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WITH
SIGNED FINDING OF NO SIGNIFICANT IMPACT**

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APPENDIX A-A
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
WITH
SIGNED FINDING OF NO SIGNIFICANT IMPACT

LIMITED REEVALUATION REPORT
WOOD RIVER LEVEE SYSTEM
DESIGN DEFICIENCY CORRECTIONS
MADISON COUNTY, ILLINOIS



AUGUST 2011

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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 bank of the Mississippi River flood plain, within Madison County, Illinois, between 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.

The Wood River levee system is part of a larger Metro East levee system that includes the Metro East Sanitary District (MESD) and Chain of Rocks levees and the Prairie du Pont and Fish Lake levees to the south. Figure A-A-1 displays the location of the Wood River, MESD, and Chain of Rocks flood protection systems in Illinois in the vicinity of St. Louis.

This SEA 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 Environmental Assessment prepared by the St. Louis District (USACE, 2005) for reconstruction and design deficiency corrections of the Wood River levee system that were approved in 2007.

The Wood River levee system protects about 12,700 acres of bottomland against flooding from the Mississippi River, as well as headwater flooding from Wood River Creek and the Cahokia Creek Diversion Channel. The system also removes drainage from the flood-protected bottomland resulting from rainfall, run-off, and underseepage. Additionally, the Wood River system provides upstream protection to the adjoining MESD levee system that extends from the Cahokia Creek Diversion Canal to Dupo. In addition to providing protection to the land side area, the levee structure is a part of the containment features for the Melvin Price Locks and Dam Project. Modifications made to the original Lock and Dam 26 at Alton resulted in construction of the Melvin Price Lock and Dam two miles downriver and raised the height of the navigation pool on the intervening stretch of the existing levee and necessitated the construction of a new pump Station at East Alton in the late 1980s.

As part of the development of plans and specifications for the approved design deficiency correction, the St. Louis District conducted additional underseepage analyses based on new geotechnical information, and those analyses prompted a re-evaluation of the approved plan. Alternative solutions to correct the design deficiency are the focus of this SEA and a Limited Reevaluation Report prepared by the St. Louis District. The report is scheduled to be completed in 2011 and serves to identify a recommended plan to correct the design deficiency.

Alternative solutions for correcting a design deficiency in the Wood River levee adjacent to the Melvin Price Locks and Dam will be documented in a separate Limited Reevaluation Report, and potential environmental impacts will be described in a separate Environmental Assessment, that likewise are to be completed in 2011.



Figure A-A-1. Location of Wood River Levee System in Southwest Illinois

Description of Wood River Drainage and Levee District

The Wood River levee system (Figure A-A-2) is an urban levee design that protects approximately 12,700 acres, 200,000 inhabitants and over \$1 billion in property assets. The Wood River Drainage and Levee District operates and maintains 21 miles of riverfront and flank levees, 170 relief wells, 26 closure structures, and 41 gravity drains for flood protection. It also operates and maintains 7 pump stations with ponding areas for removal of interior drainage to the Mississippi River.

The drainage and levee district consists of three separate protected areas – upper, lower, and East-West Forks.

The Upper Wood River Drainage and Levee District originates near the intersection of Langdon and Front Streets (US highway 67) in Alton, Illinois, at Mississippi River mile 203. From this point the riverfront levee extends downstream past the Melvin Price Locks and Dam to the mouth of Wood River Creek at river mile 199.4 for a distance of about 5.2 miles. At this point the levee turns and proceeds upstream as a flank levee along the right descending bank of the Wood River Creek for 1.6 miles to the project terminus. About 1,641 acres of Mississippi River floodplain are protected by this portion of the levee system.

The Lower Wood River Drainage and Levee District originates at high ground on the left descending bank of the West Fork of Wood River Creek, 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 Creek. The levee then continues downstream along the left descending bank of Wood River Creek for 2.3 miles to the mouth of Wood River Creek 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 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. About 10,687 acres of Mississippi River floodplain are protected by this portion of the levee system.

The flank levee of the East-West Forks portion of the Wood River Drainage and Levee District is 2.68 miles long and occurs on the north side of the East and West Forks of the Wood River. About 428 acres of Mississippi River floodplain are protected by this portion of the levee system.

1.1 Purpose of and Need for Action

The purpose of this study is to evaluate design deficiency correction alternatives and choose a tentatively selected plan that will allow the Wood River Levee System to function as initially intended by the designer in a safe, viable and reliable manner.

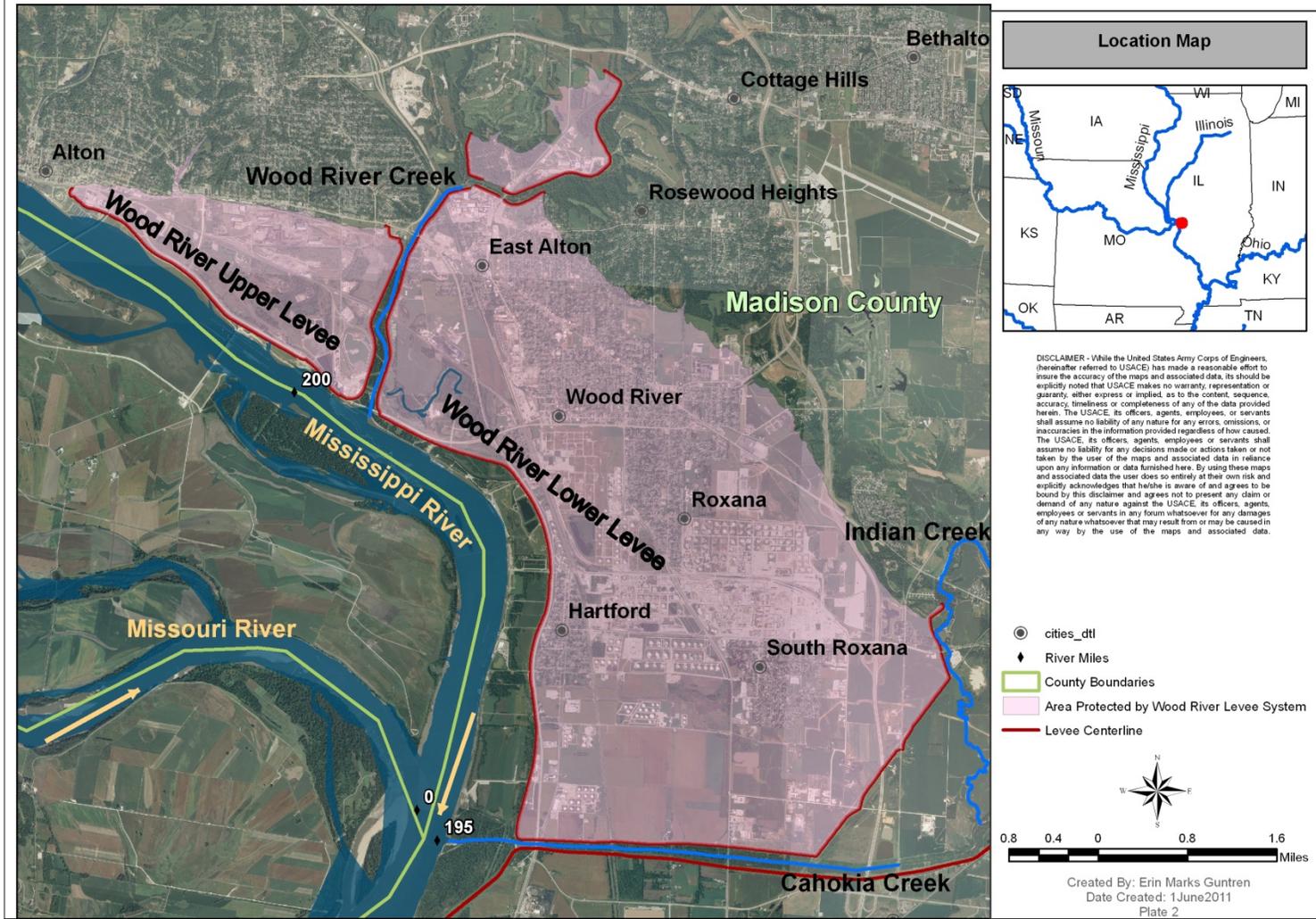


Figure A-A-2. Map of Project Area - Wood River Levee System

1.2 Authority for the Proposed Action

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.”

1.3 Prior Studies, Reports, and Related Water Projects

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-Engineering Design. The purpose of this project is to solve 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 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, 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, 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.

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 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.

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.

1.4 Public Concerns

Although the Wood River levee system has net levee grades higher than a 500-year flood, the Corps of Engineers cannot certify that the levee system will protect against a 100-year flood

without correcting the significant underseepage problems. The Federal Emergency Management Agency (FEMA) requires a professional engineer's certification that the levees will protect against a 100-year flood, otherwise, after a period of time for public input and map preparation, FEMA will revise the Flood Insurance Rate Maps and change the designation of the areas behind the levees from protected areas to flood hazard areas. The lack of certification is negatively impacting property values in the Wood River levee district area, and flood insurance rates will increase dramatically if the area becomes designated a flood hazard area. There is tremendous interest in the communities and region to complete the work that will allow certification by a professional engineer before FEMA changes the floodplain designations. The top priority of local interests is to achieve the 100-year certification. In addition, there is a strong desire to have the levees brought back to their original level of protection which is greater than 500-year.

1.5 Data Gaps and Uncertainties

Additional data on hazardous and toxic waste contamination in the soil and groundwater is needed for the final design of slurry trench cutoff walls and relief wells in areas of potential contamination. A Phase 2 Environmental Site Assessment to obtain baseline soil and groundwater information will be completed prior to construction in the potentially contaminated areas.

2.0 ALTERNATIVES

Those portions of the Wood River levee system with underseepage problems were divided into 18 reaches or decision segments based upon watershed characteristics. The beginning and end of each levee reach is described by levee stations. Alternative plans were considered for each levee reach by identifying three potential measures which may be used to control seepage under a levee. The potential measures include relief wells, seepage berms, and slurry trench cutoff walls.

Relief wells would be constructed on the protected side of the levee to relieve excessive hydrostatic pressures beneath a levee during high water conditions. Seepage berms are structures constructed of low permeability earthen material on the protected side of the levee. They act to hold seepage water, thereby counteracting the upward seepage forces resulting from high water conditions. Cutoff walls are a low permeability physical barrier advanced to the bedrock or an appropriate confining layer on the riverside of the levee, and are designed to impede seepage flows beneath a levee during high water conditions. Additional project features would involve relief well collector systems, ditches, pump stations, and borrow areas.

Relief well, berm, and cutoff wall alternatives were developed for each reach where feasible, and lifecycle costs were calculated. A No Action alternative was also considered for each levee reach. Table A-A-1 displays the 15 levee reaches and the feasible alternatives that were identified and considered in detail at each reach. These alternatives are displayed on Plates B01-B13 of Appendix B (Plan Formulation, pp. 9-22).

For each levee reach with more than one feasible alternative, alternative plans were evaluated and compared. A preliminary screening was conducted of the alternative plans for each reach in

consideration of four key planning criteria: completeness, effectiveness, efficiency and acceptability. Completeness is defined as the extent to which the alternative plan provides and

Table A-A-1. Potential Alternative Underseepage Control Measures and Tentatively Selected Measure by Levee Reach.

Design Segment	Design Segment Stationing	Possible Underseepage Control Measures					Planning Considerations	Tentatively Selected Plan by Design Segment
		No Action	Berm	Relief Well	Pump Station	Cutoff Wall		
1	14+95 - 25+00		x				Private property (commercial/industrial) in area of berm plan.	CUTOFF WALL
2	25+00 - 38+90		x				Private property (commercial/industrial) in area of berm plan.	CUTOFF WALL
3	123+75-127+05		x	x				RELIEF WELLS
4	133+65-151+50		x	x			Tree mitigation, pond. Utility Relocation	RELIEF WELLS
5	151+50- 185+50		x				Wetlands mitigation. Utility Relocation	CUTOFF WALL
6	298+65- 308+55			x			Highway, tree mitigation	RELIEF WELLS
7	430+65- 455+50		x	x	x		Private property (farmland) occupying area that may be needed for pump station. Private property (home) in area of berm plan.	RELIEF WELLS
8	455+50- 480+15		x	x	x			RELIEF WELLS
9	486+75- 493+35		x	x				RELIEF WELLS
10	551+00- 556+05		x	x	x		Pond in area of design solutions.	RELIEF WELLS
11	562+65- 589 +05		x	x	x		Private property (new home) in area of design solution.	RELIEF WELLS
12	592+35- 605+55		x	x	x			RELIEF WELLS
13	608+85- 613+70		x	x	x		Flowage easement may be needed.	SEEPAGE BERM
14	613+70- 623+80		x				Flowage easement may be needed.	SEEPAGE BERM
15	627+00- 630+30		x	x	x		Highway, railroad, flowage easement.	SEEPAGE BERM

accounts for all necessary investments or other actions to ensure the realization of the planning objectives. Effectiveness is the extent to which the alternative plans contribute to achieve the planning objectives. Efficiency is the extent to which an alternative plan is the most cost effective means of achieving the objectives. Acceptability is the extent to which the alternative plans are acceptable in terms of applicable laws, regulations and public policies.

2.1 Alternative 1 - No Action (Future without Project)

The “no action” alternative assumes that the proposed project would not be realized. Under this scenario, the levee district would continue to perform its operation and maintenance responsibilities, but no new federal action would be taken. Components would continue to age, become out of date, and to function ineffectively. In addition, the existing system would not be in compliance with current 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 appurtenant features to their original degree of protection, and may compromise the effectiveness of the structures. Future possibilities increase that a significant failure could occur under the no action alternative.

2.2 Alternative 2 – Tentatively Selected Plan

The tentatively selected plan for Wood River levee underseepage controls for a flood at 54 ft on the St. Louis gage (design flood at 52 feet on the St. Louis gage plus 2 feet of freeboard) consists of the lowest cost alternative for most decision segments. The main components of the tentatively selected plan are summarized for the Upper and Lower Reach of the Wood River levee in Table A-A-2. They are also described after the table by levee segment. The beginning and end of each decision segment are described by levee stations. (The length of a decision segment can be determined by subtracting levee stations, for example the decision segment from 45+60 to 48+90 is 330 ft long [4,890 ft minus 4,560 ft]).

An overview of the tentatively selected plan is displayed in Figure A-A-3. Drawings showing details of the tentatively selected plan on a photographic base are provided in Plates 04 – 16 of the document titled “Plates to Main Report (pp. 4-16).

Table A-A-2. Summary of Main Features of Tentatively Selected Plan

	Relief Wells (number)	Seepage Berm (linear ft)	Cutoff Wall to Bedrock (linear ft)	Cutoff Wall Shallow (linear ft)	Landside Clay Fill (linear ft)	Flowage Easement (acre)	Pump Stations (number)
Upper Reach	0	0	0	2,875	0	0	0
Lower Reach	94	815	2,910	1,060	1,010	9.88	3
Total	94	815	2,910	3,935	1,010	9.88	3

Wood River Levee System Limited Reevaluation Report for Design Deficiency Correction Study Madison County, IL Tentatively Selected Plan Features

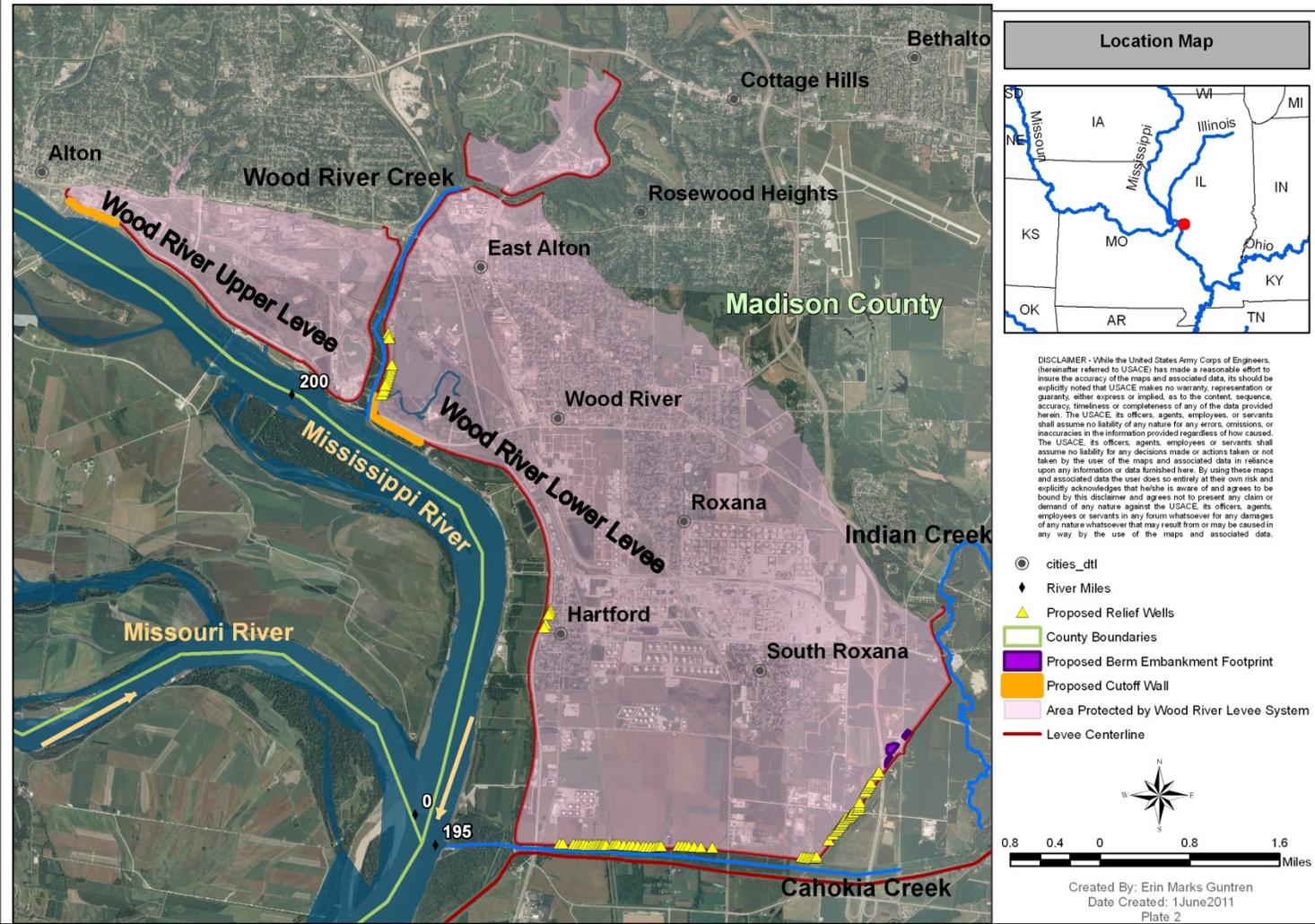


Figure A-A-3. Overview of Tentatively Selected Plan - Wood River Levee System

The following is a detailed description of the plan for each decision segment.

Upper Reach

14+95 to 25+00 DECISION SEGMENT

- 1,305 lf of slurry trench cutoff wall to shallow clay layer at riverside toe of levee to approximately el. 400.00
- Landside Features: Developed commercial/industrial property, Downtown Alton, IL
- No existing relief wells

25+00 to 38+90 DECISION SEGMENT

- 1,570 lf of slurry trench cutoff wall to shallow clay layer at riverside toe of levee to approximately el. 400.00
- Landside Features: Developed commercial/industrial property, Downtown Alton, IL
- No existing relief wells

Lower Reach

123+75 to 127+05 DECISION SEGMENT

- 3 relief wells at 110 ft spacing. Relief well flow goes to existing Wood River pump station

133+65 to 151+50 DECISION SEGMENT

- 14 relief wells at 125 ft spacing. Relief well flow goes to existing Wood River pump station
- Landside Features: Power Transmission Tower Raising

151+50 to 185+50 DECISION SEGMENT

- 3,970 lf of slurry trench cutoff wall including 1,060 lf of slurry trench cutoff wall to shallow clay layer at riverside toe of levee to approximately 100 ft depth and 2,910 lf of slurry trench cutoff wall to bedrock approximately 140 ft depth
- Landside Features: Wetland area

298+65 to 308+55 DECISION SEGMENT

- 6 relief wells (4 at 85 ft and 2 at 165 ft spacing) Relief well flow goes to existing Hawthorne pump station
- No berms due to major interstate adjacent to levee
- Landside Features: Major interstate, large ditch with trees
- No existing relief wells

430+65 to 455+50 DECISION SEGMENT

- 17 relief wells (5 at 83 ft, 6 at 110 ft, and 6 at 165 ft spacing) Relief well flow goes to new 25 cfs pump station
- Landside Features: New 25 cfs pump station
- No existing relief wells

455+50 to 480+15 DECISION SEGMENT

- 15 relief wells (3 at 110 ft, 9 at 165 ft, 1 at 330 ft, and 1 at 660 ft spacing) Relief well flow goes to new 25 cfs pump station
- Landside Features: New 25 cfs pump station
- No existing relief wells

486+75 to 493+35 DECISION SEGMENT

- 3 relief wells (3 at 330 ft spacing) Relief well flow goes to existing Grassy Lake pump station
- No existing relief wells

551+00 to 556+05 DECISION SEGMENT

- 8 relief wells (1 at 92 ft, 3 at 100 ft , and 9 at 110 ft spacing)
- Well flows to new 20 cfs pump station at station 530 + 50
- No existing relief wells

562+65 to 589 +05 DECISION SEGMENT

- 20 relief wells at 221 ft to 777 ft spacing.
- Well flows to new 20 cfs pump station at station 530 + 50
- No existing relief wells

592+35 to 605+55 DECISION SEGMENT

- 8 relief wells (3 at 120 ft, 2 at 153 ft, and 3 at 164 ft spacing)
- Well flows to new 20 cfs pump station at station 530 + 50
- No existing relief wells

608+85 to 613+70 DECISION SEGMENT

- 485 lf of seepage berm 5 ft thick at levee toe, 100 ft wide, 1.3 acres
- No existing relief wells

613+70 to 623+80 DECISION SEGMENT

- Fill in landside depression
- 1,010 lf of clay
- 9.88 acres flowage easement area
- No existing relief wells

627+00 to 630+30 DECISION SEGMENT

- 330 ft of seepage berm 5 ft thick at levee toe, 100 ft wide, 0.9 acres
- No existing relief wells

Description of All Features in the Recommended Plan

The tentatively selected plan to correct deficiencies in the design of underseepage and through-seepage controls includes (the numbers that follow may change during the review process) 94 new relief wells; filling 83 existing wood stave relief wells with grout; ditching; a 25 cfs pump station to get relief well flows over the levee and discharges into the existing gateway structure

at sta. 477+30; a 25 cfs pump station to get relief well flows over the levee and discharges into the existing gatewell structure at sta. 463+70; a 20 cfs pump station that pumps the flow from relief wells over the levee and discharges into the existing gatewell structure at sta. 530+50; 815 linear feet of seepage berms; 1,010 linear feet of landside clay fill; 2,910 linear feet of slurry trench cutoff wall at the riverside levee toe and to bedrock(140 ft deep); 1,060 linear feet of slurry trench cutoff wall(100 ft deep) at the riverside levee toe; 2,875 linear feet of slurry trench cutoff wall(25 ft deep) at the riverside levee toe; environmental and archeological mitigation work; utility relocations (not yet defined); 9.88 acres flowage easement; and easements for berms, relief wells in locations where there are no existing wells, slurry trench cutoff wall staging areas and equipment access areas along the levee, disposal areas for material excavated for the slurry trench cutoff walls, and wetland and bottomland hardwood mitigation areas.

