q Road	KS	66509
Chairman	Edmore Green	Sac & Fox Nation of Missouri in Kansas and Nebraska	305 N. Main Street		KS	66434
Principal Chief	Kay Rhoads	Sac & Fox Nation of Oklahoma	920883 S Highway 99	Building A	OK	74079
Chairman	Anthony Waseskuk	Sac & Fox Tribe of the Mississippi in Iowa	349 Meskwaki Road		IA	52339
Chairman	Ron Sparkman	Shawnee Tribe	P.O. Box 189		OK	74355
Principal Chief	Geoffrey Standing Bear	The Osage Nation	P.O. Box 779		OK	74056
Chairman	John Berrey	The Quapaw Tribe of Indians	P.O. Box 765		OK	74363
Chief	Joe Bunch	United Keetoowah Band of Cherokee of Oklahoma	P.O. Box 746		OK	74464
Chairman	Frank White	Winnebago Tribe of Nebraska	P.O. Box 687		NE	68071

Table 18. Notice of this SEA for public review was also sent to the following Tribal Cultural Representatives:

Name (First, Middle, Last)	Position	Tribe	Street Address	Street Address 2	City	State	Zipcode
Suhaila Nease	Tribal Historic Preservation Officer	Absentee-Shawnee Tribe	2025 S. Gordon Cooper Drive		Shawnee	OK	74810-9381
Kelli Mosteller	Tribal Historic Preservation Officer	Citizen Potawatomi Nation	Cultural Heritage Center	1601 S. Gordon Cooper Drive	Shawnee	OK	74801
Kim Penrod	Director Cultural and Historic Preservation Departmen	Delaware Nation of Oklahoma	P.O. Box 825		Anardarko	OK	73005
Larry Heady	THPO Special Assistant	Delaware Tribe of Indians	1929 E. 6th ST		Duluth	MN	55812
Brett Barnes	Historic Preservation Office	Eastern Shawnee Tribe of Oklahoma	12705 E. 705 Road		Wyandotte	OK	74370
Melissa Cook	Tribal Historic Preservation Officer	Forest County Potawatomi	Cultural Center, Library & Museum	8130 Mishkoswen Drive, P.O. Box 340	Crandon	WI	54520
Earl Meshigaud	Historic Preservation Office	Hannahville Indian Community	P.O. Box 351, Highway 2 & 41		Harris	MI	49845
William Quackenbush	Tribal Historic Preservation Officer	Ho-Chunk Nation of Wisconsin	P.O. Box 667		Black River Falls	WI	54675
Lance Foster	Tribal Historic Preservation Officer	Iowa Tribe of Kansas and Nebraska	3345 Thrasher Road		White Cloud	KS	66094
Robert Field	Historic Preservation Office	Iowa Tribe of Oklahoma	Route 1, Box 721		Perkins	OK	74059
Fred Thomas	Vice Chair	Kickapoo Tribe of Indians of Kansas	P.O. Box 271		Horton	KS	66439
Kent Collier	Historic Preservation Office	Kickapoo Tribe of Oklahoma	P.O. Box 70		McCloud	OK	74851
Sydney Martin	Historic Preservation Office	Match-e-be-nash-she-wish Potawatomi	2872 Mission Drive		Shelbyville	MI	49344
Diane Hunter	Tribal Historic Preservation Officer	Miami Tribe of Oklahoma	202 S. Eight Tribes Trail	P.O. Box 1326	Miami	OK	74355
Douglas Taylor	Interim Tribal Historic Preservation Officer	Nottawaseppi Band of Huron Potawatomi	2221—1 1/2 Mile Road		Fulton	MI	49052
Logan Pappenfort	Historic Preservation Office	Peoria Tribe of Indians of Oklahoma	118 S. Eight Tribes Trail	P.O. Box 1527	Miami	OK	74355
Jason Scott Wesaw	Tribal Historic Preservation Officer	Pokagon Band of Potawatomi	P.O. Box 180	58620 Sink Road	Dowagiac	MI	49047
Warren Wahweotten	Tribal Council Member	Prairie Band Potawatomi Nation	Government Center	16281 Q Road	Mayetta	KS	66509
Gary Bahr	NAGPRA/Historic Preservation Office	Sac & Fox Nation of Missouri in Kansas and Nebraska	305 N. Main Street		Reserve	KS	66434
Sandra Massey	NAGPRA/Historic Preservation Office	Sac & Fox Nation of Oklahoma	920883 S. Highway 99	Building A	Stroud	OK	74079
Johnathan Buffalo	Historic Preservation Office	Sac & Fox Tribe of the Mississippi in Iowa	349 Meskwaki Road		Tama	IA	52339
Nicky Smith	Historic Preservation Office	Shawnee Tribe	P.O. Box 189		Miami	OK	74355
Andrea Hunter	Historic Preservation Office	The Osage Nation	627 Grandview Avenue		Pawhuska	OK	74056
Everett Brandy	Tribal Historic Preservation Officer	The Quapaw Tribe of Indians	P.O. Box 765		Quapaw	OK	74363
Eric Oosahwee-Voss	Tribal Historic Preservation Officer	United Keetoowah Band of Cherokee of Oklahoma	P.O. Box 746		Tahlequah	OK	74464
Henry Payer	Tribal Historic Preservation Officer	Winnebago Tribe of Nebraska	P.O. Box 687		Winnebago	NE	68071

9 ENVIRONMENTAL COMPLIANCE

Guidance	Degree of Compliance
Federal Statutes	
Archaeological and Historic Preservation Act, as Amended, 16 U.S.C. 469, et seq.	PC[1]
Bald and Golden Eagle Protection Act, 42 USC 4151-4157	FC
Clean Air Act, as Amended, 42 U.S.C. 7401-7542	FC
Clean Water Act, as Amended 33 U.S.C. 1251-1375	PC[2]
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	PC[2]
Endangered Species Act, as Amended, 16 U.S.C. 1531-1543	PC[2]
Farmland Protection Policy Act, 7 U.S.C. 4201-4208	PC[2]
Federal Water Project Recreation Act, as Amended. 16 U.S.C. 4601, et seq.	FC
Fish and Wildlife Coordination Act, as Amended, 16 U.S.C. 661-666c	PC[2]
Land and Water Conservation Fund Act, as Amended, 16 U.S.C. 4601, et seq.	FC
National Environmental Policy Act, as Amended, 42 U.S.C. 4321- 4347	PC[3]
National Historic Preservation Act, as Amended, 54 U.S.C 300101, et seq.	PC[1]
Noise Control Act, 42 USC 4901, et seq.	FC
Migratory Bird Treaty Act of 1918, 16 USC 703, et seq.	PC[2]
Resource Conservation and Recovery Act, 42 USC 6901-6987	PC[2]
Executive Orders	
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)	FC
Floodplain Management, E.O. 11988 as amended by E.O. 12148	FC
Protection of Wetlands, E.O 11990 as amended by E.O. 12608	FC
Protection and Enhancement of the Cultural Environment, E.O. 11593	PC[1]
Consultation and Coordination with Indian Tribal Governments, 06 Nov 2000, E.O. 13175	PC[1]
Protection of Migratory Birds (EO 13186)	FC

FC = Full Compliance, PC = Partial Compliance.

