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

8 December 2015

Regional Planning and Environment Division North
Environmental Compliance Branch

Dear Reviewer:

An electronic copy of the Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONS I) for the proposed project, *"Melvin Price Reach of the Wood River Levee Underseepage Design Deficiency Corrections Project,* located in Madison County, Illinois, is attached for your review. The EA was prepared according to the requirements of the National Environmental Policy Act, and serves to notify the public of the proposed project and requests assistance in identifying the probable environmental impacts of the project alternatives.

We invite your comments related to the content of the attached documents. Please note that the Draft Finding of No Significant Impact is unsigned. This document will be signed into effect only after having carefully considered comments received as a result of this 30-day public review. Please address your comments or questions to Dr. Teri Allen, of the Environmental Compliance Branch (CEMVP-PD-C), at telephone number (314) 331-8084, or e-mail at Teri.C.Allen@usace.army.mil, by close of business on 11 January 2016.

Sincerely,

Timothy K. George

Timothy K. George
Chief, Environmental Compliance Section

DRAFT
2ND SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
WITH
DRAFT FINDING OF NO SIGNIFICANT IMPACT

MELVIN PRICE REACH OF WOOD RIVER LEVEE
UNDERSEEPAGE DESIGN DEFICIENCY CORRECTIONS PROJECT
SUPPLEMENTAL REPORT
UPPER WOOD RIVER LEVEE
MADISON COUNTY, ILLINOIS

DECEMBER 2015

Prepared by:
Environmental Compliance Section
Planning and Environmental Branch
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Introduction

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, St. Louis District, has prepared this 2nd Supplemental Environmental Assessment (SEA) to document the environmental impacts associated with interim underseepage corrections implemented from 2010 to the present and to evaluate the environmental impacts associated with proposed permanent underseepage corrections to the Wood River levee adjacent to the Melvin Price Locks and Dam, in Wood River, Madison County, southwestern Illinois. The Wood River levee system is located along the east bank of the Mississippi River between river miles 195 and 203 above the Ohio River. This urban design levee system is across the Mississippi River from St. Louis and St. Charles counties in Missouri, just upriver of the City of St. Louis (Figure EA-1). The Melvin Price Locks and Dam is located about 2 miles below Alton, Illinois, in Madison County, Illinois, and St. Charles County, Missouri, at Mississippi River mile 200.78, between the mouth of the Illinois and Missouri rivers (Figure EA-2).

This 2nd 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 1976 Environmental Impact Statement prepared for the Melvin Price Locks and Dam that replaced Locks and Dam No. 26 at Alton (USACE, 1976).

The Wood River levee system provides protection 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. In addition to providing protection from river flooding, 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 Locks and Dam two miles downriver and raised the height of the navigation pool on the intervening stretch of the existing levee (Figure EA-3). The increased seepage in this levee reach necessitated the construction of a new pump station and other related features in this vicinity in the late 1980s.

In 2010, the St. Louis District identified uncontrolled seepage in this upper reach of the Wood River levee adjacent to the locks and dam (Figure EA-4). Alternative solutions to correct the problem in this reach of the Wood River levee were the focus of a Project Completion Report completed by the St. Louis District in 2012. The plan recommended in that report consisted of 4,700 linear feet of slurry trench cutoff wall and 55 new relief wells. Design of these features was initiated in Fiscal Year (FY) 2013 and the first phase included pump tests and subsurface exploration. These efforts produced new information that indicated a different solution was needed than what had been recommended in the 2012 report. As a result, it was determined that a Supplemental Report would need to be prepared to document the revised solution. The Supplemental Report is scheduled to be completed in 2016 and will serve to identify a recommended permanent underseepage corrections plan for federal funding.

Figure EA-1. Wood River Levee System with Mel Price Reach.

Figure EA-2. Photograph of the Study Area.

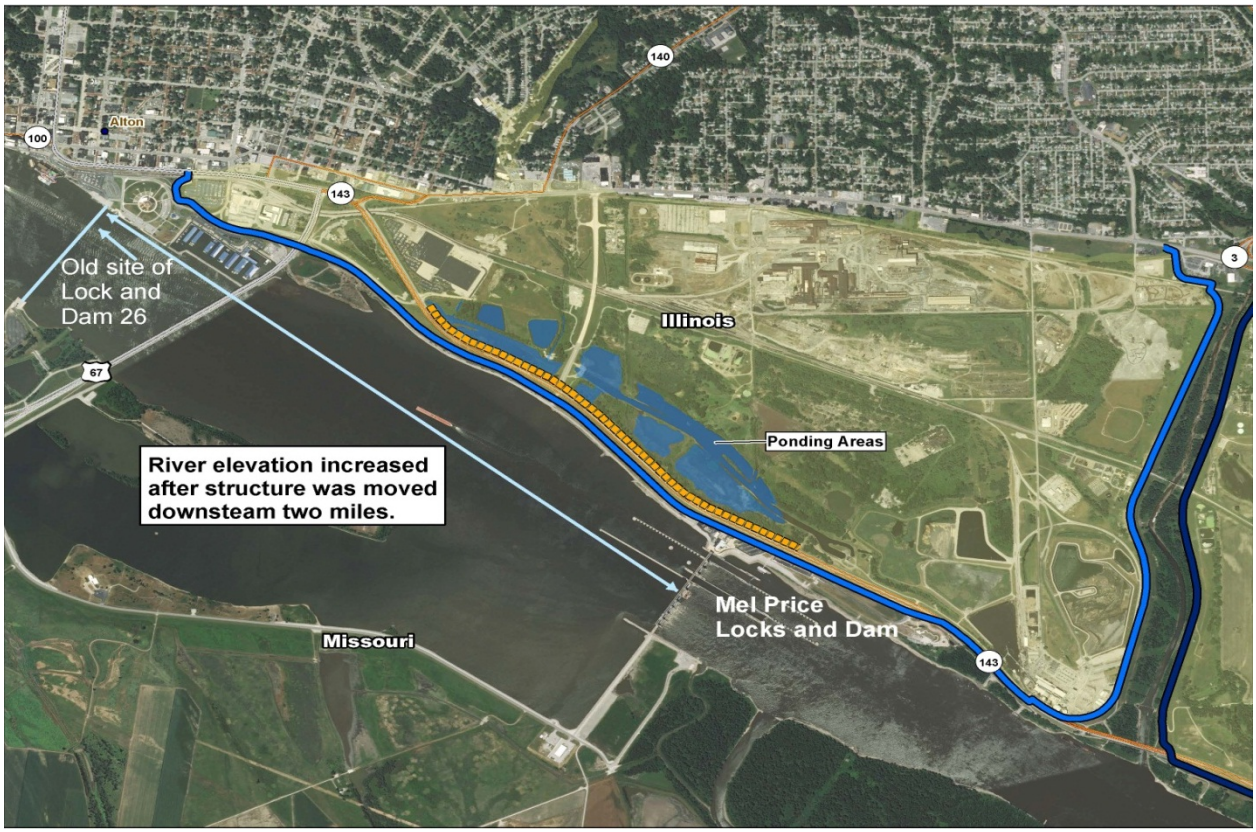

Figure EA-3. Mel Price Location in Relation to Old Lock and Dam 26 Site.

Figure EA-4. Aerial Photograph of the Seepage Concern Areas.

The St. Louis District has also identified underseepage problems at other locations within the Wood River levee system not adjacent to the locks and dam. Alternative solutions for correcting the seepage problems at these additional locations have been documented in a separate report and potential environmental impacts have been described in a separate Environmental Assessment; these documents were completed in 2011.

Description of Wood River Drainage and Levee District

The Wood River levee system (Figure EA-1) is an urban levee design that protects approximately 12,700 acres, 200,000 inhabitants and over $1 billion in property assets. Construction of the system was completed in the 1950s. The system provides protection against a river elevation equivalent to a stage of 54 feet on the St. Louis Mississippi River gage (standard project flood). 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 (Figures EA-1, EA-3) 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 primary problem facing the Upper Wood River Levee adjacent to the Melvin Price Locks and Dam is that uncontrolled underseepage currently puts the levee at an intolerable level of risk. The current relief wells are improperly designed and inadequately control underseepage up to the project flood. Uncontrolled underseepage and conveyance of earthen materials that form the foundation of the levee are occurring, and the potential for levee failure is a major problem.

Specifically, the low, marshy area located landside of the levee extending about 3,500-feet upstream from the centerline of the Melvin Price Locks and Dam exhibits heavy seepage of groundwater under the levee and displays very soft ground conditions. Wood River Drainage and Levee District and Corps officials first observed many large, flowing seeps (3 to 5 inch diameter and at least 6-feet deep) during the summer of 2009 while the Melvin Price pool was at or near its normal elevation of 419 feet.

1.2 Authority for the Proposed Action

The Melvin Price Locks and Dam project was authorized by 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.

"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."

1.3 Prior Studies, Reports, and Related Water Projects

Melvin Price Locks and Dam Project

Final Environmental Statement, Locks and Dam No. 26, Mississippi River, Alton, Illinois. Volume 1, to accompany the final report of the Chief of Engineers. Department of the Army, Office of the Chief of Engineers, Washington, D.C. 20314. Dated July 1976. The EIS addressed the impacts of the project for identified significant resources of the study area. The study area includes the Upper Mississippi River System. This area is composed of nearly 1,300 commercially navigable miles of the Upper Mississippi, Illinois, Kaskaskia, Black, St. Croix, and Minnesota Rivers. Bordering states include Illinois, Iowa, Minnesota, Missouri, and Wisconsin.

Supplemental Appropriations Act, 1985. Public Law 99-88 dated January 3, 1985, authorized the second lock at the Melvin Price Locks and Dam Project.

Water Resources Development Act 1986. Public Law 99-662 dated November 17, 1986, authorized the construction of the second lock at Melvin Price Locks and Dam.

Water Resources Development Act 1990. Public Law 101-640 dated November 28, 1990, provided authority to provide project-related recreational development at the Melvin Price Locks and Dam subject to cost sharing with the state of Illinois.

Water Resources Development Act 1992. Public Law 102-580 dated October 31, 1992, provided authority to construct the visitor center at the Melvin Price Locks and Dam.

Water Resources Development Act 1996. Section 322 of WRDA 1996 modified the Melvin Price Locks and Dam authorization.

Wood River Levee

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 and 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.

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 Final General Reevaluation Report of March 2006. Finding of No Significant Impact signed July 27, 2005.

Final General Reevaluation Report, Wood River Levee System Reconstruction Project, Wood River Levee System, Madison County, Illinois, dated March 2006. This report recommends rehabilitation of the levee system 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.

Supplemental Environmental Assessment, Wood River Levee System Limited Reevaluation Report For Design Deficiency Corrections Project, Madison County, Illinois, August 2011. The document described potential impacts associated with construction of underseepage and through-seepage controls including 94 new relief wells; grouting 83 existing wood stave relief wells; ditching; two 25 cfs pump stations and one 20 cfs pump station; 815 linear feet of seepage berms; 1,010 linear feet of landside clay fill; slurry trench cutoff walls at three locations totaling 6,845 linear feet of; archeological mitigation work; and wetland and bottomland hardwood mitigation areas. Finding of No Significant Impact signed August 31, 2011.

Supplemental Environmental Assessment, Melvin Price – Wood River Levee Underseepage Project, Project Completion Report, Madison County, Illinois, August 2012. The document described potential impacts associated with implementation of interim underseepage control measures, and construction of 4,700 linear feet of slurry trench cutoff wall, 55 new relief wells, grouting of 80 existing relief wells, removal of existing headwalls and grouting of 42 existing outlet pipes, and grouting of two abandoned utility lines. Finding of No Significant Impact signed June 10, 2012.

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

The issue of uncontrolled underseepage and conveyance of material under the Wood River levee adjacent to the Melvin Price Locks and Dam was first discovered in July of 2009, but when this condition first developed is unknown. However, it appears to have persisted for a significant time. Additionally, the degree of deterioration of the levee foundation is unknown.

Available Lidar ground surface elevation data for the study area extends landward about 700 feet out from the toe of the Upper Wood River levee. It extends more or less up to the ditch that drains to the East Alton No. 1 pump station, and encompasses roughly half of the pump station's ponding area. Additional ground surface data of lesser accuracy was used to delineate the entire ponding area at various ponding elevations. There is some degree of error in the delineations of ponding areas at one to two-foot increments. That error has introduced some uncertainty into the description of the relationship of various existing natural resources within the ponding area with topography, and the effect of standing water at various ponding elevations on natural vegetation.

All water elevations described in this document are referenced to the NGVD 29 vertical datum; all land elevations are referenced to the NAVD 88 vertical datum; at the project area, the difference between these two vertical datums is approximately one-tenth of one foot.

2.0 ALTERNATIVES

This section describes the temporary or interim risk reduction measures that were implemented in early 2010 and used to the present time to control seepage under the levee embankment of the Upper Wood River levee adjacent to the Melvin Price Locks and Dam (52+50 to 126+00, from upriver to downriver as defined by levee stationing).

This section also describes the need for final risk reduction measures to be implemented to permanently control seepage in this levee reach, presents the formulation and evaluation of final alternatives, and lastly presents the proposed permanent solution.

No Action Plan. In this document, the No Action alternative assumes that no action at all, temporary or permanent, would be taken to control underseepage along the reach of the Upper Wood River levee adjacent to the Melvin Price Locks and Dam. The No Action alternative is required to be addressed by NEPA in order to establish a baseline against which the effects of various actions can be compared.

Under this No Action scenario, the Levee District would continue to perform its operation and maintenance responsibilities and maintain its standing in the Public Law (P.L.) 84-99 program, but no Federal action outside of the P.L. 84-99 program would be taken. P.L. 84-99 is the authority by which the Army Corps of Engineers responds to emergencies. Under this law these authorities are delegated to the Corps Districts for disaster preparedness, emergency operations, rehabilitation of flood control works threatened or destroyed by flood, emergency water supplies and drought assistance, advance measures and hazard mitigation. The Levee District's operation and maintenance responsibility does not address this underseepage concern. Nothing would be done to

take care of the current relief wells that are improperly designed and inadequately control underseepage up to the project flood. Uncontrolled underseepage and conveyance of earthen materials that form the foundation of the levee would continue to occur, and the levee foundation would continue to deteriorate. The Wood River levee system would remain uncertified by FEMA. NOTE: In the Supplemental Report for this project, the No Action alternative assumes that no action would be taken to implement a permanent underseepage solution. The interim risk reduction measures, described in detail below, would remain in effect indefinitely into the future. The focus of the Supplemental Report is on the formulation, evaluation, and comparison of alternative to permanently control underseepage.

In contrast, as stated above, in this document the No Action Alternative does not include any action to address the underseepage problem. The focus is on clearly describing and assessing as separate actions the environmental effects of the interim risk reduction measures as well as final or permanent alternatives to control underseepage. The first SEA prepared in 2012 for this project characterized the temporary underseepage measures as an after the fact action, and the assessment of temporary effects was based on a two year period of implementation (2010-2012). In this 2nd SEA, the assessment of effects is based on five years of implementation (2010-2015).

2.1 Interim Risk Reduction Measures – Implemented from 2010 to Present Time

After the underseepage problem was discovered in 2009, interim risk reduction measures were identified and implemented in early 2010 to help control underseepage and reduce risk until a permanent solution is implemented. Because these measures require operation during flood events, the measures are collectively called the "Interim Operations Plan" or IOP. The IOP consists of progressive actions to help control underseepage as the river rises. The plan has two major phases: ponding water on the interior of the levee for lower flood events, followed by ponding plus airlifting the existing relief wells for higher flood events. The planning of these measures and their implementation to date has been coordinated periodically with the Wood River Drainage and Levee District and City of Alton officials starting in the fall of 2009.

Ponding – water ponded on the interior of the levee resides in the designated detention area of the East Alton Pump Station. This ponding helps control underseepage by minimizing the head differential between the river and the landside of the levee (Figure EA-5). Per the operation of the existing East Alton Pump Station, the levee district is required to have flowage easements up to approximately elevation 415 NGVD.

Dikes – because two combined sewer overflows (CSO) from the City of Alton empty into the ponding area and have weir elevations below 415, two temporary dikes (A and B) were constructed in April 2010 in front of the CSOs to prevent ponded water from back-flooding the sewers (Figure EA-6). A third dike (C) was also constructed at the same time; this dike is hydraulically transparent and was built to allow ponding up to elevation 415, when required. The rock dikes will be kept in place until final risk reduction measures are implemented, and then they will be removed.

- Dike A constructed to elevation 415.0 feet NGVD with 10' notch at elevation 412.0 feet NGVD with one 48" sluice gate. Footprint approximately 0.05 acre.

- Dike B constructed to elevation 415.0 feet NGVD with two 48" sluice gates. Footprint approximately 0.15 acre.
- Dike C constructed to elevation 411.0 feet NGVD with 10' notch at elevation 410.0 feet NGVD with one 48" sluice gate. Footprint approximately 0.6 acre.

When water is allowed to rise to elevation 415 on the interior, water has to be pumped to bypass the two dikes. One pump has been purchased and is located onsite at one dike; a bypass pump is rented for the other dike when the interior water gets high enough.

Piezometers and Rock Walkways – in 2010 three rows of piezometers were installed in the ponding area (project stations 66+10, 95+80, and 112+30) to allow for the monitoring of groundwater conditions (Figure EA-6). Wooden pallets were initially placed along these transects to facilitate the collection of data where the ground was either muddy or inundated. The pallets deteriorated and more durable rock walkways consisting of crushed stone were constructed in late 2014 (three were constructed, although five were planned). The walkways will be kept in place until final risk reduction measures are implemented, and then they will be removed.

Direct observation of groundwater seeps (sand boils) and monitoring of piezometers in the area indicate that underseepage is adequately controlled when the head differential between the river and the interior is limited to 11 feet. Because the dikes allow ponding up to elevation 415, ponding water effectively controls underseepage up to a river elevation of 426 feet NGVD (415+11=426).

Airlifting with Portable Air Compressors – when the river upstream of the lock and dam rises above elevation 426, the IOP calls for airlifting the existing relief wells. Airlifting consists of pumping compressed air down into the relief wells using portable compressors. The compressed air increases the flow of water out of the wells, which provides a reduction in underseepage pressure. Portable air compressors are placed temporarily along the edge of Illinois Highway 143 and they operate around the clock. Typically four wells are served by one air compressor, such that about 18 air compressors are needed for all 70 wells. Through 2015, airlifting has been implemented two times; both events occurred during the flooding of late spring and early summer of 2013.

Pump Pads and Portable Pumps – centrifugal pumping of the 70 relief wells along the landside levee toe was the last graduated response under the IOP, and would occur when river levels are at their highest. One portable pump was to be placed alongside each of the 70 existing wells (Figure EA-6). A pump pad consisting of crushed stone would be needed to support each pump. About 35 pads were constructed along the landside embankment of Illinois Highway 143 in mid-2014. Through 2015, the use of portable pumps has not been called for. The remainder of the pads will not be installed. A recent reanalysis of underseepage conditions has indicated that this measure is not necessary at the highest river levels, as ponding with airlifting would be sufficient to reduce underseepage pressures. The existing pump pads will be kept in place until final risk reduction measures are implemented, and then they will be removed.

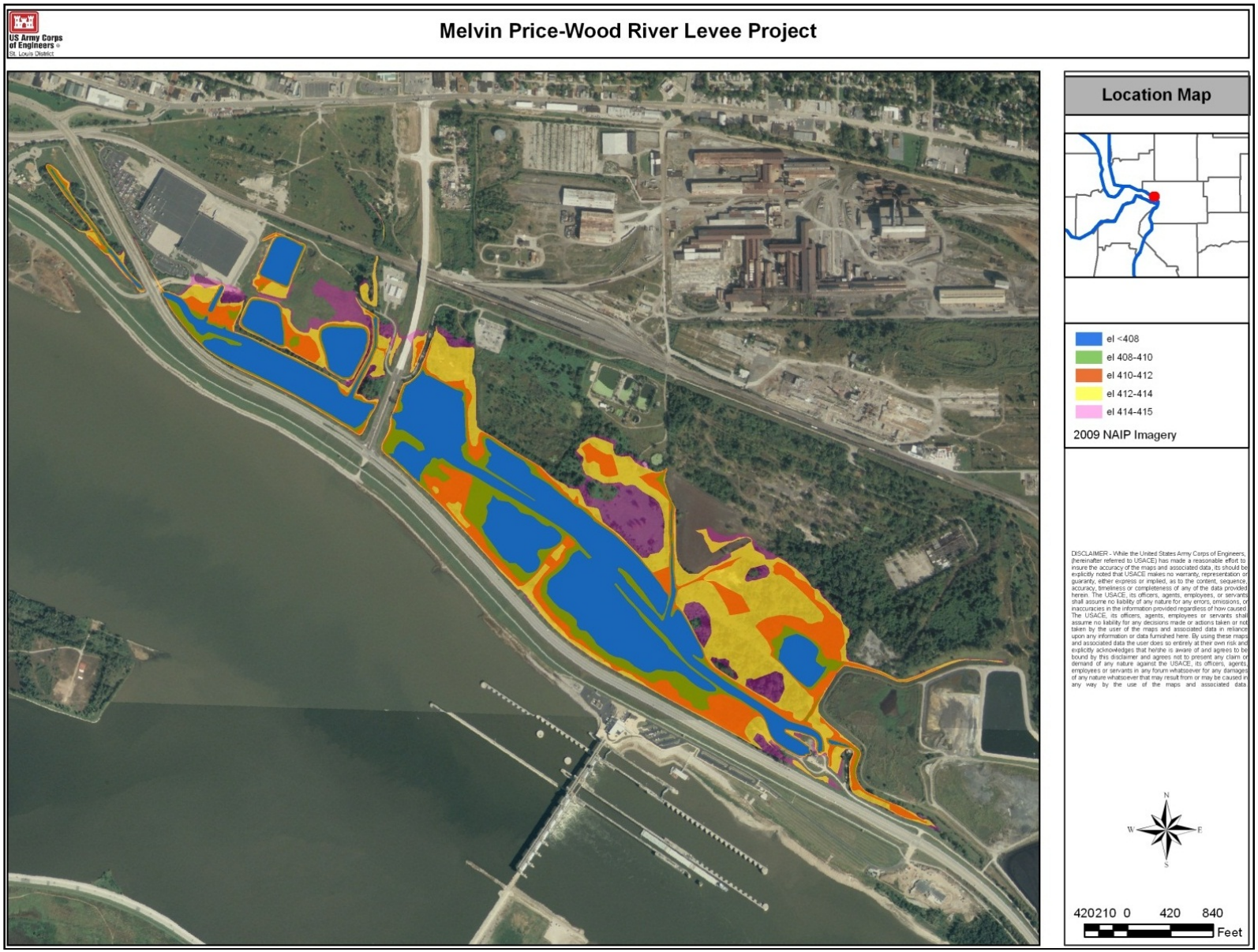

Figure EA-5. Interim Risk Reduction Measures – Extent of Surface Ponding at Various Elevations.

Figure EA-6. Interim Risk Reduction Measures – Location of Features.

It is assumed that the IOP will continue to be operated until a more permanent solution is implemented. While the IOP does provide better underseepage control during flood events, it is very expensive and can adversely impact relief wells that are over 60 years old. For example, the two 2013 flood events cost over $2 million and airlifting damaged 6 relief wells.

2.2 Final Risk Reduction Measures

2.2.1 Planning Objectives

The overarching goal of this study is to identify the design deficiency correction that allows the project to function as intended in a safe, viable, and reliable manner. The primary objective of the study is to develop a risk-informed plan that will decrease the risk to life and property within the study area.

2.2.2 Plan Formulation

Background. Seepage under a levee can be controlled permanently by a variety of measures. Seepage through the main aquifer under a levee can be controlled by 1) landside relief wells, 2) seepage berms (generally landside), 3) cutoff walls (generally near the riverside levee toe or at the levee centerline), and 4) measures to increase the distance between the levee and the point where flood water is introduced to the aquifer (examples: placing a clay cap on riverside land, making a creek bottom impervious where it is directly connected to the aquifer). The first three of the above options are applicable to the project site conditions and are described below:

Seepage Berms. This measure would construct a seepage berm using sand dredged from the Mississippi River. The berms would extend from the existing relief well line beyond the existing landside drainage ditch.

Relief Wells. This measure would construct relief wells with outlets at lower flow lines to provide the necessary underseepage protection for the river elevations ranging between normal pool and maximum project flood.

Slurry Trench Cutoff Walls. This measure would construct a fully penetrating slurry trench cutoff wall. The cutoff wall would consist of a three foot wide trench extending from the riverside surface of the levee near the toe down to the top of bedrock. A cement-bentonite slurry would be pumped into the trench to make the wall.

Because the underseepage problem area along the levee can be regarded as consisting of three distinct sections (55+00 – 80+00, 80+00 – 99+50, 99+50 – 126+00, from upriver to downriver as defined by levee stationing), combinations of these plans could also be considered.

Previous Alternatives Formulation and Screening. In the 2012 Project Completion Report, the above measures were evaluated to develop alternative plans to permanently address the underseepage problem. At the time, it was assumed that all action alternatives were equally

effective in reducing flood risk and economic damages. These five action alternatives are described in the following paragraphs.

Seepage Berms Only. Landside seepage berms were evaluated using the results of a calibrated Seep/W model at the three piezometric lines (project stations 66+10, 95+80, and 112+30). The St. Louis District anticipated that berm construction would be built of sands and silty sands dredged from the Mississippi River and hauled into the construction site. These dredged sands and silty sands should easily meet the assumptions implicit in the berm analyses and would meet the requirements for landside seepage berm construction. The berm thickness and width are designed to meet current Corps criteria as outlined in EM1110-2-1913 – Design and Construction of Levees, ETL 1110-2-569 – Design Guidance for Levee Underseepage, and DIVR 1110-1-400, Section 8, Part 6, Landside Seepage Berms for Mississippi River Levees.

Relief Wells Only. At each section, required well spacing was determined utilizing an Engineer Research and Development Center (ERDC) developed method that merged the 2D Seep/W analyses with the Mansur-Kaufmann partially penetrating well solution. The flow lines of the wells was set at elevation 406 and assumed to have landside ponding to elevation 410. The design flood was set in place. In order to meet current Corps criterion - a Factor of Safety (FS) equal to 1.6 midway between the relief wells - the solution required well spacing of 50-feet at station 66+10 and well spacing of 35 feet for stations 95+80 and 112+30, resulting in the need for 237 relief wells.

Slurry Trench Cutoff Wall Only. The St. Louis District completed seepage analyses of a fully penetrating slurry trench cutoff wall using the calibrated seepage model. The cutoff wall was modeled as a three-foot wide trench extending from the surface riverside of the levee down to the top of rock. The wall would extend from approximately levee station 52+50 to 126+00. The seepage model shows that all head losses between the river side and landside occur through this trench resulting in no excess head landside of the trench. The St. Louis District completed global stability analyses of the trench to ensure that its installation would not threaten the integrity of the existing Wood River levee. The stability analyses were completed with Slope/W using Spencer's method of analyses. All Factors of Safety exceeded 1.30 for slurry unit weights of 80 to 90 pounds per cubic foot.