Implementation Schedule. Work is assumed to begin in fiscal year 2014 and end in fiscal year 2020 (duration of nine fiscal years).

3.0 AFFECTED ENVIRONMENT

This section describes existing conditions in the 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 Socioeconomics and Land Cover

The Wood River levee protects major industrial and commercial businesses as well as residential and agricultural lands. The area has a population of approximately 23,106, of which some 9,930 are employed. The property value of the levee-protected area is estimated at approximately \$1.8 billion. The Wood River levee is also an integral part of a larger levee system in southwestern Illinois, including the Chain of Rocks and Alton to Gale levee systems, collectively providing protection to over 300,000 people both residing and employed behind these levees.

Municipalities that are protected by the Wood River levee include Alton, East Alton, Wood River, Hartford, Roxana, South Roxana, and Bethalto. The 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 flood-protected area.

The most recent land cover data available for the area protected by the Wood River levee system was obtained about 10 years ago in 2000 (Figure A-A-4). This data is based on interpretation of satellite imagery that has 30 by 30 meter (98.4 by 98.4 feet) ground spatial resolution (INHS, 2010).

Nearly two-thirds of the levee protected area is urbanized, and consists of a mix of industrial, commercial, and residential areas (Table A-A-3). Over 25 percent of the bottomland is agricultural, and is represented by various row crops. Less than 10 percent of the protected area is undeveloped, and consists of various wetlands, open water, and upland forest (Table A-A-3). Forested and herbaceous wetlands and open water are located along the inside of the main levee in some areas, especially in the upper portion of the drainage and levee district. In the adjacent

uplands residential areas border the bottomland. Cropland is the chief land cover further up in the upland watersheds.

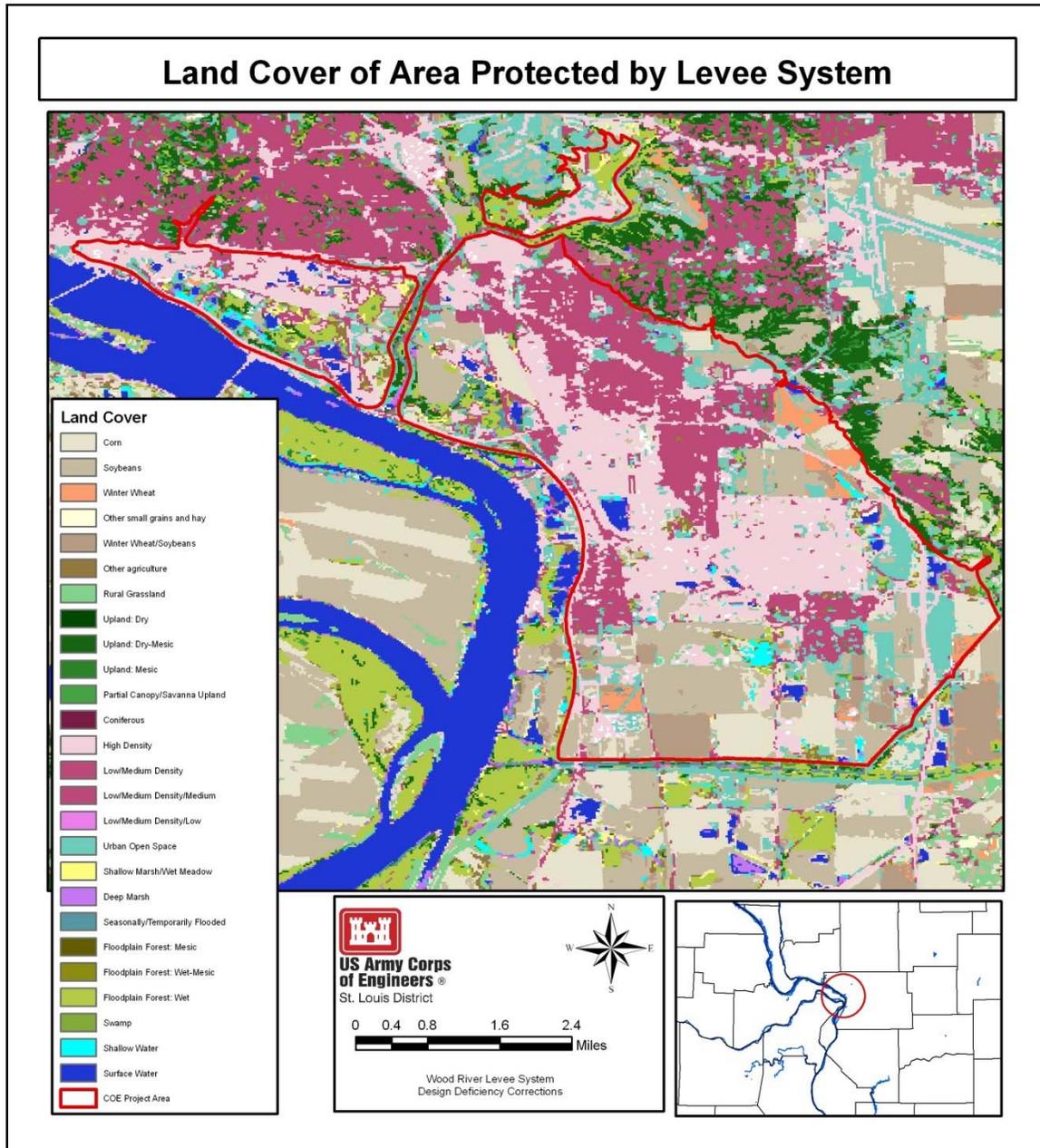


Figure A-A-4. Land Cover of Area Protected by Wood River Levee System.

The project area has long supported the oil refinery industry with all of the major companies having had a presence in the area. Currently Conoco-Phillips, American Refining, Clark-Hartford, Piasa Motors Fuels and Shell have facilities in the area. On a daily basis Conoco-Phillips alone produces about 6.3 million gallons of gasoline, 1.3 million gallons of diesel fuel, 1.6 million gallons of defense grade jet fuel and about 1.4 million gallons of asphalt. They have recently invested some \$160,000,000 to expand this capability. BOC Gases has a state of the art

air separation plant in Hartford and their liquid and gaseous products are used by a wide variety of industries including oil refining, chemicals, fabrication, welding, food, electronics, glass, iron and steel.

Table A-A-3. Land Cover of Area Protected by Wood River Levee System.

Major Category	Area (acres)	% Area	Minor Category	Area (acres)	% Area
Agricultural Land	3,637	28.5	Corn	1,052	8.2
			Soybeans	1,738	13.6
			Winter Wheat	244	1.9
			Other small grains and hay	15	0.1
			Winter Wheat/Soybeans	368	2.9
			Other Agriculture	142	1.1
			Rural Grassland	77	0.6
Forested Land	228	1.8	Upland: Dry-Mesic	109	0.9
			Upland: Mesic	8	0.1
			Partial Canopy/Savanna Uplands	111	0.9
Urban Land	7,862	61.6	High Density	3,892	30.5
			Low/Medium Density	2,675	20.9
			Urban Open Space	1,295	10.1
Wetland	723	5.7	Shallow Marsh/Wet Meadow	65	0.5
			Deep Marsh	43	0.3
			Seasonally/Temporarily Flooded	74	0.6
			Floodplain Forest:Wet-Mesic	16	0.1
			Floodplain Forest: Wet	404	3.2
			Shallow Water	121	0.9
Other	318	2.5	Surface Water	221	1.7
			Barren and Exposed Land	97	0.8
TOTAL	12,768	100.0		12,768	100.0

Source: Illinois Gap Analysis Program Land Cover Classification (INHS, 2010).

As with many other communities in the nation this region is undergoing economic shifts from such industries as steel manufacturing. Laclede Steel closed in 2000 to service related industries such as Schiber Truck Company that transports waste in 38 states and National Maintenance and Repair that repairs barges and marine and other motors. Olin Corporation has both their Brass and Winchester Ammunition Divisions located in the project area.

The following three tables taken from the 2000 U.S. Bureau of Census (U.S. Census Bureau, 2010) provide an overview of the area's economic character.

Table A-A-4. Occupations.

Occupation	Number	Percentage
Management, professional	2,140	22
Service occupation	1,953	20
Sales and office occupation	2,731	28
Farming, fishing and forestry	11	---
Construction, extraction, and maintenance	1,054	10
Production, transportation and material moving	2,041	20
Total	9,930	100

The project area average median household income (Table A-A-5) is below that of both Madison County and the State by 20% and 28% respectively.

Table A-A-5. Median Household Income.

Community	Median Household Income
Wood River	\$33,875
Hartford	\$33,828
Roxana	\$38,800
South Roxana	\$33,295
East Alton	\$28,404
Madison County	\$41,541
State of Illinois	\$46,590

Approximately 16% of the project area's population is over 65 years of age compared to the State average of 12% and Madison County average of 14%. The following (Table A-A-6) are retirement mean incomes as reported by the U.S. Bureau of Census. The average for the project area of \$15,126 is 7% and 10% below the mean for Madison County and the State respectively.

Table A-A-6. Retirement Mean Incomes.

Community	Mean Retirement Income
Wood River	\$17,051
Hartford	\$10,532
Roxana	\$14,916
South Roxana	\$21,574
East Alton	\$11,560
Madison County	\$16,117
State of Illinois	\$16,770

A risk based economic analysis was completed for the study area in accordance with Engineering Regulation (ER) 1105-2-100, Planning Guidance, using the National Economic Development Procedures Manual for Urban Flood Damage, prepared by the Water Resources Support Center,

Institute for Water Resources, as a reference. Table A-A-7 provides a graphic representation of inventory results showing a total structural value of residential, commercial and industrial buildings inventoried for both the Lower and Upper Wood River Levee areas. The total structural value of residential, commercial, and industrial buildings inventoried in the study area is approximately \$1.48 billion.

Table A-A-7. Structure Inventory By Area.

Area	Building Category	Number of Buildings	Average Value of Buildings (\$)
Lower Wood River	Residential	8,640	\$77,917
	Commercial	960	\$247,562
	Industrial	50	\$4,159,060
	Total	9,650	\$4,484,539
Upper Wood River	Residential	0	\$0
	Commercial	59	\$1,913,531
	Industrial	29	\$8,713,615
	Total	88	\$10,627,146
TOTAL	Residential	8,640	\$77,917
	Commercial	1,019	\$2,161,093
	Industrial	79	\$12,872,675
	Total	9,738	\$15,111,685

Within the upper drainage and levee district, Illinois Highway 143 is located on the landside levee slope. In addition to affording protection to the highway, the levee also protects the Alton Sewage Treatment Plant, portions of the City of Alton, Illinois Power Company, Laclede Steel Company, Owens-Illinois, Inc., and the Alton Packaging Company from flooding during high river stages.

3.2 Topography and Geology

The geological and topographic setting of the Wood River Drainage and Levee District can be conveniently treated by considering the bluff area bordering the east side of the Mississippi Valley as separate from the valley flood plain. The bluffs are as high as 650 feet above sea level. The floodplain is characterized by ridge and swale topography, with a maximum natural relief of approximately 35 feet (elevations ranging from 440 to 405).

The line of bluffs that more or less 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 feet or more thick. Adjacent to the bluffs, a series of sand and gravel deposits form

terraces which stand an average of 30 feet 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 flood plain for several miles upstream. The deepest part of the bedrock surface ranges in depth from 160 to 170 feet beneath the valley fill with an average thickness of 130 feet 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.

3.3 Air Quality

The project area is located to the east of St. Louis, within the Metropolitan St. Louis Interstate Air Quality Control Region (AQCR). This AQCR covers part of Missouri and Illinois. Areas within the AQCR are further defined according to the attainment status of criteria pollutants. The Metropolitan St. Louis AQCR includes the Illinois counties of Jersey, Madison, Monroe, and St. Clair, which are referred to as the Metro-East Nonattainment Area (EWGCG, 2010a). The Metropolitan St. Louis AQCR is in attainment for most of the criteria pollutants, including sulfur dioxide, carbon monoxide, nitrogen dioxide, and lead. The Metro-East Nonattainment Area is a moderate nonattainment area for ozone (8-hr). It is a maintenance area for particulate matter (PM-2.5); this area includes Jersey, Madison, and St. Clair Counties, and Baldwin Township within Randolph County (USACE, 2003; EWGCG, 2010a; USEPA, 2010). A small area in Granite City, Illinois, is classified as nonattainment for lead 2008 (USEPA, 2010).

Ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on nitrogen oxides (NO_x) 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).

3.4 Surface Water and Surface Water Quality

The project area is within the watershed referred to as the Mississippi South Central River Watershed by the Illinois Environmental Protection Agency (IEPA, 2008). Tributaries draining upland watersheds into the bottomland include Wood River Creek and its west and east branches. The bottomland portion of its channel was straightened long ago to create a more direct connection with the Mississippi River. Wood River Creek discharges into the river near the midpoint of the levee district's riverfront levee. The Cahokia Creek Diversion Channel bounds the south side of the Levee District (Figure A-A-2). 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.

According to the IEPA (2008, 2010a), impaired uses and causes for impairment (within parentheses) for these waterways include: Mississippi River - fish consumption (mercury, polychlorinated biphenyls), primary contact recreation (fecal coliform), and public water supplies (manganese); Cahokia Creek Diversion Channel – aquatic life (phosphorus total); and Wood River Creek and its two forks – aquatic life (manganese, total suspended solids, sedimentation/siltation), and primary contact recreation (fecal coliform).

3.5 Groundwater and Groundwater Quality

The bottomland portion of the study 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 Illinois Environmental Protection Agency in Madison County and three adjacent counties to the south. 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, 2010b). The Illinois EPA's Bureau of Land is implementing a groundwater contamination response strategy for East Alton (IEPA, 2010b). There is also dissolved and free phase hydrocarbon contamination under portions of the northern part of the Village of Hartford. The dissolved plume is under investigation by the IEPA.

3.6 Hazardous, Toxic, and Radioactive Wastes

Within the lower Wood River drainage and levee district, 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. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund) 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.

Phase I Environmental Site Assessments were conducted in conformance with the scope and limitations of ASTM Practice E 1527 for the Wood River Levee System design deficiency corrections project. These assessments have revealed recognized environmental conditions in connection with this Project in the Hartford area. Significant groundwater contamination was found in the project area. Interviews and available information indicate two main areas of potential concern:

1. IEPA Site – Former Premcor Refining. The refinery units are now owned and operated by ConocoPhillips. The property is owned by Premcor/Velaro Refining. They own property on the west and east side of the levee. The property on the west side of the levee is being investigated for contamination through the Illinois EPA Corrective Action Unit. There are several past spills

on the west property. The property on the east side of the levee is the refinery/marketing terminal. This also is allegedly being remediated under an Illinois EPA Corrective Action. There is apparently significant groundwater contamination under the refinery. This plume is connected/related to the plume under the Village of Hartford.

2. USEPA Site -The North Hartford Project deals with the significant dissolved and free phase hydrocarbon contamination under portions of the northern part of the Village of Hartford. The RPs for this contamination are Shell Oil Products US, Apex Oil Company, BP, Sinclair and Premcor. The LNAPL plume has allegedly been identified. The dissolved plume is still under investigation. The dissolved plume may extend under Illinois Rt. 3 and to the base of the COE levee.

In addition to the Phase I's, sampling was conducted in the upper portion of the Wood River levee system in September of 2009. This sampling was conducted in response to the discovery of seep holes in a wetland area on the land side of the levee adjacent to the Melvin Price L&D. Results of the samples indicated elevated levels of metals, but this may be a result of leaching in the soils. An old industrial area to the east included Laclede Steel, Alton Box Board, American Smelting & Refining, and Owens Illinois Glass Company. Elevated levels of metals have been associated with glass manufacturing and steel production, but it could not be determined if these industries were the source of these inorganic elements.

3.7 Hydrologic Conditions

The Wood River levee project is intended to provide protection against a 52 foot 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 feet, m.s.l. at the upper end (opposite river-mile 202.7); elevation 442.7 feet, m.s.l, at the mouth of Wood River creek; and elevation 441.4 feet, m.s.l, at the lower end (Cahokia Creek Diversion Channel) of the levee district. Levee grade freeboard is 2 feet 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 was 175 years. The project endured two other significant flood events; 43.3 feet on the St. Louis gage in 1973, and 41.9 feet on the St. Louis gage in 1995. For the flank levees, a net grade equal to the main stem design flood elevation plus 2-foot 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, and 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.

3.8 Noise

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.

3.9 Prime Farmland

According to the digital soil survey of Madison County (NRCS, 2010), prime farmland soils of various kinds occur within the project area, but most are concentrated in the upland watersheds. Roughly 70 percent of the bottomland in the project area consists of soils that are “not prime farmland”, and developed or built-up areas are included in this category. About 20 percent of bottomland consists of soils for which “all areas are prime farmland”. The remaining soils in the bottomland consist of soils that are either “prime farmland if drained”, “prime farmland if drained and protected from flooding”, or “prime farmland if protected from flooding or not frequently flooded during the growing season”. Bottomland soils for which “all areas are prime farmland” occur inside the levee-protected area, and are concentrated in the southwest and southeast corners of the project area, as well as along the flank levees on either side of Wood River Creek. These soils include Landes very fine sandy loam, Shaffton clay loam, Onarga sandy loam, Tice silty clay loam, Ridgeway silt loam, and Geff silt loam. Soils that are classified as “important” by the soil survey occur in the adjacent uplands and rarely in the bottomlands.

3.10 Biological Resources

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 Creek. The Mississippi River is an aquatic resource of major significance, and provides habitat to numerous species of invertebrates, fish, and birds. Some man-made ponds occur in the uplands and on the levee-protected floodplain. Because much of the levee district is 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. At a distance from the river, scattered

wetlands occur on the historic floodplain. Wetlands also occur in a narrow band along the Diversion Channel, where they are bordered by the waterway's flank levees. Most wetlands consist of either forested or herbaceous (nonwoody) 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.

A relatively large wetland complex is found along the landside of the levee immediately downriver of the confluence of the Mississippi River and Wood River Creek. This location supports about 75 acres of mainly open water wetlands and mudflats that are surrounded by wetland forest. Wetland hydrology consists of surface runoff from adjacent levee-protected land as well as groundwater inflow during times when the Mississippi River is high. The trunks of large cottonwood trees in this forested wetland exhibit staining from the seasonal ponding of stormwater, and these marks are about 10 feet above the ground.

Terrestrial habitats occur in the vicinity of Wood River Creek 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.

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. A variety of animal species use the urbanizing 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 mosquito fish and carp. 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*). Turkey may also be seen as well as red-winged blackbirds. Larger mammals include raccoon, opossum, and deer.

3.11 Threatened and Endangered 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 Wood River levee system (USFWS 2010). Six species listed for this county are applicable to the project area (Table A-A-8). There is no designated critical habitat within Madison County for any of these species.

The following discussion addresses the potential presence and life habits of these six federally listed species within the vicinity of the Wood River levee system.

Table A-A-8. List of Federally Endangered (E), Threatened (T), and Candidate (C) Species in the Vicinity of the Project Area.

Common Name (Scientific Name)	Status	Habitat
Least tern (<i>Sterna antillarum</i>)	E	Sparsely vegetated sand and gravel bars on large rivers (nesting)
Indiana bat (<i>Myotis sodalis</i>)	E	Caves, mines (hibernacula); small stream corridors with well developed riparian woods, upland forests (foraging)
Pallid sturgeon (<i>Scaphirhynchus albus</i>)	E	Large rivers
Decurrent false aster (<i>Boltonia decurrens</i>)	T	Disturbed alluvial soils
Eastern massasauga (<i>Sistrurus c. catenatus</i>)	C	Floodplain forests, marshlands, bogs, and old fields,
Eastern prairie fringed orchid (<i>Platanthera leucophaea</i>)	T	Mesic to wet prairies

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 most 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, causing them to abandon their nests.