1. Full compliance will be attained after all required archaeological investigations, reports and coordination have been completed.
2. Full compliance will be attained upon completion of any permitting requirements or coordination with other agencies.
3. Full compliance will be attained upon signing of the NEPA decision document.

Applicable permits:

10 LIST OF PREPARERS

- Alison Anderson, Ph.D., Environmental Coordinator
- Rick Archeski, HTRW
- Mark Smith, Ph.D., Cultural and Tribal Coordinator
- Charles Frerker, Regulatory
- Harold Graef, Project Manger
- Lisa Andes, Climate Change Analysis
- John Boeckman, Hydrology
- Derek Dodd, Economics

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FINDING OF NO SIGNIFICANT IMPACT

Supplemental Environmental Assessment
Lower Wood River Levee System Design Deficiency Corrections
Mississippi River, River Miles 195 – 203
Madison County, Illinois
July 2018

1. I have reviewed and evaluated the Supplemental Environmental Assessment (SEA) for the Lower Wood River Levee System Design Deficiency Corrections project. The purpose of this project is to correct a deficiency in the design of underseepage controls in the Lower Wood River Levee system, Madison County, Illinois.

2. Alternatives were considered in correcting design deficiencies for each decision reach along the levee system. After consideration of life safety risk, environmental impacts, and cost factors, the proposed action is the least cost option for reaches 2, 3, and 5b, while still meeting life safety guidelines. The No Action Alternative was selected for the remaining reaches either because: 1) no underseepage was observed or 1) life safety risk was already at an acceptable level.

3. The recommended plan consists of various underseepage control measures, including 74 new relief wells; 2 new pump stations; 8,700 yd^3 of fill; 3,800 linear ft of collector system pipe, 4,000 yd^3 of excavation for ditch cutting; and 105 acres of flowage easement.

4. The recommended plan has been studied for physical, biological, and socioeconomic effects. Major findings of the analyses presented in this SEA include the following:

    a. The recommended plan provides an engineering solution to the problem consistent with the preservation of the environment.

    b. Construction and operation of the recommended relief wells in reaches 2 and 3 are in proximity of known underground contamination based on the best available information collected during a Phase I Environmental Site Assessment conducted by the St. Louis District. A Phase II Environmental Site Assessment would be conducted prior to construction in order to avoid contact with contaminated substances.

    c. Hydrologic impacts to surface water are considered to be relatively minimal. The increase in the number of relief wells may cause an increase in water on the landside of the levee. However, modifications to existing ditches and pump stations, as well as the addition of new pump stations and the obtainment of flowage easements, should increase water conveyance to offset the increase in surface water flows.

    d. The plan would permanently impact a total of 1.6 acres of wetland habitat that requires mitigation. The mitigation plan would establish a total of 3.25 acres of wetland habitat at the proposed mitigation site. With this plan compensating for these unavoidable losses, these direct impacts will not have a significant impact on biological resources. Further development of the mitigation plan will be coordinated with federal and state natural resource agencies.

e. There will be about 1.0 acres of prime farmland permanently converted to nonagricultural use. An additional 3.25 acres of farmland may be permanently converted to nonagricultural use for mitigation.

f. The St. Louis District, Army Corps of Engineers is engaged in consultation with the Illinois State Historic Preservation Agency (IHPA), the Advisory Council on Historic Preservation (ACHP), the Osage Nation, and the United Keetoowah Band of Cherokees per the Programmatic Agreement established in 2011.

g. The proposed plan will result in minor and temporary impacts on air quality, surface water quality, traffic movement, recreation, aesthetics, and noise levels. Minor and permanents impacts may also occur to prime farmland, biological resources, surface hydrology, and land use. The proposed plan would not affect any threatened or endangered species. There are no environmental justice.

h. Disposal areas have yet to be identified, and their locations will be determined prior to construction. The National Environmental Policy Act process would continue once these areas are identified.

i. Based on my analysis and evaluation of the alternative courses of action presented in these documents, I have determined that the Lower Wood River Levee System Design Deficiency Corrections project would not have significant effects on the quality of the human environment. Therefore, no Environmental Impact Statement will be prepared prior to proceeding with this action.

_____
Date

_____
Bryan K. Sizemore
Colonel, U.S. Army
District Commander

ATTACHMENT 1: STATE AGENCY CORRESPONDENCE

ATTACHMENT 2: FISH AND WILDLIFE SERVICE CORRESPONDENCE

ATTACHMENT 3: ILLINOIS STATE HISTORIC PRESERVATION OFFICE & TRIBAL CORRESPONDENCE

APPENDIX I: CLEAN WATER ACT - 404(B)1 EVALUATION

Section 404(b)(1) Evaluation

1 PROJECT DESCRIPTION

Location. The Wood River Drainage and Levee District (Levee District) lies in southwestern Illinois on the left descending bank (LDB) of the Mississippi River flood plain, within Madison County, Illinois, between Mississippi River Miles 195 and 203 above the Ohio River. The levee district is protected by an urban design levee, across the Mississippi River from St. Louis and St. Charles counties in Missouri. About 10,687 acres of former Mississippi River floodplain are confined by this portion of the levee system.

General Description. The general purpose of this study is to evaluate design deficiency correction alternatives that would allow the Lower Wood River Levee System to function as initially intended and in a safe and reliable manner.

Authority. The Wood River Levee project originally was authorized by the Flood Control Act of 28 June 1938, Flood Control Committee Document No. 1, 75th Congress, and First Session to provide flood protection to urban, agricultural, and industrial areas. Projects that address deficiencies with the original project design do not require any additional Congressional authorization, provided that the project meets certain criteria as defined in Engineer Regulation (ER) 1165-2-119. According to ER 1165-2-119, a design or construction deficiency is a flaw in the Federal design or construction of a project that significantly interferes with the project's authorized purposes or full usefulness as intended by Congress at the time of original project development. Corrective action, therefore, falls within the purview of the original project authorization.

Purpose. The purpose of the evaluation portion of this document is to comply with Section 404 of the Clean Water Act pertaining to guidelines for the placement of fill material into waters of the United States. This evaluation, in conjunction with the *Supplemental Environmental Assessment for the Lower Wood River Levee System Design Deficiency Corrections, Madison County, Illinois* will assist in analysis of alternatives for the proposed project, resulting in a designated Recommended Plan. Additionally, this evaluation will provide information and data to the state water quality certifying agency demonstrating compliance with state water quality standards.

2 GENERAL DESCRIPTION OF EXCAVATED AND FILL MATERIAL

1. General Characteristics of Material.
    a. *Fill Material.* Fill materials will include quarry run limestone consisting of graded "A" stone and earthen materials including silt, sand, and clays.
    b. *Excavated Material.* Excavated material is defined as material that is either hydraulically dredged or mechanically excavated from waters of the United States. Earthen material excavated as part of this project will consist of alluvial sand, silt, and clay. Disposal locations for this material has not been identified.
2. Quantity of Material. An estimated 4,000 cubic yards (CY) of material would be excavated from drainage ditches in the levee protected area. An estimated 8,000 CY of material would be placed in a vegetated drainage ditch in reach 3. An estimated 600 CY of material would be placed in the

fill area identified in reach 2. The disposal route for the excavated material has not been determined. These estimates would be confirmed prior to construction.