Seepage Berm and Relief Well Combination. This alternative would construct a seepage berm in combination with relief wells. Depending on the reach, the berm length would range from 150 feet to 250 feet and the well spacing would range from 45 feet to 100 feet. There are many combinations of seepage berm width and relief well spacing that can be utilized to meet Corps' criteria for seepage gradient at the berm toe. In this case, one trial utilizing a 150-foot wide berm was analyzed at each of the three piezometer lines using the calibrated Seep/W model. This width corresponded to the traditional minimum seepage berm in use within the Mississippi Valley Division. At each section, required well spacing was determined utilizing an ERDC-developed method that merged the 2D Seep/W analyses with the Mansur-Kaufmann partially penetrating well solution, resulting in the need for 41 relief wells spaced 50 feet apart.

Slurry Trench Cutoff Wall and Relief Well Combination. This alternative utilizes the Slurry Trench Cutoff Wall measure described above between approximately levee stations 80+00 and 126+00. Between levee stations 52+50 and 80+00, approximately 46 relief wells would be installed because their spacing would be equal to or greater than 50 feet.

The above alternatives from the 2012 report were determined based primarily on a design requirement to meet a factor of safety of 1.6 for vertical gradient. During the preliminary screening process, the study team determined that the close spacing of relief wells (less than 50 feet apart) between stations 95+80 and 112+30 for the Relief Wells Only alternative was not technically advisable. After consulting and confirming this concern with other experts in relief well design, the study team eliminated the Relief Wells Only alternative from further consideration. Additionally, the preliminary estimate for the Slurry Trench Cutoff Wall Only alternative was $46 million while the cost of the Slurry Trench Cutoff Wall with Relief Wells alternative was estimated to be $34 million. The study team determined the two alternatives did not differ significantly in cultural or environmental effects or reliability. The primary difference was the somewhat higher operations and maintenance requirements for the combination alternative, which the study team determined would be easily offset by the cost savings in the initial investment. Therefore, the Slurry Trench Cutoff Wall Only alternative was screened from further consideration.

The final array of alternatives in the 2012 report consisted of 1) a slurry trench cutoff wall with relief wells, 2) berms with relief wells, and 3) berms only. The justification for the recommendation in the report was based on economics, which meant that the plan with the greatest net economic benefits was the default recommendation. Because all alternatives were assumed to be equally effective at controlling underseepage and none had significant environmental effects, a plan was selected based on which plan had the lowest estimated total cost. The plan that had the lowest estimated cost at that time and that was the recommended plan in the report was the Slurry Trench Wall with Relief Wells.

Post-LRR Data Gathering and Plan Revision. After the 2012 Project Completion Report was approved, the St. Louis District completed a series of pump tests on existing relief wells to help refine the Interim Operations Plan. These pump tests were completed between June and November of 2012 on multiple existing relief wells using pumps of varying capacity. The information gathered from the pump tests was analyzed to determine the aquifer permeability. Permeability values used in the 2012 report were based on published relationships between the D10 size of the aquifer sand and its permeability. This relationship is published in EM 1110-2-1913 “Design and Construction of Levees.” The aquifer permeability values determined from the pump tests were on average 1.5 times higher than originally assumed for the LRR. This change in condition was incorporated into the seepage analysis of the recommended plan (Slurry Trench Wall with Relief Wells).

At the time of this analysis, it was still assumed that a factor of safety of 1.6 for vertical gradient needed to be met in order to be an acceptable solution. The revised analyses showed that the required factor of safety could not be achieved with relief wells spaced at 50 foot centers as recommended in the 2012 report. The greater measured aquifer permeability would require

relief well spacing smaller than 50 feet. As previously discussed, relief well spacing of less than 50 feet is not technically advisable. Since the 2012 recommend plan component of relief wells spaced at fifty feet no longer met the required factor of safety and could not be spaced any closer, it was determined that the 2012 recommended plan needed to be modified in order to identify a plan that could meet the factor of safety requirements.

Using the higher permeability value, the team reevaluated the original array of alternatives from the 2012 report. The results of this analysis determined that the screening of the Relief Wells Only alternative was still valid. Additionally, the Berms with Relief Wells alternative was no longer viable due to the same concerns about relief well spacing. Lastly, the Slurry Trench Cutoff Wall Only alternative was reevaluated since it had only previously been screened out due to cost. These changes, along with the elimination of the Slurry Trench Cutoff Wall with Relief Wells alternative, resulted in two action alternatives to be considered: Seepage Berms Only, and Slurry Trench Cutoff Wall Only.

The cost estimates for both of these action alternatives were updated with the most current information. In order to meet a factor of safety of 1.6 with the new permeability information, the seepage berm had to be extended further to the landside of the levee. The cutoff wall estimate was updated to account for the extension of the wall to the whole reach as well as to account for new subsurface information that would affect the construction costs. During the initial design work for the cutoff wall with relief wells plan, subsurface exploratory borings down to bedrock were conducted along the riverside toe of the levee as well as along the centerline. These borings showed that a thick cobble and boulder zone is present about 50 feet below the ground surface throughout the area. The presence of these large rocks drove up the estimated construction costs of the cutoff wall.

The updated cost estimates of the seepage berm only and cutoff wall only alternatives were $151.6 million and $143.0 million, respectively. Because of the very high cost estimates for both potential solutions, it was determined that a permanent solution to the underseepage problem should be based on the total risk to the levee instead of being driven solely by the design criteria. Additionally, the 1.6 factor of safety is generally recommended to prevent the initiation of uncontrolled underseepage. In this specific situation, uncontrolled underseepage has been already observed and is a known condition, so the recommendation should focus instead on cost-effective ways to reduce the risk to tolerable levels. In consultation with the Engineering and Construction Office at Corps Headquarters along with the Risk Management Center (RMC), it was determined that a limited baseline condition risk assessment analysis (BCRA) should be conducted to better characterize the total risk. In consultation with the Engineering and Construction Office at Corps Headquarters along with the RMC, it was determined that a limited BCRA should be conducted to better characterize the total risk.

This total risk includes the anticipated performance of the levee during flood events as well as the consequences associated with non-performance. While the 2012 report recommendation was based on a solution that maximized net economic benefits, the recommendations in the 2016 Supplemental Report are informed by the risks identified in the limited BCRA and the goal of reducing the risk to tolerable levels. This risk-informed decision methodology is in line with the

criteria described in ER 1110-2-1156 (Safety of Dams – Policy and Procedures) as well as current levee safety practices.

2.2.3 Final Array of Alternatives

The risk assessment indicates that this levee is subject to a relatively moderate, actionable risk. This characterization is a result of a combination of a relatively high annual probability of failure (APF) associated with the primary risk driver (underseepage) and relatively small life safety consequences. Because of this risk profile, a plan that reduces the APF (and therefore overall risk) to a tolerable level with reasonable costs will meet the objectives of this study.

Because the cutoff wall has a lower cost estimate than the seepage berm, the seepage berm was eliminated from further consideration. As the least cost plan that meets all Corps design criteria, the fully penetrating cutoff wall remained in consideration for planning purposes. The analysis performed during the limited BCRA demonstrated that relief wells can provide adequate underseepage controls, even if the spacing and design of those wells does not result in a factor of safety of 1.6 for vertical gradient. As a result, the team re-evaluated a relief well-only solution as an alternative to the cutoff wall.

This relief well plan would replace the existing wells with new, stainless steel wells with lower discharge elevations. In addition, the team investigated increasing the number of relief wells from the 70 existing wells. The team looked at various scenarios and spacing; the analysis included seepage analysis for both vertical and horizontal gradient as well as interior drainage analysis. After this analysis, the team determined that 100 wells with an average spacing of 65 feet and an outlet elevation of 409 could provide reduce the risk to a level below the tolerable risk reference line without requiring construction of a new pump station.

As part of the Interim Operations Plan, some wells needed to be replaced immediately. This relief well plan will take into account any new wells constructed for the Interim Operations Plan so the final number will likely be less than 100. Limiting the number of new wells will allow the existing pump station to handle the increased flow.

2.2.4 Plan Comparison

The final array of alternatives for consideration in the Supplemental Report to be completed in 2016 includes the No Action Plan, the fully-penetrating cutoff wall only plan, and the relief well only plan. These alternative plans were evaluated and compared. Construction and operation and maintenance costs were estimated to allow for cost comparison. A screening was conducted of the alternative plans 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 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.

Figure EA-7. Cutoff Wall Alternative.

Figure EA-8. Relief Well Alternative.

A summary of these plans with associated planning considerations is included in Table EA-1 below.

Table EA-1. Final Array of Alternatives Comparison

Planning Consideration/Criteria	No Action (Continue IOP)	Relief Well Plan	Cutoff Wall Plan
Risk Reduction	Temporary risk reduction, but not sustainable	Reduces risk to a tolerable level (~1 order of magnitude)	High level of risk reduction (multiple orders of magnitude)
Technical Guidelines	Does not meet technical criteria or tolerability of life safety	Does not meet standard technical criteria, but does meet tolerability guidelinesfor life safety risks	Meets USACE guidelines to prevent initiation of uncontrolled underseepage
First Cost	--	$28.9 million	$143.0 million
Increase in Annual O&M Costs	Varies (spent ~$2 million in FY13, $175K in FY 15)	$38,000/year, responsibility of levee district	No increase in O&M costs
Environmental Impacts	Higher ponding, temporary features. 0.2 acres mitigation	Access road. 23.5 acres mitigation in addition to IOP requirements	Temporary during construction. 22.5 acres mitigation in addition to IOP requirements
Completeness	Does not meet criteria	Does meet criteria	Does meet criteria
Effectiveness	Does not meet criteria	Does meet criteria	Does meet criteria
Efficiency	Does not meet criteria	Does meet criteria	Does not meet criteria
Acceptability	Does not meet criteria	Does meet criteria	Does meet criteria

2.2.5 Plan Selection

The final array of alternatives was evaluated against cost, the results of the limited BCRA, and their ability to reduce risk to a tolerable level. While a quantified risk assessment of each alternative was not performed, the qualitative characterization of risk reduction presented in the first row of Table EA-1 is a result of professional consensus of the risk assessment team and the St. Louis District project delivery team.

The No Action Plan (continue with the IOP) is an unacceptable alternative because it does not permanently reduce risk and it does not address the design deficiency. It meets neither the goals nor objectives of this study and does not meet the criteria of completeness, effectiveness, efficiency, or acceptability.

Both the cutoff wall plan and the relief well plan meet the primary objective of this study, which is to reduce risk to a tolerable level. However, given the current risk profile of this levee, the cutoff wall is not a cost efficient plan compared to the relief well plan. The additional risk reduction gained from going from the relief wells to the cutoff wall is not justified by the associated 5-fold cost increase. As a result, the least cost, risk-informed tentatively selected plan is the Relief Well only alternative.

2.2.6 Tentatively Selected Plan for Final Risk Reduction Measures – Relief Wells Only

Based on engineering experience and cost effectiveness and efficiency, the relief wells only alternative was identified as providing the best permanent solution to the underseepage problem. This alternative provides a long term solution to address the underseepage concerns and has been found to be the most economical.

This is the proposed action and it is carried forward for analysis in Section 4.0 – Environmental Consequences, along with the No Action Plan, the Interim Risk Reduction Measures, and the other final risk reduction alternative considered in detail, the cutoff wall only option.

The tentatively selected plan for final risk reduction measures at the Upper Wood River levee adjacent to Melvin Price Locks and Dam consists of the following components (detailed drawings for this relief wells plan can be found in Appendix EA-A, Plates):

New relief wells – 88. This plan would install approximately 88 new relief wells between Upper Wood River Levee stations 52+50 and 126+00. This plan originally identified 100 new relief wells; however, 12 new wells in this reach are under contract as of October 2015 to replace damaged or compromised wells that are needed for the Interim Operations Plan. The spacing of the new wells varies based on the seepage conditions. All new wells would discharge at elevation 409. The locations, spacing, and discharge elevation were determined through seepage analysis using a calibrated Seep/W model.

Modify Existing Wells – 21. As of October 2015, 12 new relief wells have been awarded and will be installed by spring of 2016. These wells were awarded to replace damaged wells that are required for the minimum operation of the IOP. The wells will be installed with discharges at the existing ground surface in accordance with other existing wells. They will be modified by lowering the discharge to elevation 409 during project implementation when drainage and discharge channel excavation is completed as part of the project. An additional 9 wells that have previously been installed as part of the 2006 Wood River General Re-evaluation Report project will also need to be modified because of their proximity to the access road.

New Access/Maintenance Road. Because of the proximity to the roadway embankment of Illinois Route 143 (which is located on the landside levee berm) and existing topography, an access road about 5,000 feet long (total length) would be needed in order to install the new relief wells. The road would be built along and partially against the roadway embankment. In addition, industry practice requires a minimum head differential of 7 feet to ensure stability of the borehole during drilling. Because the water table in this area is near (and in some cases above) the ground surface elevation, portions of this road would have to be elevated above existing round elevations during construction. The base road would remain in place after construction to allow the levee district to perform their required maintenance activities on the wells. The top or crown of this road would be at elev. 415; prevailing ground elevations are about elev. 412.

New Drainage Collection and Discharge Channels. A drainage system for the collection of flows from the new relief wells would be constructed parallel to and along the landside toe of the access/maintenance road. For that portion of the project area upriver of Cpl. Belchik Expressway (toward Alton), an articulated concrete mat and riprap spillway (about 1,900 feet long) would receive flows from new relief wells in that area; these flows would sheetflow across the detention basin to the main ditch leading to the East Alton pump station. For that portion of the project area downriver of the Expressway (toward the lock and dam), a concrete-lined collector channel (about 4,600 feet long) would capture flows from new relief wells in that area; these flows would be carried to the main ditch by four discharge channels (about 1,875 feet total length), also with an articulated concrete mat and riprap base.

Grout Shut Existing Wood-Stave Wells – 104. The existing wood-stave relief wells will be grouted shut.

Main Ditch Modifications. Accumulated sediment would be removed by excavation from about 3,425 feet of the existing main ditch leading to the East Alton pump station. About 27,600 cubic yards of excavated sediments would be placed onsite in the detention basin at disposal sites totaling about 18 acres. The bottom of the excavated ditch would be lined with filter sand, gravel and rock ditch liner to counteract underseepage occurring in the ditch. Upriver of Cpl. Belchik Expressway (toward Alton), excavated sediment would be spread one foot deep into an approximately 7.0 acre disposal site, with a maximum ground elevation after disposal of elev. 408. Downriver of the Expressway, excavated sediment would be spread one foot deep into three separate disposal sites totaling about 11.0 acres, with a maximum ground elevation after disposal of elev. 409. Disposal sites would be delineated to avoid any existing live woody vegetation.

Dewatering. To dewater the project area during construction, the East Alton Pump Station would be operated to keep water levels within the detention basin down to elev. 405. Portable pumps would be utilized at Cpl. Belchik Expressway to drop water levels in the main ditch as low as possible (approximately elev. 400). To reduce the groundwater table, a well-point system would be employed using a spacing of 15 feet between well heads. To hydraulically separate the project area into three separate reaches, use of existing Dikes A and C, as well as new temporary dikes, referred to as D and E would be

required in the main ditch leading to the pump station. Additional pumps would be required to remove water from the main ditch at each of these dike locations to supplement the well-point system. The well-point pumps would also discharge downstream of these dikes where possible and appropriate.

Implementation Schedule. The implementation schedule for the final risk reduction measures begins with preliminary engineering and design activities being completed in Fiscal Year (FY) 2018. Advertisement and award of the first item of construction is scheduled in FY2019 (late 2018). The last year of interim risk reduction measures (Interim Operations Plan) is FY2019. Construction is scheduled to be completed in FY2022 (late 2021, three year duration). The project area would be divided into three reaches, one for each year of construction: Reach 1 – from the upriver end of the project area nearest Alton to Cpl. Belchik Expressway (levee station 54+00 to 80+00); Reach 2 – from the Expressway downriver about 2,000 feet (levee stations 80+00 to 100+00); Reach 3 – from the lower end of Reach 2 down to a point about 1,500 feet below Mel Price Dam (levee station 100+00 to 130+00).

3.0 AFFECTED ENVIRONMENT

This section describes existing conditions in the study 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.

The study area is defined as the Upper Wood River Drainage and Levee District. These descriptions reflect conditions in this area prior to the St. Louis District's implementation in March 2010 of interim risk mitigation measures to control underseepage along the levee reach adjacent to Melvin Price Locks and Dam.

3.1 Socioeconomics

The upper Wood River levee protects an urban area consisting of industrial and commercial businesses. No residential buildings are located within this area. Municipalities that are protected in part by the Wood River levee include Alton and East Alton. The flood-protected area is traversed by several railroads that service industrial development. Illinois Highways 3 and 143 provide highway access. 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.

In support of the 2012 Project Completion Report, 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 EA-2 provides inventory results showing a structural value of residential, commercial and industrial buildings for the Upper Wood River Levee area. The total structural

value of commercial and industrial buildings inventoried in the upper Wood River area is about $365 million.

Table EA-2. Structure Inventory.

Area	Building Category	Number of Buildings	Average Value of Buildings ($)
Upper Wood River	Residential	0	$0
	Commercial	59	$1,904,717
	Industrial	29	$8,673,478
	Total	88	

The Southwest Illinois Flood Prevention District Council (FPD) is pursuing FEMA accreditation for the Wood River Levee System. The FPD was formed through Madison, St. Clair, and Monroe Counties in southwestern Illinois to represent the Wood River, East St. Louis, and Prairie du Pont/Fish Lake levee districts. The FPD has been overseeing non-Federal projects in all three levee systems that will allow them to be accredited by FEMA. Because each of the three levees in the Wood River system is hydraulically independent, they require separate certification.

3.2 Topography and Geology

In the Upper Wood River drainage and levee district, topography ranges from a low of about 400 feet in the levee protected area (channel bottom of main ditch leading to East Alton pump station) to about 440 feet along the base of the bluff. A series of islands and side channels existed in the vicinity of the riverfront levee adjacent to Melvin Price Locks and Dam prior to the levee's construction. The naturally low area along the landside of the levee serves as a ponding area for temporary storage of local storm and seepage water before it drains into the adjacent Mississippi River. In the area of this landside ponding, bedrock is overlain by a layer of sands about 130 feet thick, which in turn is blanketed by a mixture of silts and clays ("topsoil") that ranges in depth from about 18 inches to 30 inches. Soil investigations conducted as part of this study revealed that this blanket generally increases in thickness away from the levee, as does the percentage of clay, which ranges from about 30% near the levee and 60% further away from the levee. The crown of the riverfront levee is at an elevation of about 445 feet, and the adjacent river upstream of Mel Price Locks and Dam has a normal pool elevation of 419 feet.

3.3 Air Quality

Of the six criteria air pollutants - particulate matter, ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead - Madison County, Illinois, the location of the study area, is currently classified as nonattainment for two, ozone and particulate matter. For ozone (8-Hr Ozone, 2008), the study area is included in the marginal nonattainment area named St. Louis-St. Charles-Farmington, MO-IL, which includes Madison, St. Clair, and Monroe Counties in Illinois, and St. Louis, St. Charles, Jefferson, and Franklin Counties, in Missouri, along with the City of St. Louis (USEPA, 2015). For particulate matter (PM-2.5, 1997), the study area is included in the moderate nonattainment area named St. Louis, MO-IL, which includes Madison,

St. Clair, Monroe, and Randolph (partial) Counties in Illinois, and St. Louis, St. Charles, Jefferson, and Franklin Counties in Missouri, along with the City of St. Louis (USEPA, 2015). Granite City, a small area in Madison County, Illinois, is classified as nonattainment for lead (lead, 2008) (USEPA, 2015).

Ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on nitrogen oxides (NOx) and volatile organic compounds (VOC's) in the air. There are many sources of these gases. Some common sources include gasoline vapors, chemical solvents, fuel combustion products, and some consumer products (USACE, 2003).

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, 2014a). Within this watershed, Wood River Creek borders the lower end of the Upper Wood River levee district, the West and East Forks border the Upper Wood River levee district to the north, and the Mississippi River borders the riverfront levee. According to the IEPA (2014b), impaired uses and causes for impairment (within parentheses) for these waterways include:

- East Fork Wood River - aquatic life and aesthetic quality (sedimentation/siltation, temperature water, bottom deposits, changes in stream depth and velocity patterns, loss of instream cover, fecal coliform);
- West Fork Wood River Creek – aquatic life (sedimentation/siltation, loss of instream cover);
- Wood River Creek - aquatic life and primary contact (alteration in stream-side vegetative covers, total suspended solids, fecal coliform, changes in stream depth and velocity patterns, loss of instream cover);
- Mississippi River - fish consumption and primary contact (mercury, fecal coliform).

Within the study area, surface waters on the landside of the Upper Wood River levee include a drainage ditch leading to the East Alton No. 1 Pump Station, and shallow open water areas and vegetated wetlands bordering this ditch that are remnants of historic floodplain of the Mississippi River. Several man-made water bodies also are present but at a greater distance from the levee. The naturally low topography occupied by the ditch, open water and wetlands areas serves as a ponding area for temporary storage of local storm and seepage water before it drains into the adjacent Mississippi River.

Surface water quality of the ditch and its adjacent open water and vegetated wetlands areas is impaired from two main sources. Urban runoff from the City of Alton is carried by several small ditches into the drainage ditch that leads to the pump station. In addition, two combined sewer outfalls from the City (Central Avenue and Shields Valley) also outlet into this ditch system. During wet weather, these combined sewer outfalls can release a mixture of runoff from precipitation and treated or partially treated sewage into the ditch that leads to the pump station, as well as the adjacent open water and vegetated wetlands areas.

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 the Upper Wood River levee district, upon completion of Melvin Price Locks and Dam in 1989, a 2.2 mile length of riverfront Wood River levee became located within the permanent navigation pool of the new lock and dam. Long-term maintenance of the pool at elevation 419 has resulted in an increase (rise) in the normal level of the groundwater landward of this section of levee. Numerous existing groundwater relief wells located along the landside toe of this levee reach were intended to relieve this groundwater pressure. However, these relief wells do not function as they were intended. St. Louis District geotechnical engineers first noted uncontrolled seepage of groundwater along the landside of the levee in July 2009 when the Mel Price navigation pool was at elevation 419 and the landside ponding was at 402.9. Active sand boils carrying sand were noted in the same area in November 2009 during open-river conditions at elevation 421.93 and landside ponding at elevation 409. The area of uncontrolled underseepage is played in Figure EA-4. This movement of sand is significant because it raises the possibility that it came from the levee foundation, which would put the structural integrity of the levee at risk.

Ten piezometers were installed in late 2009 in the seepage area exhibiting the most critical conditions. Eight of these were arranged in 2-ranges of 4 piezometers each located downstream of Cpl. Belchik Road. A third range of two piezometers was installed upstream of Cpl. Belchik Road. The final piezometer was installed in the Alton Pump station inlet bay to measure the landside ponding elevation. Instrumentation and cabling were added to these piezometers to automate the collection of the piezometric data. The piezometric data are used to supplement direct observations of underseepage conditions and to calibrate numerical seepage models.

Groundwater model predictions for piezometric levels between the levee and the landside drainage ditch are excellent, with no difference exceeding 0.70-feet. But the model results for two piezometers on the far side of the drainage ditch are about +/- 2.0-feet off of the predicted value. This indicates that some other local feature, other than the Melvin Price pool and tailwater, is impacting the groundwater regime. Given the highly industrialized nature of the area, the most likely features include groundwater domes caused by broken water mains and groundwater drawdowns caused by industrial groundwater extraction.

In the project area, groundwater generally seeps from the base of the landside embankment of Illinois Highway 143 and moves along a topographic gradient to the drainage ditch that leads to the East Alton pump station. At the toe of the highway embankment, ground elevations vary around 412 feet NGVD, and the channel bottom of the main ditch is about 400 feet NGVD (as designed). Groundwater also seeps to the ground's surface throughout much of the low lying area between Illinois Highway 143 and the main ditch. Depending on local microtopography,

the surface movement of groundwater toward the main ditch occurs either in a sheet-flow fashion or as small rivulets.

Because the groundwater has naturally high concentrations of iron and manganese, it leaves an orange-brown precipitate on the ground surface and low-lying vegetation.

3. 6 Hazardous, Toxic, and Radioactive Wastes

Phase I Environmental Site Assessments were conducted in conformance with the scope and limitations of ASTM Practice E 1527. In addition to these assessments, sampling was conducted in the upper portion of the Wood River levee system in September of 2009 in the area of uncontrolled underseepage (USACE, 2009). Levels of metals were higher in the seep water than the river water, but this may be the result of leaching from the soils in the seep area. An old industrial area is just to the east of the wetland area which included Laclede Steel, Alton Box Board, American Smelting & Refining, and Owens Illinois Glass Company. Residues from glass manufacturing furnaces have been found to contain elevated levels of Zirconium, Strontium, Chromium, Copper, Magnesium, Zinc, Iron, Barium, Vanadium, and Manganese. Manganese, Nickel, Copper, Chromium, Zinc, Aluminum, and Iron are also widely used in steel production. At this time it cannot be determined if either or both of these industries are in fact sources of these inorganic elements. Further investigation would be needed in order to determine if these elements are migrating in ground water from these sources. In addition, historical topographic maps indicate a possible sewage disposal facility in the area. Some drilling muds contain barium, so there is a possibility that the drilling mud could have been leaching barium into the seeps. However, a review of the Material Safety Data Sheet for Quick-Gel which is used in the drilling process indicates that barium is not a component of the substance.

3.7 Hydrologic Conditions

The Wood River levee project is intended to provide protection against a 54 foot Mississippi River stage on the St. Louis gage, which has a current expected frequency of less than 0.2% Annual Chance Exceedance. 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; and elevation 441.4 feet, m.s.l, at the lower end (Cahokia Creek Diversion Channel) of the levee district. 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 just greater than a 0.5% Annual Chance Exceedance Probability. 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 was projected back along the tributaries. 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.

In the upper portion of the drainage and levee district, a ponding area on the landside of the levee serves to store local storm and seepage water temporarily. The East Alton Pump Station No. 1, completed in 1989, services this ponding area and the surrounding 4.17 square mile watershed. This drainage area enlarges to 5.81 square miles when the gravity drain to Wood River Creek is closed (elevation 417.0) and its flow is diverted to the ponding area. The Wood River Drainage and Levee District owns impoundment easements allowing the ponding of water up to elevation 415.8 feet. At this elevation, ponding would encompass roughly 250 acres.

The ponding area is drained by a main ditch that parallels the levee and is located 100 to 500 feet landside of the landside levee toe. Some smaller drainage ditches and storm sewers from the City of Alton are connected to this main drainage ditch. The main ditch begins at the City of Alton's Central Avenue Combined Sewer Outlet (CSO) and ends at the East Alton Pump Station. Two 54-inch diameter gravity drain structures in the East Alton Pump Station drain this main ditch to the Mississippi River when Melvin Price tailwater elevations are at or below elevation 405. When the gravity drains are closed due to tailwater conditions above elevation 405, the levee district activates the East Alton pumping station when the landside ponding elevation is at or above elevation 406.0.