Indiana bat. Indiana bats winter in caves or mines, but such features used by this bat are not known in the Metro-East area (Herkert, 1992). Females use trees in the summer months as nursery roosts, and forage for insects in the tree canopy. The presence of this species within the project area during the maternity season is assumed. Trees preferred for maternity roosting in Illinois have included dead individuals with shaggy or loose bark, and diameters at breast height (dbh) greater than 9 inches. Species have included slippery elm, American elm, northern red oak, white oak, post oak, shagbark hickory, bitternut hickory, cottonwood,

silver maple, green ash, white ash, and sycamore (Hofmann, 1994). Live shagbark hickory trees with loose bark or cavities are also used. Males have been known to roost in single oak, sassafras, and sugar maple (Hofmann, 1994). Some dead cottonwood, silver maple and sycamore greater than 10 inches dbh are present near the railroad embankment and the riverside depressions.

Pallid sturgeon. This fish is found in the Mississippi River downstream of its confluence with the Missouri River, which is about 4 miles downriver 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 sturgeons 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.

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 (USFWS 2001). 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). *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 (Keevin, 2010).

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 2000:60).

Eastern massasauga rattlesnake. This rattlesnake, a candidate for listing, is known 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.

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.

Bald eagles 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 dead fish. The Mississippi River is a focal point for wintering eagles, especially upriver of the project area north of Alton. Nesting has been observed on islands near the confluence with the Illinois River, further upriver from Alton, and also at other locations. 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 its nest are provided by the U.S. Fish and Wildlife Service in that agency's National Bald Eagle Management Guidelines publication (USFWS, 2010b). Those 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 feet 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 levee system and Mel Price Locks and Dam. It was last used in 2006.

3.12 Recreation

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 and drainage district and was built along an abandoned rail corridor.

3.13 Aesthetics

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.

3.14 Historic Properties

Congress has, historically, 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 of 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 creek, 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 no survey investigations for the majority of the project area with the exception of the eastern terminus of the south flank of the levee.

Within the proposed project construction footprint, six archaeological sites have been previously recorded: 11MS67 (further testing required), 11MS108 (ineligible), 11MS178 (further testing required), 11MS1584 (ineligible), 11MS1600 (further testing required), and 11MS2025 (eligible). As noted for each site, two have been determined to be ineligible for nomination to the National Register of Historic Places (NRHP); therefore, the project will have no adverse impact on these sites. Of the remaining four, additional research will be required for three sites in order to assess the potential effects of this undertaking upon the sites, while one site has been determined to be eligible.

3.15 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 2000 Census (U.S. Census Bureau, 2010) and Environmental Systems Research Institute (ESRI) estimates were utilized for this analysis (ESRI, 2009).

The project area's population is 39,781, according to 2000 Census Data. Low-income and minority communities are present within the area protected by the Wood River levee system. Table A-A-9 presents demographic statistics for the area protected by the levee system as well as Madison County. Figure A-A-5 displays the geographic location of census block groups with varying percentages of minorities. Low income populations are scattered throughout the levee protected area (Figure A-A-6). Demographic data from the 2000 Census indicates that Wood River, as well as some of the surrounding region, contain some low-income and minority population areas. Within the project area, the minority population is 10%. This is slightly below the level for Madison County as a whole. About 15% of the population in the project area is below the poverty level.

Table A-A-9. Demographic Statistics of Madison County and Wood River Levee Protected Area. Source: ESRI (2009)

	Madison County		Protected Area	
Total Population	273,178		39,781	
White	242,112	88.6%	35,821	90.0%
Minority	33,103	13.7%	3,951	9.9%
Black or African American	23,851	9.9%	2,994	7.5%
American Indian and Alaska Native	753	0.3%	97	0.2%
Asian	1,592	0.7%	269	0.7%
Native Hawaiian and Other Pacific Islander	55	0.0%	5	0.0%
Hispanic or Latino	5,038	2.1%	448	1.1%
Some other race	1,814	0.7%	138	0.3%
Total Households	106,755		15,482	
Below Poverty Level (individuals)	12.2%		15.0%	

The Census Bureau defines a “poverty area” as a Census tract with 20 percent or more of its residents below the poverty threshold and an “extreme poverty area” as one with 40 percent or more below the poverty level.

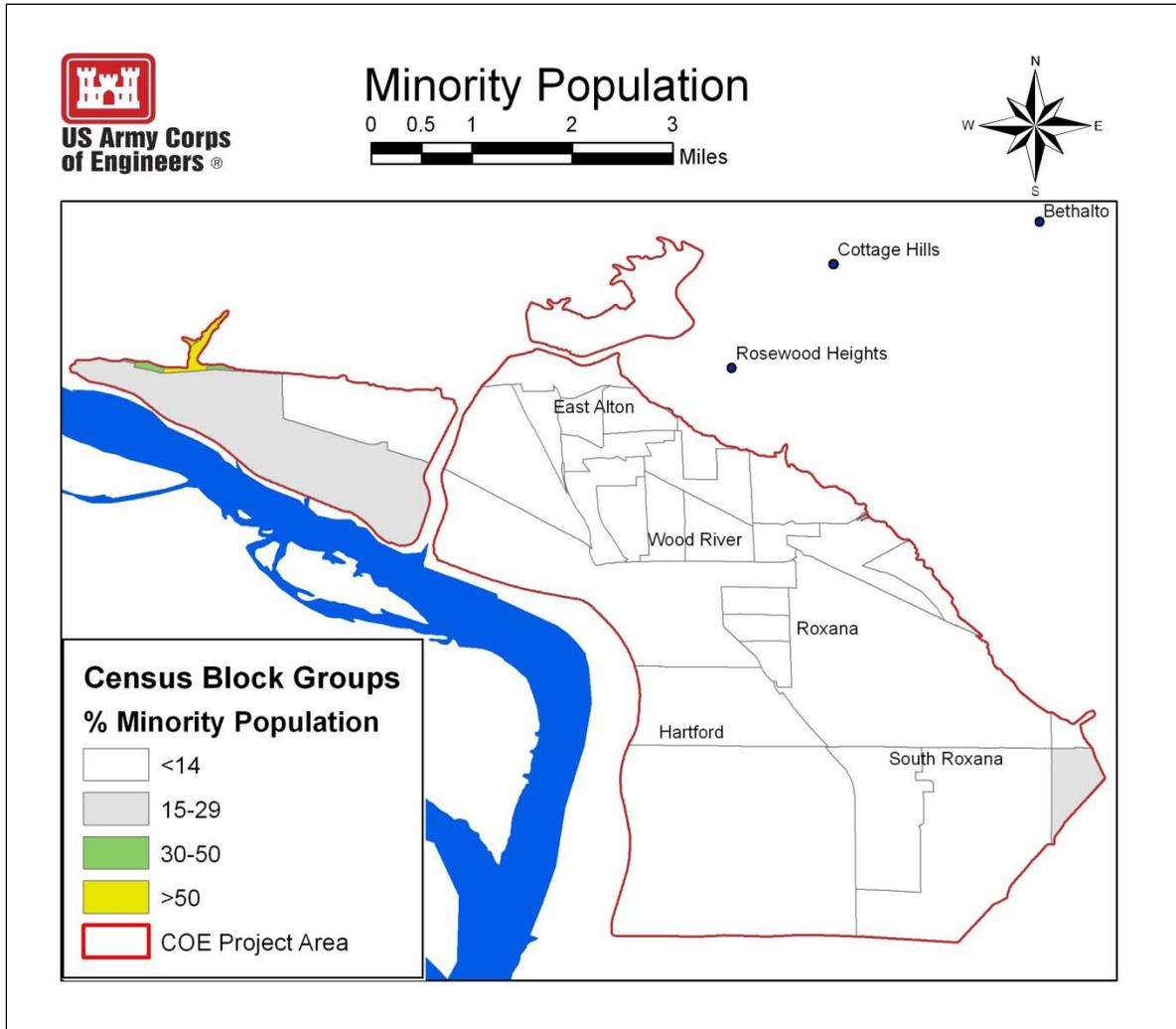


Figure A-A-5. Geographic Location of Minority Populations within Wood River Levee Protected Area.

Source: ESRI (2009)

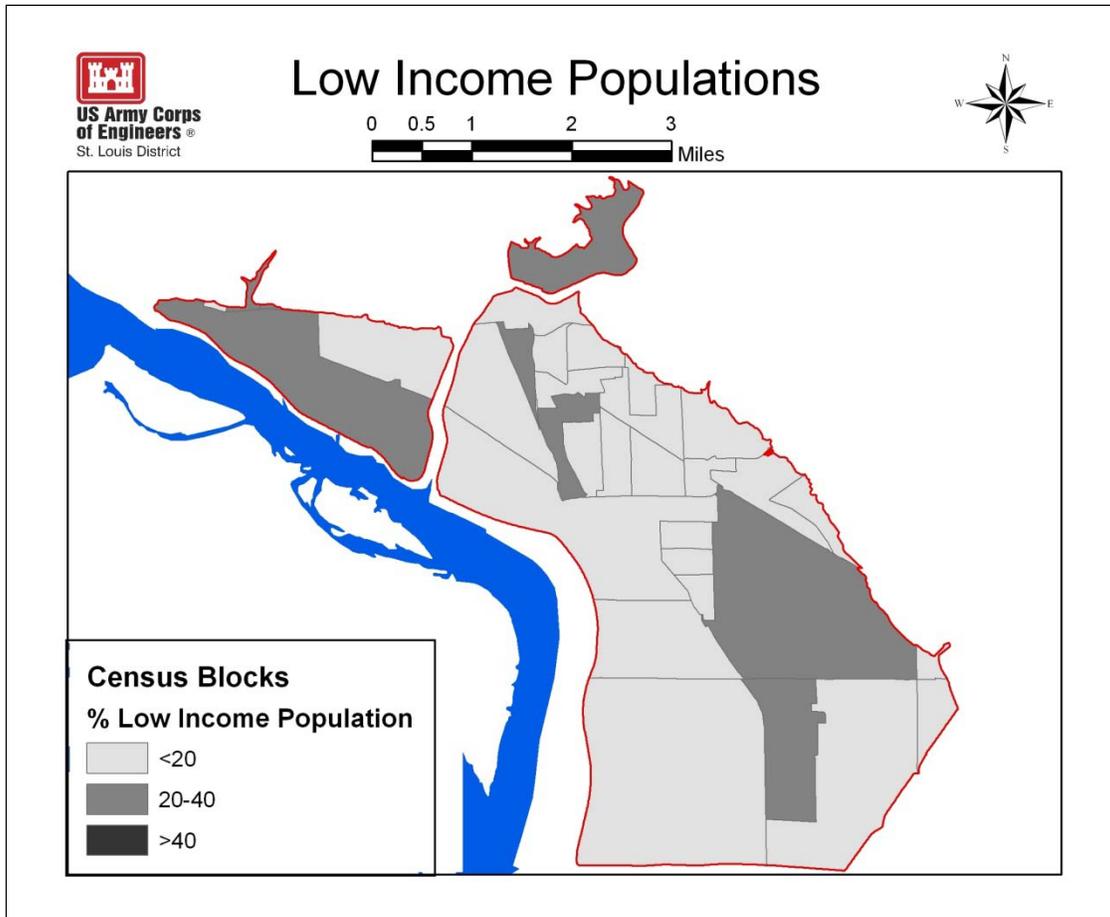


Figure A-A-6. Geographic Location of Low Income Populations within Wood River Levee Protected Area.

Source: ESRI (2009)

4.0 ENVIRONMENTAL CONSEQUENCES

The discussion of impacts (environmental consequences) details those resources that could be impacted, directly or indirectly, by the no-action alternative, and the tentatively selected plan. 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)).

The discussion of cumulative impacts 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).

Because stockpile and disposal areas have yet to be identified, the following discussion of environmental consequences does not address these features.

4.1 Socioeconomics and Land Cover

No Action Plan

Development is expected to continue in the levee-protected portion of the project area, as only a few years ago a major Interstate Highway (I-255) opened within the Levee District. The connection that this new expanded highway makes to the regional interstate system increases the likelihood of future development in the project area. The surrounding region has become a distribution center and this new interstate spur, which will soon be further expanded, makes the project area attractive for development. Investments by Conoco-Philips and the issuance of another permit for refinery operations by the State in the last 5 years would indicate that this base would continue to expand also. This increases the importance of the flood protection system to perform as intended in the future.

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 no action is taken, underseepage problems could cause interior flooding that can impact industries, infrastructure and interrupt the transportation system. Future odds increase that a significant failure could occur under the no action alternative. Public safety will continue to be jeopardized.

For example, within the Upper and Lower Wood River levee protected areas, total expected structure damages at the 500 year flood event exceed \$200 million while damages at the 1,000 year flood event exceed \$2.25 billion. The number of residential, commercial, and industrial structures likely to be damaged are displayed in Table A-A-7. Impacts to the petrochemical industry residing within Lower Wood River are a significant National Security interest. These companies produce 1.6 million gallons of defense grade jet fuel each year. If their operations were to be shut down, costs would be large and widespread.

The loss of the Wood River Levee system would not only have devastating economic impacts in the traditional measurement of losses but would have the added implication of creating an environmental contamination scenario not experienced on any inland waterway system to date. When the U.S. EPA was contacted for information on potential effects, they likened such an occurrence to that experienced as a result of the Exxon Valdez. Not only would the land protected by the levee experience significant contamination from oil, oil byproducts and chemicals used in the refining process, but also the Mississippi River system itself would be impacted. At a conservative estimate of \$125,000 per acre of clean up costs, a loss of this levee would result in environmental damages exceeding \$2,000,000,000 (two billion dollars), not including the relocation costs of residents and future loss of agriculturally productive land.

Tentatively Selected Plan

With regard to land cover, the proposed cutoff walls and relief wells would be largely confined to the existing levee right of way, which consists of maintained grassy turf. However, the proposed seepage berms along the South Flank levee in design reaches 16, 17, and 18 (608+85 – 630+30) would be located outside the existing levee right of way, and would replace about 6 acres of cropland and natural habitats with new grassy turf. Table A-A-10 displays the expected changes in land cover by design reach and proposed feature, and compares total losses by cover type with estimates of existing land cover within the levee-protected area.

As shown in Table A-A-10, there would be very minor losses to cropland, emergent wetlands, forested wetlands, and bottomland hardwood forests. With regard to agricultural lands, the tentatively selected plan would impact less than one acre of cropland, which is less than one-hundredth of one percent of the estimated 3,417 acres of various small-grain crops identified by satellite imagery in 2000 within the flood-protected levee district (see Table A-A-3). Similarly, very small percentages of emergent wetlands (2.6 acres versus 303 acres), forested wetlands (0.5 acre versus 420 acres), and bottomland hardwood forest (2.1 acres versus 228 acres) would be affected by the project compared to the amount of these natural resources that would be remaining (see Table A-A-3).

With regard to socioeconomic resources, the estimated loss of 0.2 acre of existing cropland associated with the proposed seepage berm at design reach 18 (627+00 – 630+30) would not likely represent a significant economic impact to the landowner.

According to the U. S. Department of Housing and Urban Development, “Economic development is an important part of strengthening communities by creating and retaining jobs” (USDHUD, 2010). The creation of jobs that could reasonably be expected to occur or continue once the 100-year flood event level of protection is restored within the Metro East Levee System, would invariably lead to or complement other types of development such as single-family and multi-family housing, commercial and service industry, retail, and 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 an expansion of infrastructure. Examples of infrastructure include roads and bridges; recreation and open spaces such as parks, sports facilities and community gardens; public or institutional facilities such as hospitals, airports, and cultural attractions; utility and sewer capacity; and health and human, and environmental services.

The Wood River Levee System falls within Madison County, Illinois, which is located in the southwestern part of the state. The East-West Gateway Council of Governments states that “Southwest Illinois has more than \$9 billion dollars in its economic development pipeline”; and that “in recent years the area has seen significant new investments in commercial, office and institutional projects across the region while major industrial facilities are reinvesting in and expanding their operations in the Metro East”. In addition, “public and private investment in the region’s infrastructure has created a transportation network that makes Madison, St. Clair, and

Monroe counties prime locations for development and their development potential will only be enhanced upon completion of the new Mississippi River Bridge” (EWGCG, 2010b). It is clear that “growth and development can improve quality of life by adding services, creating opportunity, and enhancing access to amenities. But it can also drive disinvestment, reduce competitiveness, and degrade the environment” (Smart Growth Network, 2010). “Smart growth”, techniques such as master planning, zoning, and land use planning enhance the safety and livability of communities through the efficient application of programs that balance growth and conservation.

Table A-A-10. Direct Impacts (in acres) to Land Cover for the Proposed Action ^{1,2}

Design Reach		Proposed Feature	Grass	Cropland	Emergent Wetland	Forested Wetland	Bottomland Hardwoods
1	14+95 - 25+00	Cutoff wall	1.3				
2	25+00 - 38+90	Cutoff wall	1.7				
3	123+75 - 127+05	Relief wells	(3)				
4	133+65 - 151+50	Relief wells	(11)				(3)
5	151+50 - 185+50	Cutoff wall	4.0			0.2	
6	298+65 - 308+55	Relief wells	(6)				
7	430+65 - 455+50	Relief wells	(17)				
8	455+50 - 480+15	Relief wells	(15)				
9	486+75 - 499+95	Relief wells	(3)				
10	551+00 - 556+05	Relief wells	(8)				
11	562+65 - 589+05	Relief wells	(20)				
12	592+35 - 605+55	Relief wells	(4)				(4)
13	608+85 - 613+70	Seepage berm	2.1				0.6
14	613+70 - 623+80	Seepage berm	2.7		2.6	0.3	0.6
15	627+00 - 630+30	Seepage berm	0.3	0.2			0.9
Total - Cutoff walls, Berms		Acres	12.1	0.2	2.6	0.5	2.1
		% of Existing Land Cover		< .01%	0.86%	0.12%	0.92%
Total - Wells			(87)				(7)

1 Grass is represented by mowed grass, old fields, and various developed areas.

2 Numbers within parentheses represent number of proposed relief wells, not acres.

USACE does not control what may be developed within the 100-year floodplain. 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.

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. From a risk standpoint, FEMA-certified protection from a 100-year flood event 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. Therefore, there are many non-structural measures that can be implemented and steps that can 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.

Non-structural measures can be used to help reduce damage from flood events. 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 repair of 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 repair 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.

The "smart growth" management, planning initiatives, and code enforcement instruments already adopted or in draft form pending adoption, by Madison County, IL, include but are not limited to the following:

Comprehensive Plans and Comprehensive Land Use Plans, generally plan for growth and development up to twenty years in the future. Madison County's 2020 Land Use Plan considers

the preservation or construction of greenways; public preserves; designated urban areas; parks; wetlands; planned high and low density residential, commercial, retail, industrial areas; and preservation of agricultural areas and open spaces (MCG, 2010).

Short and Long Range Transportation and Growth Management Plans of Madison County study IL-255 interchanges and the widening of lanes, improved access management, improved street signal operations, proposed construction of new roads, and widening of roads (MCG, 2010).

Enterprise Zones, which are areas targeted for economic revitalization encourage economic growth and investment in distressed areas by offering tax advantages and incentives to businesses locating within the zone boundaries. Madison County plans for designated Enterprise Zones along the Mississippi River in the cities of Alton, East Alton, Wood River, Hartford and South Roxana, Granite City, Madison and Venice (MCG, 2010).

Ordinances enforce safety and enhance the livability of communities. Madison County enforces a Fill Ordinance, Liquor Ordinance, Noise Ordinance, Zoning Ordinance, Private Sewage System Ordinance, Recycling Ordinance, Storm Water and Erosion Control Ordinance, Subdivision Control Ordinance, Cell Tower Ordinance (MCG, 2010).

Detailed growth management and development plans for Madison County can be found at MCG (2010).

4.2 Topography and Geology

No Action Plan

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.

Tentatively Selected Plan

Existing ground elevations would be maintained or restored after construction at all design reaches where relief wells and cutoff walls are proposed. Installation of relief wells would not cause any changes to topography.

At the location of the shallow cutoff wall proposed at design reaches 1 and 2 (14+95 – 25+00, 25+00 – 38+90), a trench extending about 25 feet deep (to elevation 400 feet NGVD) and three feet wide would be excavated along the riverside of the levee.

At the location of the deep cutoff wall at design reach 5 (151+50 – 185+50), a trench varying in depth from 110 to 140 feet deep and three feet wide would be excavated along the riverside of the levee. The excavated earthen material would be side cast, mixed on-site with bentonite, and

the mixture would be placed back in the trench. After construction of the wall existing ground elevations would be restored. Excess excavated earthen material would be taken to a yet to be identified disposal area.

Along the South Flank levee where seepage berms are proposed at design reaches 13, 14, and 15 (608+85 – 630+30), topography would be altered to a minor degree. At design reaches 13 and 15, ground elevations would be permanently raised. Berms would be about 5 feet thick and cover a total of about 4 acres. They would extend out away from the levee for a distance of about 200 feet. At design reach 14, an existing low area or depression would be filled up to the surrounding ground elevations.

4.3 Air Quality

No Action Plan

Because the St. Louis metropolitan area is a nonattainment area for ozone and particulate matter (PM-2.5), 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).