3. Source of Material. Stone used for the project will be obtained from commercial stone quarries in the vicinity of the project area.

3 DESCRIPTION OF PROPOSED WORK SITES

1. Location. The proposed work sites are located within the levee protected area in reaches 2, 3, and 5. Due to the differences in existing conditions, type of work proposed, and potential timing of construction, each reach will be analyzed separately for this evaluation
    a. Reach 2: Located in the north-west corner of the levee protected area where Wood River creek joins with the Mississippi River. This area contains the majority of the identified wetlands in the levee protected area.
    b. Reach 3: Located to the south of Reach 2 and runs parallel to the Mississippi River. This area primarily consists of residential structures.
    c. Reach 5b: Reach 5 is the southern boundary of the levee protected area and runs west-east, parallel to the Cahokia Creek Diversion Channel. Reach 5b is the eastern half of this reach. This area is primarily agricultural.

2. Size and Types of Habitat. Within the levee-protected area, there are approximately 205 acres and 185 acres of emergent and forested wetland, respectively. Some man-made ponds and open water wetlands also occur in the levee-protected area and according to the National Wetland Inventory there are approximately 133 acres of freshwater pond, 79 acres of lake, and 19 acres of river habitats. Final placement of project features will result in loss or conversion of low amounts of these natural habitats. Temporary, short-term impacts to wetlands may result from construction activities.
    a. Reach 2: This reach contains the majority of the identified wetlands, both emergent and forested, in the levee protected area. There are approximately 270 acres of various wetland and riverine habitats. Currently, habitats below elevation 420 ft retain water during prolonged or intense precipitation events and water is not conveyed from this area until water retention surpasses 420 ft elevation. The long duration of water retention during the growing season has negatively impacted the emergent and woody vegetation. The placement of fill and construction of features in this area will impact 0.6 acres of forested wetland.
    b. Reach 3: This reach primarily consists of residential developed. The area identified for proposed fill placement is a drainage ditch which conveys water from the residential storm systems to a pump station. That pump station ultimately pumps water over the levee during prolonged or intense precipitation events.
    c. Reach 5b: This reach primarily consists of agricultural fields. Habitats affects under the proposed plan include drainage ditches and agricultural fields. Without the existing drainage on the farm fields and the drainage ditches, this area would quick return to its former wetland conditions. The construction of features and increased ditching in this area will impact 1.0 acres of emergent wetland.

3. Type of Site

a. *Permanent Deposits of Excavated or Fill Material.* Reaches 2 and 3 would require the permanent placement of fill material. In reach 5, material would be placed to establish new pump stations.

   All reaches under evaluation would require the excavation of material to increase ditching. A disposal area for the material has not been identified.

b. *Temporary Deposits of Excavated or Fill Material.* Temporary placement of fill material will be done in such a manner as to avoid and minimize impacts to wetlands and other natural features. Temporary stockpiles of material may also be necessary during construction of the various project features. Construction staging areas would be created in a logical manner in order to avoid impacts to wetlands.

4. Timing and Duration of Placement. The construction period may occur over several years and seasons but is expected to occur any time during the typical construction season. Actual duration of discharges will only be a fraction of the total construction time.

Description of Placement Method. Material removed from the existing ditches would be mechanically removed depending on contractor's equipment utilized for the Project. Mechanical equipment could consist of a crane with clamshell bucket or an excavator. The excavated material would be transported on site to the planned disposal locations. During the plans and specifications phase, the project delivery team would identify locations for disposal locations that would avoid and minimize the amount of temporary impact to habitat. After material has been placed to the desired height, the material may be re-graded using earth-moving equipment and re-seeded using a native grass mixture.

Stone and fill material used to fill the ditch in reach 3 and fill area in reach 2, would be transported by truck to the project site. Heavy equipment (e.g., cranes and/or excavators) would be used to place stone and soil to fill these features.

4 FACTUAL DETERMINATIONS

Physical Substrate Determinations

1. Substrate Elevation and Slope. The Wood River Drainage and Levee District is boarder along the east by a line of bluffs and along the west by a manmade earthen levee and Mississippi River. The bluffs are as high as 650 ft above sea level. The floodplain, which is the area between the bluffs and Mississippi River, is characterized by ridge and swale topography, with a maximum natural relief of approximately 35 ft and elevations ranging from 440 to 405 ft. The slope of natural ground on the protected side of the levee system varies by location, with relatively flat areas where wetlands occur (1-2%) and gentle slopes in other areas (2-5%). Levee embankment sideslopes are typically about 30%.
2. Sediment Type. The line of bluffs that define the eastern boundary of the levee district consists of relatively soft shales and sandstones. However, bedrock is not exposed as the bluffs are mantled with deposits of glacial drift overlain with loess. The drift is commonly an unsorted deposit of pebbly clay, very plastic clay, sandy clay, and occasional lenses of sand or gravelly sand. The loess that blankets the summit and faces of the bluffs consists of windblown silts and lean clays locally 50 ft or more thick. Adjacent to the bluffs, a series of sand and gravel deposits

form terraces which stand an average of 30 ft above the level of the surrounding plain. These terraces are remnants of an aggraded fill resulting from glacial meltwater deposits.

Wood River creek, a tributary of the Mississippi River, divides just west of East Alton and the valleys of the two forks are coincident with the Mississippi floodplain for several miles upstream. The deepest part of the bedrock surface ranges in depth from 160 to 170 ft beneath the valley fill with an average thickness of 130 ft of overlying alluvial deposits. Immediately above the bedrock surface is a stratum consisting of coarse gravels and sands with occasional boulders. Overlying this stratum is a thick section of medium to fine sands. The surface deposits are complex and varied as they result from filled lakes and swamps, abandoned meander loops, and flood water deposition. The surface materials range from heavy plastic clays to fine sands. In addition, industrial waste and artificial deposits are also found as part of the surface deposits.

3. Excavation/Fill Material Movement. Excavated material will be taken to a designated disposal location using a truck. Fill material will be transported from a commercial facility to the project location using a truck.
4. Actions Taken to Minimize Impacts. Numerous actions will be taken to avoid adverse effects of sediment related impacts. Project features will be designed with stable slopes. Project features will be positioned to minimize impacts to forest habitats. Faunal impacts from the construction of project features would be limited to short-term disruption of the aquatic and terrestrial communities in the areas of the disturbance. Construction would be scheduled in such a way as to avoid impacting threatened and endangered species. Additionally, best management practices for construction will be enforced to minimize impact to surrounding aquatic habitats.

Water Circulation, Fluctuation, and Salinity Determinations

1. Water. Excavation would temporarily reduce water quality in the adjacent area. Turbidity and sedimentation would increase. This would cease after construction completion and the increased depth would improve water conveyance in the proposed project area and would have minimal impacts on fish and wildlife resources in the long-term.
2. Current Patterns and Circulation. Project features located on the protected side of the levee system along the Lower levee will not have the potential to affect any current patterns or flow on any natural waterways.
3. Natural Water Level Fluctuations. Normal water level fluctuations in the Mississippi River would be unaffected. Design deficiency correction features would not detrimentally increase flood heights or adversely affect private property or infrastructure.
4. Actions That Will Be Taken to Minimize Impacts. Best management practices for construction will be enforced. The primary actions taken to avoid adverse effects to the water are designing stable slopes on structures, placement of silt fences or hay bales to arrest the migration of material, and revegetation measures to minimize erosion of fill or dredged materials.