A substantial portion of the City of Alton combined sewer system terminates at the Central Avenue CSO. "Dry weather" sewer flows backup behind a weir in the CSO, are captured by a 30-inch main, and are diverted to the Alton wastewater treatment plant. The top of the weir is at elevation 410.8. When significant local rainwater events occur over the City, the mixture of precipitation runoff and wastewater overflow the weir, enter the ditch, and flow to the Mississippi River via the East Alton Pump Station. Another part of the City of Alton combined sewer system terminates at the Shields Valley CSO. This system operates in similar fashion, but the top of the Shields Valley CSO weir is at elevation 413.8.

Table EA-3 presents estimates of stormwater runoff volumes that come to the pump station for various rainfall events. Underseepage also collects in the ponding area, and the rate of underseepage has been estimated using SEEP/W© 2007, a finite element software product for analyzing groundwater seepage. The amount of underseepage entering the ponding area per unit time depends on various soil, geological, and hydrological conditions, including the elevation of the Melvin Price pool as well as the surface elevation of any ponding within the ponding area. In general, the rate of underseepage increases with increasing pool elevations and decreases with increasing landside ponding elevations. Based on a normal pool elevation of 419.0 feet and an interior ponding elevation of 406.0 feet, the underseepage rate into the ponding area is estimated to be 15,000 gallons per minute, or 33.42 cubic feet per second. By comparison, for a 24-hour period, this amount of underseepage would be 2,887,488 cubic feet of water, which is similar to the estimated runoff volume of a 2-year rainfall event of one hour duration (Table EA-3).

3.8 Noise

The Metro-East area of southwestern Illinois 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

Table EA-3. Estimated Stormwater Runoff Volumes (cubic feet) for East Alton No.1 Pump Station.

Runoff Volume (ft^3)							
Duration (hrs)	Probability (%)						
	50	20	10	4	2	1	0.2
	Reoccurrence Interval						
	2-year	5-year	10-year	25-year	50-year	100-year	500-year
0.08	2,627	11,947	51,212	157,360	275,866	423,166	544,800
0.17	221,417	519,422	825,975	1,370,227	1,845,447	2,371,097	2,795,179
0.25	651,400	1,260,010	1,762,585	2,698,853	3,448,506	4,311,851	4,997,601
0.5	1,721,687	3,090,990	4,256,124	6,018,782	7,547,077	9,161,880	10,563,906
1	2,991,267	5,591,639	7,416,209	10,279,760	12,600,171	15,016,155	17,195,430
2	5,232,856	8,547,104	10,849,826	14,100,103	16,332,680	19,587,495	24,934,390
3	6,707,532	10,279,760	13,345,762	16,332,680	19,345,883	22,524,082	28,740,936
6	9,507,895	14,100,103	17,511,154	22,194,594	26,194,862	29,596,488	36,985,134
12	13,121,142	18,384,637	22,854,319	27,888,713	32,615,179	37,425,429	45,436,401
24	16,410,770	23,268,146	28,399,639	34,617,594	40,700,177	46,155,432	57,230,541
48	20,965,937	29,510,787	35,580,045	44,718,397	51,941,551	58,604,459	71,061,937
96	26,110,557	38,131,049	46,515,324	59,062,945	66,892,738	76,642,703	94,445,313
168	33,919,532	46,785,405	56,315,916	70,134,161	78,507,945	92,563,578	115,234,796
240	38,307,671	52,214,137	65,506,464	79,441,433	94,445,313	104,348,600	138,054,721

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 Wood River levee system, 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 somewhat by the levee.

3.9 Prime Farmland

According to the digital soil survey of Madison County (NRCS, 2010), soils of the Upper Wood River levee area are classified as “not prime”, including along the landside toe of the riverfront levee. There are relatively small areas within the protected area at some distance from the riverfront levee that are classified as “prime” and “prime if drained”. However, the entire levee-protected area is zoned for nonagricultural use (USACE, 1986). There are no prime farmland soils outside of the levee protected area, including along the Mississippi River.

3.10 Biological Resources

Various aquatic and terrestrial natural resources are found within and adjacent to the Upper Wood River levee-protected area. Natural resources bordering the exterior of the levee system include the Mississippi River along the riverfront levee, Wood River Creek along the eastern side of the protected area, and narrow areas of forested wetlands along the channel of Wood River Creek. On the protected side of the levee, these resources are concentrated in the vicinity of the pump station's 250-acre ponding area. These levee-protected habitats are located in what once was the historic Mississippi River floodplain before the Wood River levee system was constructed in the 1950s, and are remnants of the islands and side channels that once existed at this location. According to historic aerial photos from the early 1940s, the islands in this vicinity were not densely tree-covered but appeared to be used primarily as pasture, with scattered areas of trees and shrubs.

Wetlands and other Waters of the United States are protected by the Clean Water Act of 1977, as amended, and Executive Order 11990 of 1977, Protection of Wetlands. Project-related wetland losses require compensatory mitigation or replacement in accordance with Corps of Engineers requirements. In addition, losses of bottomland hardwood forests also require compensatory mitigation or replacement in accordance with Corps of Engineers requirements. These floodplain forests do not meet the definition of a wetland because as occur on slightly higher ground that is better drained.

The various aquatic and terrestrial natural resources that occur in the pump station's ponding area and vicinity are described below. Their spatial distribution and relative abundance have been approximated using geographic information systems analysis. A landuse cover type map of the project vicinity was superimposed upon a range of 2-foot topographic intervals to approximate the location and amounts of various habitats in the detention basin by topographic zone (Figure EA-9, Table EA-4). This information was validated and refined by field observations since 2010 to identify habitat types that are present within the detention basin and provide a best estimate of their relative amounts (Table EA-5). No map of habitats comparable to Figure EA-9 has been developed.

Aquatic Habitats. Aquatic habitats that are present in the approximately 250 acre ponding area of the East Alton pump station include herbaceous wetland, shrub-scrub wetland, forested wetland, riverine, and lacustrine habitats. In the areas that support these habitats, ground elevations range from about 412 to 400 feet. Hydrological conditions within the detention basin are influenced by its watershed, the pump station's operation manual, local soil properties, and the unique underseepage conditions occurring along the Upper Wood River levee.

The detention basin captures local rainfall and runoff from a roughly 6 square mile watershed, inflows from two City of Alton sewage and treatment facilities, as well as underseepage from the adjacent levee. Under normal operations at the East Alton pump station, pumping is scheduled to start once a ponding elevation of 406 feet is reached. The maximum ponding elevation is elevation 415.8 feet. In practice, surface water elevations sometimes exceed elevation 406, however surface ponding gauge data for the detention basin do not exist prior to 2010.

Regarding local soil properties, according to the digital soil survey for Madison County, Illinois (NRCS, 2010), the pump station's detention basin is mapped as 1070L, "Beaucoup silty clay loam, undrained, 0 to 2 percent slopes, occasionally flooded, long duration". This particular soil was formed from alluvium of silty clay loam, is considered to be very poorly drained, and meets the definition of hydric or wetlands soils (NRCS, 2004). The upper limit of the water table in this soil is considered to typically occur within 12 inches of the ground's surface during all months of the year.

Regarding underseepage, as noted in Section 3.7 Hydrologic Conditions, the underseepage rate into the ponding area is currently estimated to be 15,000 gallons per minute or 33.42 cubic feet per second, assuming a Mel Price pool elevation of 419 and a landside ponding elevation of 406. By comparison, for a 24-hour period, this amount of underseepage is similar to the detention basin's estimated runoff volume of a 2-year rainfall event of one hour duration. This underseepage is not seasonal but constant, and increases with a rising river. Underseepage entering the detention basin comes out of the ground along the landside toe of Illinois Highway 143, as well as through numerous seeps located within the detention basin (Figure EA-4). Where groundwater seeps from the base of Illinois Highway 143, the land elevation is about 412.

The detention basin below approximate elevation 412 is regarded as Waters of the United States under Section 404 of the Clean Water Act; based on field observations of positive indicators for wetland soils, vegetation, and hydrology, most of this area meets the definition of wetland.

Herbaceous wetlands. Nonwoody or herbaceous wetlands occurring in the detention basin include wet meadows and marshes. Whereas wet meadow habitat currently supports diverse herbaceous vegetation, in recent years marsh habitat is largely unvegetated due to soft ground conditions.

Wet meadow wetlands**.** This wetland type occurs on relatively high ground (about elevation 412-410) and supports mainly herbaceous vegetation consisting of a dense growth of forbs, such as smartweeds (*Polygonum* spp.), grasses, and sedges (*Carex* spp.). Woody species typically consist of scattered tree saplings such as green ash (*Fraxinus pennsylvanica*) and silver maple (*Acer saccharinum*). This habitat occurs mainly along the landside toe of the highway/levee in a relatively narrow band. Underseepage moves across this habitat constantly in a sheet flow fashion, with water depths typically about 2-6 inches depending on microtopography; normal detention basin ponding reaches this topographic zone infrequently.

Shallow and deep marsh wetlands**.** Formerly vegetated marshes occupy the lower topographic zone bordering wet meadow wetlands (about elevation 410 and below). This habitat occurs in large broad areas on the highway side of the main ditch leading to the pump station. Prior to the mid to late 2000s, cattail (*Typha latifolia*) was the dominant emergent plant. Shallow marshes (about elevation 410-408) supported a relatively dense growth of cattails with areas of open water. Deep marshes (about elevation 408-407) consisted of less dense cattails interspersed by larger areas of open water. For some time after the late 1980s, the normal water regime of

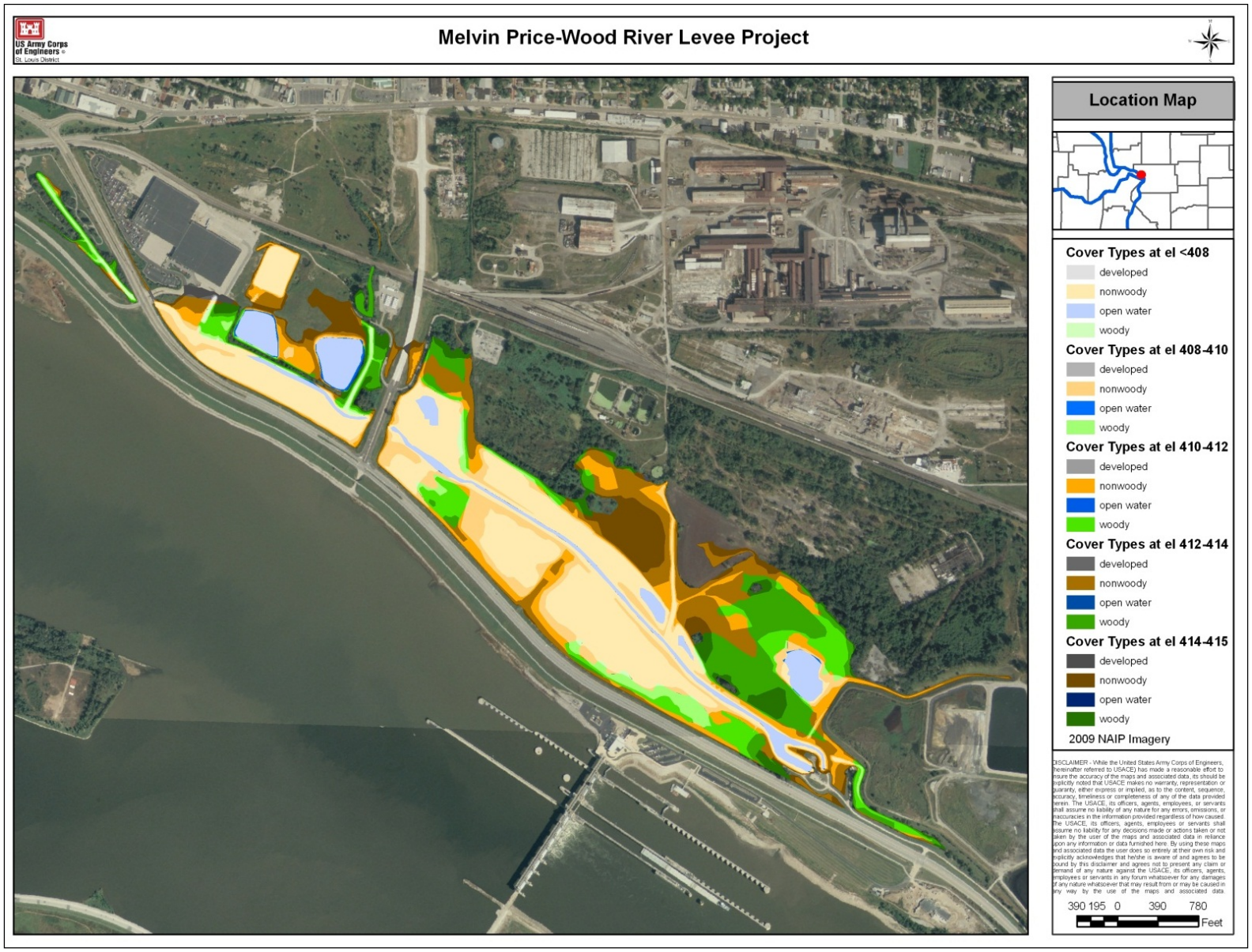

Figure EA-9. Landuse Cover Types by Topographic Interval within Ponding Area.

these marshes was semipermanently flooded or intermittently exposed. A maintenance road that was part of the St. Louis District's 1985 Design Memorandum project and constructed along the levee side of the main ditch with a designed crown elevation of 409 acted as a berm for a number of years and caused surface waters to pond in much of the marsh area.

Since then, the maintenance road has been "breached" at a number of locations due to the erosive forces of seepage water coming from the highway and entering the main ditch. As a result, the dominant water regime of marsh habitat has changed to temporarily flooded from detention basin ponding; when not inundated, the ground is saturated due to underseepage. When no detention basin ponding is present, groundwater entering this habitat type follows topographic depressions in the mudflats to form rivulets (Figure EA-10).

Figure EA-10. Deep Marsh Habitat ("mudflat") with Rivulets (date October 6, 2014; no interim ponding present; standing at land side of main ditch looking south toward highway).

Regarding relatively recent changes in the abundance of emergent vegetation, cattail vegetation was noted to be common in marsh habitat as recently as the summer of 2007. However, in late 2009, much of the cattail vegetation located between the highway and the ditch

was gone. Soft ground conditions were noted in the underseeage area, as well as small areas of dead standing cattails and some individual live cattail plants that had fallen over. The constant underseepage conditions (the continual push of groundwater up to the ground surface) appears to have softened and saturated the ground to such an extent as to cause the disappearance of much of the cattail vegetation on the highway side of the main ditch. As a result, by 2010 formerly vegetated shallow and deep marsh habitats largely resembled mudflats.

Shrub-scrub wetlands. This wetland type occurs in low areas (below about elevation 407) within former marsh habitat, and consists of woody shrubs such as buttonbush (*Cephalanthus occidentalis*) and indigo bush (*Amorpha fruticosa*). These plants grow in small, dense patches or as scattered individual plants. This wetland type is a minor habitat component.

Table EA-4. Landuse Cover Types by Topographic Interval.

Ponding Elevation	Cover Type (acres)				Total
	Open Water	Non woody	Woody	Developed	
< 408	18.0	68.1	1.9	0.0	88.0
408 - 410	0.6	19.1	6.3	0.0	26.0
410 - 412	0.2	19.7	15.0	0.1	35.0
412 - 414	0.1	27.7	23.9	0.2	51.9
414 - 415	0.0	16.9	8.5	1.0	26.4
Total	18.9	151.5	55.6	1.3	227.3

Table EA-5. Habitat Types by Topographic Interval.

Landuse Covertype	Habitat Type	Acres
Open water <408	Riverine (main ditch)	11.0
Open water <408	Lacustrine (lagoons)	7.4
Open water <408	Lacustrine (natural)	13.6
Non woody <408	Herbaceous wetland: deep marsh	55.0
Non woody 408-410	Herbaceous wetland: shallow marsh	19.1
Non woody 410-412	Herbaceous wetland: wet meadow	19.7
Non woody <408	Scrub shrub wetland	1.9
Woody 408-410	Forested wetland: wet	6.3
Woody 410-412	Forested wetland: wet-mesic	15.0
Woody 412-415	Bottomland hardwood forest (not wet)	32.4
Non woody 412-415	Old field	44.6
Developed 410-415	Developed	1.3
Total		**227.3**

Forested wetlands. Forested wetlands occurring in the detention basin include two subtypes (wet-mesic and wet).

Wet-mesic and wet forested wetlands. Forested wetlands are a relatively minor component of the habitats that are present in the detention basin. They often occur near the landside toe of the levee, or border areas of formerly vegetated marshes. Wet-mesic forested wetland occupies higher ground (about elevation 412-410), and often supports a greater diversity of tree species, including silver maple, green ash, cottonwood (*Populus deltoides*), red mulberry (*Morus rubra*), and dogwood (*Cornus* sp.). Groundcover is usually dense and is represented by various sedges, forbs, and grasses. Because wet forested wetland occupies lower elevations (about elevation 410-408) and is wetter, it supports a lower diversity of tree species, such as willow (*Salix* sp.), silver maple, and green ash. Groundcover is often sparse. Hard mast tree species such as oaks and hickories are not present in either kind of forested wetland, although they were present historically and provided an important food source to some wildlife species such as turkey and deer.

Like wet meadow wetland habitat, wet-mesic forested wetland where it occurs along the landside toe of the levee intercepts groundwater seepage. Underseepage moves across this habitat constantly in a sheet flow fashion, with water depths typically about 2-6 inches depending on microtopography; normal detention basin ponding reaches this topographic zone infrequently. Wet forested wetland can be temporarily flooded from detention basin ponding; when not inundated, the ground is saturated due to underseepage.

Lacustrine. Lacustrine habitats occupy low topography bordering the north side of the main ditch leading to the pump station, and are typically long narrow areas of standing shallow water with no submergent or emergent vegetation. They consist of fragments of a historic side channel of the Mississippi River.

Riverine. Riverine habitat includes the man-made ditch leading to the pump station. This habitat is permanently flooded and water depths are typically less than five feet. Poor water quality due to urban runoff and intermittent combined sewer outflows prohibits the establishment of any aquatic vegetation. Ditch banks are typically muddy and support sparse vegetation. The bottom of the ditch is about elevation 400.

Terrestrial Habitats. Terrestrial habitats are non-wetland habitats for which site conditions do not meet the federal criteria for positive indicators of wetland vegetation, soils, and hydrology (USACE, 2010a, 2010c). In the landside area along the levee they include floodplain or bottomland forest and old fields as well as grassy areas.

Bottomland hardwood forest. Floodplain forest occupies elevations above approximate elevation 412 feet, and rarely experiences ponding of stormwater. Because of the relatively high ground elevations, this type of forest does not receive or experience groundwater seepage from the levee. Also, the tree roots are usually high enough above the prevailing groundwater table to not be influenced by saturated soil conditions. Tree species that are typically present overlap with those of wet-mesic forested wetland, and include additional species such as hackberry (*Celtis* spp.) and black locust (*Robinia pseudoacacia*). Groundcover is usually very dense and includes a number of tall forb species such as aster (*Aster* spp.). This type of forest occurs in the vicinity of the East Alton pump station, at various locations on the north side of the main ditch leading to the pump station, and along smaller ditches that feed into the main ditch. Like

forested wetland habitat, hard mast tree species such as oaks and hickories are no longer present or occur very infrequently.

Old fields, Grassy and Developed areas. Old field habitat represents areas previously cleared of trees or formerly developed sites. Like bottomland hardwood forest, it occupies sites that are above approximate elevation 412 feet. A small amount of old field habitat is located between the levee and main ditch to the pump station, but most occurs on the north side of the main ditch. Similarly, maintained grassy areas occur at higher elevations, such as along the side slopes of the levee and Illinois Highway 143 or in the vicinity of the pump station. Developed areas within the detention basin are uncommon and typically consist of man-made features such as roads.

Fish and Wildlife. The Mississippi River is an aquatic resource of major significance, and provides habitat to numerous species of invertebrates, fish, birds, and other animals. 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. For example, fishes observed in the main ditch and areas of standing water are tolerant of high turbidity, and include mosquito fish and carp. Wading birds such as the great blue heron (*Ardea herodias*) and great egret (*Ardea alba)* typically feed along the ditch and shallow ponded areas. Turkey may also be found in the ponding area, and red-winged blackbirds were common in the recent past in the marshes. Detained surface waters serve as resting and feeding areas for some migratory ducks and geese. Larger mammals include raccoon, opossum, and deer.

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 active nest on the protected side of the levee in the detention basin.

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 initiated coordination with the U.S. Fish and Wildlife Service in 2009, and 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. This list was updated in 2015 (USFWS, 2015a). Eight species listed for this county are applicable to the project area (Table EA-6). There is no designated critical habitat within Madison County for any of these species.

Table EA-6. List of Federally Endangered (E), Threatened (T), and Proposed (P) Species in the Vicinity of the Project Area.

Common Name (Scientific Name)	Status	Habitat
Indiana bat (*Myotis sodalis*)	E	Caves, mines (hibernacula); small stream corridors with well developed riparian woods, upland forests (foraging)
Northern long-eared bat (*Myotis septentrionalis*)	T	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Least tern (*Sterna antillarum*)	E	Bare alluvial and dredged spoil islands
Eastern massasauga (*Sistrurus c. catenatus*)	PT	Graminoid dominated plant communities (fens, sedge meadows, peatlands, wet prairies, open woodlands, and shrublands)
Pallid sturgeon (*Scaphirhynchus albus*)	E	Large rivers
Spectaclecase mussel (*Cumberlandia monodonta*)	E	Shallow areas in larger rivers and streams
Decurrent false aster (*Boltonia decurrens*)	T	Disturbed alluvial soils
Eastern prairie fringed orchid (*Platanthera leucophaea*)	T	Mesic to wet prairies

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

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.

Northern long-eared bat. The northern long-eared bat was recently declared a federally threatened species throughout its range (Federal Register, 4 May 2015). The northern long-eared bat is sparsely found across much of the eastern and north central United States and spends winter hibernating in caves and mines. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Within hibernacula, they are found in small crevices or cracks (USFWS 2015b). During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. They have also been found, rarely, roosting in structures like barns and sheds (USFWS 2015b). Foraging occurs in floodplain and upland forests. Forest fragmentation, logging and forest conversion are major threats to the species. One of the primary threats to the northern long-eared bat is the fungal disease, whitenose syndrome, which has killed an estimated 5.5 million cave-hibernating bats in the Northeast, Southeast, Midwest and Canada. Suitable northern long-eared bat summer habitat may occur in the forested areas adjacent to the work area.

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). The only known nesting habitat of the least tern that occurs in the vicinity of the project area is an abandoned barge located near Melvin Price Locks and Dam. 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.

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 Drainage and Levee District. The massasauga or pygmy rattler historically lived in prairies of the Midwest, apparently in the wetter areas, and today inhabits old fields, floodplain forests, marshlands, and bogs. It is active from April through October, and often suns on clumps of grass, in branches of small shrubs, or near crayfish burrows. It feeds on small rodents, and overwinters in crayfish burrows, hibernating until spring.

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

Spectaclecase mussel. This mussel is "known to occur in the Meramec River and may potentially occur in the Mississippi River north of Monroe County, Illinois" (USFWS undated). In an assessment of the status of population viability at known locations of occurrence across its range, USFWS (undated) considered all spectaclecase populations in the Mississippi River in Illinois and Missouri to be either extirpated or "non-viable or unknown." None were classified as having "some evidence of viability." Habitat destruction and degradation are the chief causes of imperilment, including reservoir construction, channelization, chemical contamination, mining, and sedimentation. Habitats are found in medium to large rivers with low to high gradients, and include shoals and riffles with slow to swift currents over coarse sand and gravel. Substrates sometimes consist of mud, cobble, and boulders (USFWS 2011).

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). This plant 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 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.

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 Wood River 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 types of 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

The project area was surveyed by Sydney J. Danny in 1974 (IHPA Document #1432) in preparation for the construction of Melvin Price Locks and Dam. The survey included the project area from the banks of the river and a quarter of a mile inland. Danny found no evidence of archaeological sites in the area and interviews of local artifact hunters indicated that no artifacts had been found in the area in the last 50 years.

The lack of sites in the area is attributable to the low-lying, swampy land surface. Prior to the construction of the levee system, the project area would have been annually flooded. The 1892 map of the Missouri River commission (Figure EA-11) indicates that the project area was composed of swamps prior to the construction of the levees. By 1927, the U.S.G.S topographic map of Alton, Illinois indicated that the river had changed course and cut a channel through the proposed project area (Figure EA-12).

In addition to the lack of previously reported sites, the area on the landward side of the levee was disturbed during construction with some of the fill being taken from this area.

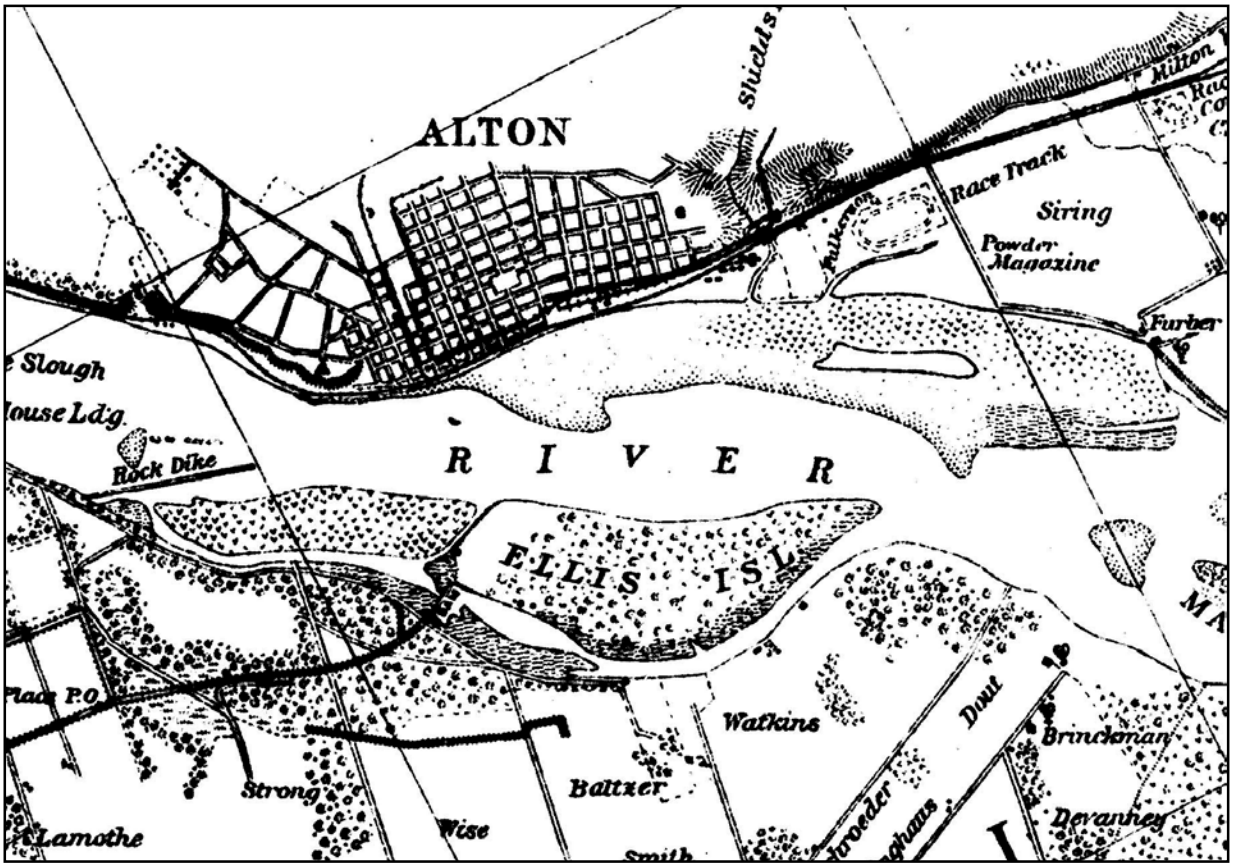

Figure EA-11. Missouri River Commission map of the project area, 1892.