Tentatively Selected Plan

A Clean Air Act General Conformity Determination indicates that the project would have minimal air quality impacts and would be below the de minimis levels set for a moderate ozone nonattainment area and for a PM-2.5 1997 nonattainment area. The determination also shows that the project is not regionally significant as the project's emissions would not exceed 10% of the total emissions in the nonattainment or maintenance area. Minor short term effects on air quality are expected during construction from exhaust and dust. Care would be taken to minimize all impacts on air quality, such as wetting down excavated materials/construction areas and wearing appropriate respiratory protection as needed. These impacts would cease once construction was completed.

A contingency plan would be developed to handle any unexpected encounter with contaminated materials and their potential effects on air quality. If ground disturbance during construction activities were to uncover unknown significant soil and/or groundwater contamination, certain contaminants can be volatilized, potentially causing impacts to air quality. If this were to occur, depending on site conditions, on-site construction workers may need to wear respiratory protection. Activities associated with stockpiling or handling contaminated soils could also cause impacts to air quality. Care would be taken to minimize soil contamination impacts on air quality, such as covering stockpiled materials or wetting down excavated materials.

4.4 Surface Water and Surface Water Quality

No Action Plan

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).

At the same time, 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.

Tentatively Selected Plan

The proposed action is 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 cutoff wall excavations or 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).

With regard to permitting requirements, the St. Louis District would need to receive from the Illinois Environmental Protection Agency (IEPA) a water quality certification issued under Section 401 of the Clean Water Act for the proposed action. 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.

4.5 Groundwater and Groundwater Quality

No Action Plan

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 of declining quality.

Tentatively Selected Plan

At the design reaches where relief wells and seepage berms are proposed, existing patterns of groundwater movement beneath the levee would remain essentially unchanged. These features would not inhibit groundwater movement along gradients that are typically perpendicular to the Mississippi River channel or its tributaries.

However, along the Riverfront levee at design reaches 1 and 2 (14+95 – 38+90) and design reach 5 (151+50 – 185+50), the proposed cutoff walls are intended to act as a barrier to the direct movement of groundwater under the levee during periods of high water on the Mississippi River, when groundwater typically moves toward the protected interior. But because the ends of these cutoff walls would not tie underground into the Illinois bluff, during high river conditions groundwater would still reach the levee protected area underground, but indirectly by flowing around both ends of the wall at each location.

With regard to groundwater elevations, these cutoff walls would permanently lower the elevation of groundwater on the protected side by one to two feet in the vicinity of these features. Based on the results of modeling of groundwater elevation responses to these features using SEEP/W[®] 2007, a finite element software product for analyzing groundwater seepage, it is likely that groundwater surface elevations in the protected area would remain about two feet below the ground surface when the Mississippi River is at normal elevation.

The proposed action is not expected to cause any impacts to groundwater quality. A limited Phase II Environmental Site Assessment conducted in August 2011 at decision segment 298+65-308+55 in the vicinity of a known HTRW plume did not identify any underground petroleum related contaminants at the location of the six proposed relief wells. Because the well locations are outside the extent of the known plume, no impacts of HTRW on groundwater quality are expected.

4.6 Hazardous, Toxic, and Radioactive Wastes

No Action Plan

No Action

Remediation efforts are ongoing 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 (see Section 3.6 Hazardous, Toxic, and Radioactive Wastes).

Tentatively Selected Plan

Portions of the Wood River Levee District 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 IL EPA, a very limited potential exists to encounter HTRW in only 1 of 15 decision segments (segment 298+65-308+55), which is approximately 0.2 miles in length, and approximately 400 feet from a known HTRW plume. Current drill-hole, IL IEPA monitoring information and plume maps indicate that the tentatively selected plan lies entirely outside the plume footprint and the plan is not expected to be impacted by HTRW sources. In addition, the plume is migrating away from the proposed wells at decision segment 298+65-308+55.

Contamination in the plume area exists as both gaseous soil contamination and liquid petroleum products. A limited Phase II ESA conducted in August 2011 has provided for the continuation of the Phase I ESA assessment and identification of the potential presence of petroleum related contaminants. The Phase II ESA results indicate that the well locations at segment 298+65-308+55 are outside the extent of the plume, and therefore construction of these features will avoid underground this known contamination. Although costs are not expected to be incurred, a projected worst case disposal cost of contaminated material for this reach is \$34,500. The potential contaminants are non-CERCLA in nature, so this expense would be cost-shared with the nonfederal sponsor. The Corps will continue working with regulatory agencies and local stakeholders to monitor the plume status and mitigate any project impacts resulting from the presence of HTRW.

4.7 Hydrologic Conditions

No Action Plan

No significant climatological changes are expected to occur over the next 50 years. In addition, 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 or landside ponding area are expected.

Tentatively Selected Plan

A total of 94 new relief wells are proposed to be installed at 9 of the 15 levee design reaches along the Riverfront and South Flank levees, and a small new pump station is proposed at each of three design reaches along the South Flank levee (ranging from 20 to 25 cfs). Relief well flow from these new wells is not expected to require increased capacities at any existing pump stations. This is primarily the result of replacement of existing wells with seepage berms or cutoff walls. Individual flow from new wells is expected to be less than that considered in the original design of the existing wells because of new geotechnical data. Consequently, there is no need for any increase in ditching.

Due to the nature of the topography along the South Flank levee in the southern portion of the levee district, there is a need for several new pumping stations to address the flows from new relief wells. This area of the levee district currently has no existing relief wells. The proposed action includes the installation of 74 wells along the South Flank levee with an approximate total flow of 100 cfs. There is an existing pump station near IL Route 111 recently built to address interior ponding issues in this area, however it has a total capacity of 45cfs, and was not designed for excess capacity for future relief wells.

Although Hawthorne and Grassy Lake Pump station would carry an additional 6 cfs at the peak flood event, this is not significant to their capacities and the flow could be handled by a small increased duration of pumping in the case of a coincident interior storm, with a Mississippi River event.

4.8 Noise

No Action Plan

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.

Tentatively Selected Plan

Noise receptors consisting of residential areas or single residences are located near some of the areas of proposed work. Short-term noise impacts would be generated by the use of various types of construction machinery, and these impacts would be intermittent in nature. Overall, the proposed action is not expected to significantly create noise effects for the short or long-term.

4.9 Prime Farmland

No Action Plan

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).

Tentatively Selected Plan

Farmland impacts were assessed by geospatial analysis of the Madison County digital soil survey (USDA-NRCS, 2010), which classifies the county’s soils by capability for agricultural production. As shown in Table A-A-11, the cutoff walls, seepage berms, and relief wells of the proposed action would impact less than one acre 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 8 acres of such lands to nonagricultural use (Table A-A-11). The proposed 6-acre mitigation site (described in Appendix A-B of this SEA) does not include any areas considered to be prime farmland, but it would result in the conversion of 6 acres of cropland to nonagricultural use. 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.

Table A-A-11. Direct Impacts (in acres) to Prime Farmland Soils for the Proposed Cutoff Walls, Berms, and Wells ^{1,2}

Prime Farmland Status	Proposed Feature			Total (acres)
	Cutoff walls	Berms	Wells	
Not prime farmland	5.6	0.6	(68)	6.2
All areas are prime farmland		5.6	(23)	7.4
Prime farmland if drained		0.2	(3)	
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	0.3			
Prime farmland if protected from flooding or not frequently flooded during the growing season	1.3			

1 Numbers within parentheses represent number of proposed relief wells, not acres.

2 Data Source: NRCS (2010)

This assessment of 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 way to the maximum extent practicable. However, for cutoff walls, staging areas would be required off of existing levee right of way in the project vicinity. Use of these areas would be temporary. Specific locations for these areas remain to be determined. Existing cropland would be avoided to the extent practicable during the identification of potential sites.

To evaluate these potential impacts to agricultural land and initiate compliance with the federal Farmland Preservation Act and Illinois Farmland Preservation Act, the proposed action is being coordinated with the Natural Resources Conservation Service (NRCS) and Illinois Department of Agriculture (IDOA) by the St. Louis District using Form AD-1006, Farmland Conversion Impact Rating. According to a 300 point scale to assess the relative value of the affected farmland, alternatives scoring 175 or fewer points have a low rating for farmland protection, those from 176 to 225 points a moderate rating for protection, and those above 225 points should be kept in agricultural use. Correspondence documenting this coordination is included as an appendix to this SEA.

The National Environmental Policy Act (NEPA) process would also continue once stockpile and borrow areas are identified. A Supplemental Environmental Assessment would be prepared and circulated to fulfill this requirement for public disclosure and involvement.

4.10 Biological Resources

No Action Plan

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 wetlands 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).

Tentatively Selected Plan

The proposed action would result in direct losses of about 5.0 acres of various wetland and terrestrial habitats that are of low quality. No aquatic habitats would be directly affected. The cutoff wall proposed at design reach 5 (151+50 – 185+50) is likely to indirectly impact groundwater hydrology of a relatively large wetland area landside of the levee, and existing mud flats are expected to be gradually replaced by shallow marshes and wet meadows.

Compensatory mitigation would be required for 2.9 acres of wetland losses, as required under Section 404 of the Clean Water Act, and for 2.1 acres of nonforested bottomland forest losses, as required by the USACE Planning Guidance Notebook. A compensatory mitigation plan is included in this SEA as Appendix A-B. These direct and indirect impacts, along with the inclusion of this mitigation as part of the proposed action, would not have a significant impact on biological resources. As the project would require authorization under Section 404 of the Clean Water Act, a Section 404(b)(1) Guidelines Evaluation is included in this SEA as Appendix A-D.

Direct Impacts As shown in Table A-A-12, wildlife habitats affected by the proposed action include 2.6 acres of emergent wetlands, 0.3 acres of forested wetlands, and 2.1 acres of bottomland hardwood forest (nonwetland floodplain forest). The seepage berms that would affect these habitats, which are proposed on the landside of the south flank levee in design reach numbers 13, 14, and 15, are displayed on Plate 16 of the document titled "Plates to Main Report (p. 16).

According to a habitat assessment conducted for this project, the habitats affected by these seepage berms are currently of low quality. Table A-A-13 displays estimates of the quality of these affected habitats, in terms of habitat suitability indices generated by the Wildlife Habitat Appraisal Guide (WHAG). WHAG was developed by the Missouri Department of Conservation and the U.S. Department of Agriculture, Soil Conservation Service (now Natural Resources Conservation Service) (MDC and NRCS 1990). It was adapted from the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (USFWS 1976). WHAG is widely accepted by local agencies, and it has become the primary wetland/terrestrial habitat evaluation method used in the St. Louis District.

Table A-A-12. Direct Impacts (in acres) to Natural Habitats for the Proposed Action ¹

Design Reach		Proposed Feature	Emergent Wetland	Forested Wetland	Bottomland Hardwoods	Potential to Avoid
4	133+65 - 151+50	Relief wells			(3)	yes
5	151+50 - 185+50	Cutoff wall		0.2		yes
12	592+35 - 605+55	Relief wells			(4)	yes
13	608+85 - 613+70	Seepage berm			0.6	no
14	613+70 - 623+80	Seepage berm	2.6	0.3	0.6	no
15	627+00 - 630+30	Seepage berm			0.9	no
Total Impacts (acres) Requiring Mitigation			2.6	0.3	2.1	

¹ Numbers within parentheses represent number of proposed relief wells, not acres.

Table A-A-13. Habitat Suitability Indices for Various Wildlife Species That May Use Natural Habitats Affected by Proposed Action – Current and Future Without Project Conditions. ¹

Emergent Wetland (613+70 - 623+80)									
Target Year	Mallard	Canada Goose	Least Bittern	Lesser Yellow-legs	Muskrat	King Rail	Green-backed Heron	American Coot	Ave
0	0.00	0.00	0.47	0.56	0.06	0.53	0.40	0.00	0.25
50	0.00	0.00	0.47	0.56	0.06	0.53	0.40	0.00	0.25
Forested Wetland (613+70 - 623+80)									
Target Year	Mallard	Green-backed Heron	Wood duck	Beaver	Northern Parula	Prothonotary Warbler			Ave
0	0.09	0.10	0.13	0.09	0.56	0.29			0.21

50	0.09	0.08	0.13	0.07	0.60	0.29			0.21
Bottomland Hardwoods (608+85 - 630+30)									
Target Year	Deer	Turkey	Pileated Woodpecker	Fox Squirrel	Wood Thrush	Kentucky Warbler	Indigo Bunting		Ave
0	0.00	0.00	0.00	0.48	0.00	0.41	0.64		0.26
50	0.00	0.00	0.00	0.52	0.00	0.49	0.50		0.25

1 Target years 0 and 50 represent current condition and 50 years in future, respectively.

WHAG is a numerical model that evaluates the quality and quantity of particular habitats for various wildlife species. The qualitative component of the analysis is known as the habitat suitability index (HSI) and is rated on a 0 to 1.0 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. Each value corresponds to a suitability index for each species. Future values are determined using management plans, historical conditions, and best professional judgment. The habitat evaluation (Table A-A-13) indicated that existing conditions of low quality (target year 0) are expected to continue 50 years into the future without any project (target year 50).

Mitigation Following the requirements of the Clean Water Act, all appropriate and practicable steps have been 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, alternatives other than seepage berms were the lowest cost alternatives and the environmental impacts of seepage berms were avoided. In the few locations where berms were included in the recommended plan, factors other than cost savings were sufficient to justify not avoiding the minor environmental impacts. These alternatives did not cause significant adverse environmental impacts. Mitigation for unavoidable adverse impacts to wetlands and bottomland hardwoods is part of the recommended plan.

Table A-A-14. Habitat Suitability Indices for Various Wildlife Species at Proposed Mitigation Site. ¹

Emergent Wetland									
Target Year	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	American Coot	Ave
0	0.07	0.10	0.00	0.00	0.06	0.46	0.00	0.00	0.09
50	0.38	0.43	0.00	0.00	0.07	0.47	0.00	0.00	0.17
Forested Wetland									
Target Year	Mallard	Green-backed Heron	Wood duck	Beaver	Northern Parula	Prothonotary Warbler			Ave
0	0.10	0.08	0.04	0.09	0.25	0.08			0.11
50	0.15	0.07	0.11	0.05	0.60	0.17			0.19
Bottomland Hardwoods									
Target Year	Deer	Turkey	Pileated Woodpecker	Fox Squirrel	Wood Thrush	Kentucky Warbler	Indigo Bunting		Ave
0	0.58	0.51	0.28	0.53	0.29	0.38	0.46		0.43

50	0.64	0.68	0.67	0.84	0.59	0.71	0.36		0.64
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- 1 Target years 0 and 50 represent immediately post-vegetation plantings and 50 years in future, respectively.

Mitigation for unavoidable adverse impacts to wetlands and bottomland hardwoods is part of the tentatively selected plan. Avoidance of impacts to wetlands and bottomland hardwoods was considered during the development of the proposed action. For example, at design reach 5 (151+50 – 185+50), the seepage berm option considered there would directly impact about 70 acres of various wetland habitats. Instead the proposed cutoff wall would avoid these direct impacts. Avoidance or minimization of impacts is possible at design reaches 4, 5, and 12 (see Table A-A-12). Where relief wells are proposed within small areas of bottomland hardwoods, individual wells can be sited in the future during the plans and specifications stage to minimize any required tree clearing. Similarly, the construction easement for the cutoff wall proposed at design reach 5 (151+50 – 185+50) can be narrowed in width to avoid the loss of about 0.2 acre of forested wetland. Table A-A-12 reflects future efforts at design reaches 4, 5, and 12 to avoid and minimize habitat losses. At design reach 14, habitat losses are unavoidable because the proposed seepage berm (or fill) was the only feasible solution to solve the underseepage problem at this location. At design reaches 13 and 15, relief wells would avoid about 1.5 acres of impacts to low-quality bottomland hardwoods (Table A-A-12), but this option was not the least cost alternative at these locations. Table A-A-14 displays estimates of the quality of the habitats to be established at the proposed mitigation site, in terms of habitat suitability indices.

Therefore all appropriate and practicable steps have been taken to first avoid impacts to these resources, then to minimize the impacts, and as a last resort to mitigate the impacts. The proposed mitigation plan would create a total of 6 acres of mitigation habitats on existing cropland at Chouteau Island (see Appendix A-B). The proposed mitigation plan was developed using a habitat evaluation and cost effective/incremental cost analyses (see Appendix A-C).

Indirect Impacts The cutoff wall proposed at design reach 5 (151+50 – 185+50) is likely to indirectly impact groundwater hydrology of a relatively large aquatic area consisting of wetlands landside of the levee and adjacent to the confluence of the Mississippi River and Wood River Creek. During high river conditions, the proposed cutoff wall is expected to eliminate the movement of groundwater beneath the levee toward the land side, and aquatic habitats on the landside of the levee are expected to experience “drier” or less wet hydrological conditions. Existing mud flats are expected to be gradually replaced by shallow marshes and wet meadows.

The elimination of underseepage during high river conditions is not expected to result in a conversion of aquatic habitats to terrestrial (non-wetland) habitats. Based on the results of modeling of groundwater elevation responses to the cutoff wall alternative using SEEP/W[®] 2007, a finite element software product for analyzing groundwater seepage, it is likely that groundwater surface elevations in the landside area would remain about two feet below the ground surface when the Mississippi River is below flood levels. Under these conditions, capillary fringe action of the soil (alluvial silts and clays on top of the underlying sands) would be expected to draw groundwater upward into the root zone of the existing wetland plant communities. As such, the existing wetland area would likely meet the criterion of wetland hydrology by exhibiting inundation or saturation to the surface continuously for at least 5% of the growing season in most years (50% probability of recurrence) (USACE 2010a). The actual

changes in groundwater levels will be monitored after completion of construction using piezometer wells to be installed at various locations within the wetland area. No mitigation for these indirect impacts is being proposed at this time.

As a result of less wet conditions in the ponding area, shifts in the abundance and spatial extent of several wetland plant communities are expected. The currently extensive mud flats are expected to diminish in area and be replaced shallow marshes and wet meadows. Within wetland forest fringing these mudflats, the species composition of herbaceous ground cover is expected to gradually shift to slightly drier species. Surface wetland hydrology provided by local stormwater runoff is not expected to change, which can at times create temporary ponding in this wetland area up to about 10 feet deep.

According to existing information from the Illinois EPA as well as a limited Phase II Environmental Site Assessment conducted in August 2011, construction and operation of the six proposed relief wells at decision segment 298+65-308+55 at North Hartford are expected to avoid underground HTRW materials known to occur in the vicinity, and therefore no effects to fish and wildlife resources from HTRW contamination are anticipated.

4.11 Threatened and Endangered Species

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

No-Action Plan

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

Tentatively Selected Plan

Potential impacts of the tentatively selected plan are described for each species below.

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 waterbodies. Therefore, the proposed action is unlikely to adversely affect the least tern.

Indiana bat. The proposed action would require some tree clearing, and tree felling would need to be restricted to the colder months when maternity roosting is known not to occur (October 1 to March 31), in accordance with guidelines established in the species' recovery plan. With this restriction, the proposed project is unlikely to affect the Indiana bat.

Pallid sturgeon. There is no proposed dredging of sand from the Mississippi River to acquire sand to be used for the construction of seepage berms. Construction activities associated with building cutoff walls on the riverside of the levee would not occur in the river. Therefore, the proposed action is unlikely to adversely affect the pallid sturgeon.

Decurrent false aster. Colonies or 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 will 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, it is unlikely that the proposed action will adversely affect the decurrent false aster.

Eastern massasauga rattlesnake. Although suitable habitat for this snake consisting of herbaceous and forested wetlands and old fields occurs on the Mississippi River floodplain, the eastern massasauga is not known to currently occur anywhere in the Metro-East area of Madison County, Illinois. Therefore, it is unlikely that the proposed action will adversely affect this species.

Eastern prairie fringed orchid. This plant is known historically from Madison County. Suitable habitat consisting of remnant mesic or wet prairies does not exist in the immediate vicinity of the Wood River levee system. It is unlikely that the proposed action will adversely affect the eastern prairie fringed orchid.

With regard to the bald eagle and its protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, the proposed action would not affect any known bald eagle nest trees. The nearest known bald eagle nest tree is along the Wood River levee about one mile away from the proposed cutoff wall at Alton (design reaches 1 and 2, 14+95 – 38+90). Therefore, at this time there is no identified need to implement any of the management guidelines. Because the proposed action is expected to take 9 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 will continue to evaluate potential impacts to the bald eagle as design plans are developed, and will coordinate in this regard with the U.S. Fish and Wildlife Service.

It is the St. Louis District's opinion that the proposed action will not adversely impact any of the six federally listed species that might occur in the project area, provided that conditions for the protection of the Indiana bat and decurrent false aster are implemented. The USFWS will be given an opportunity to review this SEA and comment on this Biological Assessment.

4.12 Recreation

No Action Plan

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).

Tentatively Selected Plan

Construction activities associated with proposed new relief wells and seepage berms are not expected to affect use of the Confluence Trail on top of the Riverfront levee. Construction of the proposed cutoff walls on the riverside of the Riverfront levee centerline at design reaches 1 and 2 (14+95 – 38+90) and design reach 5 (151+50 – 185+50) would likely require heavy equipment to cross over the levee periodically during the construction period. Coordination between the St. Louis District and trail officials would occur in the early design phase to ensure that appropriate measures at such crossings 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.

4.13 Aesthetics

No Action Plan

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. In the upper protected area, where no agriculture lands occur, new development is likely to be located on previously used lands.

Tentatively Selected Plan

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.

The aesthetics of the proposed construction sites once work is completed would change slightly. In those design reaches where new relief wells are proposed, aesthetic changes would be limited to the visual appearance of new wells, as any disturbed grassy turf would be restored. Where cutoff walls are proposed, these features would not be visible at all after construction because they would be underground. Trenches would be backfilled to the original ground surface, and grassy turf would be reestablished over them.