Suspended Particulate/Turbidity Determinations

1. Expected Changes in Suspended Particles and Turbidity Levels in Vicinity of Placement Site. Short-term increases in suspended particulates and turbidity due to construction activities are expected within the vicinity of the excavation and disposal areas. This will cease after construction completion.
2. Effects on Chemical and Physical Properties of the Water Column.

The project does not involve any construction in the Mississippi River, Cahokia Creek Diversion Channel, the East and West Forks of the Wood River, or Wood River Creek. No permanent waterbody will be impacted. The only affected wetlands experience only temporary inundation or soil saturation.

a. *Light Penetration*: There will be a temporary reduction until sediments suspended as part of the project activities settle out of the water column.
b. *Dissolved Oxygen*: No adverse effects expected.
c. *Toxic Metals and Organics*: Toxic metals or organics are not expected at the site of proposed wetland impacts. However, contaminants are known to occur underground in the vicinity of Hartford (reach 3). This work area is approximately 400ft from a known HTRW plume. Contamination in the plume area exists are both gaseous soil contamination and liquid petroleum products.
d. *Aesthetics*: Aesthetics of work sites are likely to be adversely affected during construction, but are expected to be temporary and improve after construction.
e. *Water Temperature*: No adverse effects expected.

3. Effects on Biota. The project would likely result in some short-term displacement of biota in the immediate vicinity of construction activities due to temporary decreases in water quality and disturbance from construction equipment.

Contaminant Determinations. The project is located in former Mississippi River floodplain which is primarily industrial and residential development. The Phase I Hazardous, Toxic, and Radioactive Waste survey has been completed and revealed recognized environmental conditions that may impact the project area.

Aquatic Ecosystem and Organism Determinations.

1. Effects on Plankton. The project could have temporary adverse effects on the plankton in the immediate vicinity of the project area. This would cease after construction completion.
2. Effects on Benthos. Negative effects to benthos would be limited to elimination of those organisms currently residing in the immediate excavation sites and fill sites. Benthic organisms in the immediate vicinity of sites designated for the placement of fill material or rock will be lost due to burial. However, these species would quickly recolonize the area once construction ceased.
3. Effects on Nekton. Temporary adverse effects may be experienced by free-swimming aquatic life during construction.
4. Effects on Aquatic Food Web.
5. Effects on Special Aquatic Sites. Effects on special aquatic sites should be negligible in the project area; no sanctuaries or refuges would be adversely affected by the proposed action. Project goals and features have been developed in coordination with state and federal partners.
    a. *Sanctuaries and Refuges.* The project is not expected to impact fish and migratory wildlife.
    b. *Wetlands, Mudflats, and Vegetated Shallows.* Wetlands or mudflats would be adversely affected by the proposed action. The placement of the fill material in reach 2 would convert current emergent wetland habitat to non-wetland habitat. Project planning considered many project features and layouts to minimize wetland loss.
6. Threatened and Endangered Species. Presence, or use by, federally endangered and threatened species is discussed in the Biological Assessment in the Supplemental Environmental Assessment. No adverse effects are expected to result from this Project, provided that conditions

for the protection of the Indiana bat are implemented. Because the proposed project requires a small amount of tree clearing, field surveys on construction sites requiring tree clearing will be conducted by the St. Louis District prior to any work to determine if any dead trees with loose bark or living trees with cavities are present that might be used a maternity roosts by the Indiana bat. If such trees are identified, tree felling will be restricted to the colder months when maternity roosting is not known to occur in accordance with guidelines established in the species' recovery plan.

7. Other Wildlife. The Project would likely result in some short-term displacement of wildlife in the immediate vicinity of construction activities. Minimizing disruption of migratory waterfowl during fall and early winter will be considered during the development of plans and specifications. Disruptions to wildlife are expected to decrease once the Project is completed.

Proposed Placement Site Determinations

1. Mixing Zone Determinations. A mixing zone is that volume of water at a placement site or discharge site required to dilute contaminant concentrations associated with discharge of excavated material to an acceptable level. The concentration of sediment material associated with construction of proposed project features would not be high enough to require a mixing zone.
2. Determination of Compliance with Applicable Water Quality Standards. This Section 404(b)(1) evaluation serves as the necessary compliance required by law under the Clean Water Act. A Section 401 Water Quality certification and all other permits necessary for the completion of the project, would be obtained prior to project construction. In addition, a Section 402 NPDES permit will also be required from the IEPA. Effluent limitations guidelines and new source performance standards promulgated in 2009 by the U.S. EPA to control discharge of pollutants from construction sites are likely to apply to this project, requiring the implementation of a range of erosion and sediment control measures and pollution protection practices.
3. Potential Effects on Human Use Characteristics. No long-term adverse impacts to municipal and private water supplies; water-related recreation; aesthetics; or parks, national and historic monuments, national seashores, wilderness areas, research sites or similar preserves would occur.

Determination of Cumulative Effects on the Aquatic Ecosystem. Although minor short-term construction-related impacts to local and wildlife populations are likely to occur, no negative cumulative impacts to fish and wildlife are identified.

Determination of Secondary Effects on the Aquatic Ecosystem. No adverse secondary affects should result from the proposed action. No long-term impacts to aquatic habitat and wildlife are expected.

5 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

A. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation. No significant adaptations of the 404(b)(1) guidelines were made relative to this evaluation.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would have Less Adverse Impacts on the Aquatic Ecosystem. Alternatives that were considered for the proposed action included more features than the Recommended Plan. They were analyzed for environmental impacts, life safety, and costs. The Recommended Plan involved the smallest amount of environmental impacts and best met project objectives and the four plan formulation criteria of completeness, effectiveness, efficiency, and acceptability.

C. Compliance with Applicable State Water Quality Standards. Certification under Section 401 of the Clean Water Act would be obtained from the Illinois Department of Natural Resources.

D. Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act. The project is not anticipated to introduce toxic substances into nearby waters or result in appreciable increases in existing levels of toxic materials. The proposed activity is in compliance with Applicable Toxic Effluent Standards or Prohibitions under Section 307 of the Clean Water Act.

E. Compliance with Endangered Species Act of 1973. No significant impact to Federal or state listed threatened or endangered species would result from the proposed action. Prior to construction, full compliance with the Endangered Species Act would be documented.

F. Findings of Significant Degradation of the Waters of the United States. No municipal or private water supplies would be affected by the proposed action, and no degradation of waters of the United States is anticipated to result from the proposed action. The proposed construction activity would not have a significant adverse effect on human health and welfare, recreation and commercial fisheries, plankton, fish, shellfish, wildlife, or special aquatic sites. No significant adverse effects on life stages of aquatic life or other wildlife dependent on the aquatic ecosystem are expected to result. The proposed construction activity would have no significant adverse effects on aquatic ecosystem diversity, productivity, and stability. No significant adverse effects on recreational, aesthetic, and economic values would occur. The materials used for construction would be chemically and physically stable and non-contaminating.

G. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem. All appropriate and practicable measures have been taken to insure minimal adverse effects of the proposed discharges. No other practicable alternative less damaging to the aquatic environment has been identified that would address the project goal and objectives better than the Recommended Plan.

H. On the Basis of the Guidelines the Proposed Disposal Sites for the Discharge of Dredged and Fill Material. Based on this evaluation, the proposed Design Deficiency Corrections for the Wood River Drainage and Levee District, IL is in compliance with Section 404(b)(1) of the Clean Water Act, as

amended with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem. The proposed action would not significantly impact water quality.

Prepared by:

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Approved by:

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Chief, Environmental Compliance
Branch, Regional Planning and
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Date: _____

BRYAN K. SIZEMORE
Colonel, U.S. Army
District Commander

To be signed following the review of comments received during the public comment period.

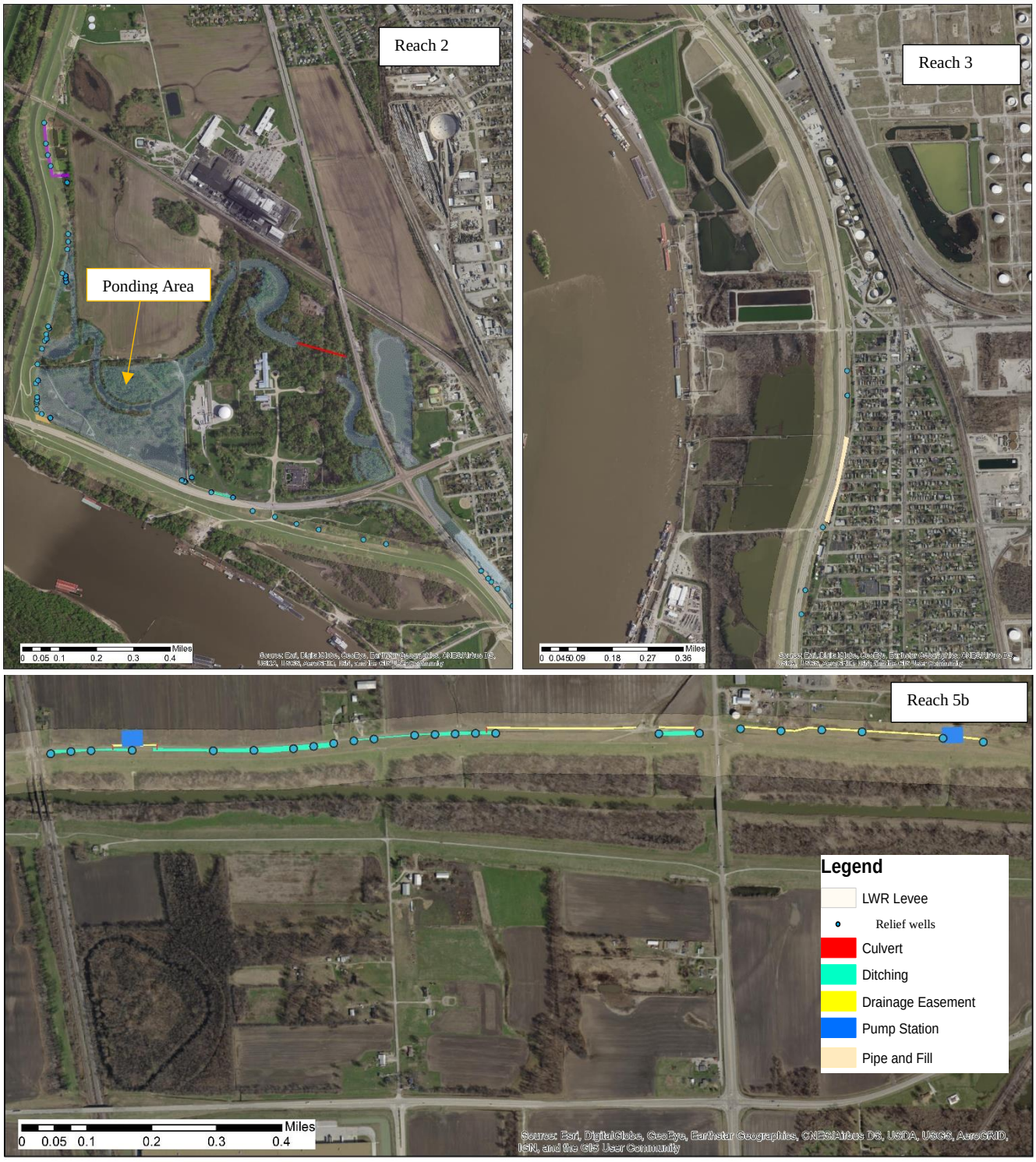

Figure 20. Proposed features to address underseepage in reaches 2, 3, and 5b.

APPENDIX II: HABITAT EVALUATION AND MITIGATION PLAN

Habitat Evaluation and Mitigation Plan
Appendix to Supplemental Environmental Assessment
July 2018

1. INTRODUCTION

Construction activities for the Wood River Drainage and Levee District, IL Design Deficiency Corrections Project will impact 1.0 acre of emergent wetland and 0.6 acres of forested wetland. These impacts require mitigation. The Water Resources Development Act (WRDA) of 2007 details mitigation requirements for fish and wildlife and wetland losses cause by water resources projects. An excerpt from Title VIII, Section 2036 of WRDA 2007 states:

(3) MITIGATION REQUIREMENTS.—

(A) IN GENERAL.—To mitigate losses to flood damage reduction capabilities and fish and wildlife resulting from a water resources project, the Secretary shall ensure that the mitigation plan for each water resources project complies with the mitigation standards and policies established pursuant to the regulatory programs administered by the Secretary.

(B) INCLUSIONS.—A specific mitigation plan for a water resources project under paragraph (1) shall include, at a minimum—

(i) a plan for monitoring the implementation and ecological success of each mitigation measure, including the cost and duration of any monitoring, and, to the extent practicable, a designation of the entities that will be responsible for the monitoring;

(ii) the criteria for ecological success by which the mitigation will be evaluated and determined to be successful based on replacement of lost functions and values of the habitat, including hydrologic and vegetative characteristics;

(iii) a description of the land and interests in land to be acquired for the mitigation plan and the basis for a determination that the land and interests are available for acquisition;

(iv) a description of—

(I) the types and amount of restoration activities to be conducted;

(II) the physical action to be undertaken to achieve the mitigation objectives within the watershed in which such losses occur and, in any case in which the mitigation will occur outside the watershed, a detailed explanation for undertaking the mitigation outside the watershed; and

(III) the functions and values that will result from the mitigation plan; and

(v) a contingency plan for taking corrective actions in cases in which monitoring demonstrates that mitigation measures are not achieving ecological success in accordance with criteria under clause (ii).

(C) RESPONSIBILITY FOR MONITORING.—In any case in which it is not practicable to identify in a mitigation plan for a water resources project the entity responsible for monitoring at the time of a final report of the Chief of Engineers or other final decision document for the project, such entity shall be identified in the partnership agreement entered into with the non-Federal interest under section 221 of Flood Control Act of 1970 (42 U.S.C. 1962d–5b).