Figure EA-12. USGS Topographic map of project area, 1927.

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, and policies and actions. The purpose of environmental justice analysis is to identify and address human health or environmental effects of actions proposed by federal agencies on resident minority and low-income populations. According to an inventory of buildings (Table EA-2), there are no residential structures within the Upper Wood River levee-protected area. Therefore there is no residential population within the project area, and no need to address environmental justice for this project.

4.0 ENVIRONMENTAL CONSEQUENCES

The discussion of environmental consequences describes effects on resources that could be impacted, directly or indirectly, by the no-action alternative, the interim flood risk reduction measures (Interim Operations Plan), and the two alternative final flood risk reduction actions that have been compared in detail in the present planning study. In this document, the no-action alternative involves doing nothing at all to address the underseepage problems. The interim flood risk reduction measures are represented by the Interim Operations Plan (ponding, dikes and other rock structures, airlifting) that began in 2010 and would continue until construction of a final flood risk reduction plan is completed (assumed to be late 2021). The proposed final risk reduction plan is tentatively identified as the relief well alternative. The alternative final risk reduction plan is the cut-off wall option.

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).

4.1 Socioeconomics

<u>No Action Plan</u>

Under the no action plan, development is expected to continue in the levee-protected portion of the project area. 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. The chances of a significant failure in the future increase under the no action alternative. Public safety would continue to be jeopardized.

Economic losses associated with failure of the Upper Wood River levee would consist of structure damages due to flooding and loss of navigation on the Mississippi River. With regard to damages due to overtopping, within the Upper Wood River levee protected area, total expected structure damages are estimated at $365 million. The number of commercial and industrial structures likely to be damaged is displayed in Table EA-2.

Because of the underseepage problems in the Wood River levee system, obtaining accreditation of the Upper Wood River levee by the Federal Emergency Management Agency (FEMA) would not be possible under the No Action Plan.

Interim Risk Reduction Measures. The Interim Operation Plan itself has had minor effects to socioeconomic resources within the Upper Wood River levee-protected area. During high river conditions in late spring and early summer of 2013 when airlifting of existing relief wells was required, the outer landside lane of Illinois Highway 143 (consisting of four lanes, two in each direction) was temporarily closed for about a month as a safety precaution during the time that portable air compressors were placed along the edge of the highway for operation. The St. Louis District has coordinated the development and permitting of the Interim Operations Plan with the Illinois Department of Transportation periodically over the last several years.

Regarding FEMA accreditation of the Upper Wood River levee, the Southwest Illinois Flood Prevention District Council (FPD) is pursuing FEMA accreditation for the Wood River Levee System. The FPD was formed through Madison, St. Clair, and Monroe Counties in Illinois to represent the Wood River, East St. Louis, and Prairie du Pont/Fish Lake levee districts in the Metro East. The FPD has been overseeing non-Federal projects in all three levee systems that will allow them to be accredited by FEMA. This accreditation requires a professional engineer's certification that the levee will provide protection against the 1.0% chance exceedance event (commonly referred to as the "100 year event"). Because each of the three levees in the Wood River system are hydraulically independent, they require separate certification.

Because of the outstanding underseepage issues discussed in this document as well as the St. Louis District's Supplemental Report under preparation, the FPD requested that the St. Louis District perform an evaluation to provide 100 year certification for Upper Wood River Levee. The St. Louis District initiated this evaluation in 2014; the evaluation report is called "USACE Process for the National Flood Insurance Program Levee System Evaluation for the Wood River Upper Levee Wood River Drainage and Levee District" (NLSER). This NLSER is being completed per the requirements of EC 1110-2-6067 (USACE Process for the National Flood Insurance Program (NFIP) Levee System Evaluation). As of November 2015, this report is 95% complete and is only waiting on as-built drawings from the FPD. Results of the NLSER demonstrate that the Wood River Upper Levee meets the USACE requirements for evaluation of the 1% annual chance exceedance flood based on the results of investigations (supporting accreditation by FEMA). These conclusions are based on the existing conditions and the current state of the Interim Operations Plan; the conclusions are not dependent on the recommendations of the Supplemental Report.

The following discussion describes the effects of FEMA accreditation on socioeconomic resources in the study area.

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.

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, 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 study 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).

Final Risk Reduction Measures

Relief Well Alternative (Tentatively Selected Plan)
As a safety precaution, temporary closure of the outer lane of Illinois Highway 143 along the landside of the highway may be necessary during the construction process when heavy equipment is in use. The St. Louis District will continue coordination with the Illinois Department of Transportation to ensure that construction contractors are aware of and plan for that agency's requirements. The potential for a temporary lane closure would occur at any time during the 3-year construction period.

Cutoff Wall Alternative
Given that the cut-off wall alignment is located on the riverside of the Upper Wood River levee and at a distance from Illinois Highway 143, it is unlikely that any temporary lane closures of the highway would be required during the construction process.

4.2 Topography and Geology

No Action Plan

Under the no action plan, scattered borrow activities associated with private development on the levee protected side of the Upper Wood River 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.

Interim Risk Reduction Measures. Implementation of the interim measures since early 2010 has had minor effects on topography within the ponding area of the East Alton No. 1 pump station. The construction of the three rock dikes has had minor impacts to topography in the East Alton No. 1 pump station's ponding area. Crown elevations of these structures are at elevation 415.0 (Dikes A and B) and elevation 411.0 (Dike C). They range in height from about 10 to 15 feet. The footprints of these dikes are about 0.05 acre (A), 0.15 acre (B), and 0.60 acre (C). Constructed in March 2010, the rock dikes will be kept in place until final risk reduction measures are implemented. Similarly, the three rock walkways and 35 pump pads that were constructed in 2014-2015 have also had minor effects on topography, and these features will be removed also. Continuing the operation of these measures until 2019 is not expected to result in any new effects to topography or geology.

Final Risk Reduction Measures

Relief Well Alternative (Tentatively Selected Plan)
The Relief Well Alternative would have minor effects on topography. The proposed access/maintenance road located along the landside of the levee would be about three feet high, and would appear to be an extension of the levee. Sediments excavated from the main ditch and placed in the disposal sites located with the pump station's detention basin would raise the affected ground by one foot on average. The drainage collection system would create minor depressions over s small area. Installation of new relief wells and modifications to existing relief wells would have negligible effects to topography.

Cutoff Wall Alternative
The Cutoff Wall Alternative would have minor effects on topography. A trench varying in depth from 110 to 145 feet deep and three feet wide would be excavated to the top of bedrock along the riverside of the embankment (Figure EA-7). After filling the trench with a cement-bentonite mixture, existing ground elevations would be restored. All materials excavated from the trench would be taken to a disposal site for placement on the landside of the levee; assuming a 10-acre site, the average depth would be 5 feet.

4.3 Air Quality

No Action Plan

Because Madison County, as part of the St. Louis metropolitan area, is a nonattainment area for ozone and 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).

Interim Risk Reduction Measures. Implementation of the interim measures since early 2010 through 2015 has had minor effects on air quality. Continuing the operation of these measures into the future is not expected to result in any new effects to air quality. Equipment used to construct dikes and other structures as well as trucks hauling construction materials to the project area have emitted exhaust and generated some dust during operation. Air quality impacts were minor as they were temporary and of short duration.

Final Risk Reduction Measures

When a federal action is being undertaken in a nonattainment area, the federal agency responsible for the action is required to determine if its action conforms to the applicable State Implementation Plan (SIP). A SIP is a plan that provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS) and includes emission limitations and control measures to attain and maintain the NAAQS. An analysis was conducted to determine the conformity of the Relief Well Alternative (Tentatively Selected Plan) and Cutoff Wall Alternative to the SIPs for the state of Illinois. As a result of the analysis, the

District has concluded that each alternative would have minimal air quality impacts and they would be below the de minimis levels for the area.

For these alternatives, 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 encounters 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

Under the no action plan, the ponding area of East Alton No. 1 Pump Station would continue to store surface water in its detention basin after rainfall events and inflows from the City of Alton's combined sewer and treatment plant (CSO) outflows, in addition to underseepage from the river.

Regarding water quality, surface water quality within the vicinity of the project area has a wide variety of impairments. There is a general increasing trend in population and commercialization/industrialization within this larger 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 coming from the watershed that drains into the Upper Wood River levee protected area and the landside ponding area.

With respect to the project area, the City of Alton is currently permitted by the Illinois Environmental Protection Agency under the National Pollutant Discharge Elimination System (NPDES) Permit Program to discharge combined sewer and treatment plant (CSO) outflows into waters of the State of Illinois. Discharges from the Shields Valley and Central Avenue CSO outfalls are received by the detention basin of the East Alton Pump Station. The NPDES permit

calls for the City to develop plans for updating its CSO facilities by separating treatment outflows from sewer outflows. One option under consideration is the use of a constructed wetland treatment facility for the treatment of sewage effluent. The pump station's detention basin is being considered as the site for such a wetland treatment facility. The St. Louis District has periodically coordinated with the City and its consultant with regard to this treatment option and the potential impact that the City's option and the underseepage project might have on one another.

Interim Risk Reduction Measures. Since April 2010, the East Alton No. 1 pump station is being operated to intentionally pond surface water within its ponding area to a greater depth and duration than normal in order to control underseepage. This ponding has increased the area of surface water within the ponding area from roughly 25 acres under normal pump station operations to over 100 acres, depending on surface elevation. This enhanced ponding will continue until final risk reduction measures are implemented by late 2021. See Section 4.7 Hydrologic Conditions for more information.

With respect to water quality, construction of the three rock dikes likely caused temporary and localized increases in levels of suspended particulates and turbidity at the construction sites and for relatively short distances downstream. As water quality in the project area is impaired, no adverse changes to surface water quality have been noted. Continuing the operation of these measures into the future is not expected to result in any new effects to surface water or surface water quality.

Final Risk Reduction Measures

The interim risk reduction measure consisting of higher interior ponding levels at the East Alton No. 1 pump station would cease. As a result, the storage capacity of the ponding area would be restored to what was present prior to implementation of interim ponding in 2010. The extent of surface waters would be reduced and would return to conditions under normal pump station operations.

Cutoff Wall Alternative
The Cutoff Wall Alternative, due to the location of construction on the riverside of the levee, would not any affect surface waters in the ponding area at all.

Relief Wells Wall Alternative (Tentatively Selected Plan)
During construction of the Relief Wells Alternative, the project area would be subdivided hydraulically into three separate reaches, one for each of three years of proposed construction. Each reach would be dewatered to allow for land-based equipment to work in that portion of the detention basin. Surface waters, consisting of the main ditch, would be temporarily drained.

After construction is completed, the new relief wells would introduce groundwater with iron and manganese into adjacent wetlands.

The proposed action is expected to cause minor short term impacts to surface water quality during the construction process. Proper stormwater pollution prevention practices would be

employed in construction areas where the ground surface is disturbed. During construction the pumping of any surface water from precipitation or groundwater would follow proper environmental protocols (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.

4.5 Groundwater and Groundwater Quality

No Action Plan

Under the no action plan, heavy underseepage would continue under the Upper Wood River levee adjacent to the Melvin Price Lock and Dam, and continue to threaten levee integrity. Regarding groundwater quality, the general trend toward increasing population, commercialization and industrialization in the vicinity of the study area (USACE, 2003) is likely to lead to a further slow decline in overall groundwater quality due to the infiltration of surface water of declining quality.

Interim Risk Reduction Measures. The interim measures have not changed any groundwater movement patterns in the vicinity of the Wood River levee adjacent to the Melvin Price Locks and Dam. The interim ponding and airlifting have been effective at controlling excessive underseepage by retarding the rate of groundwater movement. Groundwater elevations have not changed. Based on periodic observations since March of 2010, the ponding appears to be controlling the movement of sand from under the levee foundation. No changes are expected to groundwater quality while these measures remain in effect.

Final Risk Reduction Measures

Automated monitoring of piezometers installed within the detention basin along three transects would continue during construction and thereafter to assess the response of groundwater to the final risk reduction measures. Neither of the alternatives is expected to cause any impacts to groundwater quality.

Cutoff Wall Alternative

With regard to groundwater movement patterns, the Cutoff Wall Alternative is designed to impede the prevailing lateral movement of groundwater away from the river channel. This underground wall would be built parallel to the levee on the riverside of the levee's centerline for

a distance of about 6,600 feet and extend from the ground surface down to the top of bedrock. Because neither end of the cutoff wall would tie underground into the Illinois bluff, groundwater from the river would flow around both ends and still reach the landside detention basin and vicinity, but with reduced energy. The heavy underseepage currently occurring along the landside base of Illinois Highway 143 would be halted, and the movement of sand from under the levee foundation would cease. Groundwater elevations in the pump station's detention basin would still remain close to the ground surface.

Relief Wells Alternative (Tentatively Selected Plan)

The Relief Wells Alternative would not impede the prevailing lateral movement of groundwater away from the river. Rather, the new relief wells would intercept much of the underground "flow" and bring it to the landside ground's surface in a controlled fashion, without the conveyance of sand from under the levee foundation. Based on groundwater modeling using SEEP/W© 2007, the relief well plan would lower existing groundwater elevations along the landside base of Illinois Highway 143 by about one foot. Further landside from the levee, groundwater elevations are expected to remain close to the ground surface as they are now. Figure EA-13 displays results of groundwater modelling in the project area under existing and future-without conditions at Sta. 112+30 where a range of piezometers have been installed; this assumes a Melvin Price pool at normal elevation (419 feet) and interior ponding at 402 feet. Figure EA-14 displays the modeled response of groundwater surface elevation at the same location with the relief well plan in place.

4.6 Hazardous, Toxic, and Radioactive Wastes

No Action Plan

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).

Interim Risk Reduction Measures. The Interim Operations Plan, including the construction of rock dikes and other structures that are part of the interim risk reduction measures, has not affected any hazardous, toxic, or radioactive wastes within the upper Wood River levee-protected area.

Final Risk Reduction Measures

The Cutoff Wall Alternative and Relief Well Alternative (Tentatively Selected Plan) would disturb both soil and groundwater, and both have the potential to encounter HTRW material if it is there. However, the Cutoff Wall Alternative would disturb a greater amount of soil and therefore would have a greater potential to encounter HTRW material. Construction of the Relief Well Alternative (Tentatively Selected Plan) would only disturb the surface of the soil and thereby would have the least likelihood of encountering HTRW material in the landside ponding area.

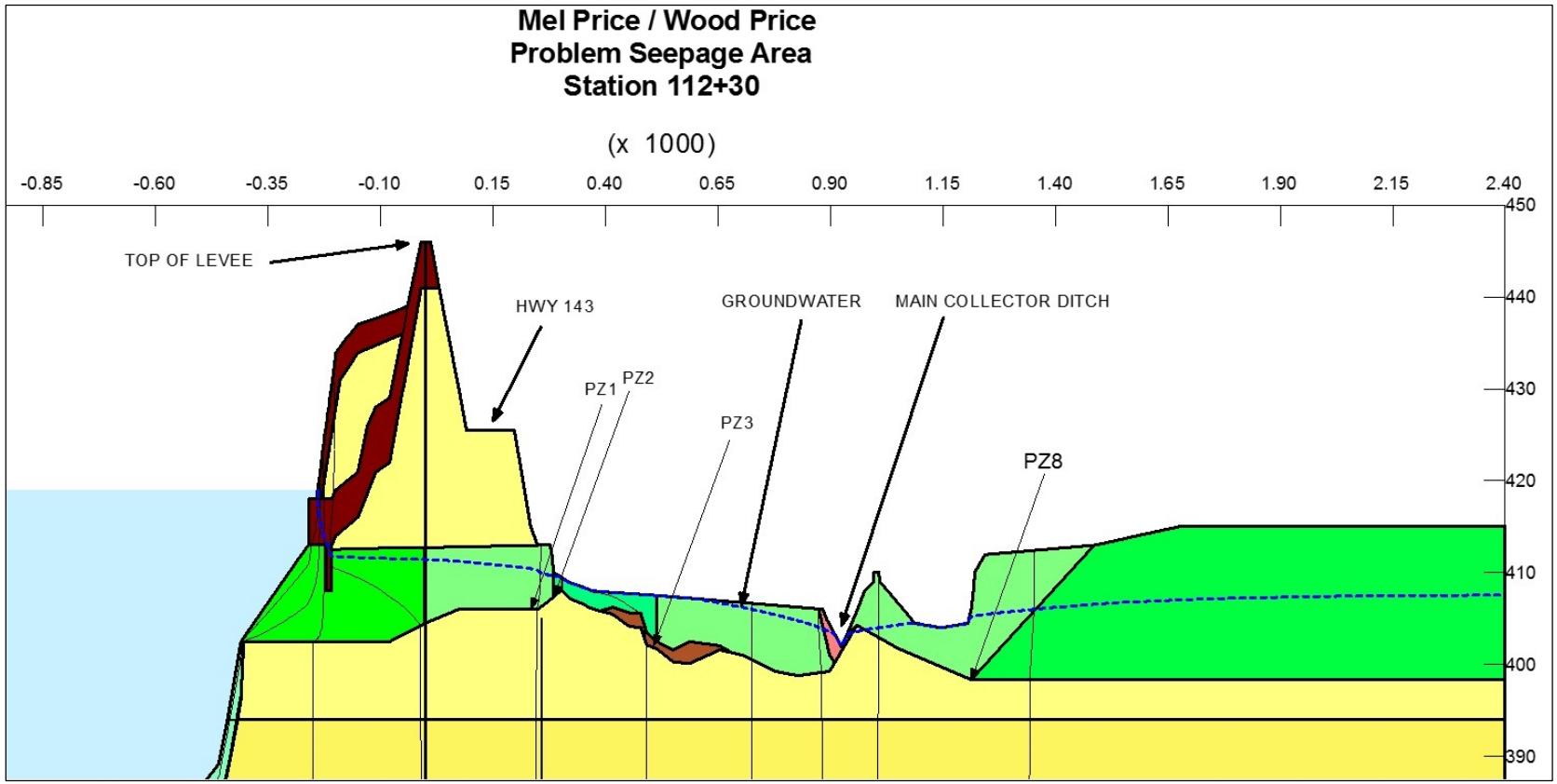

Figure EA-13. Modeled Groundwater Surface Elevation (dashed blue line) under Existing and Future Without Conditions at Sta. 112+30.

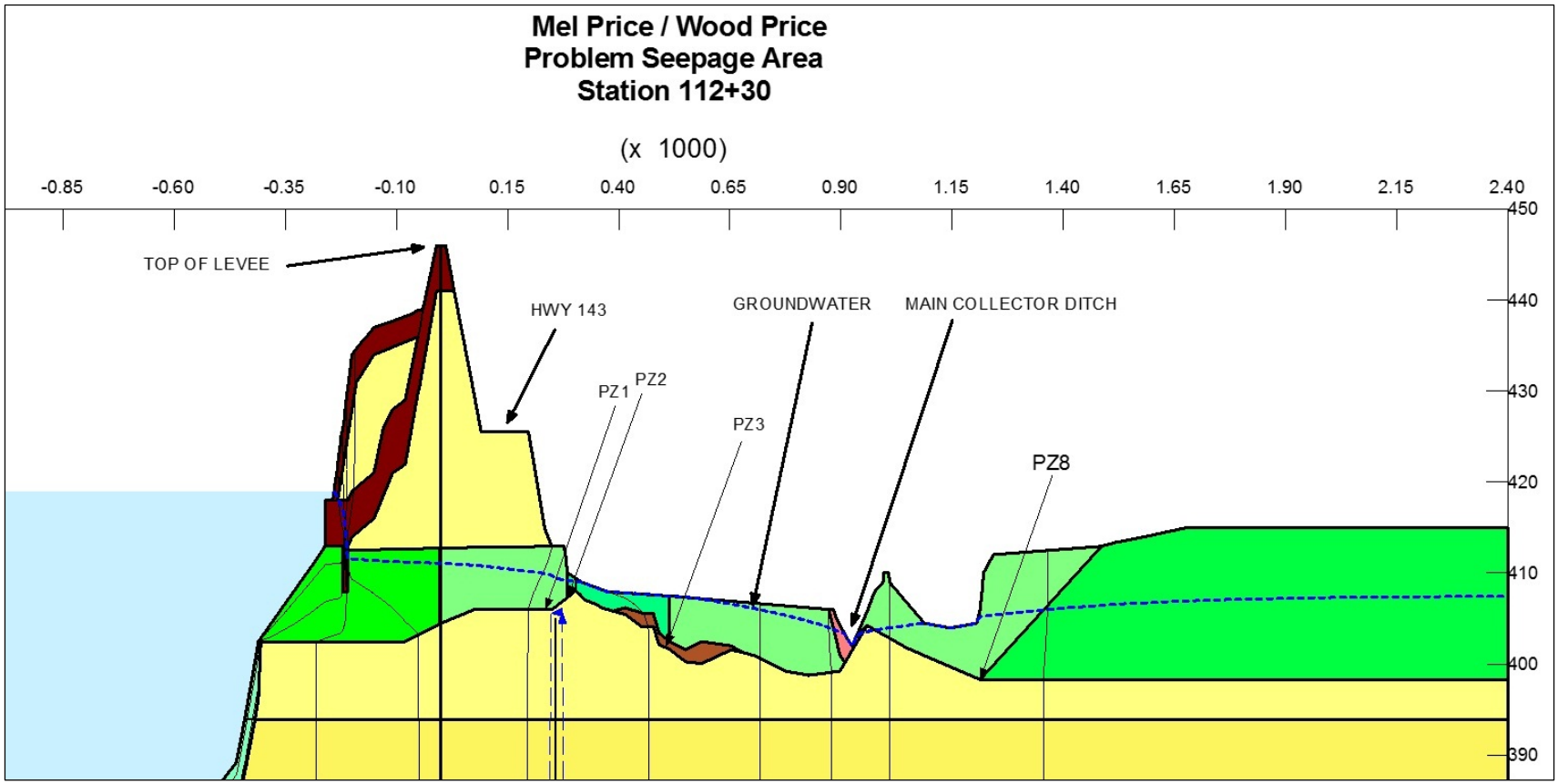

Figure EA-14. Modeled Groundwater Surface Elevation (dashed blue line) under Relief Well Plan (Tentatively Selected Plan) at Sta. 112+30.

A contingency plan would be developed to handle any unexpected encounter with contaminated materials. During construction of the Relief Well Alternative (Tentatively Selected Plan), excavated materials would be monitored to determine if any contaminants of concern are present that might require such materials to be considered a special waste. Any materials considered to be a special waste would not be placed at the proposed disposal site. A Site Health and Safety Plan, and a Quality Control Plan should be required, discussed with contractors, and implemented to avoid any environmental hazards.

4.7 Hydrologic Conditions

No Action Plan

Under the no action alternative, the inflows to the detention area of the East Alton pump station would continue to consist of storm water runoff, seepage, and combined sewer outflows. No significant climatological changes are expected to occur over the next 50 years that would affect surface water in the detention area. 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.

Interim Risk Reduction Measures. As discussed in Section 3.7, implementation of these interim measures since early 2010 has affected the hydrologic conditions of the ponding area of the East Alton No. 1 pump station. Continuing the operation of these measures until late 2021, when the final risk reduction measures are assumed to be completed, is not expected to result in any new effects to hydrologic conditions of the ponding area or any other waterbody.

Recorded ponding elevations are displayed in Figure EA-15 for time periods before and after the onset of intentional ponding as an interim underseepage control measure, along with corresponding elevations in the adjacent Mississippi River at the Mel Price pool and tailwater. Ponding started about 1 April 2010. Whereas ponding elevations prior to that date fluctuated and often dipped down to the 403 to 405 range, after that date they became more uniform and often stayed above elevation 408. Table EA-7 presents the frequency of ponding throughout the year (1 January – 31 December) at various ponding intervals before and after the onset of intentional ponding.

Final Risk Reduction Measures

The interim risk reduction measure consisting of higher interior ponding levels at the East Alton No. 1 pump station would cease. As a result, the storage capacity of the ponding area would be restored to what was present prior to implementation of interim ponding in 2010.

Expected inflows to the pump station were considered for each design alternative.

Table EA-7. Frequency of Ponding at Various Elevation Intervals in the Pump Station's Ponding Area.

Ponding Interval	2010	2011	2012	2013	2014	2015	Average
<408	36.3%	46.5%	37.5%	24.9%	43.3%	38.1%	37.6%
408-410	48.4%	27.1%	60.3%	57.7%	54.0%	45.7%	48.8%
410-412	14.1%	14.9%	2.2%	6.3%	2.7%	5.8%	7.8%
412-414	1.3%	11.5%	0.0%	5.1%	0.0%	1.4%	3.3%
414-415	0.0%	0.0%	0.0%	5.1%	0.0%	8.0%	2.1%
>415	0.0%	0.0%	0.0%	0.9%	0.0%	1.1%	0.3%

Cutoff Wall Alternative

This alternative would not take up any storage capacity in the ponding area, would decrease flows to the pump station, and would not require any changes to the current pump operations.

Relief Well Alternative (Tentatively Selected Plan)

Using hydrologic and hydraulic models, the computed flows from the new relief well system can be stored in the existing ponding area without additional pumping required at the East Alton #1 Pump Station. The only additional requirement is the adjustment of the pump operations curve, which lowers the normal ponding elevation and increases the available storage for runoff in the protected area behind the Upper Wood River Levee. The adjusted pump operations schedule is displayed below (Table EA-8). The adjustment would be required only when Mel Price tailwater elevations are above elev. 431, which is infrequent.

Table EA-8. Adjusted Pump Operations Schedule.