Where berms are proposed along the South Flank levee, about 10 acres of natural habitats along a railroad would be replaced by extensions of the levee system. These berms would consist of maintained turf. Once constructed, none of the proposed action's features are likely to be considered as aesthetically unpleasant, as they would likely blend in with the existing levee system and surroundings. Areas where the ground surface is disturbed would be reseeded and returned to pre-project conditions.

4.14 Historic Properties

No Action Plan

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).

Tentatively Selected Plan (Impacts to Historic Properties from All Alternatives)

Cultural resources surveys within the proposed project area have recorded prehistoric and historic archaeological sites as previously noted. However, the majority of the Area of Potential Effect (APE) has not been surveyed and will require additional research. Unidentified historic properties may exist within the APE.

Of the alternatives considered, each of the alternatives will have a negative impact upon any cultural resources. However, the full effects and their extent have yet to be determined. 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 Memorandum of Agreement (MOA) specifying how USACE will address preservation concerns within the project area. A MOA 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 MOA with the IHPA. The MOA will outline and ensure 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 MOA for the mitigation of adverse impacts. As a result of completing those activities, any adverse effects on historic properties within the project area will be mitigated.

Historic Properties

Federal and state laws require the identification and evaluation of cultural resources that may be affected by a project. Those resources deemed eligible for listing on the National Register ("historic properties") must either be avoided or the project's effects on the property mitigated, typically by research and data collection. The USACE has addressed these concerns, in consultation with the Illinois Historic Preservation Agency (IHPA), the Advisory Council on Historic Preservation (ACHP), the Osage Nation, and the United Keetoowah Band of Cherokee by the execution of a Programmatic Agreement (PA, see Appendix K – Cultural Resources) to ensure compliance with all relevant laws and regulations should the project be approved and funded.

The signatories to the PA include the IHPA, the ACHP, and the USACE, with the Osage Nation and the United Keetoowah Band of Cherokee as a concurring parties. The PA stipulates the necessary actions to ensure compliance with provisions of the National Historic Preservation Act

of 1966 as amended (NHPA, P.L. 89-665, 16 U.S.C. 470 et seq.), the Illinois State Agency Historic Resources Preservation Act (20 ILCS 3420), the Illinois Historic Preservation Act (20 ILCS 3410), and the Illinois Municipal Code (65 ILCS 5), specifically Article 11 Division 48.2 Preservation of Historical and Other Special Areas. Execution of the PA constitutes compliance with Section 106 of the NHPA.

4.15 Environmental Justice

No Action Plan

This alternative is not acceptable since the safety criteria for underseepage would not be met for the design flood. Under the no-action alternative, failure to maintain 100 year protection would result in significant impacts borne directly by minority and low- income populations.

Tentatively Selected Plan

The proposed action would not create any adverse effects on low-income and minority communities within the levee protected areas of the Wood River Levee District.

Based on the proposed work site locations, the upper protected area of the Wood River Levee District includes low-income and minority communities. Therefore, the relatively close proximity of the project to these areas presents the possibility of environmental justice issues forming as the project moves through the construction phases.

Logistics and Social Impacts. Construction activities associated with the proposed project would have a temporary impact on the immediate area. As with any project, vehicle and equipment traffic would be ongoing, especially during the construction phases of the project. No significant impact on community activities or cohesiveness appears imminent.

Social impacts on the community would not be significant. The proposed project would not require displacement of businesses or private residences. Nor would access to critical local institutions such as churches, community centers or government offices be impacted.

Public Health Factors. This project would not significantly increase environmental health risks faced by local residents. During the course of the project, levels of dust caused by construction activities and volatile organic carbon (VOC) emitted by construction vehicles and equipment may cause a temporary increase. However, these increased levels would represent a small increase in current levels in the area and would not significantly increase background levels.

Additional Exposures. Noise, water quality, air quality issues may affect the area due to construction activities. Concerns with noise and air quality impacts stem from the influx of construction and material handling equipment at construction sites. A scientific analysis of noise and air quality impacts on nearby communities has not been conducted. However, due to the distances from residential sites, layout of the construction sites, as well as the use of conventional construction equipment, the project's construction activities are not likely to result

in significant noise impacts. These effects are short term and temporary in nature and therefore would not have an adverse impact on the local communities.

Economic Impacts. The proposed design deficiency corrections are designed to reduce the risk of flooding and therefore may be beneficial to local communities by attracting and encouraging further agriculture and industrial development.

Cumulative Impacts. The impacts caused by the proposed action would have positive cumulative effects to protect low-income and minority individuals from flooding.

Taking all of the above factors into consideration, the proposed project does not conflict with the federal government's policy on environmental justice.

Overall, the proposed project appears unlikely to pose increased environmental risk factors. It is expected to improve environmental conditions in the area, and at the same time, opportunities for economic activity would be enhanced. Residential areas are situated far enough away from the expected short term environmental impacts and would not be adversely affected.

Therefore, the inhabitants of Alton and surrounding municipalities encompassing a wide spectrum of income levels and socioeconomic backgrounds would realize cumulative environmental and economic benefits from the proposed project.

4.16 Relationship of the Proposed Project to Land-Use Plans

The proposed project, which is to restore a fully functional flood protection project, is consistent with the original purpose of the Wood River project and the need to protect a relatively large urban area from Mississippi River flooding.

4.17 Adverse Effects Which Cannot Be Avoided

There are unavoidable impacts associated with the proposed action. Wildlife habitats losses include 2.6 acres of emergent wetlands, 0.3 acres of forested wetlands, and 2.1 acres of bottomland hardwoods. Other unavoidable impacts include noise and exhaust generated by heavy equipment during construction.

4.18 Short-Term Use versus Long-Term Productivity

The proposed action does not represent a short-term use of the environment, but a long-term or permanent solution to underseepage problems that require corrective measures. These levee problems raise the risk of levee failure and resulting catastrophic damage to property and infrastructure, and disruption of the livelihoods of many people.

4.19 Irreversible or Irretrievable Resource Commitments

Irreversible or irretrievable resource commitments that have occurred to date include those associated with the acquisition of geotechnical data for the Wood River levee system, the

development of alternative underseepage solutions, and the preparation of planning reports and environmental compliance documents in support of the proposed action.

4.20 Cumulative Impacts

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (40 CFR Section 1508.7). Cumulative effects are defined as, “...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

The Council on Environmental Quality (CEQ) issued a manual entitled “Considering Cumulative Effects under the National Environmental Policy Act”. The manual details and 11 step procedure for addressing cumulative impact analysis. The 11 step procedure is broken down into three main components – scoping, describing the affected environment and determining the environmental consequences. Much of the information used in the following discussion is taken from USACE (2003).

Scoping: Past, Present and Future Actions

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 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 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 recommended plan include 369 new relief wells; 2,410 linear feet of seepage berms; 12,300 linear feet of slurry trench cutoff wall through the levee and to bedrock; 2,640 linear feet of shallow (40 ft deep) cutoff wall at the riverside levee toe; 3,640 linear feet of clay filled cutoff trench; and 1,320 linear feet of 5 foot 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.

Scoping: Geographic and Spatial Boundary

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.

Identification of Affected Environment

The essential components of determining the affected environment is the characterization of stressors and defining the baseline of the environment. Stressors result from natural events or human actions that cause a subsequent population, community or ecosystems level response. The goal of characterizing stressors is to determine whether the resources, ecosystems and human communities of concern are approaching conditions where additional stresses will have an important cumulative effect (CEQ, 2010). Generally, those occurring for a short duration at a localized site, such as the proposed design deficiency corrections project, are of less concern than those occurring for an extended time over a wide geographical region.

As a result of development over the last two centuries, the levee protected area is a major part of the second largest concentration of residential, commercial, and industrial land use on the Mississippi River floodplain, after New Orleans. The primary water and land resource problems of the levee protected area include ecosystem degradation, sedimentation from hillside tributaries, and recurring interior flooding. Ecosystem degradation is characterized by: the loss of biodiversity and the fragmentation of natural systems caused primarily by intensive urbanization over the years; the loss of historic ecosystem disturbances such as natural flooding and wildfires; the loss of habitat quality; and the degradation of tributary stream resources due to development in the adjacent uplands.

In 2000, Madison County passed a 100-year stormwater control ordinance requiring new development to incorporate post-construction measures to temporarily detain runoff onsite, up to and including the 100-year storm, with release of stormwater to the local watershed at a rate no greater than that of preconstruction conditions. The Federal Emergency Management Agency, acting through local counties, bought out some flood-damaged properties after flooding in the mid-1990s. Finally, the Metro East Regional Storm Water Committee issued in 2000 a framework for coordinated storm water work in the Metro East.

The existing land use planning strategy in Madison and St. Clair counties can be summarized as follows: conserve agricultural lands; diversify employment opportunities; give the environment consideration in land use decisions; ensure housing availability; manage growth in a sensible manner; utilize best management conservation practices; provide open space and recreational opportunities; and provide a safe, efficient, and compatible transportation system.

Description of Environmental Consequences

For this design deficiency corrections project, key stressors of concern include changes to land cover or land use, natural habitats, water quality, and hydrologic regime. These stressors act to reduce environmental quality within the levee protected area and decrease the overall quality of life.

The proposed project would not affect sediment transport dynamics between the upland-floodplain interface. The hydrologic regime of a 75-acre wetland complex adjacent to the levee system would experience a minor reduction in groundwater recharge due to the installation of a cutoff wall down to bedrock. The implementation of best management practices for the protection of water quality at project construction sites is expected to give rise to localized temporary adverse effects. A project-induced loss of about 5 acres of various habitats along with establishment of mitigation within the local watershed to compensate for this loss is not expected to contribute to an ongoing long-term spatial decline in natural areas due to floodplain development.

5.0 RELATIONSHIP OF RECOMMEND ALTERNATIVE TO ENVIRONMENTAL REQUIREMENTS

Table A-A-15. Relationship of Plan to Environmental Requirements

Guidance	Degree of
----------	-----------

	Compliance
Federal Statutes	
Archaeological and Historic Preservation Act, as Amended, 16 U.S.C. 469, et seq.	PC ¹
Clean Air Act, as Amended, 42 U.S.C. 7609	FC
Clean Water Act, as Amended 33 U.S.C. 466 et seq.	PC ²
Endangered Species Act, as Amended, 16 U.S.C. 1531. et seq.	PC ²
Farmland Protection Policy Act, 7 U.S.C. 4201, et seq.	FC
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. 4601, et seq.	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, et seq.	PC
National Historic Preservation Act, as Amended, 16 US. C. 470a, et seq.	PC ¹
Executive Orders	
Flood Plain 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
Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, CEQ Memorandum, August 11, 1980.	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.

The National Environmental Policy Act (NEPA) process would continue once stockpile and borrow areas are identified, and also if new geotechnical data leads to a revised recommended plan with changed environmental impacts. The NEPA process would be followed to coordinate and account for these changes. A Supplemental Environmental Assessment would be prepared by the St. Louis District and circulated to fulfill this requirement for public disclosure and involvement. Coordination will continue with the U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, Natural Resources Conservation Service, Illinois Department of Agriculture, and Illinois State Historic Preservation Office.

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8.0 COORDINATION, DISTRIBUTION LIST, PUBLIC VIEWS, AND RESPONSES

Notification of the Supplemental Environmental Assessment and Unsigned Finding of No Significant Impact was sent to the following officials, agencies, organizations, and individuals for review and comment. Project documents were sent to state and federal natural resource agencies. A 30-day public review period (August 2 – August 31, 2011) was implemented for this project. No public meeting was held. In addition to the mailing of the notification or project documents, the entire project report, including appendices and notification letter, have been placed on the St. Louis District's website. The District's Regulatory Branch issued a public notice for this project (P-2801) on August 2, 2011, soliciting public comment until August 23.

All associated letters, comments, and responses have been filed with the final document in Appendix L – Public Involvement and Correspondence. As a result of the public review, two written comment letters were received. In a letter dated August 22, 2011, Rose and Mike Schulte commented on the recommended plan's possible effect on agricultural land, the proximity of some proposed features to a known area of contamination, and the potential effect of the plan on private enterprises located along the bank of the Mississippi River, as well as navigation traffic. In a letter dated August 26, 2011, Joyce Collins of the U.S. Fish and Wildlife Service supported the determination of a Finding of No Significant Impact and did not object to issuance of the Section 404 authorization for the project. She requested that coordination with her agency continue if borrow sites would be required for the project. She expressed concern that the mitigation plan as proposed does not provide enough compensation for the various habitats that would be lost. The Service recommended that the Section 404 authorization for the project be conditioned to require further coordination regarding mitigation ratios, and that her agency as well as the Illinois Department of Natural Resources be given the opportunity to review and approve the mitigation plan in the future. The St. Louis District's response to each of these comment letters is found in Appendix L.

To assure compliance with the National Environmental Policy Act, Endangered Species Act and other applicable environmental laws and regulations, coordination with these agencies would continue as required throughout the planning and construction phases of the proposed project.

Distribution List. The Draft Environmental Assessment and Unsigned Finding of No Significant Impact was sent to the following

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elected officials, agencies, organizations and individuals for review and comment. All responses will be filed with this document.

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FINDING OF NO SIGNIFICANT IMPACT

WOOD RIVER LEVEE SYSTEM DESIGN DEFICIENCY CORRECTIONS MADISON COUNTY, ILLINOIS

1. I have reviewed and evaluated the Limited Reevaluation Report and Supplemental Environmental Assessment (SEA) for the 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 Wood River levee system, Madison County, Illinois.
2. Alternatives were considered in correcting design deficiencies for each distinct problem area or “decision segment” along the levee system. After consideration of logistical, environmental, and cost factors, the proposed action is the least cost option for all of these problem areas, except for one. By not making any design corrections, the "No Action" alternative would not eliminate the unacceptable level of risk associated with these deficiencies.
3. The recommended plan consists of various underseepage control measures, including 94 new relief wells; three small pump stations; 815 linear feet of seepage berms; 2,910 linear feet of slurry trench cutoff wall at the riverside levee toe to bedrock; 3,935 linear feet of shallow (25 ft deep) cutoff wall at the riverside levee toe; 1,010 linear feet of 5 foot thick landside clay fill; about 10 acres of flowage easements; and other appurtenances.
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. The recommended plan will avoid known areas of contaminated substances. Construction and operation of the recommended relief wells at decision segment 298+65-308+55 at Hartford will avoid underground contamination in the vicinity, based on best available information from other agencies and a recent Phase II Environmental Site Assessment conducted by the St. Louis District, Corps of Engineers at this location to obtain baseline soil and groundwater information. Because the well locations are outside the extent of the plume, during operation these wells are not expected to bring contaminated groundwater to the surface. Precautionary plans to prevent the spreading of contaminated substances will be in place during construction for the proper handling of earthen materials, surface water and groundwater should contaminants be encountered.
 - c. Hydrologic impacts to surface water are considered to be relatively minimal. There is the potential for groundwater mounding on the landside of the two cutoff walls during low or normal river flows, and the creation of localized groundwater gradients that may trend perpendicular to the walls.

d. The plan would permanently impact a total of 5 acres of various natural habitats that require mitigation, including about 3 acres of various wetlands and about 2 acres of non-wetland bottomland hardwood forest. The mitigation plan would establish a total of 6 acres of habitats 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 plan will be coordinated with federal and state natural resource agencies.

e. There will be about 14 acres of prime farmland permanently converted to nonagricultural use.

f. The St. Louis District, 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 and has executed a Programmatic Agreement stipulating the process by which historic properties will be identified and treated prior to construction. The Corps, IHPA, and ACHP are signatories to the Programmatic Agreement and the Osage Nation and the United Keetoowah Band of Cherokees are concurring parties. The Agreement constitutes compliance with Section 106 of the National Historic Preservation Act, as amended.

g. The revised plan will result in minor and temporary impacts on air quality, surface water quality, traffic movement, recreation, aesthetics, and noise levels; minor and permanent impacts on prime farmland, biological resources, surface hydrology, groundwater movement, land use, and land owner income; and possible minor and permanent effects on historic properties. The revised plan would not affect threatened and endangered species or environmental justice.

h. The stockpile and disposal areas have yet to be identified, and their locations will be determined in 2011. The National Environmental Policy Act (NEPA) process would continue once stockpile and borrow areas are identified.

5. Based on my analysis and evaluation of the alternative courses of action presented in these documents, I have determined that the Wood River Levee System Design Deficiency Corrections Project will 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 31 AUG 2011



Red Colonel, U.S. Army
District Commander

**APPENDIX A-B
MITIGATION PLAN**

APPENDIX TO ENVIRONMENTAL ASSESSMENT

LIMITED REEVALUATION REPORT
WOOD RIVER LEVEE SYSTEM
DESIGN DEFICIENCY CORRECTIONS
MADISON COUNTY, ILLINOIS



AUGUST 2011

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MITIGATION PLAN

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1) *Introduction*

Construction activities for the Wood River Drainage and Levee District, IL Design Deficiency Corrections Project will impact 2.6 acres of emergent wetland, 0.3 acres of forest-wetland, and 2.1 acres of non-wetland bottomland forest (Table A-B-1).

Table A-B-1. Unavoidable impacts by habitat type due to the proposed Wood River Drainage and Levee District, IL Design Deficiency Corrections Project

Station Impacted	Unavoidable Impacts by Habitat Type (acres)			Total
	Non-Wetland	Wetland		
	Bottomland Hardwood Forest	Forested-	Emergent-	
608+85 to 613+75	0.6	0.0	0.0	0.6
613+70 to 623+80	0.6	0.3	2.6	3.5
627+00 to 630+30	0.9	0.0	0.0	0.9
Total	2.1	0.3	2.6	5.0

These impacts require mitigation. The Water Resources Development Act (WRDA) of 2007 details mitigation requirements for fish and wildlife and wetland losses caused 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.

The following paragraphs outline 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 area consists of the Wood River Drainage and Levee District levee system and associated right of way. The goal is to mitigate for impacts to 2.9 acres of Section 404 jurisdiction wetland and 2.1 acres of non-wetland bottomland forest. Current ecological problems for the project area's biological resources, including forested and emergent wetlands and non-wetland bottomland forest are: fragmentation and degradation resulting from altered hydrologic regimes that depart from natural conditions, the addition of sediments and agricultural chemicals or urban runoff, encroachment of exotic plant species, and the prevalence of disturbance-tolerant native plant species in local plant communities (USACE, 2003). The mitigation area would combat some of these problems because it would be adjacent to publicly owned land, and with establishment of vegetation it would create a larger contiguous block of habitat.

3) *Site Selection.*

The project and proposed mitigation site are located within the U.S. Environmental Protection Agency (USEPA) HUC 07140101 Cahokia-Joachim watershed. There are currently no mitigation banks available within this watershed. The Illinois portion of this watershed was investigated for suitable parcels with willing sellers. Coordination with the U.S. Fish and Wildlife Service (USFWS) and the Illinois Department of Natural Resources (IDNR) resulted in mitigation being proposed at Chouteau Island, Madison County, Illinois. The location of Chouteau Island in relation to the impacted project areas is shown in Figure A-B-1. The specific site on Chouteau Island is shown in Figure A-B-2. The site is within a parcel of about 22 acres, located on the riverside of the levee. Additionally, there are several mitigation banks within the watershed currently going through the approval processes that could be available and potentially provide the mitigation acres needed.

4) *Site Protection Instrument.*

The non-Federal sponsor, Wood River Drainage and Levee District (WRD&LD), 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 Wood River Drainage and Levee District, IL Design Deficiency Corrections Project's Mitigation Plan by reference. A copy of the conservation servitude would be provided to the Corps of Engineers St. Louis District (CEMVS) for review and approval.