(4) DETERMINATION OF SUCCESS.—

(A) IN GENERAL.—A mitigation plan under this subsection shall be considered to be successful at the time at which the criteria under paragraph (3)(B)(ii) are achieved under the plan, as determined by monitoring under paragraph (3)(B)(i).

(B) CONSULTATION.—In determining whether a mitigation plan is successful under subparagraph (A), the Secretary shall consult annually with appropriate Federal agencies and each State in which the applicable project is located on at least the following:

(i) The ecological success of the mitigation as of the date on which the report is submitted.

(ii) The likelihood that the mitigation will achieve ecological success, as defined in the mitigation plan.

(iii) The projected timeline for achieving that success.

(iv) Any recommendations for improving the likelihood of success.

(5) MONITORING.—Mitigation monitoring shall continue until it has been demonstrated that the mitigation has met the ecological success criteria.

This document outlines the St. Louis District's plans for mitigation and monitoring to assess ecological success of the mitigation for the Wood River Drainage and Levee District, IL Design Deficiency Corrections project.

2. OBJECTIVES

The project areas consists of the Wood River Drainage and Levee District levee system and associated right-of-way. The goal is to mitigate for impacts to 1.6 acres of Section 404 jurisdictional wetland. Current ecological problems for the project area's biological resources are: fragmentation and degradation resulting from altered hydrologic regimes that depart from natural conditions, the addition of sediments and agricultural chemical and urban runoff, encroachment of exotic plant species, and the prevalence of disturbance-tolerant native plant species. The mitigation area would combat some of these problems because it would create a larger block of habitat with the establishment of vegetation.

3. SITE SELECTION

The project and proposed mitigation site are located within the Cahokia-Joachim watershed (HUC 07140101). The proposed mitigation site is on-site mitigation located within the levee protected area near reaches 1 and 2. The site is a parcel of about 100 acres directly adjacent to the forested wetland being impacted in reach 2. There are currently no mitigation banks available within this watershed. However, there could be mitigation banks available once construction for the project begins.

4. SITE PROTECTION INSTRUMENT

The non-Federal sponsor, Wood River Drainage and Levee District (WRDLD), would be responsible for maintaining and protecting lands contained within the mitigation site in perpetuity. The non-Federal sponsor would be required to place a conservation servitude over the property and that conservation servitude would incorporate this mitigation plan by reference. A copy of the conservation servitude would be provided to the Corps of Engineers St. Louis District for review and approval.

Uses Prohibited by the Conservation Servitude:

1. Placing, filling, storing or dumping or refuse, trash, vehicle bodies or parts, rubbish, debris, junk, waste or such items on the Property.
2. Mechanized land clearing or deposition of soil, shell, rock or other fill on the Property without written authorization from Corps of Engineers St. Louis District.
3. Cutting, removal or destruction of vegetation on the property except in accordance with the non-Federal Sponsor's vegetation management plan and/or in accordance with any permits authorized by the Corps of Engineers. Tree removal will only be approved if the Corps determines that such activities are needed to maintain or enhance the ecological value of the site.
4. Grazing of cattle or other livestock on the property.
5. Commercial, industrial, agricultural or residential uses of the Property without prior approval from the Corps.
6. Dredging, draining, ditching, damming or in any way altering the hydrology of the Property except as required or permitted by this Wood River Drainage and Levee District, IL Flood Protection Project's Mitigation Plan.
7. All other activities, which the Corps determines to be inconsistent with the establishment, maintenance and protection of wetlands within this Wood River Drainage and Levee District, IL Flood Protection Project's Mitigation Plan and that may or may not be subject to Corps of Engineers regulatory authority.

Uses Allowed by the Conservation Servitude. No other human activities that result in the material degradation of habitat within the lands covered by this Wood River Drainage and Levee District, IL Design Deficiency Corrections Project's Mitigation Plan will occur. The conservation servitude will not prohibit, subject to appropriate regulatory authority, the following activities:

1. Monitoring of vegetation, soils and water;
2. Hunting and fishing, and non-consumptive recreation uses such as hiking and bird watching;
3. Ecological education;
4. Sub-surface exploration and production of minerals;
5. Provision of rights-of-way;
6. Compliance with Federal regulations or appropriate court orders.

5. BASELINE INFORMATION

5.1 IMPACT SITES:

Total areas to be impacted include 0.6 acres of forested wetland and 1.0 acre of emergent wetland. The proposed project sites are highly disturbed and consist of low quality emergent and forested wetlands. They are considered low to moderate quality because they are small in area as a result of past and ongoing development, occur in close proximity to developed areas, support a low diversity of native plant species, and experience unnatural flood regimes due to the severed connection with the Mississippi River.

Wetland hydrology in these areas primarily consist of surface runoff from adjacent levee-protected land as well as groundwater inflow during times when the Mississippi River is high.

The emergent wetland in reach 2 is a man-made depression which is routinely inundated by surface runoff. The wetland area being filled was isolated from the surrounding wetland by a small berm constructed during previous flood-fight efforts in an effort to contain underseepage. Groundcover in this area consists of various sedges, forbs, and grasses. The forested wetland in reach 5 receives and retains surface runoff from the surrounding farm fields as well as groundwater from the Mississippi River. The area has been farmed in the past, but has quickly regenerated early successional shrub and woody-vegetation. Hard-mast species such as oaks and pecans are nearly absent.
A variety of animal species use the urbanized project area. However, most wildlife are adapted to human disturbances or tolerant of fragmented habitats of poor water quality, and consists mainly of amphibians, reptiles, birds, and mammals. The herbaceous wetlands may serve as resting and feeding areas for some migratory and non-migratory birds.

5.2 MITIGATION SITE:

On-Site – The mitigation area falls within an area commonly referred to as the American Bottoms. The American Bottoms is an expansive floodplain of the Mississippi River extending from Alton, Illinois, south to the Kaskaskia River. The floodplain lies just south of the confluence of three great rivers, Missouri, Illinois, and Mississippi Rivers and is bounded by a nearly continuous bluff on the east and the Mississippi River to the west. Even though the area is currently by being protected from flooding by a levee and drainage canal system there are many remaining wetlands and oxbow lakes of ecological importance. Historically, this area was primarily used for agricultural due to its rich fertile soils and has the potential to support migratory waterfowl and other birds, as well as a variety mammals and amphibians. In addition, an increase in wetlands in highly urbanized areas could help contribute to the aesthetics of the area and provide natural filtration of surface runoffs before being discharged into the Mississippi River.

Analysis for mitigation requirements focused on this specific area of the levee-protected area. Currently, most of the area proposed for mitigation is being maintained as cropland. These fields are productive when dry, but that is a non-guaranteed condition at this location. Even though this area is protected by the Lower Wood River Levee System, it is subject to flooding by interior drainage and seepwater manages to flood the area when Mississippi River levels are high. Internal drainage is altered in this area by a series of ditches, drainage tiles, and ponding areas. Due to the existing topography and hydrologic regime, much of the restoration work would be relatively simple. For example, the discontinuation of farming would accomplish some of the restoration effort. The close proximity to existing wetlands and hydrology of the area would allow for the natural revegetation of wetland species. Wetland habitat could be greatly enhanced by accentuating the existing ridge-swale topology, allowing seasonal hydrologic fluctuations, and utilizing the unique hydrologic conditions in this area.