			Peak Hours						Non-Peak Hours					
Hydraulic Condition Number	Mel Price Tailwater Stage (feet)	Mel Price Tailwater Elevation (feet NGVD 29)	Rising Sump Start Pump Elevation			Falling Sump Stop Pump Elevation			Rising Sump Start Pump Elevation			Falling Sump Stop Pump Elevation		
			1	2	3	1	2	3	1	2	3	1	2	3
1	10.5 - 27.5	406 - 423	406.0	408.5	409.0	405.5	407.0	407.0	406.0	406.5	408.5	405.0	406.0	407.0
2	27.6 - 32.5	423.1 - 428.0	408.0	408.0	409.5	406.0	407.5	408.0	408.0	408.5	408.5	406.0	407.5	408.0
3	32.6 - 35.5	428.1 - 431.0	408.5	409.0	410.5	407.5	408.5	409.5						
4	35.6 - 39.5	431.1 - 435.0	408.5	410.5	411.0	408.0	409.5	410.0						
5	39.6 - 48.7	435.1 - 444.2	412.0	412.0	412.5	411.0	411.5	412.0						

Notes:

1. Highlighted sections of the table indicate the changed portions of the Pump Operation Schedule.
2. Peak Hour operations remain unchanged for Hydraulic Condition Numbers 1 and 2.
3. Non-Peak Hour operations remain unchanged.

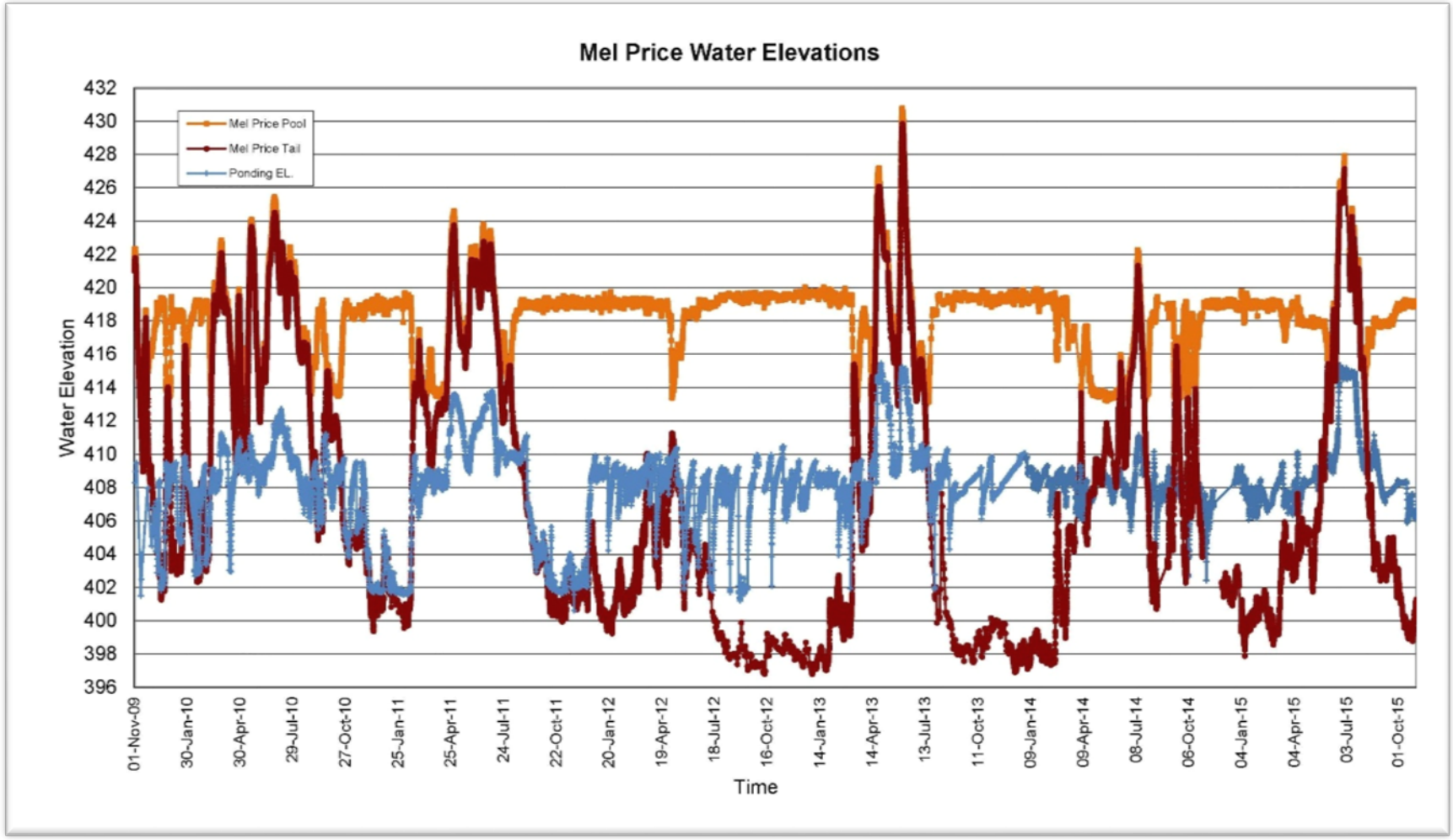

Figure EA-15. Ponding Elevations in the Pump Station's Ponding Area.

4.8 Noise

No Action Plan

Under the no action plan, industrial and commercial development on the Upper Wood River levee-protected floodplain of the Mississippi River is expected to gradually increase. 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 agricultural and residential areas are not present within the Upper Wood River levee-protected area, noise levels are expected to gradually increase. No new noise-sensitive receptors such as hospitals or schools are expected to be built in the area along the landside of the levee.

Interim Risk Reduction Measures. Implementation of these measures generated noise when heavy equipment was in operation; the noise was of relatively short duration and minor. Construction equipment was used to install dikes and other features in 2010, 2014, and 2015, and portable air compressors placed along the edge of Illinois Highway 143 were in operation around the clock for about a month during spring/summer of 2013. These noise levels were similar to that generated by traffic on this highway. Continuing the operation of these measures until late 2021 when final risk reduction measures are assumed to be completed is not expected to result in any new noise impacts.

Final Risk Reduction Measures

The Wood River levee embankment that is adjacent to and parallels the Mississippi River is a prominent feature topographically, and is expected to buffer or deflect noise. As such, noise or sound generated along the base of one side of the levee would be much reduced on the other side of the levee.

Cutoff Wall Alternative
Noise generated during construction of the Cutoff Wall Alternative would be largely limited to the Mississippi River side of the levee, where no noise-sensitive receptors are located.

Relief Well Alternatives (Tentatively Selected Plan)
Construction noise generated by the Relief Well Alternative (Tentatively Selected Plan) would be largely confined to the protected side of the levee. Noise receptors consisting of residential areas or facilities such as schools or hospitals are not located near the construction area for this alternative. Therefore noise generated by the relief well plan is not expected to impact these kinds of receptors. Short-term noise impacts would be generated during the operation of various types of construction machinery, and these impacts would occur during the day and be intermittent in nature. The duration of construction is expected to be about three years. Overall, this alternative is not expected to significantly increase noise for the short or long-term.

4.9 Prime Farmland

No Action Plan

Under the 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).

Interim Risk Reduction Measures. Because land zoned for agricultural use does not exist within the Upper Wood River levee-protected area, the interim measures have not affected this resource.

Final Risk Reduction Measures

Cutoff Wall Alternative and Relief Wells Alternative (Tentatively Selected Plan)
Because land zoned for agricultural use does not exist within the Upper Wood River levee-protected area, this alternative would not affect this resource.

4.10 Biological Resources

No Action Plan

Under the 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 herbaceous and forested wetlands and bottomland hardwood forest, 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).

Interim Risk Reduction Measures.

Direct Impacts. Direct impacts to project area habitats associated with the interim risk reduction measures are outlined below and presented in Table EA-10. As of November 2015, a total of about 1.0 acre of herbaceous wetland habitat and about 0.5 acre of bottomland hardwood

forest habitat have been directly impacted. As the Interim Operations Plan has been fully developed, no additional direct impacts to project area resources are anticipated.

- Dikes A,B, & C (constructed in 2010) – 0.80 acres, herbaceous wetland (temporary)
- Access road to Dike B (constructed in 2010) – 0.50 acres, bottomland hardwood forest (permanent)
- 35 rock pads (constructed in 2014) – 0.05 acres, herbaceous wetland (temporary)
- 3 rock walkways (constructed in 2015) – 0.15 acres, herbaceous wetland (permanent)
- 1 boat ramp (constructed in 2015) – 0.01 acre, herbaceous wetland (permanent)

Dikes A, B, and C as well as the pump pads would remain in place until construction of permanent risk reduction measures is completed, and then they would be removed. The expected duration of this long-term temporary impact is about 9 years (2010-2018). The affected sites would be restored to their original condition after the permanent underseepage solution is completed.

Habitat changes for these losses were assessed using the Habitat Evaluation Procedures (USFWS, 1980); the habitat evaluation is provided as an appendix to this SEA (Appendix EA-C).

Indirect Impacts. The prolonged detention of surface water in the East Alton No. 1 pump station's ponding area to counteract underseepage pressures has stressed vegetation in some wetland habitats within the ponding area. The ponding of water in wetlands for extended periods of time can stress wetland vegetation, which in turn can slow individual plant growth; shift plant species composition over time to those more tolerant of flooding; increase susceptibility of woody species to invasion by boring insects and disease, which can lead to early death; or cause mortality due to waterlogged soils that prevent oxygen from reaching root systems that is needed for respiration (Baughman 2010). After permanent risk reduction measures are completed, the total amount of tree mortality within the detention basins habitats is estimated to be five acres of trees in forested wetland.

Table EA-9 displays the annual frequency of ponding during the growing season (1 April - October 15) for various 2-foot topographic intervals during 2010 through 2015. This information was obtained from automated recording equipment installed at the pump station at the onset of implementation of interim measures. During each year, ponding occurred most often within the 408-410 topographic interval (Table EA-9). Ponding exceeded elevation 415 for brief periods during 2013 and 2015. Daily ponding elevations in the pump station's ponding area are displayed in Figure EA-15 for the same time period, along with pool and tailwater elevations on the adjacent Mississippi River.

As of early October 2010, effects on vegetation were first noted in scrub-shrub and wet forested wetland. In scrub-shrub wetlands, the lower half of buttonbush plants exhibited a complete loss of leaves, whereas the upper half of these woody plants remained green. This adverse effect was temporary because new leaf growth has since returned and no buttonbush mortality has been observed to date.

Table EA-9. Frequency of Ponding in the Pump Station's Ponding Area at Various Elevation Intervals during the Growing Season.

Ponding Interval	2010	2011	2012	2013	2014	2015	Average
<408	18.1%	22.1%	44.7%	22.4%	49.7%	17.8%	29.0%
408-410	55.6%	29.2%	52.2%	46.8%	45.9%	56.2%	47.6%
410-412	23.9%	27.5%	3.1%	10.4%	4.5%	9.3%	13.2%
412-414	2.4%	21.1%	0.0%	9.4%	0.0%	2.2%	5.9%
414-415	0.0%	0.0%	0.0%	9.3%	0.0%	12.7%	3.7%
>415	0.0%	0.0%	0.0%	1.7%	0.0%	1.8%	0.6%

In wet forested wetland habitat, the first signs of tree stress were displayed in leaves. These symptoms included yellowing, early leaf drop, and partial death of individual leaves. After the passage of six years of interim ponding, continuing stress has caused some tree mortality. Although the estimate of expected tree mortality provided in the first SEA for this project was 25 acres, the actual amount of tree mortality observed has been limited to several acres (based on observations made during annual site visits, during which dead trees were noted either individually or in small clumps at scattered locations). Based on these observations, the continuation of ponding until late 2021, when the construction of final risk reduction measures is scheduled to be completed, is expected to result in a total of about 5 acres of tree mortality in forested wetland habitat.

Continuation of the interim measures through late 2021 is not expected to give rise to any new impacts to biological resources.

Coordination and Environmental Compliance for Interim Measures. In November 2009, the St. Louis District notified the Illinois Department of Natural Resources, Illinois Environmental Protection Agency, and U.S. Fish and Wildlife Service of the underseepage project and need to declare an emergency to implement interim measures, and that interim ponding had the potential to adversely affect project area habitats. For the construction of interim features that have involved the placement of fill materials (rock) from early 2010 through 2015, the District's Regulatory Branch applied Nationwide Permit #30 (Maintenance of Existing Flood Control Facilities) of Section 404 of the Clean Water Act. Although Nationwide Permit #30 is not to be used for projects requiring mitigation, the agencies were informed that an Environmental Assessment(s) would be prepared addressing the interim and permanent measures, that the proposed permanent solution would require issuance of a Section 404 public notice to allow for a more extensive review of likely impacts, and that a mitigation plan if needed would be incorporated as a feature of the proposed permanent plan.

Final Risk Reduction Measures

Relief Well Alternative (Tentatively Selected Plan).

Direct Impacts. An estimated total of 9.15 acres of various habitats within the pump station's detention basin would be directly impacted by the proposed Relief Well Alternative and permanently lost. This includes about 8.65 acres of various wetlands and 0.50 acre of terrestrial habitats. Temporary adverse direct impacts would also occur to an estimated additional 21.8 acres of various habitats, including herbaceous wetland and riverine habitat. These direct impacts are outlined below along with the proposed feature causing the effect.

- Road & drainage system – 7.15 acres, herbaceous wetland (permanent loss)
- Road & drainage system – 0.25 acre, shrub-scrub wetland (permanent loss)
- Road & drainage system – 1.25 acre, forested wetland (permanent loss)
- Road & drainage system – 0.50 acre, bottomland hardwood forest (permanent loss)
- Disposal sites (excavated sediments) – 18.1 acres, herbaceous wetland (temporary impact)
- Removal of sediments from main ditch, articulated concrete mat placed on ditch bottom in excavated ditch, dikes E & F placed in ditch temporarily for dewatering – 3.7 acres, riverine (temporary impact).

Marsh habitat serving as disposal sites for sediments excavated from the main ditch is expected to experience temporary adverse impacts, including the smothering of new herbaceous plant growth that is expected to sprout shortly after dewatering of the project site commences. After disposal is completed, the disposal sites are expected to naturally revegetate and function as shallow marsh habitat. Similarly, riverine habitat represented by the man-made main ditch is expected to experience temporary impacts due to the loss of bankline vegetative cover, loss of surface water from dewatering, and temporarily increased turbidity levels.

Habitat changes for these final risk reduction measure losses were assessed using the Habitat Evaluation Procedures (USFWS, 1980); the habitat evaluation is provided as an appendix to this SEA (Appendix EA-D).

Table EA-10. Direct Permanent Losses (acre) to Aquatic and Terrestrial Habitats and Associated Mitigation (acre) for Interim and Final Risk Reduction Alternatives.

Habitat Type	Interim Operations Plan	Cutoff Wall	Relief Wells
Aquatic - Herbaceous Wetland	1.0	0	7.15
Aquatic - Forested Wetland	0	0	1.25
Aquatic - Shrub-scrub Wetland	0	0	0.25
Terrestrial - Nonwetland Bottomland Forest	0.5	0	0.5
Total Impact	1.5	0	9.15
Total Mitigation	0.2	22.5*	23.5**

* due to adverse indirect impacts

** due to adverse direct and indirect impacts

Indirect Impacts. Some aquatic habitats located in the ponding area on the landside of the levee are expected to experience changes in surface hydrology. Whereas surface hydrology of

herbaceous wetlands on the Alton side of Cpl Bechik Expressway is expected to remain the same (relief wells there would discharge onto the ground and groundwater would still sheet flow to the main ditch), on the downstream side of the expressway, sheet flow of groundwater across wet meadow and higher forested wetland habitats would no longer occur. In these habitats in this area, rather than continue sheet flowing toward the main ditch, groundwater from relief wells would instead be collected on the ground's surface and funneled into a series of collector ditches leading to the main ditch. Shallow surface water would be eliminated and likely replaced by saturated soil conditions.

Another expected indirect impact is an increase in the abundance of plant cover in herbaceous wetlands, mainly marshes. The relief wells are expected to reduce groundwater pressure that currently forms and maintains seeps throughout much of the ponding area. Existing ground conditions that are too soft to support the growth and establishment of herbaceous plants like cattails are expected to become like that of ground not subject to constant underseepage pressures. Hence, aquatic habitats on the landside of the levee are expected to experience "drier" or less wet hydrological conditions. As a result, marsh habitat that currently resembles mud flats is expected to become naturally vegetated and support a dense growth of herbaceous plants species, such as cattails, smartweeds, various *Carex* species.

Regarding potential effects of the proposed relief wells on wetland hydrology, groundwater elevations are expected to remain essentially the same in the underlying sandy substrate (Figures EA-13 and EA-14). Capillary fringe action of the soil (alluvial silts and clays on top of the underlying sands) would be expected to continue to draw groundwater upward in the same manner into the root zone of the existing wetland plant communities. As such, the ponding area below elevation 412 feet would likely still 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 existing piezometer wells installed at various locations in the ponding area.

Mitigation. The Relief Well Alternative (tentatively selected plan) would directly impact a total of about 9.15 acres of various habitats within the project area, including about 8.65 acres of various wetlands and 0.50 acre of terrestrial habitats (Table EA-13). These impacts are unavoidable and require compensatory mitigation under the Clean Water Act and Corps Planning Guidance Notebook. Habitat changes and mitigation requirements for these losses were assessed using the Habitat Evaluation Procedures for the interim measures and final risk reduction measures (Appendix EA-C); under the Corps planning model certification process, the HEP models that were used in the analysis are presently approved for regional or nationwide use. The mitigation plan (Appendix EA-D) describes a specific location off-site and adjacent to the impact watershed, and is proposed to be purchased from a willing seller. The combined mitigation requirement for the Interim Operations Plan and the Relief Well Alternative is the creation of 10.7 acres of herbaceous wetlands, about 12.8 acres of forested wetlands, and about 0.2 acre of bottomland hardwood (non-wetland) forest, for a total of 23.7 acres. With incorporation of the mitigation plan as part of the tentatively selected plan, this alternative is not expected to have any significant impacts to natural resources.

Coordination and Environmental Compliance for Relief Well Alternative (Tentatively Selected Plan). Because various types of clean fill materials would need to be placed into Waters of the United States including wetlands, a Section 404 permit review process is required through the District's Regulatory Branch. A Section 401 Water Quality Certification review process through IEPA will address the discharge of materials into waters of the United States as well as limitations to ensure that water quality standards are met. The specific conditions that IEPA describes in their 401 Water Quality Certification would become part of the Section 404 authorization that the Regulatory Branch would issue. Both processes would be required before any fill activities can take place in association with the proposed final risk reduction project. Permits may be required from IDNR, Office of Water Resources for construction activities within waterways and design plans would be coordinated through their office. A Section 404(b)(1) evaluation is attached to this SEA as Appendix EA-B.

The National Environmental Policy Act (NEPA) process would continue to address potential effects of any yet to be defined, revised, or new project features that might be developed during the design phase. Any need for borrow or dredged material would be coordinated with the USACE Regulatory and Environmental leads relative to permit and endangered species issues. Additional Section 404 and 401 review could be required for these activities. An additional Supplemental Environmental Assessment would be prepared and circulated to fulfill this requirement for public disclosure and involvement.

Cutoff Wall Alternative. This alternative would have no direct impacts to natural habitats since the cutoff wall would be constructed on the riverside of the levee in the existing grassy levee right of way. Grassy levee turf would be disturbed during construction and restored to pre-project conditions after the wall was completed. However, the cutoff wall is expected to reduce underseepage in a manner like the relief wells, and eliminate groundwater sheet flow along the base of Illinois Highway 143. As described above, this would adversely affect the wet meadow and higher forested wetland habitats in this area by eliminating shallow surface groundwater. Habitat suitability changes for this alternative were also assessed using the Habitat Evaluation Procedures, and mitigation required to offset the resulting adverse indirect effect to natural habitats would be 22.5 acres (Table EA-10).

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

Under the 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.

Interim Risk Reduction Measures. Implementation of the Interim Risk Reduction Measures as represented by the Interim Operations Plan (IOP) from 2010 through 2015 has not resulted in

any adverse effects to the eight federally listed species that may occur in the project area. The project area was re-surveyed by USACE for the presence of decurrent false aster as recently as September 2015 and no plants were found. Similarly, no adverse effects to the known active bald eagle nest have occurred. Since the IOP has evolved over time, USACE has periodically coordinated proposed IOP changes with the U.S. Fish and Wildlife Service to comply with the Endangered Species Act and Bald and Golden Eagle Protection Act. On these occasions assessments of potential project effects on the known active nest have been prepared by USACE and coordinated with USFWS. The most recent assessment, a comprehensive evaluation of all IOP activities, was prepared in August 2015 and concluded that the IOP, including noise generated during airlifting and centrifugal pump operations, was not expected to result in any harm or harassment to the active nest. USFWS concurred with this conclusion on August 31, 2015 (email message dated 31 August 2015, Appendix EA-E). Continued operation of the IOP into the future is not expected to result in any new impacts to listed species or the bald eagle. Additional coordination with USFWS will occur as the need arises.

Final Risk Reduction Measures

Potential impacts of the Final Risk Reduction alternatives including the Tentatively Selected Plan are described for each species below.

Indiana bat. Since the Cutoff Wall Alternative would not require any tree clearing, it would have no effect on this species. In contrast, tree clearing would be required for the Relief Wells Alternative (Tentatively Selected Plan), including some trees with suitable maternity roosting characteristics. Tree felling would need to be restricted to the colder months when maternity roosting in trees does not occur (October 1 to March 31). With this restriction, the Relief Wells Alternative (Tentatively Selected Plan) "may affect, but is not likely to adversely affect" the Indiana bat.

Northern Long-eared Bat. Since the Cutoff Wall Alternative would not require any tree clearing, it would have no effect on this species. In contrast, tree clearing would be required for the Relief Wells Alternative (Tentatively Selected Plan), including some trees with suitable maternity roosting characteristics. Tree felling would need to be restricted to the colder months when maternity roosting in trees does not occur (October 1 to March 31). With this restriction, the Relief Wells Alternative (Tentatively Selected Plan) "may affect, but is not likely to adversely affect" the Northern long-eared bat.

Least tern. Neither of the two action alternatives would 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 Cutoff Wall Alternative and Relief Wells Alternative (Tentatively Selected Plan) would have "no effect" on the least tern.

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 occur at the present time anywhere in the Metro-East area of Madison County, Illinois, including the project area. Therefore, the Cutoff Wall

Alternative and Relief Wells Alternative (Tentatively Selected Plan) would have "no effect" on this proposed threatened species.

Pallid sturgeon. Neither of the two action alternatives would require any activity in the adjacent Mississippi River, such as the dredging of sand. As this fish species is known from this part of the river, potential impacts would include entrainment of individual fish if dredging of sand needed for the project was part of the plan. However, the Cutoff Wall Alternative and Relief Wells Alternative (Tentatively Selected Plan) do not involve any work activity in the river, and they would have "no effect" on the pallid sturgeon.

Spectaclecase mussel. This mussel is not considered to be present in the adjacent Mississippi River. As the Cutoff Wall Alternative and Relief Wells Alternative (Tentatively Selected Plan) do not involve any activity in the river, they would have "no effect" on the spectaclecase mussel.

Decurrent false aster. The Cutoff Wall Alternative would have "no effect" on this plant because construction activities would be restricted to the riverside of the levee, where suitable habitat is not present (groundcover consists of mowed levee turf). With respect to the Relief Wells Alternative (Tentatively Selected Plan), colonies or populations of this plant are not known from the Wood River Drainage and Levee District, including the levee reach adjacent to the Melvin Price Locks and Dam and the landside ponding area for the East Alton 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 6 years before Final Risk Reduction 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. With this restriction, the Relief Wells Alternative (Tentatively Selected Plan) "may affect, but is not likely to adversely affect" the decurrent false aster.

Eastern prairie fringed orchid. Although this plant is known historically from Madison County, suitable habitat consisting of remnant mesic or wet prairies does not exist in the vicinity of the Wood River levee system, including the project area. Therefore, the Cutoff Wall Alternative and Relief Wells Alternative (Tentatively Selected Plan) would have "no effect" on 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 Cutoff Wall Alternative would not affect the known active bald eagle nest because there are no proposed activities on the landside of the levee. In contrast, the Relief Wells Alternative (Tentatively Selected Plan) is located on the landside of the levee, and one feature – a proposed discharge channel – lies within 660 feet of the nest. To avoid any harm or harassment to the nest during the construction period, human activity within 660 feet of this nest, either associated with this feature or any other project activity such as dewatering, will be restricted to the non-nesting season (July-December). This assessment of the

potential effect of the Relief Wells Alternative (Tentatively Selected Plan) on the active nest has been coordinated with USFWS (email message dated 14 October 2015, Appendix EA-E). If this restriction cannot be met, then a permit would be recommended by USFWS.

The District will continue to evaluate potential impacts to the bald eagle as design plans are developed, and will coordinate in this regard with USFWS.

It is the St. Louis District's opinion that the Relief Wells Alternative (Tentatively Selected Plan) will not adversely impact any of the eight federally listed species that might occur in the project area, provided that conditions for the protection of the decurrent false aster, Indiana bat, and Northern long-eared bat 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

Under the 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).

Interim Risk Reduction Measures. Construction of IOP features and operation of the IOP have not adversely affected the Confluence Trail on top of the levee along the Mississippi River or any other recreational resource. Continuing the operation of these measures into the future is not expected to result in any new impacts to recreational resources.

Final Risk Reduction Measures

Construction of the Cutoff Wall Alternative on the riverside of the levee centerline would require heavy equipment to cross over the levee periodically during the construction period. Coordination between the St. Louis District and trail officials would be needed to ensure the safety of trail users. Recreational use of the trail would be expected to continue during the construction process with appropriate safety measures in place. Recreational use of the Mississippi River would not be affected.

Construction activities associated with the Relief Wells Alternative (Tentatively Selected Plan), located on the landside of the levee, are not expected to affect use of the Confluence Trail on top of the levee.

4.13 Aesthetics

No Action Plan

Under the no action plan, the overall aesthetics of the study area are expected to progressively change. In the Upper Wood River protected area, redevelopment is likely to be located on previously used lands.

Interim Risk Reduction Measures. Implementation of these measures since 2010 has likely been noticed by the public that drives by the project area on Illinois Highway 143 and Cpl. Belchik Boulevard. Dikes B and C are visible, but their relatively small size does not present much visual impact. Elevated ponding of extended duration is also noticeable by the public that drives by or uses the recreational trail on top of the levee. Mortality of some trees along the forested margins of the ponding area due to drowning/soil saturation is readily observed. The overall effect of the interim measures on aesthetics is considered to be minor because the area has functioned as a natural ponding area for decades.

Final Risk Reduction Measures

The Cutoff Wall Alternative would be located on the riverside of the levee in a grassy area along the levee toe, and the wall itself would not be visible at all after construction because it would be entirely underground. The aesthetics of the project area would be temporarily impacted by the presence of construction equipment, removal of vegetation, and the creation of noise, fumes and dust during the construction phase.

The Relief Wells Alternative (Tentatively Selected Plan) would be located in the same area that has been affected by the IOP. The aesthetics of the project area would be temporarily impacted by the presence of construction equipment, removal of vegetation, and the creation of noise, fumes and dust during the construction phase. A linear strip of trees and other nonwoody natural habitats along Highway 143 would be replaced by the proposed grassy access/maintenance road, and this change would probably create a notable temporary adverse aesthetic impact. Once constructed, the proposed action's features are likely to blend in with the existing levee system and surroundings. Disturbed grassy areas would be reseeded and returned to pre-project conditions.