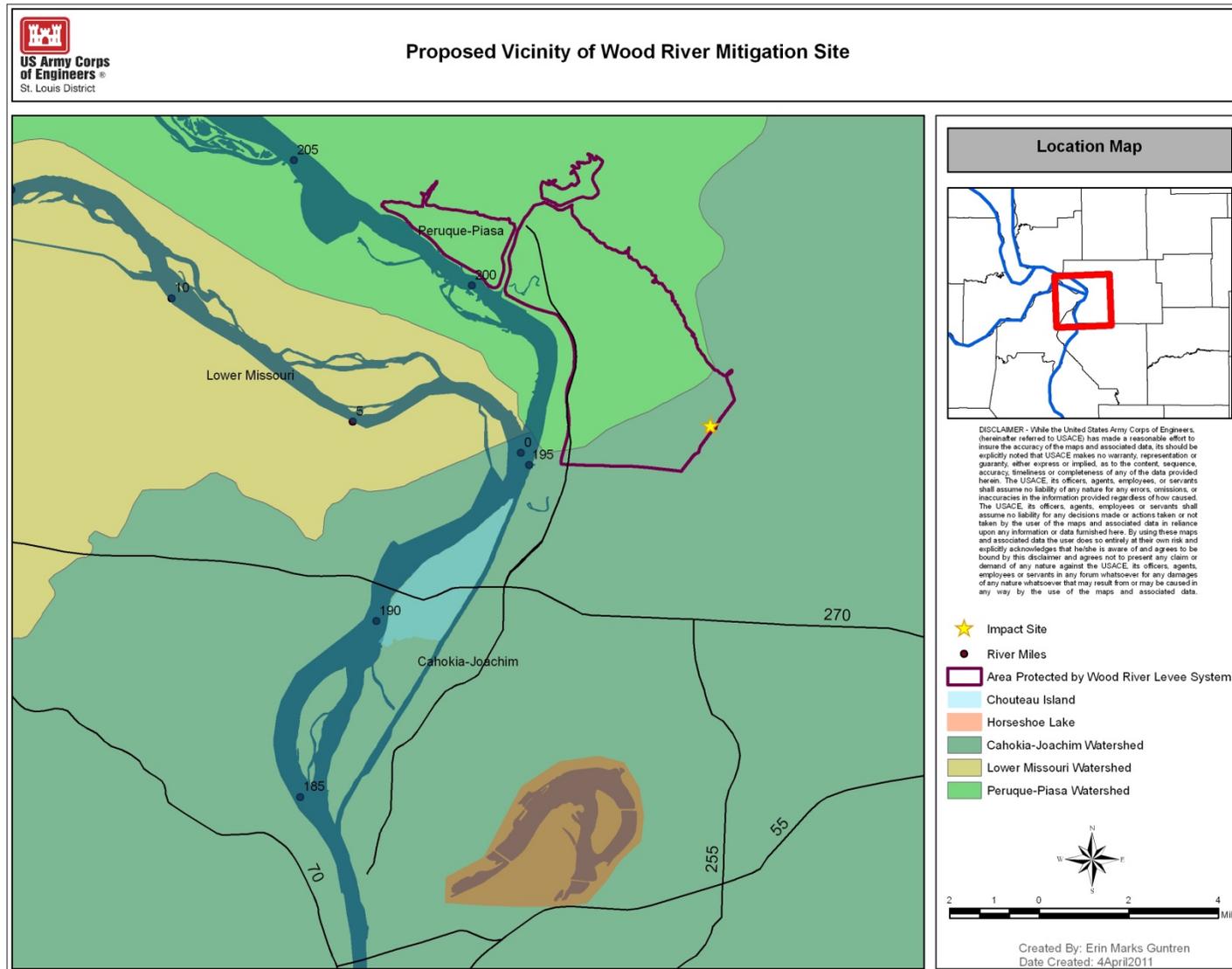


Figure A-B-1. Location of Chouteau Island and proposed mitigation site in relation to project area.

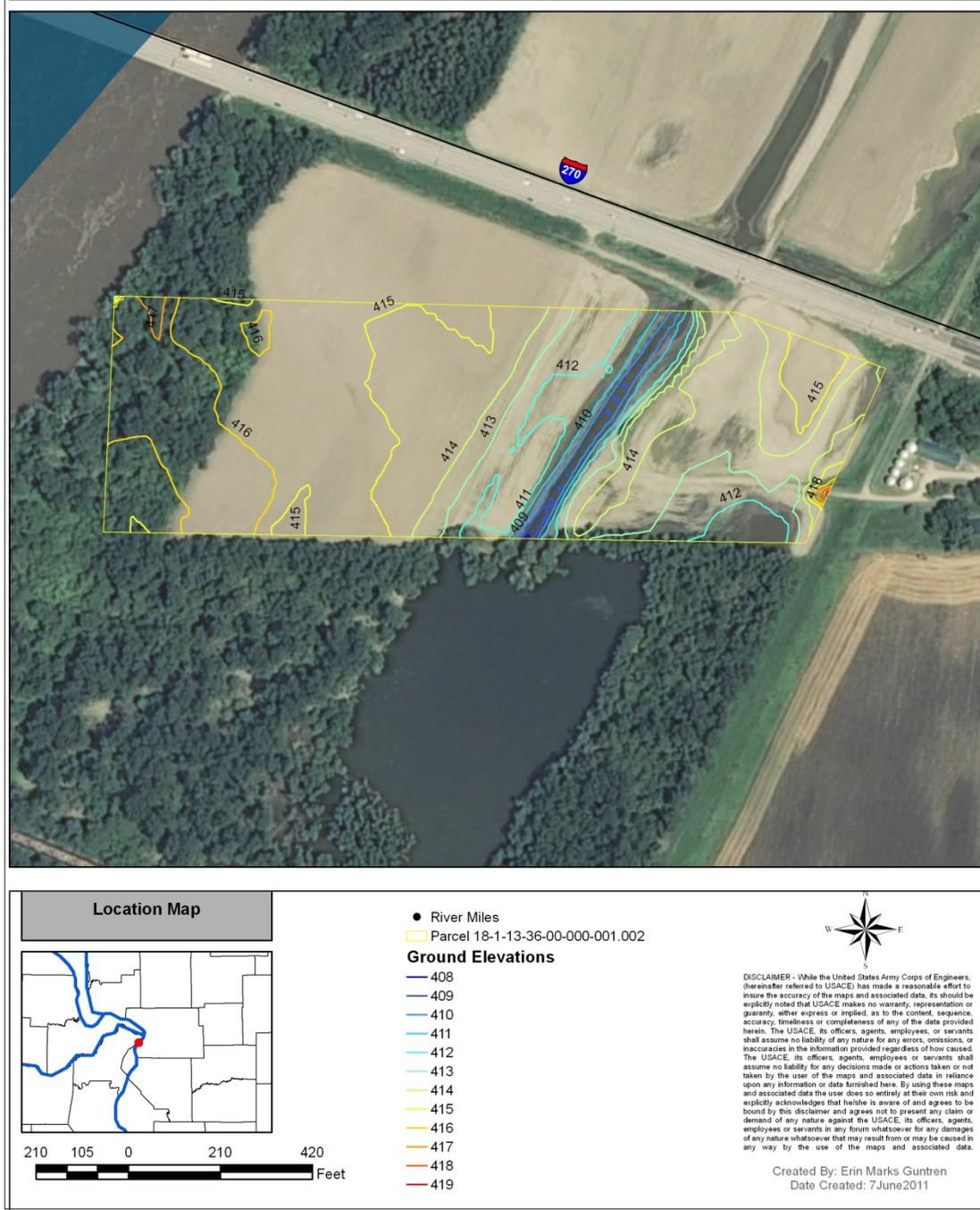


Figure A-B-2. Proposed mitigation site on Chouteau Island, located at Mississippi river mile 190, Madison County, Illinois, with ground elevations.

- a) 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.
- b) 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.**

Impact Sites: Areas to be impacted include a 0.6 acre non-wetland bottomland hardwood plot between stations 608+85 to 613+75; a 0.9 acre non-wetland bottomland hardwood plot between stations 627+00 to 630+30; and an area between stations 613+70 to 623+80 which is comprised of 0.6 acres of non-wetland bottomland hardwood, 0.3 acres of forested-wetland, and 2.6 acres of emergent wetland (Table A-A-12; Plate 16 of plates accompanying Main Report).

The proposed project sites are highly disturbed. The impact areas consist of low quality emergent wetlands, forested wetlands, and non-wetland bottomland forest. The affected wetlands have limited ecological importance. They are considered low to moderate quality because they are small in area (fragmented) 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 because of their severed connection with the Mississippi River. Wetland hydrology consists of surface runoff from adjacent levee-protected land as well as groundwater inflow during times when the Mississippi River is high.

The emergent wetland is a man-made depression which is periodically disturbed by mowing. Groundcover consists of various sedges, forbs, and grasses. Species include smartweed (*Polygonum* spp.). Tree species in forested wetlands include cottonwood and silver maple. Hard mast species such as oaks and pecans are absent. Non-wetland bottomland forest exists as early successional vegetation encircling the non-wetland forest area. Species consist of box elder, white mulberry, hackberry, American elm, red cedar, and cottonwood.

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. The herbaceous wetlands serve as resting and feeding areas for some migratory ducks. Turkey may also be seen as well as red-winged blackbirds when water is present.

Mitigation Sites:

1) *Chouteau Island* – Chouteau Island was originally part of the Illinois floodplain with ridge and swale topography typical of the area that was forested prior to settlement. With construction of the Chain of Rocks Canal, the island was created to resemble its present day state. The Mississippi River Commission maps indicate that the entire area was historically emergent wetland or farmland. By the late 1930s, the area was being heavily farmed. Now large areas of the island are publicly owned. These areas support forest and emergent vegetation.

Analysis for mitigation requirements focused on Chouteau Island. Most of the area proposed for mitigation is being maintained as unreliable cropland. These fields are productive when dry, but that is highly unpredictable and a non-guaranteed condition at this location. A low private levee restricts flooding into most of the fields, but seepwater

manages to flood many of the areas during wetter years. Internal drainage is altered by ditches and levees and there are currently minimal control options. Many of the agricultural levees are in poor condition. Japanese hops and phragmites are present in some adjacent forest areas and wetland areas and would need to be controlled.

Because of the existing topography and hydrologic regime, much of the restoration would be relatively simple. Discontinuation of farming would accomplish some of the restoration effort. Restoration of the habitat on the island could be greatly enhanced by accentuating existing ridge and swale topographic features, allowing seasonal hydrologic fluctuation, and utilization of unique hydrologic conditions. Non-wetland bottomland hardwood would be established on ridges, while forested wetland and wetland bottomland hardwood would be situated in swales.

Because of the island's unique position near the Mississippi/Missouri River confluence, it has enormous potential for increased use by migratory species. The island's bottomlands and sloughs already provide habitat for various waterfowl species, wading birds, shorebirds, neotropical migrants, and wintering and nesting bald eagles. Deer, turkey, and many small game species are permanent residents and inhabit most of the island. Endangered pallid sturgeon are known to prefer the nearby habitat of the Chain of Rocks, and least tern have been observed in the area.

Restoration of additional agricultural land at this site would advance the regional St. Louis effort to create a perpetually sustainable, 40-mile riverside recreation and conservation area on both banks of the Mississippi, extending from the Gateway Arch in downtown St. Louis to the confluences with the Missouri and Illinois Rivers.

6) *Determination of Credits.*

The ecosystem benefit analyses for the Wood River Levee System Project utilized a panel of subject matter experts represented by a multi-agency team with representatives from U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and U.S. Army Corps of Engineers.

The Wildlife Habitat Appraisal Guide (WHAG), developed by the Missouri Department of Conservation and the U.S. Department of Agriculture, Soil Conservation Service (now NRCS) (MDC and NRCS 1990), was used to evaluate the quality of non-wetland bottomland hardwood, forested-wetland, and emergent wetland habitat, and to determine the quantity of like-quality mitigation habitat required. The WHAG was adapted from the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (USFWS 1976). WHAG is widely accepted by local agencies. It has become the primary terrestrial habitat evaluation method used in the St. Louis District. The WHAG results are explained in detail in the project EA.

The WHAG is a numerical model that evaluates the quality and quantity of particular habitats for species selected by team members (Table X). The qualitative component of

the analysis is known as the habitat suitability index (HSI) and is rated on a 0.1 to 1.0 scale, with higher values indicating better habitat. The evaluation team determines the HSI for a particular habitat type by answering questions that establish values for various biotic and abiotic conditions under present and future conditions. Future conditions are determined by the team using management plans and best professional judgment. The quantitative component 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 ($HSI \times Acres = HUs$). 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 without-project benefits, expressed as 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 WHAG habitat assessment (1, 5, 6, 25, 50) were primarily chosen to reflect expected future changes in woody vegetation planted at mitigation sites. Woody species such as hard mast tree species that are 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 Wood River Levee System WHAG Team established the following assumptions: For the purpose of planning, design, impact and mitigation analysis, project life was established as 50 years. The multi-agency team made the following assumptions during the habitat evaluation: (1) the No Action Alternative assumed that no project features would be instituted; (2) target years selected are sufficient to annualize HUs and to characterize habitat changes over the life of the project; (2) target species were selected based on project location, habitat type, and management objectives; (3) 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; (4) water input to the system is solely reliant on precipitation, runoff, ground water, and seepage through/under the levee; and (5) Mississippi River level fluctuations would result in water level fluctuations within the impacted and mitigations sites due to seepage through/under the levee.

Based on the habitat units calculated using the WHAG methodology, the acres of mitigation required to offset the unavoidable project impacts are 0.7 acre of non-wetland bottomland hardwood, 0.4 acre of forested-wetland, and 4.5 acres of emergent wetland habitat (Table A-B-2).

Table A-B-2. Acres*, habitat units (HUs*), and average annualized habitat units (AAHUs*) impacted and required to mitigate for unavoidable impacts of the Wood River Drainage and Levee District, IL Design Deficiency Corrections Project.

Levee Reach	WHAG Habitat Type	Acres*		HUs*		AAHUs*	
		Impacted	Mitigated	Impacted	Mitigated	Impacted	Mitigated
WR 608-614	Non-Wetland Bottomland Hardwood	0.64	0.20	0.56	0.58	0.08	0.12
WR 614-623	Non-Wetland Bottomland Hardwood	0.59	0.18	0.51	0.52	0.07	0.11
WR 614-623	Wetland Bottomland Hardwoods	0.31	0.38	2.24	2.27	0.06	0.06
WR 614-623	Wetland Non-Forest	2.57	4.53	22.79	22.78	0.65	0.52
WR 627-630	Non-Wetland Bottomland Hardwood	0.92	0.28	0.79	0.81	0.11	0.17
Total		5.03	5.57	26.89	26.96	0.97	0.98
Total	Non-Wetland Bottomland Hardwood	2.15	0.66	1.86	1.91	0.26	0.40
	Wetland Bottomland Hardwoods	0.31	0.38	2.24	2.27	0.06	0.06
	Wetland Non-Forest	2.57	4.53	22.79	22.78	0.65	0.52

*All habitat evaluation calculations are on file at the U. S. Army Corps of Engineers St. Louis District.

7) **Mitigation Work Plan.**

Native containerized Root Production Method (RPM) bottomland hardwood trees and native emergent wetland species would be planted at the Chouteau Island and/or Horseshoe Lake sites. RPM trees are grown from locally-collected seed and are better able to survive the herbivory, competition, and flooding that occurs in the floodplain environment. Fifty trees will be evenly planted across each acre. The highest ridges in the Chouteau site would be planted with pecan (*Carya laciniosa*). Remaining areas would be planted with a mixture of softwood species including green ash (*Fraxinus laceolata*), sugar berry (*Celtis laevigata*), hackberry (*Celtis occidentalis*), river birch (*Betula nigra*), and box elder (*Acer negundo*).

The 4.5 acres of the wettest hydric areas will be seeded with native emergent wetland species. Emergent vegetation should include a variety of species listed in Table A-B-3. A mix of at least 15 of these species should be planted.

8) **Performance Standards.**

To compensate for unavoidable impacts to emergent wetlands and bottomland hardwood forest and related habitats, the site must show progression from the current state of row crops towards a stable emergent wetland and bottomland hardwood forest. Specific features that could be measured to show the progression and satisfy ecological success

Table A-B-3. Representative emergent wetland species for mitigation site.

Plant	Form/Common Name	Scientific Name
Grasses		
	Blue joint grass	<i>Calamagrostis canadensis</i>
	Fowl manna grass	<i>Glyceria striata</i>
	Rice cutgrass	<i>Leersia oryzoides</i>
	Prairie cord grass	<i>Spartina pectinata</i>
Sedges		
	Common lake sedge	<i>Carex lacustris</i>
	Prickly sedge	<i>Carex stipata</i>
	Common tussock sedge	<i>Carex stricta</i>
	Fox sedge	<i>Carex vulpinoidea</i>
	Dark green rush	<i>Scirpus atrovirens</i>
	River bulrush	<i>Scirpus fluviatilis</i>
Forbs		
	Swamp milkweed	<i>Asclepias incarnata</i>
	Nodding beggar-ticks	<i>Bidens cernua</i>
	Autumn sneezeweed	<i>Helenium autumnale</i>
	Southern blue flag	<i>Iris shrevei</i>
	Cardinal-flower	<i>Lobelia cardinalis</i>
	Blue cardinal-flower	<i>Lobelia siphilitica</i>
	Pinkweed	<i>Polygonum pennsylvanicum</i>
	Common bur reed	<i>Sparganium eurycarpum</i>

include basic hydrology of the site, plant survival, and vegetation composition. Ecological success at this mitigation site is comprised of three parts – bottomland hardwood, herbaceous wetland, and invasive species. Specific monitoring and potential adaptive management requirements are further discussed in the Section 9: Monitoring Requirements and Section 11: Adaptive Management Plan of this appendix.

Bottomland Hardwood Forest and Forested-Wetland:

Bottomland hardwood survival rates can decrease in areas located behind levees. Although the proposed mitigation sites are located behind existing levees, existing bottomland hardwoods in the vicinity of the areas have remained stable and healthy. The Choteau Island bottomland hardwood areas have been noted on the 1890s Mississippi River Commission maps.

Bottomland hardwood and forested-wetland mitigation sites shall be considered to meet ecological success, if after 10 years, there is 80% survivorship and a positive relative growth rate of planted trees.

Non-Forest Wetland:

Non-Forest 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.

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%.

9) ***Monitoring Requirements.***

Monitoring will commence the year after mitigation bottomland hardwood and wetlands are planted which will constitute year one.

Bottomland Hardwood Forest and Forested-Wetland:

For the first five years (given no high water events), 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 5 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 5 plots will be monitored annually and species, state (alive/dead), height, and basal diameter recorded. All invasive species with $\geq 10\%$ 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 bottomland hardwood forest and/or forested wetland portion(s) 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.

Emergent Wetland:

For the first five years, herbaceous vegetation surveys will be conducted twice each year within the restored emergent herbaceous wetland areas. Surveys will be conducted early (1 May - 15 June) and late (1 August - 15 September) growing season each year to better capture species present. In the first year, 24 (50 × 50 cm) plots will be randomly located throughout the emergent herbaceous wetland. GPS points will be recorded for each plot 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 two average percent cover (all plots both samples) values will be provided: a total plant percent cover value and a native emergent herbaceous wetland percent cover value. These values will be used to determine success. If ecological success targets are not being achieved at year five, then annual monitoring will continue. If targets are being met (75% of percent cover native herbaceous wetland species), early and late season monitoring will be conducted in year 8 and year 10. At year 10 if all the success targets are met, USACE will consider the ecological success of the mitigation site in coordination with state agencies.

Report Content:

The surveys will be documented in an annual written report that will be provided to the USACE for review by the end of the calendar year. The report will include:

- A figure showing the location of all sample plots
- Day, month, and year monitoring was performed
- Name(s) of company/individuals conducting the monitoring
- GPS coordinates for all sample plots
- Survival rate and relative growth rates of all planted trees by sample plot
- Herbaceous species and percent cover for each species listed by sample plot
- Classification (native, non-native, woody, wetland, non-wetland) of herbaceous species by plot

In the event that any monitoring period for bottomland hardwood forest, forested wetland, or emergent herbaceous wetland indicates that the long-term success criteria are likely to be unattainable as determined by the USACE or state agency in coordination with USACE, an Adaptive Management Plan would be developed and submitted to the St. Louis District, USACE. This plan would identify and describe the problem(s) and provide a plan of action. Total monitoring would cease after 10 years, if ecological success has been attained. Any monitoring beyond 10 years would be 100 percent non-Federal sponsor's cost.

10) *Long-Term Management Plan.*

The non-Federal sponsor will be responsible for maintaining and protecting lands contained within the mitigation site in perpetuity. The site will be protected under a conservation servitude following the guidelines in Section 4 of this mitigation plan. In the event a violation of the conservation servitude occurs, corrective action would be conducted to return the proposed mitigation site to either an emergent wetland, forested wetland, or bottomland hardwood forest depending on the location.

11) *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.

- 1.) If survival of replanted bottomland forest and/or forested wetland 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 pecans 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.
- 2.) 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 (re-routing/filling ditches, changing elevation, or adding/modifying management of gravity drains) should be conducted to restore the hydrology.
- 3.) If invasive encroachment exceeds 25% of percent land cover, measures will be taken to remove invasives. Common invasives 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 5 years.

If implementation of adaptive management measures occurs after year 10, then annual monitoring as described above will be conducted during subsequent years. This monitoring will continue for two years after completion of all management measure(s). Ecological success will be evaluated after two years of monitoring for herbaceous wetland, forested wetland, and bottomland forest targets and five years for the invasive target. If success is not obtained, monitoring and evaluation will continue on an annual basis. Alternatively, additional adaptive management and subsequent monitoring cycle (2 or 5 yrs) could be conducted. This process will continue until success is determined.

12) *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.

13) *Cost.*

For monitoring there are two potential scenarios. If ecological success targets are not being met at year 5, then monitoring will continue annually until year 10. If targets are met at year 5, then monitoring after year five would occur less frequently. The most costly alternative is presented in Table A-B-4 below. The years that monitoring would occur if targets are met are highlighted in grey.

Table A-B-4. Monitoring scheme for the mitigation site. Monitoring highlight in grey would definitely occur. Monitoring that is not highlighted would only occur if targets are not met.

Habitat Type	Year										
	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Bottomland and Non-wetland Forest	Construction	X	X	X	X	X	X	X	X	X	X
Herbaceous Wetland		X	X	X	X	X	X	X	X	X	X
Invasive Species		X	X	X	X	X	X	X	X	X	X
Estimated Cost (\$)		\$750	\$750	\$750	\$750	\$750	\$750	\$750	\$750	\$750	\$750
TOTAL	\$7,500 maximum										

Monitoring will indicate if and when adaptive management measures are necessary to achieve successful implementation of the functions and values of the mitigation habitat. The approximate cost for adaptive management measures is included in Table A-B-5.

Table A-B-5. Adaptive Management Costs for the Chouteau Island, IL Mitigation Site.