6. DETERMINATION OF CREDITS

The ecosystem analyses for the Wood River Levee System Project was generated by U.S. Army Corps of Engineers subject matter experts with coordination and review by representatives from the U.S. Fish and Wildlife Service and Illinois Department of Natural Resources.

The U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP; USFWS 1976) is widely used to assess project alternatives using numerical models and equations to evaluate the quality and quantity of particular habitats for select wildlife species. The qualitative component of the analysis is known as the habitat suitability index (HSI) and is rated on a 0 to 1 scale, with higher values indicating better habitat. The HSI for a particular habitat type is determined by selecting values that reflect present and future project area conditions from a series of abiotic and biotic metrics. Future values are determined using management plans, historical conditions, and best professional judgment. HSI models for the slider turtle (*Pseudemys scripta*; Morreale et al. 1986) and mink (*Mustela vison*; Allen 1986) were used in the HEP framework to assess the existing and future habitat conditions of emergent and forested wetlands, respectively.

The quantitative component of the analysis process is the number of acres of the habitat being evaluated. From the calculated qualitative and quantitative values, the standard unit of measure, the habitat unit (HU) is calculated using the formula (HSI x Acres = HUs). Habitat units are calculated for specific target years to forecast changes in habitat values over the life of the project for with-project and without-project conditions and are then annualized to yield the Average Annual Habitat Unit (AAHU). Target years are set to capture the change in habitat that occurs with habitat maturation and changes caused by constructed features. The benefits of each proposed project feature are then determined by subtracting with-project benefits from with-out project benefits, expressed at net AAHUs. The effects of various habitat improvement feature combinations (alternatives) can then be evaluated by comparing the net AAHUs and costs for each alternative considered.

The target years selected for use in the habitat assessments (1, 5, 10, 25, 50) were primarily chosen to reflect expected future changes in woody and herbaceous vegetation planted at mitigation sites. Woody species such has hard mast tree species planted as Root Pruned Method (RPM) seedlings can produce acorns and nuts as early as 5 years after planting. These target years would allow for capturing this onset of mast production. These same target years were then used across all habitat types to standardize data analysis.

The following assumptions were established as part of this assessment:

1. Project life was established as 50 years;
2. No Action Alternative assumes that no new project features would be constructed;
3. Target years selected are sufficient to annualize HUs;
4. Target species were selected based on project location and habitat type;
5. The existing HSI values developed are a fair representation of the quality of habitat in all target years and for all future conditions with or without a project;
6. Water input to the system is solely reliant on precipitation, runoff, groundwater, and relief well discharges; and

7. Mississippi River level rises would result in rises in water level within the impacted and mitigation sites due to relief well flows and ponding

In reach 5, approximately 1 acre of a 6 acre emergent wetland would be impacted with the construction of a pump station and associated ditching, which would increase wetland drainage. As indicated by the HSI score (Table 1), this wetland is of relatively poor quality due to infrequent agricultural use and fragmentation. However, this area, including the adjacent ditch, regularly retains water and if not planted with row crop, has emergent vegetation suitable for wildlife. This area is also within 200 meters of open water habitat which is within the home range size of an individual turtle (Slavenko et al. 2016). The primary driver of the reduced HSI values under the Action Alternative is the reduction in habitat size. The installation of the pump station and increased ditch capacity may reduce the wetland size from 6 acres to 5 acres, ultimately reducing the AAHUs by 0.75 over the course of 50 years.

In reach 2, approximately 0.6 acre of a 51.50 acre forested wetland would be impacted with the construction of relief wells, collector system, and the placement of fill material. As indicated by the HSI scores (Table 1), this wetland area is of relatively high quality due to its larger size, dense forest canopy cover, and presence of open water habitat year around. The primary drives of the reduced HSI scores under the Action Alternative is due to the reduction in habitat size. The installation of permanent features may reduce the wetland size from 51.50 acres to 50.90 acres, ultimately reducing the AAHUs by 1.56 over the course of 50 years.

Table 20. Habitat Suitability Index scores for wetland habitats being impacted under the Tentatively Selected Plan outline in the Supplemental Environmental Assessment over the 50-year project life.

Habitat	Reach	Species	Alternative	TY 0	TY 1	TY 5	TY 10	TY 25	TY 50
Emergent wetland	5	Slider turtle	TSP	0.47	0.38	0.20	0.20	0.20	0.20
			No Action	0.47	0.47	0.47	0.47	0.20	0.20
Forested wetland	2	Mink	TSP	0.91	0.79	0.85	0.91	0.91	0.91
			No Action	0.91	0.91	0.91	0.91	0.91	0.91

7. MITIGATION REQUIRED

U.S. Army Corps policy is to ensure that adverse impacts to significant resources have been avoided or minimized to the extent practicable and that remaining, unavoidable impacts have been compensated to the extent justified.

The amount of mitigation required (acres) to offset the unavoidable losses described above was developed to allow for the development of mitigation costs, which would be factored into the overall cost of each alternative. To develop mitigation amounts (acres) needed, HSIs were developed using the same evaluation species for a hypothetical on-site compensatory mitigation site (Figure 1). In order to apply the HSI models and HEP framework, assumptions were made about the mitigation site:

1. The mitigation site would be located in current cropland

2. Suitable soils would be present for wetland restoration (i.e., hydric soils)
3. Site conditions would allow for the restoration of wetland hydrology or enhancement of surface water
4. Soil conditions would allow for the satisfactory establishment of native plant species including emergent and woody wetland species
5. Mitigation construction and implementation would take one year
6. Project life was established as 50 years

Figure 21. Proposed on-site mitigation parcel. This area is currently planted for agriculture but is frequently inundated by surface runoff and groundwater.

Table 21. Habitat Suitability Index scores for wetland habitats being impacted under the mitigation plan outlined in this document over the 50-year project life.

Habitat	Species	Alternative	TY 0	TY 1	TY 5	TY 10	TY 25	TY 50
Emergent wetland	Slider turtle	Mitigation	0.00	0.38	0.56	0.56	0.60	0.60
Forested wetland	Mink	Mitigation	0.00	0.52	0.64	0.7	1.0	1.0

Based on the habitat units calculated using the HSI values and HEP framework, the acres of mitigation required to offset the unavoidable project impacts are 1.75 acres of forested wetland and 1.50 acres of emergent wetland habitats (Table 2 and 3).

Table 22. Acres impacted under the TSP and mitigation acres required to ensure no net loss of wetland habitats.

Habitat	Acres Impacted	AAHU Loss	Acres Mitigated	AAHU Mitigated

Emergent wetland	1.0	0.75	1.50	0.78
Forested wetland	0.60	1.56	1.75	1.60

8. MITIGATION WORK PLAN*

The proposed mitigation work plan is to expand on existing wetland habitats by utilizing as much of the existing topology and hydrology. On-site swales would be expanded by minor excavation to maximize the extent of herbaceous wetlands. Small earthen berms may be needed along the perimeter of the site to contain surface runoff to make the site wetter. The wettest hydric soils in the area would be planted with native emergent wetland species to create 1.50 acres of emergent wetlands. The remaining hydric soils would be used to establish 1.75 acres of forested wetland by planting RPM seedlings of native wetland tree species such as pin oak, swamp white oak, bald cypress, persimmon, American plum, and black walnut. Fifty trees would be evenly planted across each acre.