4.14 Historic Properties

No Action Plan

Under the no action plan, the interim risk reduction measures would remain in effect. As discussed in Section 3.14, implementation of these measures has not affected any historic properties. Continuing the operation of these measures into the future is not expected to result in any new impacts to historic properties.

Interim Risk Reduction Measures. Construction of the interim features, such as the rock dikes and walkways, as well as establishment of interim ponding, have not affected any historic properties.

Final Risk Reduction Measures

The USACE has consulted with the Illinois Historic Preservation Agency (IHPA) regarding impacts within the known construction footprint. The project area lies within an area previously surveyed for cultural resources of which none were located. In addition, the USACE has executed with IHPA a Programmatic Agreement (PA) in conjunction with the Wood River Limited Reevaluation Report specifying how USACE will address any preservation concerns that may arise from changes in project impacts. A PA is a contract between the signatories specifying the procedures to be followed to achieve compliance with historic preservation laws. The PA will cover any activities undertaken on the Wood River Levee system although those activities may arise from separate projects under different funding streams.

In addition to consulting with the Illinois SHPO, USACE contacted 28 tribal organizations of which one, the Osage Nation, indicated a desire to be a concurring party to the PA with the IHPA. The PA will outline and ensure the completion of all compliance activities prior to the start of construction. For any site identified within the project Area of Potential Effect (APE), a determination of eligibility (DOE) for the National Register of Historic Places must be submitted to the Illinois SHPO for concurrence. For archaeological sites determined eligible, a data recovery plan would be formulated and carried out under the stipulations of the PA for the mitigation of adverse impacts. As a result of completing those activities, any adverse effects on historic properties within the project area will be mitigated.

The consultation process described above will be used to address potential effects of any yet to be defined, revised, or new project features.

4.15 Relationship of the Proposed Project to Land-Use Plans

The Relief Wells Alternative (Tentatively Selected Plan), which is to restore a fully functional flood protection project for the reach of Wood River levee adjacent to the Melvin Price Locks and Dam, is consistent with the original purpose of the Wood River and Melvin Price projects and the need to protect a relatively large urban area from Mississippi River flooding. In addition, the City of Alton has plans to upgrade its existing sewage and treatment plant facilities that currently discharge combined sewage and treatment flows through two outfalls into the ponding area of the East Alton pump station. One option for improvements is to construct a wetland treatment facility in the pump station's detention area. The Relief Wells Alternative (Tentatively Selected Plan) appears to be compatible with the City's optional plan.

4.16 Adverse Effects Which Cannot Be Avoided

There are unavoidable impacts associated with the Interim Risk Reduction Measures. Impacts to natural habitats include the loss of about 1.0 acre of nonwoody wetlands and 0.5 acre of bottomland hardwood forest (nonwetland) to construct various stone features, such as dikes and walkways. In addition, some stress has been placed on woody and nonwoody vegetation within the East Alton pump station's ponding area because the IOP ponding necessary to counteract underseepage has occurred at depths and durations that some plants are not able to withstand. An estimated 5 acres of trees in forested wetland have died since 2010 through 2015, and this stress will continue until the proposed plan for Final Risk Reduction Measures is constructed, which is not expected to be completed until 2021. Additional unavoidable impacts include

damage to a limited number of existing relief wells that occurred during airlifting operations in 2013, along with a temporary lane closure on Illinois Highway 143 when portable air compressors for airlifting were in place along the edge of the highway for about a month.

Unavoidable impacts associated with the Relief Wells Alternative (Tentatively Selected Plan) include the permanent loss of about 9 acres of various natural wetland habitats that requires compensatory mitigation, the elimination of groundwater underseepage in the project area that currently manifests itself as shallow surface water, a likely lane closure of Illinois Highway 143 during some portions of the construction process, and noise and exhaust generated by equipment during construction.

4.17 Short-Term Use versus Long-Term Productivity

The ongoing Interim Risk Reduction Measures are a short-term use of the environment to reduce unacceptable flood risk to a relatively large area of industrial and commercial land use. The long-term biological productivity of the East Alton Pump Station's detention area will return relatively soon after the final measures are completed and the ongoing stress to some components of the basin's wetland plant communities terminates. The Relief Wells Alternative (Tentatively Selected Plan) 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.

4.18 Irreversible or Irretrievable Resource Commitments

Irreversible or irretrievable resource commitments that have occurred to date include those associated with implementation of the Interim Risk Reduction Measures, 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.

4.19 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 an 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 of southwestern Illinois 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 Drainage and 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 Drainage and 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, 2010d, 2011a).

Similar design deficiency corrections for the larger Wood River Levee Flood Protection Project would fix problems in the levee system's underseepage and through-seepage designs. Major features of the approved recommended plan include 94 new relief wells; filling 83 existing wood stave relief wells with grout; ditching; two 25-cubic feet per second(cfs) pump stations and one 20-cfs pump station; 815 linear feet of seepage berm; 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; and 2,875 linear feet of slurry trench cutoff wall (25 ft deep) at the riverside levee toe. The SEA for this project described direct losses 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. 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 2011b).

A deficiency correction study was completed by the St. Louis District and approved for the combined Prairie Dupont and Fish Lake flood protection projects that lie south of East St. Louis levee system. The study recommended the construction of 130 new relief wells and grouting shut 162 existing wells, five new pump stations to accommodate the additional flow, and 28,500 linear feet of new seepage berms. The effects to biological resources included a total of about 20 acres of wetland and terrestrial bottomland forest impacts, which would be mitigated off-site within the same watershed. A NEPA document describing these effects was completed in association with the study report, and it detailed a compensatory mitigation plan as part of the overall plan (USACE, 2012). 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.

Probable future projects associated with flood risk reduction in the Metro-East drainage and levee districts 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 underseepage 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 underseepage 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 underseepage corrections project, key stressors of concern include changes in 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 hydrologic regime of natural habitats located within the ponding area of East Alton No. 1 pump station adjacent to the Melvin Price Locks and Dam has been altered by the detention of surface water to counteract uncontrolled underseepage, and stress to woody vegetation is occurring in forested wetlands. This stress would continue for about 6 more years until Final Risk Reduction Measures are implemented, at which time the vegetation would eventually rebound. The proposed project would not directly affect land use, nor would it have significant effects on natural resources. Best management practices for the protection of water quality at the project construction site would be implemented.

5.0 RELATIONSHIP OF RECOMMEND ALTERNATIVE TO ENVIRONMENTAL REQUIREMENTS

Table EA-14. 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 if future design of the proposed features leads to the identification of new environmental impacts. The NEPA process would be followed to coordinate and account for these changes. An additional Supplemental Environmental Assessment would be prepared by the St. Louis District and circulated to fulfill this requirement for public disclosure and involvement. Coordination would 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

Coordination. Upper Wood River levee system. In the fall of 2009, the St. Louis District coordinated the planning of the interim risk reduction measures and their implementation with officials from the Wood River Drainage and Levee District, City of Alton, and Alton Wastewater

Division, as well as other local stakeholders at several meetings. This coordination has continued through 2015 as needed.

In November 2009, the St. Louis District notified the Illinois Department of Natural Resources, Illinois Environmental Protection Agency, and U.S. Fish and Wildlife Service of the underseepage project, the need for interim and final risk reduction measures, and the potential for interim ponding to affect vegetation. The agencies were informed that an after-the-fact NEPA document and Biological Assessment of listed species would be prepared addressing the interim and final measures, and that the long-term solution would require issuance of a public notice to allow for a more extensive review of possible impacts. Coordination with these agencies has taken place periodically through 2015.

On April 2, 2010, the St. Louis District hosted a public meeting at 3:00 p.m. at the National Great Rivers Museum to update the Alton, East Alton and surrounding communities on the status of the upper portion of the Wood River Levee system that is protecting them and to describe actions that would be taken to maintain the level of risk at an acceptable level.

On April 29, 2010, the St. Louis District met with a representative from the Illinois Environmental Protection Agency to discuss the potential for any hazardous, toxic, and radioactive waste concerns in light of the ponding of surface water as an interim risk reduction measure. Similar discussions and meetings have taken place since then periodically.

Metro-East Levees. In 2010, USACE began communicating to the public via press releases and various electronic media that the Metro East levee systems, including the Wood River levee system, require underseepage control repairs. During the period 2010-2012, USACE announced the development of underseepage design solutions of its own for each of the Metro East levee projects. These USACE solutions would help restore protection against the standard project flood (about a 300-year to 500-year frequency event, depending on location), which is greater than the 100-year frequency flood, the focus of FEMA recertification. As part of this public involvement, USACE has also made available for public review during the period 2010-2012 the draft USACE decision documents and associated EAs and Section 404 Public Notices for each of these USACE proposed projects. USACE's website (http://www.mvs.usace.army.mil/pm/pm-reports.html) has been used to distribute these documents. Letters announcing the availability of these EAs were mailed to a number of elected officials, agencies, organizations and individuals, and for the Public Notices, email notification was sent to a similar list of parties.

The Southwestern Illinois Flood Prevention District Council's public board meetings have been the primary means for the public to ask questions or express concerns about the Council's efforts to fix Metro-East levee underseepage problems as part of its separate effort to gain FEMA recertification. USACE representatives have been engaged in this process. Confusion has been expressed by some people over the fact that Metro East levees are the subject of repair efforts not only by USACE but independently by the Council. At Council meetings USACE representatives have heard questions and issues raised by the public, including local environmental groups such as American Bottom Conservancy (ABC). USACE has held separate discussions with ABC on occasion to address its concerns and provide additional information about USACE projects as well as the Council's efforts.

Distribution List. The Draft 2nd Supplemental Environmental Assessment and Unsigned Finding of No Significant Impact will be sent to elected officials, agencies, organizations and individuals for a 30-day public review and comment. The distribution list is included in Appendix EA-F. All responses will be filed with this document.

DRAFT FINDING OF NO SIGNIFICANT IMPACT

MELVIN PRICE REACH OF UPPER WOOD RIVER LEVEE
UNDERSEEPAGE DESIGN DEFICIENCY CORRECTIONS PROJECT
SUPPLEMENTAL REPORT
MADISON COUNTY, ILLINOIS

1. I have reviewed and evaluated the Supplemental Report and 2nd Supplemental Environmental Assessment for the Melvin Price Reach of the Upper Wood River Levee Underseepage Project. The purpose of this project is to permanently correct underseepage problems in the Upper Wood River levee adjacent to the Melvin Price Locks and Dam, Madison County, Illinois.

2. An interim flood damage risk reduction solution that was implemented in early 2010 will remain in place until a permanent solution is constructed. Several alternatives for final risk reduction were considered. After consideration of logistical, environmental, and cost factors, the proposed action is the least cost option. By not making any permanent design corrections, the "No Action" for final risk reduction is the continuance of excessive seepage that results in a risk to the system that is above a tolerable level.

3. The tentatively selected plan, the Relief Wells Alternative, includes the installation of 88 new relief wells along the landside toe of the levee for a distance of 2,500 feet (Sta. 54+00 - Sta. 130+00), modification of 21 existing relief wells, grouting shut 104 existing wood-stave wells, construction of a new 5,000 foot long access/maintenance road along and partially against Illinois Route 143, a new drainage collection system with discharge channels, main ditch modifications, and dewatering during construction. Implementation is scheduled over three fiscal years (FY2020 – late FY2022).

4. The proposed plan has been studied for physical, biological and socioeconomic effects. Major findings of this investigation include the following:

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

b. The proposed plan will permanently correct the uncontrolled underseepage of groundwater along the Upper Wood River levee adjacent to Melvin Price Locks and Dam. The proposed relief wells will alleviate underseepage conditions on the landside of the levee in the East Alton Pump Station No. 1 detention basin by controlling the movement of groundwater and reducing underseepage pressures. Existing groundwater elevations along the landside base of Illinois Highway 143 will be lowered by about one foot. Further landside from the levee, groundwater elevations are expected to remain close to the ground surface. Hydrologic impacts to surface water in the ponding area are considered to be minimal.

c. No concerns with potential HTRW issues have been identified. A contingency plan will be developed to handle any unexpected encounter with contaminated materials. During construction of the proposed relief wells, excavated materials and pumped groundwater will be

monitored to determine if any contaminants of concern are present that might require such materials to be considered a special waste.

d. No effects to any cultural resources have been identified. The St. Louis District has executed with the Illinois Historic Preservation Agency a Memorandum of Agreement (MOA) in conjunction with the Wood River Levee Limited Reevaluation Report (a separate project) specifying how preservation concerns that may arise from changes in project impacts will be addressed. That MOA will cover any coordination activities associated with this project.

e. The interim risk reduction measures and Relief Well Alternative combined would cause unavoidable impacts to natural resources in the project area. Habitat losses due to interim features include about 1.0 acre of herbaceous wetland and 0.5 acre of terrestrial forested habitat, as well as mortality to an estimated 5 acres of trees due to ponding. The Relief Well plan's total impact (footprint) is about 36.0 acres of herbaceous and forested wetlands and 0.5 acres of terrestrial forested habitat. This is represented by about 9.15 acres of permanent losses and 27.3 acres of temporary adverse impacts. Indirect adverse impacts would occur to additional wetlands in the form of elimination of shallow surface water by reducing groundwater underseepage, affecting about 16 acres of herbaceous wetlands and 14 acres of forested wetlands. As compensation, a mitigation plan describing a specific 60-acre off-site location is proposed as part of the project for the creation of 10.7 acres of herbaceous wetlands, 12.8 acres of forested wetlands, and 0.2 acre of bottomland hardwood forest.

f. Minor and temporary impacts are expected on air quality, surface water quality, traffic movement, recreation, aesthetics, and noise. With the mitigation, the plan will not result in significant impacts to biological resources; minor impacts are expected on surface hydrology, and groundwater movement and groundwater elevations. Proper stormwater pollution prevention practices will be enacted during construction, and disturbed areas will be reseeded to restore levee turf or other groundcover. The plan will not adversely affect any threatened and endangered species or the bald eagle, socioeconomic resources, environmental justice, or agricultural lands and prime farmland soils. Measures to protect the bald eagle, decurrent false aster, Indiana bat, and Northern long-eared bat will be implemented.

5. Based on my analysis and evaluation of the alternative courses of action presented in these documents, I have determined that the Melvin Price Reach of Upper Wood River Levee Underseepage 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

/unsigned/_
Anthony P. Mitchell
Colonel, U.S. Army
District Commander

PLATES – PROPOSED RELIEF WELL PLAN
APPENDIX EA-A

SUPPLEMENTAL REPORT
MELVIN PRICE REACH OF WOOD RIVER LEVEE
UNDERSEEPAGE DESIGN DEFICIENCY CORRECTIONS PROJECT
UPPER WOOD RIVER LEVEE
MADISON COUNTY, ILLINOIS

DECEMBER 2015

Environmental Compliance Section
Planning and Environmental Branch
Regional Planning and Environment Division North
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce St.
St. Louis, Missouri 63103-2833
314-331-8084

US Army Corps
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MELVIN PRICE LOCKS AND DAM
DESIGN DEFICIENCY
SUPPLEMENTAL LIMITED
REEVALUATION REPORT (LRR)

ALTON, ILLINOIS

MADISON COUNTY, ILLINOIS

US Army Corps
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MARK	DESCRIPTION	DATE	APPR.

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ST. LOUIS DISTRICT
ST. LOUIS, MISSOURI 63103

DESIGNED BY: JOSEPH ASHER LEFF, P.E.
DWN BY: JAL
CKD BY: JMW
SUBMITTED BY: MICHAEL V. HANKS, P.E.
PLOT SCALE: N/S
PLOT DATE: 1:1
SIZE: ANSI D
FILE NAME: SLRR_G-001_Cover.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

COVER

PLATE
G-001

INDEX OF DRAWINGS

PLATE	TITLE
	GENERAL
G-001	COVER
G-002	INDEX AND LEGEND
	CIVIL
CS-001	GENERAL PLAN
CS-002	CONSTRUCTION AND STAGING LIMITS
CS-101	PLAN - REACH 1
CS-102	PLAN - REACH 2
CS-103	PLAN - REACH 3
CS-501	RELIEF WELL DETAILS
CS-502	RELIEF WELL DETAILS
CS-503	CHANNEL AND DITCH DETAILS
CS-504	ACCESS DETAILS
	REFERENCE
R-701	MELVIN PRICE L&D TAILWATER HYDROGRAPH 1990-2004
R-702	MELVIN PRICE L&D TAILWATER HYDROGRAPH 2004-2014

SURVEY NOTES:

1. HORIZONTAL DATUM IS BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD 83) CORS96. COORDINATES SHOWN ARE ILLINOIS WEST ZONE STATEPLANE AND ARE EXPRESSED IN US SURVEY FEET.
2. VERTICAL DATUM IS BASED ON THE NATIONAL GEODECTIC VERTICAL DATUM OF 1988 (NAVD88) GEOID09

WOOD RIVER CONTROL			
POINT	NORTHING (Y)	EASTING (X)	ELEVATION (FT)
B518	807849.53	2294673.5	445.0
B614	805199.33	2298433.8	447.1
IL-WEST, NAD(CORS96), NAVD88(GEOID09)			

GENERAL CROSS-REFERENCING SYMBOLS

X# — DETAIL/SECTION TITLE — SCALE: — SECTION/DETAIL TITLE ON SAME DRAWING (CENTERED UNDER SECTION/DETAIL)

X# / X-### — DETAIL/SECTION TITLE — SCALE: — SECTION/DETAIL TITLE ON ANOTHER DRAWING (CENTERED UNDER SECTION/DETAIL)

X# — SECTION CUT W/ VIEW SHOWN ON SAME DRAWING

X# / X-### — SECTION CUT W/ VIEW SHOWN ON ANOTHER DRAWING

X# — DETAIL SYMBOL W/ VIEW SHOWN ON SAME DRAWING

X# / X-### — DETAIL SYMBOL W/ VIEW SHOWN ON ANOTHER DRAWING

PLAN NORTH — INDICATES PLAN NORTH — NORTH ARROW — INDICATES TRUE NORTH

ABBREVIATIONS

* UNLESS OTHERWISE NOTED ON EACH SHEET

APPROX	APPROXIMATE	HT	HEIGHT
ALT W/	ALTERNATE WITH	I.D.	INSIDE DIAMETER
ALUM	ALUMINUM	LG	LONG
BITUM	BITUMINOUS	L/W	LANDWARD
BOT	BOTTOM	MAX	MAXIMUM
C/L	CENTER LINE	MIN	MINIMUM
C&G	CURB & GUTTER	MIRR	MIRRORED
CLR	CLEAR	MISC	MISCELLANEOUS
CJ	CONSTRUCTION JOINT	NF	NEAR FACE
CMP	CORRUGATED METAL PIPE	NO	NUMBER
CONC	CONCRETE	OF	OUTSIDE FACE
DIA OR Ø	DIAMETER	OC	ON CENTER
DWG	DRAWING	RW	RELIEF WELL
EF	EACH FACE	RCP	REINFORCED CONCRETE PIPE
EJ	EXPANSION JOINT	SPEC	SPECIFICATIONS
EL	ELEVATION	SS	STAINLESS STEEL
EW	EACH WAY	TBP	TO BE PROVIDED
ERW	EXISTING RELIEF WELL	TYP	TYPICAL
EXIST.	EXISTING	UNO	UNLESS NOTED OTHERWISE
FF	FAR FACE	UGND	UNDERGROUND
GALV	GALVANIZED	W	WIDTH

GENERAL LEGEND

- S_x — EXISTING STORM SEWER
- E_x — EXISTING OVERHEAD P0WER
- S S_x — EXISTING SANITARY SEWER
- XX — INTERSTATE HIGHWAY
- XX — U.S. HIGHWAY
- XX XXX — STATE HIGHWAY
- XX XXX — COUNTY HIGHWAY
- LIMITS OF WORK
- RELIEF WELL
- EXISTING D-TYPE RELIEF WELL TO BE CONVERTED
- EXIST. RELIEF WELL TO REMAIN
- DWG OUTLINE AND NUMBER

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DWN BY: JAL
CKD BY: JMW
SUBMITTED BY: MICHAEL V. HANKS, P.E.
PLOT SCALE: NOT TO SCALE
PLOT DATE:
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
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FILE NAME: SI-RR_G-002_Index.dgn

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

INDEX AND LEGEND

PLATE
G-002

EXISTING RELIEF WELLS, TO REMAIN, TYP

EXISTING MAIN COLLECTOR DITCH TO BE DREDGED AND LINED WITH FILTER SAND, GRAVEL AND ROCK DITCH LINER

ALTON, IL

EXISTING MAIN COLLECTOR DITCH

ARTICULATED CONCRETE MAT AND RIP RAP SPILLWAY AND MAINTENANCE ACCESS

CPL BELCHIK EXPRESSWAY

ELEVATED CONSTRUCTION ACCESS AND MAINTENANCE ROAD

ACCESS RAMPS FROM CPL BELCHIK EXPRESSWAY

ARTICULATED CONCRETE MAT DISCHARGE CHANNELS, TYP

EXISTING MAIN COLLECTOR DITCH TO BE DREDGED AND LINED WITH FILTER SAND, GRAVEL AND ROCK DITCH LINER

CONCRETE-LINED COLLECTOR CHANNELS

UPPER WOOD RIVER LEVEE CENTERLINE

ELEVATED CONSTRUCTION ACCESS AND MAINTENANCE ROAD

EXISTING MAIN COLLECTOR DITCH

EXISTING RELIEF WELLS TO BE CONVERTED TO T-TYPE

EAST ALTON #1 PUMP STATION

SOLID WASTE LIFT STATION

EXISTING ACCESS ROAD FROM IL-143

MELVIN PRICE LOCKS & DAM

143

30+00 35+00 40+00 45+00 50+00 55+00 60+00 65+00 70+00 75+00 80+00 85+00 90+00 95+00 100+00 105+00 110+00 115+00 120+00 125+00 130+00 135+00 140+00

GENERAL PROJECT PLAN

0 400' 800'

SCALE: 1" = 400'

N

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PLOT SCALE: 1:1
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SIZE: ANSI D
FILE NAME: S-LRR_CS-001_Plan.dgn
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ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

GENERAL PLAN

PLATE
CS-001

ALTON, IL

REACH 1
CS-101

143

CONSTRUCTION LIMITS

EXISTING "DIKE A"

ENVIRONMENTAL WASTE CONTROL SITE

CPL BELCHIK EXPRESSWAY

EXISTING MAIN COLLECTOR DITCH

CONSTRUCTION LIMITS

DESIGNATED SPOIL AREAS, TYP

EXISTING "DIKE B"

EXISTING "DIKE C"

REACH 2
CS-102

CONSTRUCTION LIMITS

CONSTRUCTION LIMITS

DESIGNATED SPOIL AREAS, TYP

DESIGNATED SPOIL AREAS, TYP

CONSTRUCTION OF DISCHARGE CHANNEL TO OCCUR OUTSIDE OF BALD EAGLE NESTING SEASON

MELVIN PRICE LOCKS & DAM

ENVIRONMENTAL WASTE CONTROL SITE

REACH 3
CS-103

KNOWN BALD EAGLES' NEST LOCATION

STAND-OFF DISTANCE DURING BALD EAGLE NESTING SEASON

660'

EAST ALTON NO. 1 PUMP STATION

STAGING AND ACCESS LIMITS

143

GENERAL NOTES

1. EXISTING DIKES A, B AND C TO BE REMOVED AFTER PROJECT COMPLETION.
2. CONSTRUCTION ACTIVITIES WITHIN STAGING AND ACCESS LIMITS TO BE LIMITED TO MOBILIZATION, MATERIAL STAGING AND EXISTING ACCESS ROAD REPAIRS.
3. EXCAVATED MATERIALS TO BE REUSED OR SPOILED ON SITE WITHIN CONSTRUCTION LIMITS. SPOIL SHALL NOT BE PLACED ON OR AGAINST EXISTING WOODY OR DENSE-HERBACEOUS VEGETATION, TYP.