Management Technique	Year										
	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Supplemental plantings (RPM tree seedlings and herbaceous plant plugs)	Construction	\$1000	\$1000	\$1000	\$1000	\$1000	\$1000	\$1000	\$1000	\$1000	\$1000
Invasive species management (hand removal and herbicide treatment)			\$1000		\$1000		\$1000		\$1000		\$1000
Pesticide application on diseased plants or replanting of resistant trees		\$1667	\$1667	\$1666							
Mowing to minimize competition from non-target plant species		\$1000	\$1000	\$1000	\$1000	\$1000					
Rehabilitation of water management features (re-routing/filling ditches, changing elevation, or adding/modifying structures)			\$2500	\$2500	\$2500	\$2500					
Estimated Cost (\$)		\$3667	\$7167	\$6166	\$5500	\$4500	\$2000	\$1000	\$2000	\$1000	\$2000
TOTAL	\$35,000 maximum										

14) Other Information.

The non-Federal sponsor will not be held responsible for mitigation site failure due to natural catastrophes, extreme weather conditions (i.e. drought or flooding), extreme predation of plantings or other events that the USACE determines is out of the non-Federal sponsor's control to anticipate, prevent or reasonably repair within the constraints of the original financial resources.

**APPENDIX A-C
HABITAT EVALUATION AND CE/ICA FOR PROJECT
MITIGATION**

APPENDIX TO ENVIRONMENTAL ASSESSMENT

LIMITED REEVALUATION REPORT
WOOD RIVER LEVEE SYSTEM
DESIGN DEFICIENCY CORRECTIONS
MADISON COUNTY, ILLINOIS



AUGUST 2011

U.S. Army Corps of Engineers, St. Louis District
Planning and Environmental Branch (CEMVS-PD-E)
Environmental Compliance Section
1222 Spruce Street
St. Louis, Missouri 63103-2833
Telephone Number: (314) 331-8459

HABITAT EVALUATION AND CE/ICA FOR PROJECT MITIGATION

**LIMITED REEVALUATION REPORT
WOOD RIVER DRAINAGE AND LEVEE DISTRICT,
MADISON COUNTY, ILLINOIS**

JUNE 2011

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1. Introduction

The tentatively selected plan for the Wood River levee design deficiency correction project would impact 5.0 acres of various habitats requiring mitigation: 0.3 acres of forested wetland, 2.6 acres of herbaceous wetlands, and 2.1 acres of bottomland hardwood forest (Table A-A-12, Appendix A-A). These losses are unavoidable and require compensatory mitigation. To assist in developing mitigation, this appendix describes two analyses that are required for the formulation, evaluation, and selection of a mitigation plan. First, a habitat evaluation was conducted to quantify the benefits of establishing the various types of mitigation habitats. These benefits would need to equal those of the habitats to be lost at the proposed levee project area. Second, a cost effectiveness/incremental cost analysis was performed to compare the benefits and costs of alternative ways of establishing vegetation for each type of mitigation habitat, determine which alternatives are cost inefficient and ineffective, and identify the “best buy” or least cost alternative.

These habitat and cost evaluation analyses were conducted for the proposed mitigation site, which is located on Chouteau Island near the Wood River Levee project area (see Mitigation Plan, Appendix A-B). The proposed mitigation site consists of cropland, which would be developed or converted to the required habitats for mitigation purposes.

2. Habitat Evaluation.

The habitat evaluation analyses for the Wood River Levee mitigation project were conducted by a multi-agency team with representatives from the U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and U.S. Army Corps of Engineers.

The Wildlife Habitat Appraisal Guide (WHAG), developed by the Missouri Department of Conservation and the U.S. Department of Agriculture, Soil Conservation Service (now NRCS) (MDC and NRCS 1990), was used to evaluate the quality of non-wetland bottomland hardwood, forested wetland, and herbaceous wetland habitat to be created as mitigation. The WHAG was adapted from the U.S. Fish and Wildlife Service’s Habitat Evaluation Procedures (USFWS 1976). WHAG is widely accepted by local agencies. It has become the primary terrestrial habitat evaluation method used in the St. Louis District.

The WHAG is a numerical model that evaluates the quality and quantity of particular habitats for species selected by team members. Evaluation species that were chosen are displayed in Tables A-C-1 and A-C-2. The qualitative component of the analysis is known as the habitat suitability index (HSI) and is rated on a 0.1 to 1.0 scale, with higher values indicating better habitat. The evaluation team determines the HSI for a particular habitat type by answering questions that establish values for various biotic and abiotic conditions under present and future conditions. Future conditions are determined by the team using management plans and best professional judgment. The quantitative component 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 without-project benefits, expressed as 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.

Table A-C-1. WHAG animal species used to evaluate quality of bottomland hardwood forest established for mitigation.

Evaluation Species	Purpose as Evaluation Species	Upland/Bottomland Hardwood Forests (not wetland)
White-tailed deer	Habitat diversity, game species	X
Wild turkey	Habitat diversity, game species	X
Pileated woodpecker	Old growth, cavity and snag trees, forest fragmentation	X
Fox squirrel	Old growth, cavity and snag trees, mast production	X
Wood thrush	Forest fragmentation	X
Kentucky warbler	Bottomland hardwood and riparian	X
Quail	Habitat diversity, openland edge, game species, early habitat succession	
Rabbit	Habitat diversity, openland edge, game species, early habitat succession	
Indigo bunting	Mid to late habitat succession, openland edge	X
Ruffed grouse	Early succession forest habitat, forest regeneration	

The target years selected for use in the WHAG habitat assessment (1, 6, 10, 25, 50) were primarily chosen to reflect expected future changes in woody and herbaceous vegetation planted in cropland at the mitigation site. Woody species such as hard mast tree species that could be planted as Root Production Method 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.

Table A-C-2. WHAG animal species used to evaluate quality of forested wetland and herbaceous wetland established for mitigation.

Evaluation Species	Purpose as Evaluation Species	Forested Wetland	Herbaceous Wetland
Mallard	Early succession wetland habitat, game species	X	X
Canada goose	Early succession wetland habitat, game species		X
Least bittern	Permanent summer wetland habitat, mid successional herbaceous wetland habitat		X
Lesser yellowlegs	Waterlogged wetland substrate, initial successional wetland habitat		X
Muskrat	Permanent summer wetland habitat, mid successional herbaceous wetland habitat		X
King rail	Permanent summer wetland habitat, sedge dominate wetlands, rare species		X
Green-backed heron	Mid successional herbaceous and shrub dominated wetland habitat	X	X
Wood duck	Old growth, riparian habitat, snag and cavity trees	X	
Beaver	Early successional forest habitat	X	
American coot	Permanent summer wetland habitat		X
Northern parula	Wooded riparian habitat	X	
Prothonotary warbler	Wooded riparian habitat	X	

The Wood River Levee System WHAG Team established the following assumptions: For the purpose of planning, design, impact and mitigation analysis, project life was established as 50 years. The multi-agency team made the following assumptions during the habitat evaluation: (1) the No Action Alternative assumed that no mitigation features would be instituted; (2) target years selected are sufficient to annualize HUs and to characterize habitat changes over the life of the mitigation project; (2) target species were selected based on mitigation location, habitat type, and management objectives; (3) 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; (4) water input to the system is solely reliant on precipitation, runoff, ground water, and seepage through/under the levee; and (5) Mississippi River level fluctuations would result in water level fluctuations within the mitigations site due to seepage through/under the levee.

The assumed number of years to desired output and assumed percent survival of vegetation plantings on an annual basis are presented in Table A-C-3 for each of the vegetation planting alternatives.

Table A-C-3. Assumptions for survival rates of vegetation plantings and time delay (years) to achieve fully functional mitigation site.

	Alternatives for Tree Plantings				Alternatives for Herbaceous Plantings	
	Balled & Burlap Seedling	Root Production Method Seedling	Bare Root Seedling	Broadcast Seeding	Live Plugs	Broadcast Seeding
% Planting Survival	0.8	0.9	0.5	0.4	0.8	0.2
Years to desired output	5	5	10	10	5	10

3. Mitigation Benefits.

For this analysis, the benefits of establishing or creating mitigation were calculated on a per acre basis by mitigation habitat type. These benefits are expressed as cumulative habitat units and average annualized habitat units for a 50-year project life. The WHAG evaluation matrix for non-wetland bottomland forest was used to generate benefits for both non-wetland bottomland forest and forested wetland because tree planting methods would not differ between these two habitat types. These benefits are presented in Table A-C-4.

Table A-C-4. Habitat benefits [expressed as habitat units (HUs) and average annualized habitat units (AAHUs)] generated on one acre by establishing vegetation at proposed mitigation site.

WHAG Habitat Type	Planting Alternative	Habitat Units (per acre)	Average Annualized Habitat Units (per acre)
Non-Wetland Bottomland Hardwood & Forested Wetland	Balled & Burlap & Root Production Method Seedling	2.88	0.59
	Bare Root Seedling & Broadcast Seed	1.99	0.39
Herbaceous Wetland	Live Plugs & Broadcast Seed	1.86	0.37

The WHAG habitat evaluation calculations are on file at the U. S. Army Corps of Engineers, St. Louis District.

4. Cost Effectiveness/Incremental Cost Analysis

A cost effectiveness analysis was carried out to determine the “best buy” options for establishing vegetation on the mitigation site (Table A-C-5). To conduct this analysis, estimated costs were developed on a per acre basis for the four tree planting alternatives and the two herbaceous planting alternatives. Since the methods for establishing tree plantings at non-wetland bottomland hardwood forest and wetland forest sites were considered to be the same, the costs for the tree planting alternatives at these two types of forested habitats were considered to be the same.

The costs included construction or initial planting costs (material, labor, equipment) and maintenance or replacement costs over the 10-year monitoring period. Replacement costs consist of replanting to ensure minimal plant survivability during the monitoring period, and these costs were included for each year of the assumed time period to desired output.

Table A-C-5. Estimated Annual Costs (per acre) to Establish Vegetation at Proposed Mitigation Site by Planting Alternative.

Year	Alternatives for Tree Plantings (per acre)				Alternatives for Herbaceous Plantings (per acre)		Type of Activity
	Balled & Burlap	Root Production Method Seedling	Bare Root Seedling	Broadcast Seed	Live Plugs	Broadcast Seed	
0	\$12,183	\$7,318	\$1,474	\$1,837	\$8,291	\$3,699	Construction
1	\$2,907	\$947	\$937	\$1,102	\$1,658	\$2,959	Maintenance
2	\$2,907	\$947	\$937	\$1,102	\$1,658	\$2,959	Maintenance
3	\$2,907	\$947	\$937	\$1,302	\$1,658	\$2,959	Maintenance
4	\$2,907	\$947	\$937	\$1,302	\$1,658	\$2,959	Maintenance
5	\$2,907	\$947	\$937	\$1,302	\$1,658	\$2,959	Maintenance
6	\$0	\$0	\$937	\$1,302	\$0	\$2,959	Maintenance
7	\$0	\$0	\$937	\$1,302	\$0	\$2,959	Maintenance
8	\$0	\$0	\$937	\$1,302	\$0	\$2,959	Maintenance
9	\$0	\$0	\$937	\$1,302	\$0	\$2,959	Maintenance
10	\$0	\$0	\$937	\$1,302	\$0	\$2,959	Maintenance
11-50	\$0	\$0	\$0	\$0	\$0	\$0	

Table A-C-5 displays a comparison of the construction and maintenance costs for the various planting alternatives over a 50-year project life. Initial and replacement planting costs for forested wetland and bottomland hardwood forest are displayed for the four tree

species planting alternatives, and for herbaceous wetland by the two herbaceous species planting alternatives. Table A-C-6 presents total estimated costs over a 50-year project life (net present value and average annual costs), as well as a comparison of the cost effectiveness of each of these alternatives. The net present value and average annual costs reflect an annual inflation rate of 4.125% for FY11.

The cost effectiveness analysis shows that the root production method seedling alternative is the “best buy” for establishing trees (\$891 AA cost per AAHU). For herbaceous wetland plantings, the live plug alternative is the “best buy” (\$1,931) AA cost per AAHU). Therefore the mitigation plan will incorporate these “best buy” alternatives for establishing vegetation on the proposed mitigation site.

Table A-C-6. Comparison of Estimated Total Costs (per acre) to Establish Vegetation at Proposed Mitigation Site by Planting Alternative.

Comparison Factor ¹	Alternatives for Tree Plantings (per acre)				Alternatives for Herbaceous Plantings (per acre)	
	Balled & Burlap	Root Production Method Seedling	Bare Root Seedling	Broadcast Seed	Live Plugs	Broadcast Seed
Net Present Value	\$24,088	\$11,061	\$8,668	\$11,483	\$15,028	\$26,462
Average Annual (AA) Cost	\$1,145	\$526	\$412	\$546	\$715	\$1,258
Average Annual Habitat Units (AAHU) ²	0.59	0.59	0.39	0.39	0.37	0.37
AA Cost/AAHU	\$1,941	\$891	\$1,057	\$1,400	\$1,931	\$3,401

¹ Based on 50-year project life

² From Table A-C-4

APPENDIX A-D
SECTION 404(b)(1) EVALUATION REPORT
APPENDIX TO ENVIRONMENTAL ASSESSMENT

LIMITED REEVALUATION REPORT
WOOD RIVER LEVEE SYSTEM
DESIGN DEFICIENCY CORRECTIONS
MADISON COUNTY, ILLINOIS



AUGUST 2011

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**SECTION 404(b)(1) EVALUATION REPORT
ON THE EFFECTS OF THE DISCHARGE OF DREDGED OR FILL MATERIAL
INTO WATERS OF THE UNITED STATES**

LIMITED REEVALUATION REPORT
WOOD RIVER LEVEE SYSTEM
DESIGN DEFICIENCY CORRECTIONS
MADISON COUNTY, ILLINOIS

I. PURPOSE OF THIS EVALUATION

This document presents a Section 404(b)(1) Guideline evaluation for Design Deficiency Corrections for The Wood River Drainage and Levee District, IL Flood Protection Project. This evaluation is based on the regulations found at 40 CFR 230, Section 404(b)(1): Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

The purpose of these Guidelines is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or fill material. Fundamental to these Guidelines is the precept that dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern. From a national perspective, the degradation or destruction of special aquatic sites, such as filling operations in wetlands, is considered to be among the most severe environmental impacts covered by these Guidelines. The guiding principle should be that degradation or destruction of special sites may represent an irreversible loss of valuable aquatic resources.

These Guidelines have been developed by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army acting through the Chief of Engineers under section 404(b)(1) of the Clean Water Act (33 U.S.C. 1344). The Guidelines are applicable to the specification of disposal sites for discharges of dredged or fill material into waters of the United States.

II. PROJECT DESCRIPTION

A. Location – Wood River Drainage and Levee District (Levee District) lies in southwestern Illinois, on the left bank of the Mississippi River flood plain, within Madison County, Illinois, between 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.

The drainage and levee district consists of three separate protected areas – Upper, Lower, and East-West Forks.

The Upper Wood River Drainage and Levee District originates near the intersection of Langdon and Front Streets (US highway 67) in Alton, Illinois, at Mississippi River mile 203. From this point the riverfront levee extends downstream past the Melvin Price Locks and Dam to the mouth of Wood River Creek at river mile 199.4 for a distance of about 5.2 miles. At this point the levee turns and proceeds upstream as a flank levee along the right descending bank of the Wood River Creek for 1.6 miles to the project terminus. About 1,641 acres of Mississippi River floodplain are protected by this portion of the levee system.

The Lower Wood River Drainage and Levee District originates at high ground on the left descending bank of the West Fork of Wood River Creek, 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 Creek. The levee then continues downstream along the left descending bank of Wood River Creek for 2.3 miles to the mouth of Wood River Creek 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 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. About 10,687 acres of Mississippi River floodplain are protected by this portion of the levee system.

The flank levee of the East-West Forks portion of the Wood River Drainage and Levee District is 2.68 miles long and occurs on the north side of the East and West Forks of the Wood River. About 428 acres of Mississippi River floodplain are protected by this portion of the levee system.

The Wood River levee system is part of a larger Metro East set of levee systems that includes the MESD and Chain of Rocks levees and the Prairie du Pont and Fish Lake levee system to the south. A drawing showing the MESD and Chain of Rocks flood protection system and the location of this system in the Missouri and Illinois region is shown on Figure A-D-1.

B. General Description

1. Area Subject to Section 404 Jurisdiction - Those portions of the project area that are considered to be a water of the United States, and therefore subject to Section 404 review requirements, include waterways bordering the project area, namely the Mississippi River, Cahokia Creek Diversion Channel, the East and West Forks of the Wood River, and Wood River Creek; the interior drainage system located on the protected side of the Wood River Drainage and Levee District levee system; open water areas located on the protected side of the levee system, and various herbaceous and woody wetlands located along the waterways bordering the exterior of the levee system,

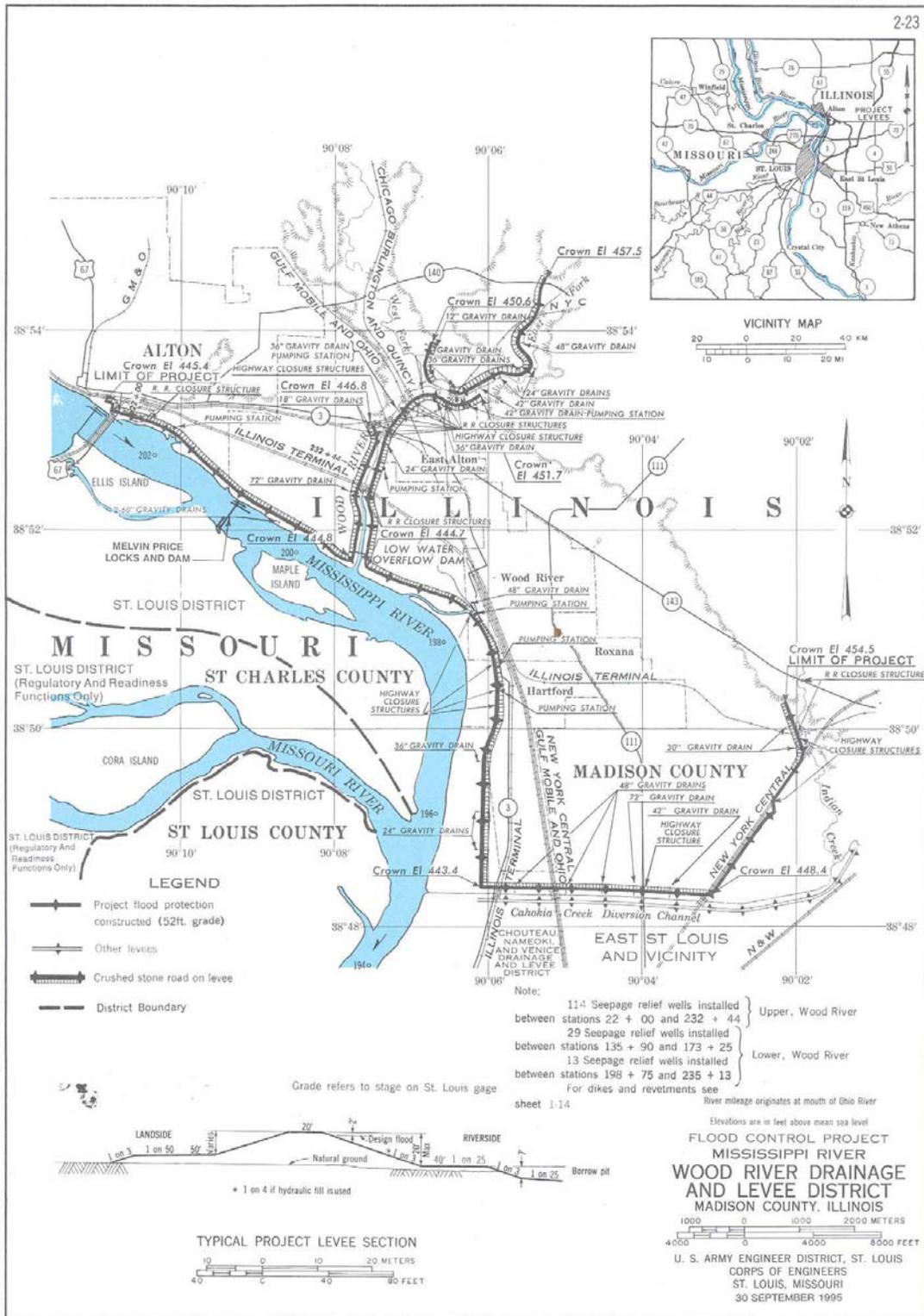


Figure A-D-1. Location of the Wood River Drainage and Levee District, IL Flood Protection Project.

along the interior drainage system, and occupying depressions within the levee protected area.

According to vegetation mapping conducted by the Illinois Natural History Survey under the Illinois Gap Analysis Program, remote sensing data obtained by satellite in 2000 revealed that about 723 acres of various wetlands were present within the 12,700-acre levee protected area. Wetland types and amounts occurring as of 2000 include shallow marsh/wet meadow (65 ac), deep marsh (43 ac), seasonally/temporarily flooded (74 ac), wet-mesic floodplain forest (16 ac), wet floodplain forest (404 ac), and shallow water (121 ac). The land cover data also included about 221 acres of open water.

Because this vegetation mapping was developed from remote sensing data on a 30 by 30 meter (98.4 by 98.4 feet) ground spatial resolution, it is not a mapping of wetlands subject to Section 404. Wetlands subject to Section 404 must exhibit positive indicators for hydric soils, wetland vegetation, and wetland hydrology, according to the Corps' wetlands delineation manual [U.S. Army Corps of Engineers-Environmental Laboratory (USACE-EL). (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1 (on-line manual), U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.], and wetland delineations must be performed on the ground. Nevertheless, the land cover data provide an acceptable representation of the project area's wetlands at a map scale of 100,000 or smaller.