*****A Cost Effective/Incremental Cost Analysis needs to be conducted to help determine the most cost effective mitigation work plan and is pending real estate information.

9. PERFORMANCE STANDARDS

To compensate for unavoidable impacts to herbaceous and forested wetland habitats, the site must show progression from the current state of row crops towards a stable emergent and forest wetland. Specific features that could be measured to show the progression and satisfy ecological success include basic hydrology of the site, plant survival, and vegetation composition. Ecological success at this mitigation site is comprised of three parts – herbaceous wetland, forested wetland, and invasive species. Specific monitoring and potential adaptive management requirements are further discussed in Section 10: Monitoring Requirements and Section 12: Adaptive Management Plan of this appendix.

9.1 FORESTED WETLAND:

Forested wetland survival rates can decrease in areas located behind levees. Although the proposed mitigation site is located behind an existing levee, existing forested wetland in the vicinity have remained stable. Mitigation sites shall be considered to meet ecological success, if after 10 years, there is 80% survivorship and a positive growth rate of planted trees.

9.2 HERBACEOUS WETLAND:

Herbaceous wetland shall be considered to meet ecological success, if after 10 years, at least 75% of the total plant percent cover is comprised of native wetland herbaceous species.

9.3 INVASIVE SPECIES:

In addition to the ecological success measures for the plant communities, the overall site shall meet ecological success, if after 10 years, percent land cover of invasive species does not exceed 25%.

10. MONITORING REQUIREMENTS

Monitoring will commence the year after the herbaceous and forest wetland sites are planted, which will constitute year one.

10.1 HERBACEOUS WETLAND:

For the first five years, herbaceous wetland vegetation surveys will be conducted twice each year within the restored emergent wetland area. Surveys will be conducted early (1 May – 15 June) and late (1 August – 15 September) growing season each year to better capture species present. Before the first sampling event, 24 (50x50 cm) plots will be randomly located throughout the emergent wetland. GPS points will be recoded and subsequent monitoring will be done at the same coordinates. Percent cover of each plant species will be visually estimated for all plants rooted within the plot. Species will be classified as native, non-native, and/or woody. For each year, an average percent cover will be calculated for total plant percent cover and native percent plant cover. These values will be used to determine success. If ecological success targets are not being achieved at year five, the annual monitoring will continue. If targets are being met (75% of percent plant cover native herbaceous wetland species), then monitoring will be conducted again in year 8 and 10. At year 10 if all success targets are met, USACE will consider the ecological success of the mitigation site in coordination with state agencies.

10.2 FORESTED WETLAND:

For the first five years, an annual forest survey will be conducted during the growing season. In the first year, ten points will be randomly selected within the reforested section of the mitigation area. Each of these points will form the center of a permanent square 1/5th acre vegetation sampling plot. If plots overlap or extend beyond the mitigation site boundaries, additional random points shall be selected until five suitable plots are found. The GPS coordinate for the center of each plot will be recorded to allow for relocation of the plot in subsequent years. All planted trees within the subplot shall be tagged with an aluminum label indicating species and month and year of planting. Tags shall be permanently placed on or adjacent to planted trees using a method that will not impair tree growth. All planted seedlings within the five plots will be monitored annually and species, state (alive/dead), height, and basal diameter recorded. All invasive species with > 10% cover will be recorded and percent cover within the 1/5th acre plot estimated. From this data, survival rates and relative growth rates of planted trees will be calculated. Any additional information such as storm damage or diseases should also be noted. If at the end of the five-year monitoring period, the ecological success targets are being met and the USACE is satisfied with the performance (greater than 80% survivorship, positive relative growth rates and less than 25% invasive cover), the forested wetland portion of the mitigation site will be considered stable and self-sustaining and require monitoring on a five-year basis instead of annually. If ecological success targets have not been attained after five years, annual monitoring will continue. At 10 years if all the measures are met, USACE will consider the ecological success of the mitigation site in coordination with state agencies.

11. LONG-TERM MANAGEMENT PLAN

The Sponsor (Wood River Levee and Drainage District) will be responsible for maintaining and protecting lands contained within the mitigation site in perpetuity. In the event a prohibited use occurs,

corrective action would be conducted to return the proposed mitigation site to either an herbaceous or forested wetland depending on the location.

12. ADAPTIVE MANAGEMENT PLAN

In the event that the USACE or state agency, in coordination with USACE, determine that ecological success is not likely to be met using information provided in the monitoring reports, the non-Federal sponsor will take all necessary measures to modify management practices in order to achieve ecological success in the future. The following adaptive management measures could be implemented to aid the achievement of ecological success.

12.1 FORESTED WETLAND:

If survival of replanted forested wetland and/or bottomland forest falls below 80% during any year following project completion, additional plantings would be needed. If tree death is caused by existing hydrology (i.e., too wet) then trees such as pin oak, bur oak, and pecan should be replaced with more water tolerant species such as box elder, river birch, black willow, cottonwood or silver maple. Supplemental plantings would continue until ecological success is met. If tree mortality is caused by invasive species (e.g., kudzu, Japanese hops, etc.) then invasive species management (hand cutting and herbicide treatment) should be implemented and trees species replanted using the species list in Section 7 above. If tree mortality is caused by disease/insect infestation, then the effectiveness of pesticide application versus replanting of resistant trees should be evaluated and one of these measures implemented.

12.2 EMERGENT WETLAND:

For herbaceous wetlands, if native herbaceous plants do not constitute 75% of the total plant percent cover then adaptive management measures may be necessary. If competition from undesirable species is reducing success, herbicide application, mowing, or burning should be implemented to reduce the prevalence of woody species. In early years if species survivorship is low, then live plant plugs of native herbaceous wetland species suitable for the areas hydrology should be planted. If the hydrology fails, hydrological work (rerouting/ filling ditches, changing elevation, or adding/modifying management of gravity drains) should be conducted to restore the hydrology.

12.3 INVASIVE SPECIES:

If invasive encroachment exceeds 25% of percent land cover, measures will be taken to remove invasive species. Common invasive species include Johnsongrass, Reed Canary Grass, Kudzu and Japanese Hops. Common management techniques include burning, hand removal, and herbicide application. Management techniques would be implemented until percent cover of invasive plants is reduced to less than 25% for at least five years.

13. FINANCIAL ASSURANCES

Financial assurances are designed to ensure that sufficient funds are available for mitigation site acquisition, preparation, monitoring, adaptive management, and perpetual maintenance of the mitigation

site. To accomplish these goals, sufficient funds to perform the restoration work must be ensured including all costs accrued for monitoring and for operation and maintenance of the mitigation project.

14. COST*

For monitoring, there are two potential scenarios. If ecological success targets are not being met at year five, then monitoring will continue annually until year 10. If targets are met at year five, then monitoring after year five would occur less frequently. All mitigation monitoring is considered Operation and Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R), and costs are 100% Federal costs. Monitoring will indicate if and when adaptive management measures are necessary to achieve successful implementation of the functions and values of the mitigation habitat.

*****A Cost Effective/Incremental Cost Analysis needs to be conducted to help determine the most cost effective mitigation work plan and real estate information to complete this section is pending.

15. LITERATURE CITED

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