CONSTRUCTION LIMITS

0 400' 800'

SCALE: 1" = 400'

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FILE NAME: S-LRR_CS-002_Plan.dgn

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

CONSTRUCTION AND STAGING LIMITS

PLATE
CS-002

ALTON, IL

ENVIRONMENTAL WASTE CONTROL SITE

UNDERGROUND UTILITY

CPL BELCHIK EXPRESSWAY

MATCHLINE SHEET CS-102

ACCESS RAMPS FROM CPL BELCHIK EXPRESSWAY

EXISTING MAIN COLLECTOR DITCH TO BE DREDGED AND LINED WITH FILTER SAND, GRAVEL AND ROCK DITCH LINER

SPOIL AREA LIMITS MAX ELEV 408

ARTICULATED CONCRETE MAT AND RIPRAP SPILL-WAY, SEE CS-503 FOR DETAILS

LOW PONDING AREA TO CARRY SHEETFLOW FROM SPILLWAY TO MAIN COLLECTOR DITCH

RELIEF WELLS TO BE DISCHARGED DIRECTLY TO DITCH

ELEVATED CONSTRUCTION ACCESS AND MAINTENANCE ROAD, SEE CS-504 FOR DETAILS

"DIKE A" TO BE REMOVED

143

EXISTING D-TYPE RELIEF WELLS TO BE CONVERTED TO T-TYPE

ELEVATED CONSTRUCTION ACCESS AND MAINTENANCE ROAD, SEE CS-504 FOR DETAILS

HIGHWAY DRAINS TO BE EXTENDED THROUGH ROADWAY, TYP

UNDERGROUND UTILITY

UNDERGROUND UTILITY

UPPER WOOD RIVER LEVEE CENTERLINE

MATCHLINE SHEET CS-102

50+00 51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00 59+00 60+00 61+00 62+00 63+00 64+00 65+00 66+00 67+00 68+00 69+00 70+00 71+00 72+00 73+00 74+00 75+00 76+00 77+00 78+00 79+00 80+00

PLAN - REACH 1

0 100' 200'

SCALE: 1" = 100'

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PLOT SCALE: 1:1
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ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

PLAN - REACH 1

PLATE
CS-101

PLAN - REACH 2

0 100' 200'

SCALE: 1" = 100'

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SUBMITTED BY: MICHAEL V. HANKS, P.E. | CONTRACT NO.:
PLOT SCALE: 1:1 | PLOT DATE: NO | FILE NUMBER:
SIZE: ANSI D | FILE NAME: S-LRR_CS-102_Plan.dgn

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

PLAN - REACH 2

PLATE
CS-102

ALTON, IL

MATCHLINE SHEET CS-102

ILLINOIS EPA
AMMUNITION PLANT
REMEDIATION SITE

OVERHEAD POWER LINES

660' NESTING SEASON BUFFER

APPROXIMATE LOCATION
BALD EAGLE NEST

EXISTING MAIN
COLLECTOR DITCH

UNDERGROUND
UTILITY

EXTEND ACCESS FROM EXISTING
EAST ALTON NO. 1 PUMP STATION
ACCESS ROAD (FROM IL-143)

ARTICULATED CONCRETE MAT
AND RIPRAP DISCHARGE
CHANNEL

ARTICULATED CONCRETE MAT
AND RIPRAP DISCHARGE
CHANNEL

EXISTING RELIEF WELLS
TO REMAIN UNDISTURBED

UNDERGROUND
UTILITY

SPOIL AREAS
MAX ELEV 409

CONCRETE-LINED
COLLECTOR CHANNEL

EXISTING D-TYPE RELIEF
WELLS TO BE CONVERTED
TO T-TYPE, TYP

ELEVATED CONSTRUCTION
ACCESS AND MAINTENANCE
ROAD

143

HIGHWAY DRAINS TO BE EXTENDED
THROUGH ROADWAY, AND COLLECTED BY
CONCRETE-LINED CHANNELS, TYP

UNDERGROUND
UTILITY

MELVIN PRICE
LOCKS & DAM

MATCHLINE SHEET CS-102

UPPER WOOD RIVER
LEVEE CENTERLINE

PLAN - REACH 3

0 100' 200'

SCALE: 1" = 100'

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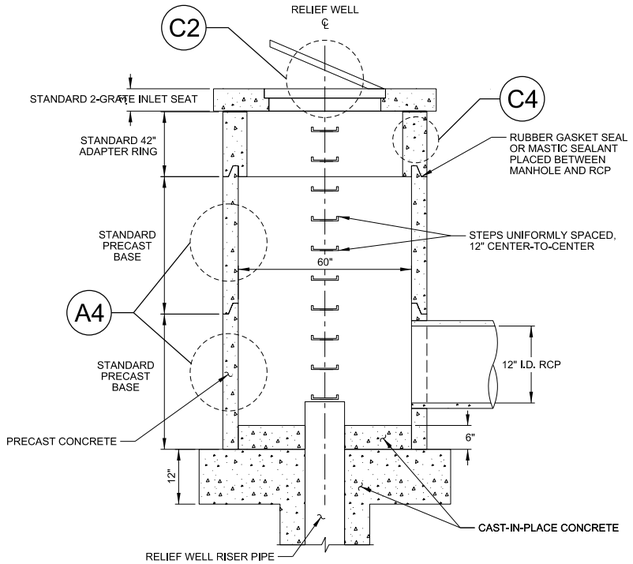
PLOT SCALE: 1
PLOT DATE: NOT SET
SIZE: ANSI D
FILE NAME: SLRR_CS-103_Plan.dgn

DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

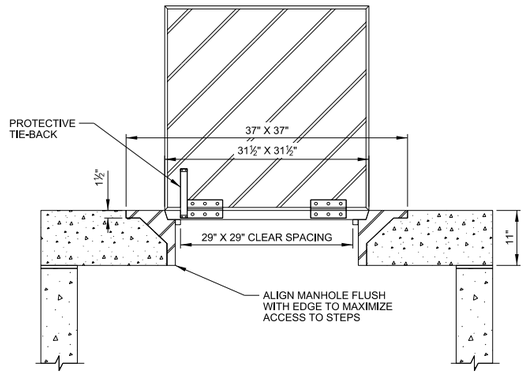
ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

PLAN - REACH 3

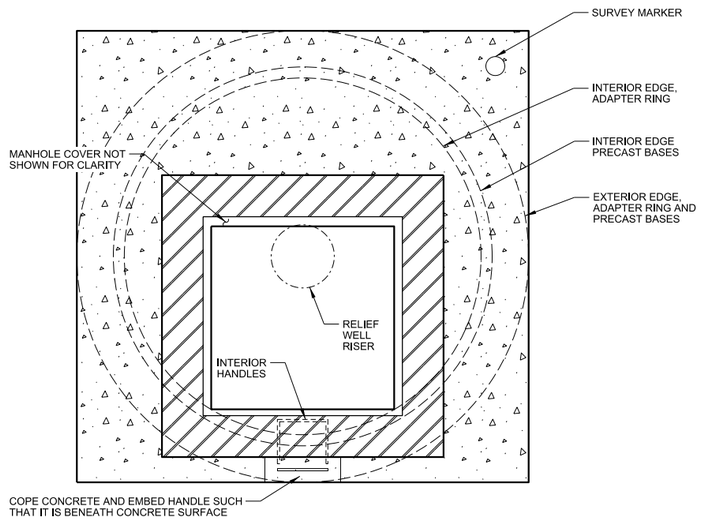
PLATE
CS-103



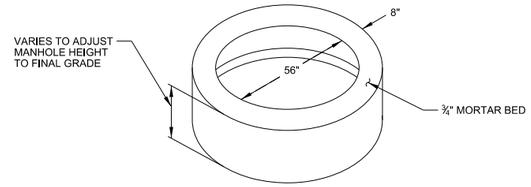
C1 C-501 RELIEF WELL (RW) MANHOLE
NOT TO SCALE



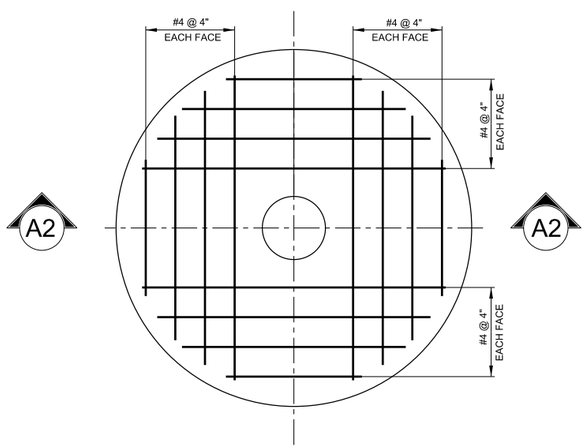
C2 GRAY IRON FRAME WITH HINGED LID DETAIL
NOT TO SCALE



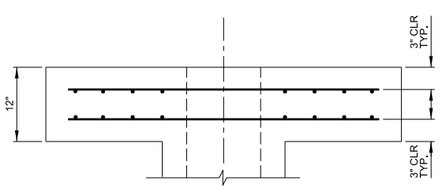
B2 RELIEF WELL MANHOLE COVER PLAN
NOT TO SCALE



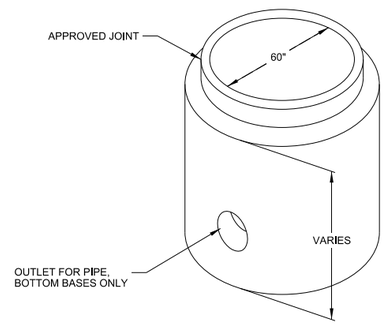
C4 STANDARD ADAPTER RING
NOT TO SCALE



A1 BASE REINFORCING PLAN DETAIL
NOT TO SCALE



A2 SECTION OF BASE
NOT TO SCALE



A4 STANDARD PRECAST MANHOLE BASE
NOT TO SCALE

GENERAL SHEET NOTES

1. PRECAST CONCRETE PRODUCTS SHALL BE DESIGNED BY THE MANUFACTURER TO WITHSTAND AN AASHTO H20 LOADING.
2. MANHOLE FRAME AND LID SHALL BE DESIGNED BY THE MANUFACTURER TO WITHSTAND AN AASHTO H20 LOADING.
3. METAL FRAME AND LID SHALL BE GREY IRON (ASTM A-48).
4. FOR MANHOLE SURVEY MARKER LABELING, SEE SPECS.

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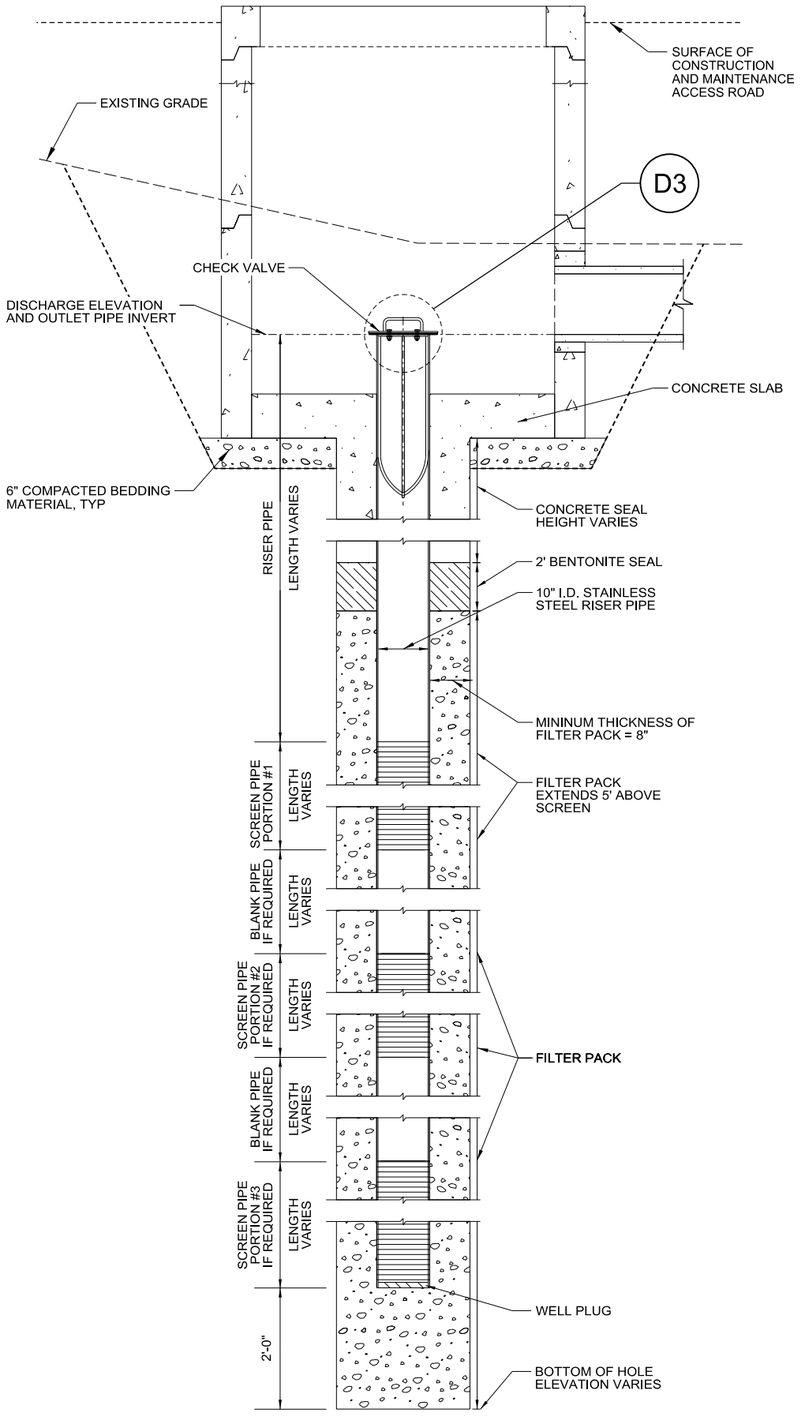
DWN BY: JAL
CKD BY: JMW
SUBMITTED BY: MICHAEL V. HANKS, P.E.
PLOT SCALE: 1:1
PLOT DATE: N/A
SIZE: ANSI D
FILE NAME: S-LRR_CS-501-T-Well_Details.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

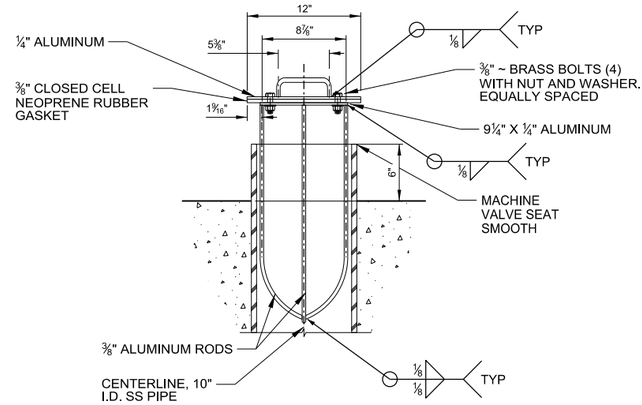
ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

RELIEF WELL DETAILS

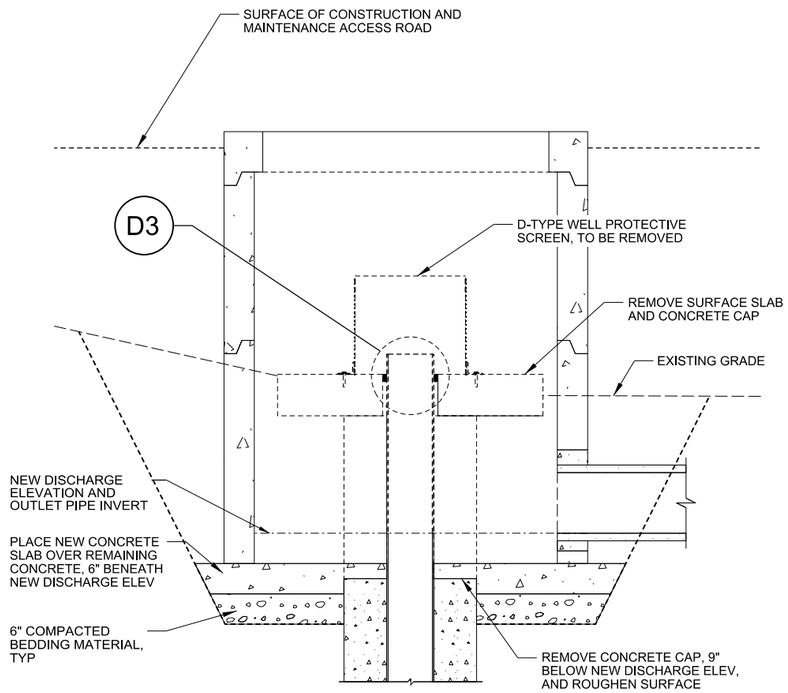
PLATE
CS-501



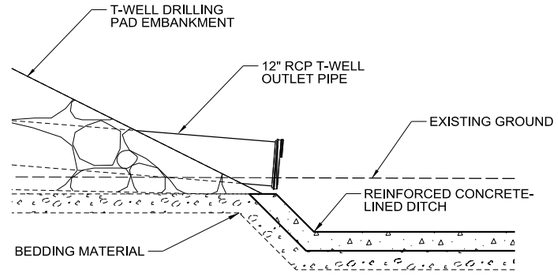
A1 TYPICAL RELIEF WELL DETAIL
SCALE: NTS



D3 CHECK VALVE FOR 10"Ø WELLS
SCALE: 1½"=1' 0 6" 1' 2'



A3 TYPICAL RELIEF WELL CONVERSION DETAIL
SCALE: NTS



A4 TYPICAL RELIEF WELL OUTLET DETAIL
SCALE: NTS

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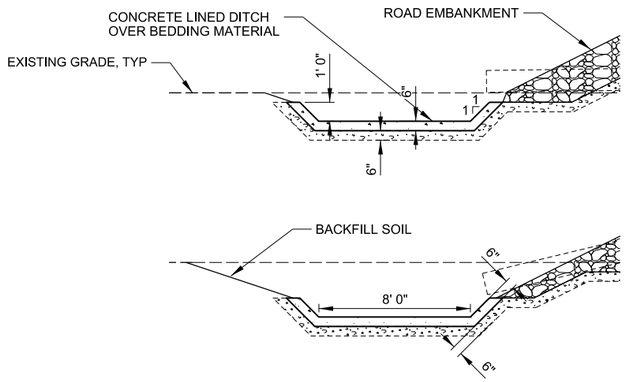
DWN BY: JAL
CKD BY:
SUBMITTED BY: GARY J. LEE, P.E.
PLOT SCALE: NTS
PLOT DATE:
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME: S:\-RR_CS-502-Well_Details.dgn

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LIMITED REEVALUATION REPORT
MADISON COUNTY, ILLINOIS

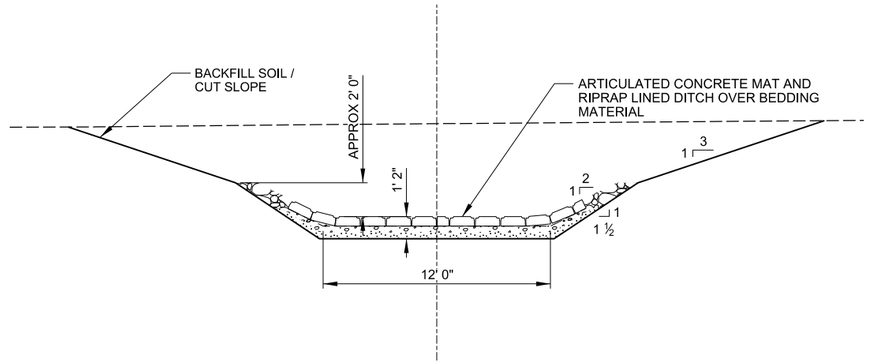
RELIEF WELL DETAILS

PLATE
CS-502



C2 TYPICAL SECTIONS - COLLECTOR CHANNELS

SCALE: NTS



C4 TYPICAL SECTION - OUTLET CHANNELS

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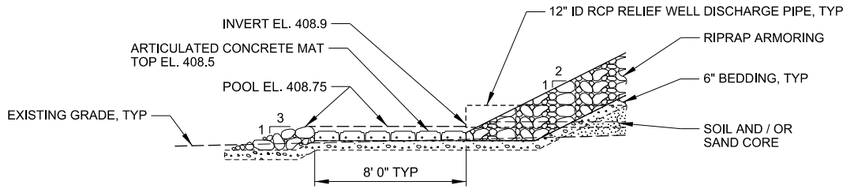
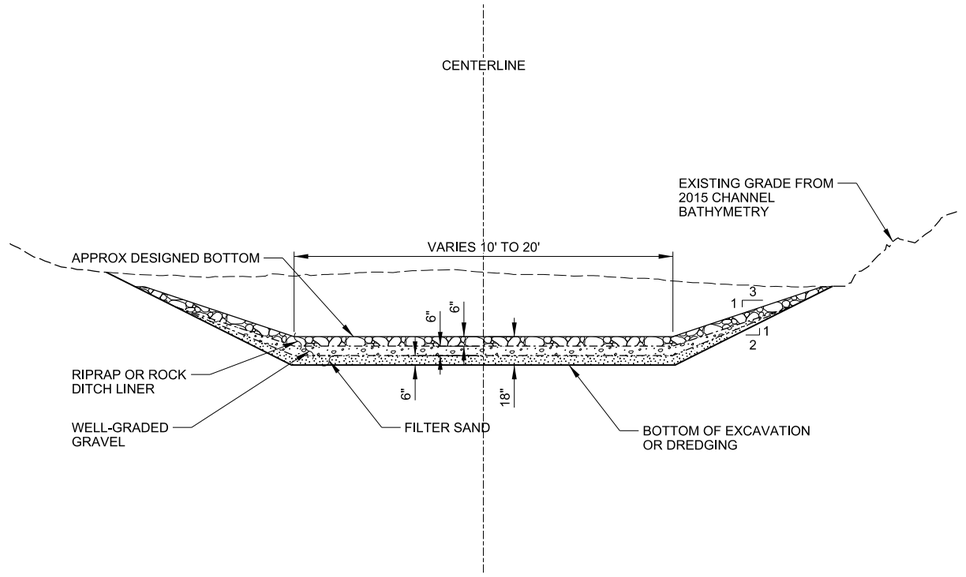


A2 TYPICAL SECTION - REACH 1 SPILLWAY DETAIL

SCALE: NTS



A4 TYPICAL SECTION - MAIN DRAINAGE COLLECTION DITCH MODIFICATION

SCALE: NTS

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MARK	DESCRIPTION	DATE	APPR.

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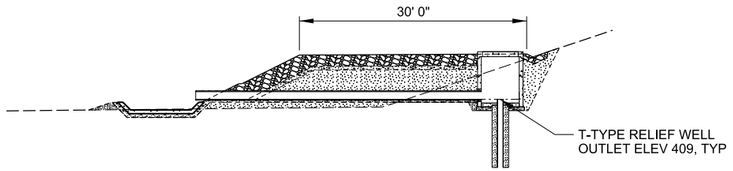
ST. LOUIS, MISSOURI 63103

DESIGNED BY: JOSEPH ASHER LEFF, P.E.
DWN BY: JAL
CKD BY: JMW
SUBMITTED BY: MICHAEL V. HANKS, P.E.
PLOT SCALE: 1:1
PLOT DATE: N/A
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME: S:\ER_CS-503_Channel_Details.dgn

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

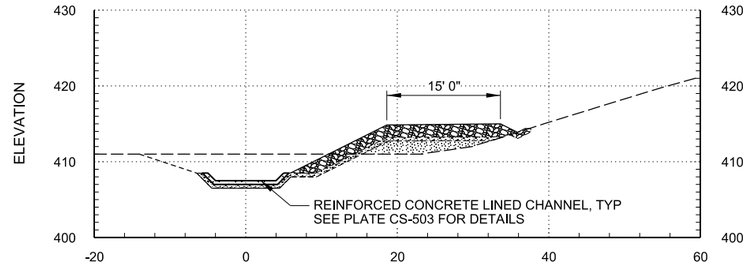
CHANNEL AND SPILLWAY DETAILS

PLATE
CS-503



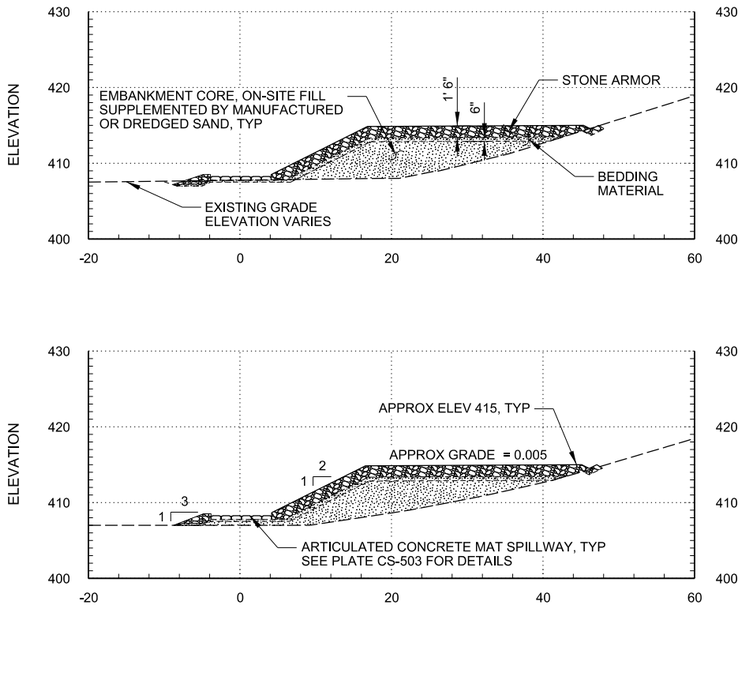
C2 TYPICAL SECTION - ELEVATED ROADWAY AND RELIEF WELL

SCALE: 1" = 10'



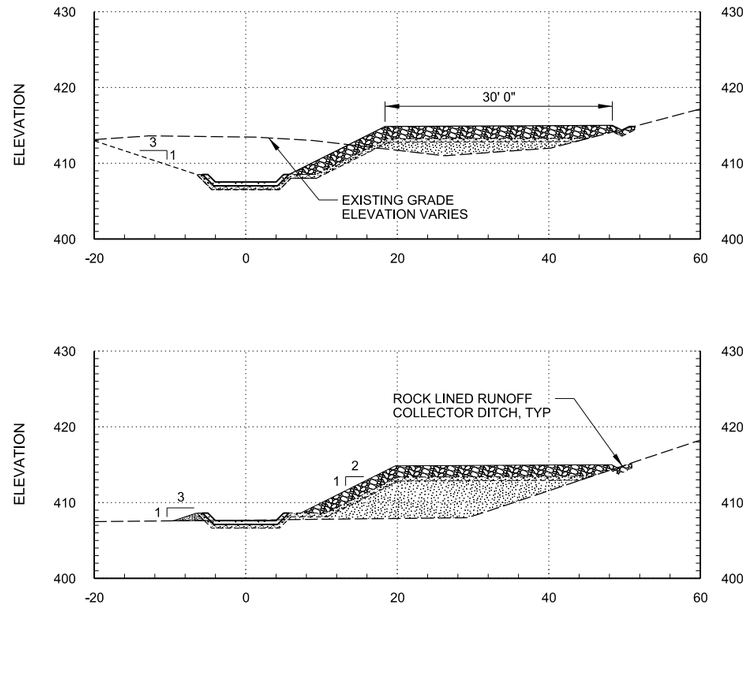
C4 TYPICAL SECTION - ELEVATED ROADWAY WITHOUT PAD

SCALE: 1" = 10'



A2 TYPICAL SECTIONS - ELEVATED ROADWAY WITH PAD (REACH 1)

SCALE: 1" = 10'



A4 TYPICAL SECTIONS - ELEVATED ROADWAY WITH PAD (REACHES 2 & 3)

SCALE: 1" = 10'

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PLOT SCALE: 1:1
PLOT DATE: NTS
SIZE: ANSI D
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SOLICITATION NO.:
CONTRACT NO.:
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ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