Impacted jurisdictional wetland includes a 2.6 acre herbaceous wetland and a 0.3 acre forested wetland between levee station 613+70 and 623+80.

2. Proposed Project Features for Recommended Plan - The tentative recommended plan to correct deficiencies in the design of underseepage and through-seepage controls is summarized in Table A-C-1 below. The plan includes installation of 117 new or replacement relief wells, construction of approximately 1825 linear feet of seepage berms, construction of approximately 4000 linear feet of slurry trench cutoff wall, construction of 3 pump stations, construction of associated ditches and relief well collector systems; environmental and archeological mitigation work; utility relocations (not yet defined); and easements for berms; slurry trench cutoff wall staging areas and temporary equipment access areas along the levee, disposal areas for material excavated for the slurry trench cutoff walls, and a wetlands and bottomland hardwoods mitigation area.

Table A-D-1 – Summary of Main Features of Tentatively Selected Plan

Levee Reach	Relief Wells	Seepage Berms (linear ft)	Cutoff Walls to Bedrock (linear ft)	Cutoff Wall Shallow (linear ft)	Landside Clay Fill (linear ft)	Flowage Easement (acre)	Number of Pump Stations
Upper	0	0	0	2,875	0	0	0
Lower	94	815	2,910	1,060	1,010	9.9	3
Total	94	815	2,910	3,935	1,010	9.9	3

3. Authority and Purpose - 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.”

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. The purpose of this project is to solve 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. Construction of this pump station has been completed.

3.3. *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.

"Sec. 102. (a) The Secretary of the Army, acting through the Chief of Engineers, is authorized to replace locks and dam 26, Mississippi River, Alton, Illinois, and Missouri, by constructing a new dam and a single, one-hundred-and-ten-foot by one-thousand-two-hundred-foot lock at a location approximately two miles downstream from the existing dam, substantially in accordance with the recommendations of the Chief of Engineers in his report on such project dated July 31, 1976, at an estimated cost of \$421,000,000."

Wood River Levee System Reconstruction, Madison County, Illinois. Water Resources Development Act of 2007 (H.R. 1495), Section 1001. (20) authorized reconstruction of the system per the Chief of Engineers Report dated July 18, 2006.

The purpose of the study is to examine the need for and feasibility of modifications to the Wood River Drainage and Levee District, IL Flood Protection Project to correct design and construction deficiencies. The study examines alternative ways to correct design and

construction deficiencies, assesses the environmental impacts of the alternatives and the tentative recommended plan, discusses various reviews of the planning effort (including public review and Independent External Peer Review comments when they are received), and is expected to recommend a design deficiency correction project for implementation.

4. General Description of Dredged or Fill Material

(1) General Characteristics of Material (grain size, soil type)

(a) Fill Material - Fill materials include primarily sand to construct seepage berms. Topsoil located under the footprint of each seepage berm area would be stripped, stockpiled, and then replaced on top of the sand core to reestablish turf.

(b) Dredged Material - Dredged material is defined as material that is either dredged or excavated from waters of the United States. Material will not be dredged from the jurisdictional wetland.

(2) Quantity of Material - The quantities of materials displayed in the following table (Table A-C-2) will be handled for the construction of the seepage berm in the jurisdictional wetland:

Table A-D-2. Features of proposed berm impacting jurisdictional wetlands.

Levee Station Start - End	Seepage Berm		
	Cubic Yards of Fill	Linear Feet	Acres
Berm			
613+70 to 623+80	65,700	1010	4.3
Total	65,700	1010	4.3

No quantities have been determined for crushed stone which might be used at the discretion of a contractor to construct work pads for temporary access easement areas or relief well sites that might be soft or wet.

(3) Source of Material - Fill material consisting of sand for berms would be obtained from landside commercial suppliers; no dredging of sand from the river would be required. Crushed stone would be obtained from commercial quarries.

e. Description of the Proposed Discharge Sites

(1) Location - The location of the proposed feature and work is displayed on Plate 13, Appendix A-A that are part of the project's Limited Reevaluation Report. One proposed discharge site is located in waters of the United States consisting of wetlands. The need for an area for disposal of excess earthen material and several staging/stockpile

areas has not been identified. Although specific locations have yet to be identified, wetland sites will be avoided.

(2) Size (acres) and Types of Habitat - The proposed discharge sites that are considered to be waters of the United States occur at one location, totaling about 2.6 acres of emergent herbaceous wetland and 0.3 acres of forested wetland (Table A-C-3).

Table A-D-3. Direct Losses of Various Wetlands Habitats (in acres) by Project Feature for the Proposed Action

Feature and Location by Levee Station	Wetland	
	Emergent	Forest
Berms		
613+70 to 623+80	2.6	0.3
Total	2.6	0.3

(3) Type of Site (confined, unconfined, open water)

(a) Permanent Deposits of Dredged and Fill Material - All disposal (placement or construction) sites are for permanent deposits of dredged (excavated) and fill materials. These disposal sites will be unconfined.

(b) Temporary Deposits of Fill Materials - Temporary easement areas for access of heavy construction equipment are located adjacent to the levee on either side. If ground conditions within these easement areas are wet during construction, access may be facilitated by the contractor by placing either timber matting or crushed stone. The placement of any crushed stone would be unconfined.

(4) Timing and Duration of Discharge - The estimated duration of the construction period is assumed to be nine years (2014-2020). Construction would occur any time during the typical construction season over this period of time. Actual duration of discharges will only be a fraction of the total construction time.

f. Description of Disposal Method (hydraulic, drag line, etc.) - If any crushed stone would be needed for temporary access easement areas, this material would also be transported and dumped by trucks.

III. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations

1. Substrate Elevation and Slope. Natural ground elevations in the vicinity of the Upper Wood River levee where it ties into high ground near the Alton Argosy Casino is

about Elevation 430 feet NGVD. As you get closer to the Clark Bridge, the prevailing natural ground is between Elevation 425 and 426 NGVD. For the portion of the Lower levee located at the confluence of Wood River and the Mississippi River, the natural ground varies between Elevation 410 and 414 NGVD. For the portion of the Upper levee near Station 300+00 along the Mississippi River, the natural ground varies between Elevation 430 and 432 NGVD. At the south end of the Lower levee, on the portion perpendicular to the Mississippi River the natural ground varies from Elevation 426 to 424 NGVD. Towards the end of the Lower levee in the berm area, the natural ground varies between Elevation 430 to 432 NGVD. 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 (grain size). Soils within the project area consist of alluvial materials consisting of silts, sands, and clays. Alluvial material extending down to bedrock consists of various layers of these materials, primarily sands and gravels.

3. Dredged/Fill Material Movement. Materials placed on the protected side of the levee system will be subject to erosion forces related to the slope of the land. As none of the disposal (construction) sites will be confined (as with a cofferdam), all materials will have the potential to migrate downhill.

4. Physical Effects on Benthos (burial, changes in sediment type, etc.) Benthos (organisms that live on the bottom of water bodies) are found in the aquatic portions of the project area. No permanent aquatic areas with benthos will be affected by the project. Intermittently wetted jurisdictional wetlands totaling 2.9 acres located at reach 613+70 to 623+80 along the Lower levee would be lost to the construction of a seepage berm. Benthos present in this area will be destroyed by burial.

5. Other Effects No other effects are expected.

6. Actions Taken to Minimize Impacts The primary actions taken to avoid adverse effects on the substrate 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 (lateral movement) of fill or dredged materials.

B. Water Circulation, Fluctuation and Salinity Determinations

1. Water

a. Salinity Not applicable.

b. Water Chemistry No changes in water chemistry are anticipated.

c. Clarity No changes in water clarity are anticipated to any waterbodies, including the Mississippi River, Cahokia Creek Diversion Channel, the East and West Forks of the Wood River, or Wood River Creek.

d. Color No change is expected to any waterbodies.

e. Odor The recommended plan is not expected to have an impact on water odors in any waterbodies.

f. Taste The project is not expected to impact water taste of any waterbodies. The Mississippi River is a source for public and private water supplies in the St. Louis area.

g. Dissolved Gas Levels Construction activities associated with the project will not affect dissolved gas levels of any waterbodies.

h. Nutrients. Nutrients are not expected to be released to wetland or aquatic areas during the construction process. Sand used for berm construction is not expected to contain excessive levels of any nutrients.

i. Eutrophication. The project is not expected to contribute toward eutrophication of the water column in any aquatic areas.

j. Water Temperature Water temperatures are not expected to change in any aquatic areas.

2. Current Patterns and Circulation

a. Current Patterns and Flow. Project features located on the protected side of the levee system along the Upper, Lower, and East-West Forks levees will not have the potential to affect any current patterns or flow of any natural waterways.

b. Velocity. No changes in water velocities within natural waterways are expected.

c. Stratification. No stratification is expected to occur in any waterways or waterbodies.

d. Hydrologic Regime. The project will not directly or indirectly alter the seasonal or annual hydrologic regime of any adjacent waterways or waterbodies.

3. Normal Water Level Fluctuations (tides, river stage, etc.) The project will not directly or indirectly alter normal water level fluctuations of the Mississippi River, Cahokia Creek Diversion Channel, the East and West Forks of the Wood River, or Wood River Creek.

4. Salinity Gradients Not applicable.

5. Actions Taken to Minimize Impacts 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 (lateral movement) of fill or dredged materials.

C. Suspended Particulate/Turbidity Determinations

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site. Construction activities will not directly impact any permanent waterbodies. Wetland areas with intermittent surface water totaling 2.9 acres (2.6 acre emergent herbaceous, and 0.3 acres forested) along the Lower levee will be entirely lost.

2. Effects (degree and duration) 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. Decreases in light penetration of the water column are not expected.

b. Dissolved Oxygen. Changes in dissolved oxygen levels are not expected.

c. Toxic Metals and Organics. Toxic metals or organics are not expected at the site of expected wetland impacts (decision segment 613+70 to 623+80). However, contaminants are known to occur underground in the vicinity of decision segment 298+65-308+55 at Hartford. This segment is approximately 0.2 miles in length and approximately 400 feet from a known HTRW plume. Current drill-hole, IL IEPA monitoring information and plume maps indicate that the tentatively selected plan lies entirely outside the plume footprint and the plan is not expected to be impacted by HTRW sources. In addition, the plume is migrating away from the proposed wells at decision segment 298+65-308+55. Contamination in the plume area exists as both gaseous soil contamination and liquid petroleum products. A limited Phase II ESA is planned for August 2011 which will provide for the continuation of the Phase I ESA assessment and will identify the potential presence of petroleum related contaminants.

d. Pathogens. There is no reason to believe any pathogens exist in any of the proposed areas of construction.

e. Aesthetics. Aesthetics of work sites are likely to be temporarily adversely affected during construction, but are expected to improve with the establishment of vegetation after construction.

f. Water Temperature. No changes in water temperatures are expected to occur in the water column of any waterbodies.

3. Effects on Biota

a. Primary Production, Photosynthesis. No impacts to primary production and photosynthetic processes are expected to occur; the loss of about 5.0 acres of various vegetated habitats (wetland and nonwetland) is negligible compared to the approximately 951 acres of forested land and wetland land cover categories that occur within the levee protected area (under the Illinois Gap Analysis Program Land Cover Classification, as of 2000).

b. Suspension/Filter Feeders. No reduction in benthos production is expected in any waterbodies.

c. Sight Feeders. No temporary or permanent impacts to sight-feeders are expected in any waterbodies.

4. Actions taken to Minimize Impacts. Actions to minimize impacts associated with suspended particulates and turbidity include best management erosion control practices, such as the installation of silt fencing and straw bales around the perimeter of areas of ground disturbance, and the seeding of work areas following construction.

D. Contaminant Determinations. The project area contains no major sites of interest, which pose significant environmental concerns. The environmental records search as well as the site visit found minimal data suggesting environmental concerns to be present in the project area. No toxic metal or organics are known to occur at any proposed disposal site of fill material.

E. Aquatic Ecosystem and Organism Determinations

1. Effects on Plankton. No impacts on phytoplankton production are expected.

2. Effects on Benthos. No permanent aquatic areas with benthos will be affected by the project. Intermittently wetted jurisdictional wetlands totaling 2.9 acres located at reach 613+70 to 623+80 along the Lower levee would be lost to the construction of a seepage berm. Benthos present in this area will be destroyed by burial.

3. Effects on Nekton. The term "nekton" refers basically to larger, free-swimming aquatic organisms, such as fishes. No impacts on nekton are expected.

4. Effects on Aquatic Food Web. Construction activities are not expected to disrupt the aquatic food chain.

5. Effects on Special Aquatic Sites

a. Sanctuaries and Refuges. No sanctuaries or refuges will be affected by this project.

b. Wetlands. Construction activities are expected to impact a total of about 2.6 acres of emergent herbaceous wetland and 0.3 acres of forested wetland at reach 613+70 to 623+80 along the Lower levee. The affected wetlands are of low to moderate quality because they are generally small in area (fragmented), occur in close proximity to developed areas, support a low diversity of native plant species, and experience unnatural flood regimes because of their severed connection with the Mississippi River.

c. Mud Flats. No mud flats exist within any proposed discharge sites.

d. Vegetated Shallows. No vegetated shallows occur at any proposed disposal sites.

e. Coral Reefs. Not applicable.

f. Riffle and Pool Complexes. Riffle and pool complexes do not occur at any proposed discharge (construction) sites.

6. Threatened and Endangered 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 Wood River levee system (USFWS 2010). Six species listed for this county are applicable to the project area (Table A-C-4). There is no designated critical habitat within Madison County for any of these species.

Table A-D-4. List of Federally Endangered (E), Threatened (T), and Candidate (C) Species in the Vicinity of the Project Area.

Common Name (Scientific Name)	Status	Habitat
Least tern (<i>Sterna antillarum</i>)	E	Sparsely vegetated sand and gravel bars on large rivers (nesting)
Indiana bat (<i>Myotis sodalis</i>)	E	Caves, mines (hibernacula); small stream corridors with well developed riparian woods, upland forests (foraging)
Pallid sturgeon (<i>Scaphirhynchus albus</i>)	E	Large rivers
Decurrent false aster (<i>Boltonia decurrens</i>)	T	Disturbed alluvial soils
Eastern massasauga (<i>Sistrurus c. catenatus</i>)	C	Floodplain forests, marshlands, bogs, and old fields,

Eastern prairie fringed orchid (<i>Platanthera leucophaea</i>)	T	Mesic to wet prairies
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It is the St. Louis District's opinion that the proposed project will not adversely impact any of six the federally listed species that might occur in the project area, provided that conditions for the protection of the Indiana bat and decurrent false aster are implemented.

Because the proposed project requires a relatively small amount of tree clearing, field surveys of 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 as maternity roosts by the Indiana bat. If such trees are identified, tree felling will be restricted to the colder months when maternity roosting is known not to occur (1 September through 31 March) in accordance with guidelines established in the species' recovery plan.

With regard to the decurrent false aster, colonies or populations of this plant are not known from the Wood River levee district, including the levee reach adjacent to the Melvin Price Locks and Dam and the landside ponding area for the East Alton No. 1 pump station. 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 4-5 year before final measures would be implemented, field surveys for this plant will be conducted by the St. Louis District on the landside of 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.

7. Other Fish and Wildlife. Given the urban setting, a variety of animal species uses the area on the landside of the levee. 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.

8. Actions to Minimize Impacts. As required under Section 404 of the Clean Water Act, the direct impacts to about 2.9 acres of wetlands would require mitigation as compensation for these losses. A compensatory mitigation plan is included as part of the design deficiency correction project. The mitigation plan will also compensate for the loss of about 2.1 acres of nonwetland bottomland forest, as required by the Corps Planning Guidance Notebook. The plan will create 5.9 acres of mitigation area on Chouteau Island or in the vicinity of Horseshoe Lake (Madison County, IL). These direct losses, along with inclusion of this mitigation as part of the proposed action, would not have a significant impact on biological resources.

F. Proposed Disposal Site Determinations

1. Mixing Zone Determination. A mixing zone is that volume of water at a placement site or discharge site required to dilute contaminant concentrations associated with a discharge of dredged material to an acceptable level. The discharges of fill and dredged material will occur in areas without permanent water at the affected forested and herbaceous wetlands. Discharges in areas of permanent water will not occur. There is no need to develop a mixing zone determination for the discharge site since it lacks permanent water.

2. Determination of Compliance with Applicable Water Quality Standards. Section 401 water quality certification will be required from the Illinois Environmental Protection Agency. In addition, a Section 402 NPDES (National Pollutant Discharge Elimination System) permit will also be required from the IEPA. Effluent limitations guidelines and new source performance standards promulgated in 2009 by the U.S. Environmental Protection Agency to control the 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 prevention practices.

3. Potential Effects on Human Use Characteristics

a. Municipal and Private Water Supply. No municipal water supply will be adversely impacted by project construction.

b. Recreational and Commercial Fisheries. Commercial fishing activities occur in the Mississippi River at some distance from St. Louis, and recreational fishing occurs at many locations along the river. Because this project will not directly affect any river or waterbody, it is not expected to diminish fishing opportunities.

c. Water Related Recreation. Although water-related recreation is an important activity in the Mississippi River, the project will not impact this kind of recreation.

d. Aesthetics. Construction activities will have minor impacts on the aesthetic quality of the project area during the duration of the work. Noise and exhaust will be generated by heavy equipment during the construction process.

e. Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. The project will not impact any of these resources.

f. Determination of Cumulative Effects on the Aquatic Ecosystem. Past, present, and reasonably foreseeable future Corps activities in Pools 25 and 26 of the Mississippi River include 1) the navigation project, 2) channel maintenance work including maintenance dredging and dikes and revetments, 3) other existing EMP-HREP projects (Batchtown, Stag Island, Cuivre Island, Calhoun Point, Dresser Island), 4) existing bullnose dikes at Slim, Peruque, and Portage Islands (constructed under the

Avoid and Minimize Program), 5) and activities under the Navigation and Environmental Sustainability Program, including a dam point control study for Pool 25, design of lock expansion at Lock and Dam 25, and a fish passage study at Lock and Dam 26. Between these projects, there are no significant cumulative impacts on the aquatic ecosystem.

g. Determination of Secondary Effects on the Aquatic Ecosystem. No significant secondary impacts to the aquatic ecosystem have been identified.

IV. FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

A. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation. In this evaluation of discharges proposed as part of the Design Deficiency Corrections for the Wood River Drainage and Levee District, IL Flood Protection Project, the Environmental Protection Agency's Section 404(b)(1) Guidelines of 24 December 1980 were applied without significant adaptation.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. No practicable alternatives exist which meet the study objectives and do not involve discharge of fill or dredged material into waters of the United States. Alternatives for design deficiency corrections to underseepage and through seepage problems were considered, and these fell into three general kinds of solutions: seepage berms, relief wells, and cutoff walls or seepage blankets. For this project, these three kinds of solutions were evaluated at each levee reach with problems. Design requirements for each solution were developed, impacts on wetlands and nonwetland forest were identified, and total costs were developed for each solution, including any required for mitigation. The least cost alternative at each reach of concern was identified, and the proposed plan consists of the least cost alternatives for the entire levee system. Of the three kinds of solutions, seepage berms present the greatest potential for impacts to waters of the United States, whereas relief wells and cutoff walls in general present a lower potential. In all cases where impacts to wetlands are proposed, there is no practicable alternative that would avoid or minimize the placement of fill or dredged material into those affected wetlands.

C. Compliance with Applicable State Water Quality Standards. Water quality certification under Section 401 of the Clean Water Act and a Section 402 permit will be required from the Illinois Environmental Protection Agency. The certification's and permit conditions will be incorporated into the project's plans and specifications. Coordination of the proposed plan with the IEPA will be accomplished.

D. Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act. The proposed activities are not expected to violate the toxic effluent standards of Section 307 of the Clean Water Act.

E. Compliance with Endangered Species Act of 1973. The recommended plan is not expected to adversely affect any of the six federally listed endangered, threatened, or

candidate species or their critical habitat, provided that restrictions pertaining to the Indiana bat and decurrent false aster are imposed.

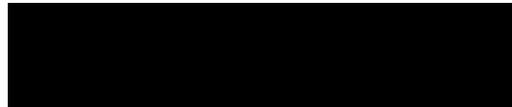
F. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972. Not applicable.

G. Findings of Significant Degradation of the Waters of the United States. The proposed project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Life stages of aquatic organisms and other wildlife would not be adversely affected in a significant manner. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values would not occur.

H. 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 through application of procedures contained in Subpart H of the Guidelines to insure minimal adverse effects of the proposed discharges.

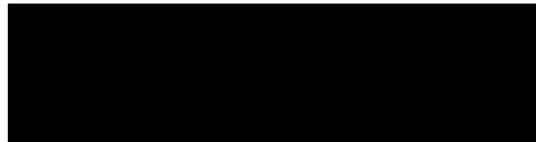
I. On the Basis of the Guidelines the Proposed Disposal Sites for the Discharge of Dredged and Fill Material. Based on this evaluation, the proposed Design Deficiency Corrections for the Wood River Drainage and Levee District, IL Flood Protection Project is specified as complying with the requirements of these guidelines with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

Prepared by:



Ecologist, Environmental Compliance
Branch, Regional Planning and
Environment Division North

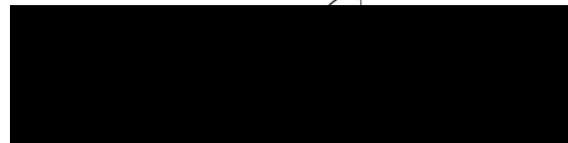
Approved by:



Chief, Environmental Compliance
Branch, Regional Planning and
Environment Division North

31 AUG 2011

Date



fol Colonel, U.S. Army
District Commander

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