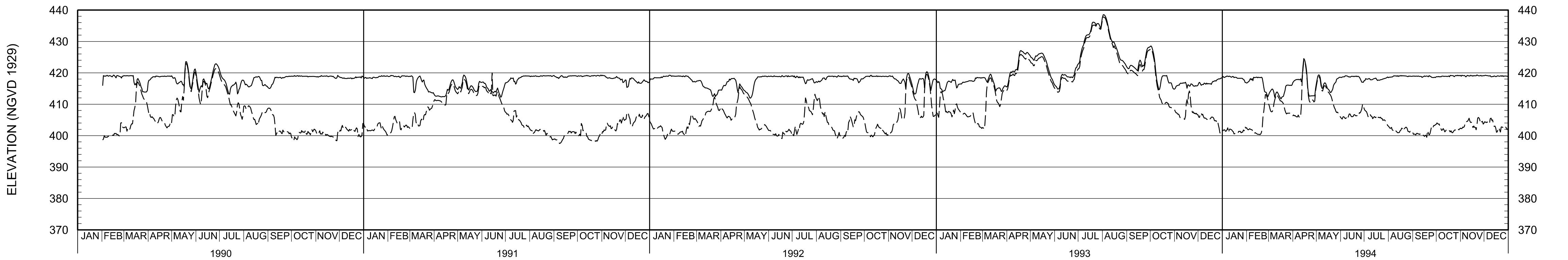
ACCESS DETAILS

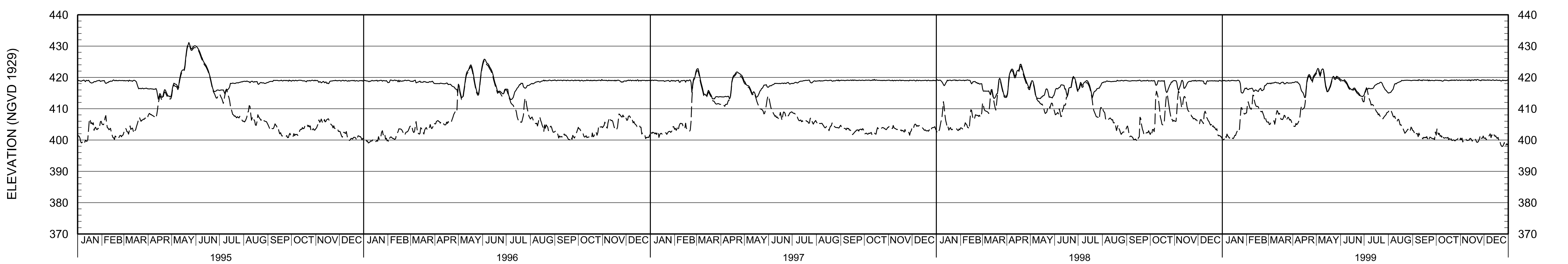
PLATE
CS-504

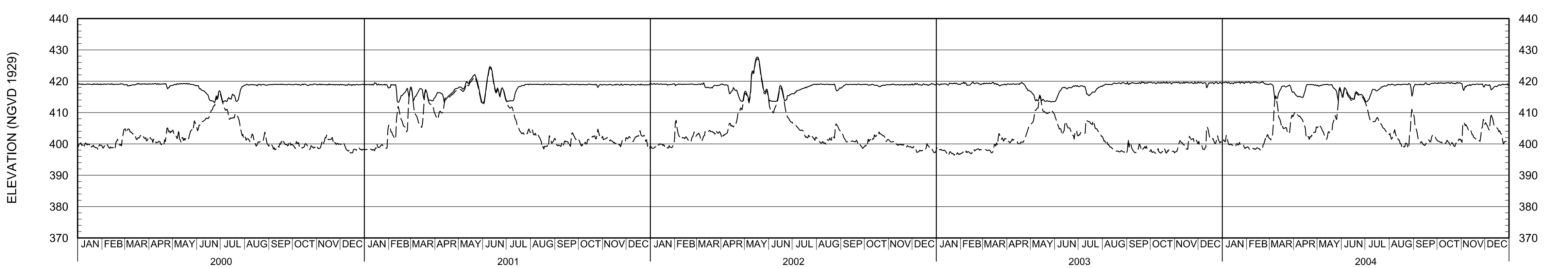
SHEET LEGEND:

MEL PRICE POOL ELEVATION ————————

MEL PRICE TAIL ELEVATION - - - - - - - - - -







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DWN BY: JAL
CKD BY: JWW
SUBMITTED BY: MICHAEL V. HANKS, P.E.
PLOT SCALE: 1:1
PLOT DATE: NO
SIZE: ANSI D
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SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

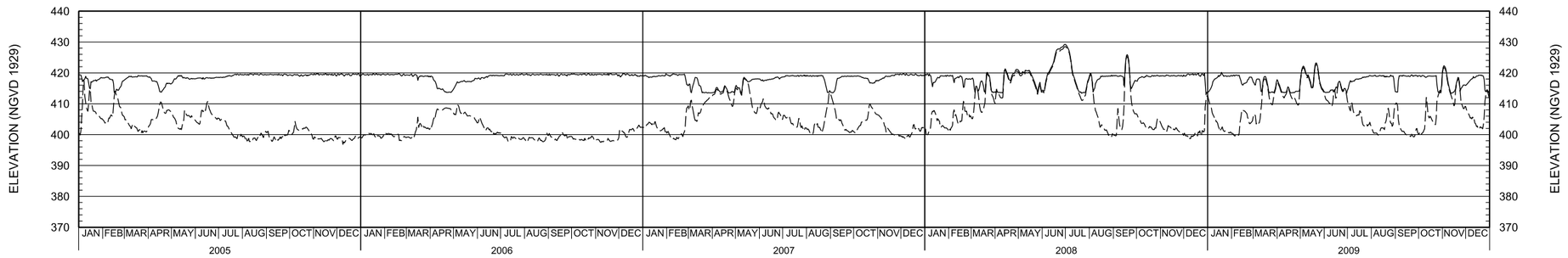
HYDROGRAPH 1990-2004

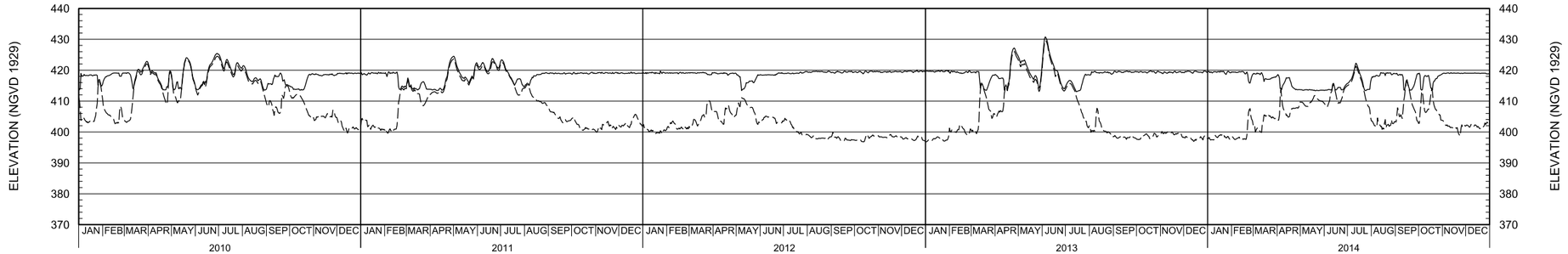
PLATE
R-701

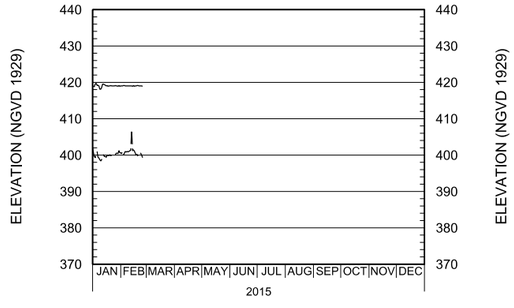
SHEET LEGEND:

MEL PRICE POOL ELEVATION ——————

MEL PRICE TAIL ELEVATION - - - - - - - - - -







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MARK	DESCRIPTION	DATE	APPR.

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DWN BY: JAL
CKD BY: JMW
SUBMITTED BY: MICHAEL V. HANKS, P.E.
PLOT SCALE: NOT TO SCALE
PLOT DATE:
SIZE: ANSI D
FILE NAME: SLRR_R-702_Hydrograph.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

ALTON, IL
MELVIN PRICE LOCKS AND DAM DESIGN DEFICIENCY
SUPPLEMENTAL LRR
MADISON COUNTY, ILLINOIS

HYDROGRAPH 2005-2015

PLATE
R-702

SECTION 404(b)(1) EVALUATION REPORT
APPENDIX EA-B

SUPPLEMENTAL REPORT
MELVIN PRICE REACH OF WOOD RIVER LEVEE
UNDERSEEPAGE DESIGN DEFICIENCY CORRECTIONS PROJECT
UPPER WOOD RIVER LEVEE
MADISON COUNTY, ILLINOIS

DECEMBER 2015

Environmental Compliance Section
Planning and Environmental Branch
Regional Planning and Environment Division North
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce St.
St. Louis, Missouri 63103-2833
314-331-8084

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

SUPPLEMENTAL REPORT
MELVIN PRICE REACH OF WOOD RIVER LEVEE
UNDERSEEPAGE DESIGN DEFICIENCY CORRECTIONS PROJECT
MADISON COUNTY, ILLINOIS

I. PURPOSE OF THIS EVALUATION

This document presents a Section 404(b)(1) Guideline evaluation for ongoing interim and proposed final corrective measures associated with the uncontrolled underseepage and conveyance of material that is occurring under the Upper Wood River Levee, in an area adjacent to the pool of Melvin Price Locks and Dam during normal operating conditions. The St. Louis District concludes that the uncontrolled seepage is a result of replacing Lock and Dam 26 with the Melvin Price Locks and Dam, two miles downstream from the original structure.

The Melvin Price Locks and Dam is located in Madison County, Illinois, and St. Charles County, Missouri, at Mississippi River Mile 200.78, 2 miles below Alton Illinois, between the mouth of the Missouri River and the Illinois River. This project is focused on a section of the Upper Wood River Levee from project station 54+00 to 130+00 which is located opposite the permanent navigation pool at the Melvin Price Lock and Dam. 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 – The Melvin Price Locks and Dam is located in Madison County, Illinois, and St. Charles County, Missouri, at Mississippi River Mile 200.78, 2 miles below Alton, Illinois, between the mouth of the Missouri River and the Illinois River. This project is focused on a section of the Wood River Levee from project station 54+00 to 130+00 which is located opposite the permanent navigation pool at the Melvin Price Locks and Dam.

The Wood River levee system provides protection 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. In addition to providing protection from river flooding, 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 Locks and Dam two miles downriver and raised the height of the navigation pool on the intervening stretch of the existing levee. The increased seepage in this levee reach necessitated the construction of a new pump station in this vicinity in the late 1980s.

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, St. Louis District, has prepared this Section 404(b)(1) Evaluation Report to document the effects of the discharge of dredged or fill material into waters of the United States with interim underseepage corrections implemented in 2010 through 2015 as well as the proposed permanent underseepage corrections to the Wood River levee adjacent to the Melvin Price Locks and Dam.

In 2010, the St. Louis District identified the increased seepage in this reach of the Upper Wood River levee system. Alternative solutions to correct the problem in this reach of the Wood River levee are the focus of a Supplemental Report prepared by the St. Louis District. The report is scheduled to be completed in 2016 and serves to identify a recommended permanent underseepage corrections plan for federal funding.

B. General Description

1. Area Subject to Section 404 Jurisdiction - Those portions of the project area that are considered to be waters of the United States, and therefore subject to Section 404 review requirements, include waterways bordering the project area, namely the Mississippi River and Wood River Creek; various herbaceous and woody wetlands located along the waterways bordering the exterior of the levee system; open water areas and various wetlands located on the protected side of

the levee system occupying depressions within the levee protected area. Wetland types and amounts are described in the 2nd Supplemental Environmental Assessment (SEA), sections 3.10 and 4.10, Biological Resources.

As a result of the interim risk reduction measures, impacts to jurisdictional wetlands have occurred, and permanent impacts to additional wetlands are anticipated for the proposed plan for final risk reduction measures.

2. Project Features - Interim Risk Reduction Measures and Proposed Final Risk Reduction Features (Tentatively Selected Plan)

Implementation of temporary risk reduction measures began in early 2010 and has continued through 2015 to help control the underseepage and minimize risk to the levee system and protected public. The planning of these measures and their implementation was coordinated with Wood River Drainage and Levee District and City of Alton officials beginning in the fall of 2009 and periodically thereafter as needed.

Details of the interim plan are described in the SEA. Three rock dikes were constructed in the detention basin of the East Alton No.1 Pump Station to prevent ponded water from backing up into two ditches and impacting combined sewage outflow (CSO) operations at the City of Alton, and to prevent water from flowing onto property without detention basin flowage easements. This construction was completed in April 2010. In 2014, 35 rock pads (about 10 ft x 10 ft each) were constructed on the landside slope of Il Route 143 and adjacent to existing relief wells; each pad is to support one portable pump. Three rock walkways (8 ft wide by several hundred feet long, depending on location) were constructed in 2015 within the detention basin to aid in the monitoring of piezometers. Lastly, a rock boat ramp (about was constructed in 2015 at Dike B to allow for water access to the main ditch leading to the pump station. Some of these stone features will be kept in place until final risk reduction measures are implemented, and then they will be removed, whereas others are permanent. Construction of final risk reduction measures is assumed to be completed in late 2021. Construction consisted of:

- Dike A – rock constructed to elevation 415.0 with 10' notch at elevation 412.0 with one 48" sluice gate. Footprint approximately 0.05 acre; temporary.
- Dike B – rock constructed to elevation 415.0 with two 48" sluice gates. Footprint approximately 0.15 acre; temporary.
- Dike C – rock constructed to elevation 411.0 with 10' notch at elevation 410.0 with one 48" sluice gate. Footprint approximately 0.6 acre; temporary.
- Walkways – rock constructed to approx. elevation 412. Total footprint approximately 0.15 acre; permanent.
- Rock Pads – total footprint 0.1 acre; temporary.

- Boat Ramp – total footprint 0.05 acre; permanent.

The Relief Well Alternative, identified as the tentatively selected plan to permanently correct underseepage problems, is summarized below. The plan includes:

- New relief wells – 88. This plan would install 88 new relief wells between Upper Wood River Levee stations 54 to 130. All new wells would discharge at elevation 409.

- Modify existing relief wells – 21. As of October 2015, 12 new relief wells have been awarded and will be installed by spring of 2016. These wells were awarded to replace damaged wells that are required for the minimum operation of the IOP. The wells will be installed with discharges at the existing ground surface in accordance with other existing wells. They will be modified by lowering the discharge to elevation 409 during project implementation when drainage and discharge channel excavation is completed as part of the project. An additional 9 wells that have previously been installed as part of the 2006 Wood River General Re-evaluation Report project will also need to be modified because of their proximity to the access road.

- Grout Shut Existing Wood-Stave Wells – 104. The existing wood-stave relief wells would be grouted shut.

- New access/maintenance road. Because of the proximity to the roadway embankment of Illinois Route 143 (which is located on the landside levee berm) and existing topography, an access road about 5,000 feet long (total length) would be needed in order to install the new relief wells. In addition, industry practice requires a minimum head differential of 7 feet to ensure stability of the borehole during drilling. Because the water table in this area is near (and in some cases above) the ground surface elevation, portions of this road would have to be elevated during construction. The base road would remain in place after construction to allow the levee district to perform their required maintenance activities on the wells. The top or crown of this road would be at elev. 415.

- New Drainage Collection and Discharge Channels. A drainage system for the collection of flows from the new relief wells would be constructed parallel to and along the landside toe of the access/maintenance road. For that portion of the project area upriver of Cpl. Belchik Expressway (toward Alton), an articulated concrete mat and riprap spillway (about 1,900 feet long) would receive flows from the new relief wells in that area; these flows would sheetflow across the detention basin to the main ditch leading to the East Alton pump station. For that portion of the project area downriver of the Expressway (toward the lock and dam), a concrete-lined collector

channel (about 4,600 feet long) would capture flows from the new relief wells in that area; these flows would be carried to the main ditch by four discharge channels (about 1,875 feet total length), also with an articulated concrete mat and riprap base.

- Main Ditch Modifications. Accumulated sediment would be removed by excavation from about 3,425 feet of the existing main ditch leading to the East Alton pump station. About 27,600 cubic yards of excavated sediments would be placed onsite in the detention basin at disposal sites totaling about 17 acres. The bottom of the excavated ditch would be lined with filter sand, gravel and rock ditch liner to counteract underseepage occurring in the ditch. Upriver of Cpl. Belchik Expressway (toward Alton), excavated sediment would be spread one foot deep into an approximately 6.5 acre disposal site, with a maximum ground elevation after disposal of elev. 408. Downriver of the Expressway, excavated sediment would be spread one foot deep into three separate disposal sites totaling about 10.5 acres, with a maximum ground elevation after disposal of elev. 409. Disposal sites would be delineated to avoid any existing live woody vegetation.

- Dewatering. To dewater the project area during construction, the East Alton Pump Station would be operated to keep water levels within the detention basin down to elev. 405. Two pumps would be utilized at Cpl. Belchik Expressway to drop water levels in the main ditch as low as possible (approximately elev. 400). To reduce the groundwater table, a well-point system would be employed using a spacing of 15 feet between well heads. To hydraulically separate the project area into three separate reaches, use of existing Dikes A and C, as well as new temporary dikes, referred to as D and E, would be required in the main ditch leading to the pump station. Additional pumps would be required to remove water from the main ditch at each of these dike locations to supplement the well-point system. The well-point pumps would also discharge downstream of these dikes where possible and appropriate.

3. Authority and Purpose - The Melvin Price Lock and Dam project was authorized by 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.

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.

Additional authorities are discussed in the project SEA.

The primary problem facing the Wood River Drainage and Levee District is the deterioration of the existing levee system adjacent to the Melvin Price Locks and Dam due to a problem in the levee underseepage control measures. Uncontrolled underseepage and conveyance of earthen materials that form the foundation of the levee is occurring, and the potential for levee failure is a major problem. As time passes the probability that the project will fail continues to increase.

Specifically, the low, marshy area located landside of the levee extending about 3,500-feet upstream from the centerline of the Melvin Price Locks and Dam exhibits heavy seepage of groundwater under the levee and displays very soft ground conditions. Wood River levee district and Corps officials first observed many large, flowing seeps (3 to 5 inch diameter and at least 6-feet deep) during the summer of 2009 while the Melvin Price pool was at or near its normal elevation of 419.

4. General Description of Dredged or Fill Material

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

(a) Fill Material - For the interim risk reduction measures, fill materials include rock used to construct dikes, walkways, rock pads, and the boat ramp. For the permanent relief well plan, fill materials would include articulated concrete mat, bedding material, CA-6 leveling material, rock ditch liner (type 3), sand, filter sand, filter gravel, earthen material, and excavated sediments.

(b) Dredged Material - Dredged material is defined as material that is either dredged or excavated from waters of the United States. The interim risk reduction measures did not include any dredged material. The tentatively selected plan for final risk reduction measures includes the removal of rock used to construct the dikes and pads, and this rock would be excavated from jurisdictional wetlands once construction of final measures is completed. It also includes the excavation of sediments from the main ditch leading to the pump station.

(2) Quantity of Material - Rock used to construct dikes and other features for the interim risk reduction measures has not been quantified. For the permanent relief well plan, quantities of fill materials and the feature(s) the material would be used for include:

Road:
Sand – 28,662 cy (to form road embankment)
Local borrow – 11,709 cy (to form road embankment)
Rock ditch liner (type 3) – 13,269 cy (to cover top and side slope of road)
CA-6 leveling material – 2,278 cy (top of road surface)

Drainage system:

Reinforced concrete (cast in place) – 950 cy (to form collector ditches parallel to base of new road)
Articulated concrete mat (ACM, pre-formed) – 7,663 sy (to form discharge channels perpendicular to road)
Bedding material – 3,614 cy (base under reinforced concrete and ACM)
Rock ditch liner (type 3) – (quantity included above; to line bottom of main ditch to pump station)
Filter sand – 1,793 cy (bottom base layer under rock ditch liner)
Filter gravel – 1,709 cy (base layer above filter sand, under rock ditch liner)
CA-6 leveling material – (quantity included above; for Dikes D and E in main ditch)

Other:
Geofabric – 49,728 sy (placed under road and discharge channels)
Excavated sediments – 27,591 cy (sediments excavated from main ditch; excess material, to be placed into disposal sites)

(3) Source of Material – For the permanent relief well plan, all fill materials, except for earthen material and sediments from excavation, would be obtained from commercial suppliers; no dredging of sand from the river would be required. Rock and leveling material would be obtained from commercial quarries. Earthen material would be obtained from onsite, as well as sediments from the ditch to be excavated.

e. Description of the Proposed Discharge Sites

(1) Location - For the interim risk reduction measures and the permanent relief well plan, the location of interim and proposed features is displayed in the project's SEA and associated drawings (Appendix EA-A, Plates). This discharge sites are located within the detention basin of the East Alton pump station. Although a small amount of work has or would occur in uplands, most of the discharge sites are located in waters of the United States and consist of various types of wetlands.

(2) Size (acres) and Types of Habitat – For the interim risk reduction measures, the footprints of the constructed features, the date of construction, and types of affected habitat are as follows:

Dikes A,B, & C (constructed in 2010) – 0.80 acres, herbaceous wetland
35 rock pads (constructed in 2014) – 0.05 acres, herbaceous wetland
3 rock walkways (constructed in 2015) – 0.15 acres, herbaceous wetland
1 boat ramp (constructed in 2015) – 0.01 acre, herbaceous wetland

The total size (footprint) for interim risk reduction features is about 1.0 acre of herbaceous wetlands. Dikes A, B, and C and all the rock pads would be removed when construction of the proposed permanent relief well plan is completed

(assumed to be late 2021); long-term temporary impact is about 0.85 acres. The rock walkways and boat ramp would stay in place (permanent impact is about 0.15 acres).

For the proposed permanent relief well plan, the footprints of the features and types of affected habitat are estimated as follows:

Road & drainage system – 7.15 acres, herbaceous wetland (permanent loss)
Road & drainage system – 0.25 acres, shrub-scrub wetland (permanent loss)
Road & drainage system – 1.25 acres, forested wetland (permanent loss)

Disposal sites (excavated sediments) – 18.1 acres, herbaceous wetland (temporary impact)

Removal of sediments from main ditch, articulated concrete mat placed on ditch bottom in excavated area, dikes E & F placed temporarily for dewatering – 3.7 acres, riverine (temporary impact)

The total size (footprint) for the proposed permanent relief well plan is about 36.5 acres of various wetlands and terrestrial habitats (about 9.15 acres permanent impacts, and 27.3 acres temporary impacts).

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

(a) Permanent Deposits of Dredged and Fill Material - Permanent discharge sites located in waters of the United States that consist of wetlands are described for interim risk reduction measures and the proposed permanent relief well plan in the Size (acres) and Types of Habitat section above.

(b) Temporary Deposits of Fill Materials – Temporary discharge sites located in waters of the United States that consist of wetlands are described for interim risk reduction measures and the proposed permanent relief well plan in the Size (acres) and Types of Habitat section above. Depending on the feature, the temporary discharge sites are long-term and would be used for a period of years, ranging roughly from 5 to 10 years.

(4) Timing and Duration of Discharge - Interim risk reduction measures were put in place in early 2010, 2014, and 2015; duration for the construction of each feature extended over a 1-2 days. Most of these features would be removed upon completion of the tentatively selected plan, which is scheduled in late 2021. For the proposed permanent relief well plan, the estimated duration of the construction period for the tentatively selected plan is expected to be about three years (2019-2021). Construction would occur any time during the typical construction season over this period of time. Actual duration of discharges would only be a fraction of the total construction time.

f. Description of Disposal Method (hydraulic, drag line, etc.) – Water-based equipment is not planned for any construction activities. Dewatering of the project area, which is soft and swampy, would be required to allow for the entry of land-based construction equipment. Hydraulic or drag-line methods of disposal are not planned. A long-range excavator would likely be used to remove accumulated sediments from the main ditch. Dozers, loaders, and tractors with pans would be likely equipment to place excavated sediments into disposal areas. Such vehicles would likely require tracks or low pressure wheels, along with the potential placement of temporary swamp mats, to accomplish the required construction in the detention basin.

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. Closer to the Clark Bridge, the prevailing natural ground is about elevation 425 NGVD. On the protected side of the levee within the ponding area of the East Alton No. 1 pump station, land elevations range from about 430 feet NGVD to about 400 feet NGVD. Here the slope of natural ground 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 would be subject to erosion forces related to the slope of the land. As none of the disposal (construction) sites would be confined (as with a cofferdam), all materials would 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, but because of impaired surface water quality in this area, benthic resources are limited. Nevertheless, aquatic areas with benthos were affected by construction of the interim risk reduction features, such as rock dikes and walkways, when rock was on earthen/muddy substrates. Similar effects on benthos, over a larger area, are expected for the proposed permanent relief well plan. At most disposal sites, changes in sediment types would be minor (i.e., excavated sediments from the main ditch to be placed in disposal areas consisting of mud flats), whereas some disposal sites would have experience

covering by reticulated concrete mats, reinforced concrete, etc. Benthic organisms are expected to recolonize disturbed substrates in the main ditch as well as disposal areas.

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 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 or Wood River Creek.

d. Color No change is expected to any waterbodies.

e. Odor The proposed plan is not expected to have an impact on water odors in any waterbodies, but because the detention basin is a water-logged wetland, the smell of hydrogen sulfide can be noted when the soft substrate is sufficiently disturbed. This smell would be confined to the immediate project area.

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 would 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.

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 significantly in any aquatic areas. Groundwater currently seeping into the detention basin has a natural temperature of about 55 degrees Fahrenheit, and this tends to prolong the formation of ice in this area during the winter, and also

has a cooling effect in the summer months. After construction of the proposed permanent relief well plan, surface water temperatures are expected to approximate the conditions that occur in typical isolated water bodies on the protected side of levees where groundwater influence is not constant year-round, as is the case in the detention basin, but seasonal.

2. Current Patterns and Circulation

a. Current Patterns and Flow. Some project features located in the detention basin of the East Alton pump station, such as the interim dikes A, B, and C, have affected to some degree the current patterns or flow in the main ditch that leads to the pump station. To mitigate this effect, a few portable pumps have been used during higher ponding situations to move water from one side of the dike to the other.

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 would 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 would not directly or indirectly alter normal water level fluctuations of the Mississippi River or Wood River Creek. At the localized level, the ponding employed within the detention basin to counteract underseepage has deviated from normal water level fluctuations during the operation of interim risk reduction measures (from 2010 until an assumed 2021). After construction of the proposed permanent relief well plan, ponding would no longer be needed, and normal fluctuations due to local rainfall, runoff, and combined sewer outflows from the City of Alton would be restored.

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, revegetation measures to minimize erosion (lateral movement) of fill materials, and the temporary use of portable pumps to move water around temporary dikes.

C. Suspended Particulate/Turbidity Determinations

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site. With respect to water quality, construction of rock

features as interim risk reduction measures (dikes, walkways) caused temporary and localized increases in levels of suspended particulates and turbidity at the construction sites and for relatively short distances downstream. As water quality in these areas is generally poor, adverse effects were likely minor. Similar effects are expected during construction of features for the proposed permanent relief wells plan, chiefly removal of sediment from the main ditch leading to the pump station. No permanent detrimental impacts to suspended particulate/turbidity determination are anticipated as a result of the proposed plan. To minimize these effects, dewatering of the project area as well as hydraulically segmenting the project area into three distinct work areas (one for each of the three years of planned construction) is expected to reduce and minimize the extent of elevated particulate and turbidity levels in surface waters

2. Effects (degree and duration) on Chemical and Physical Properties of the Water Column. The interim risk reduction features have not had any known effects on chemical and physical properties of the water column of surface waters within the detention basin. The proposed permanent relief well plan is expected to reduce the levels of iron and manganese in surface introduced by groundwater seeping into the project area. The relief wells are expected to lower the groundwater table by 2-3 feet, depending on the location; currently the groundwater table is at the existing ground surface. This change is considered to be minor. The project does not involve any construction in the Mississippi River or Wood River Creek.

a. Light Penetration. Decreases in light penetration of the water column are not expected; due to poor water quality, there is no submerged aquatic vegetation supported by the detention basin, nor do any species of sight feeding fish live there.

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

c. Toxic Metals and Organics. Toxic metals or organics are not expected.

d. Pathogens. Fecal coliform bacteria are undoubtedly present within the project area because at times the City of Alton discharges sewage from its sewage treatment plant along with stormwater into the ponding area of the East Alton pump station. Normal fluctuations in ponding elevations of the detention basin (which cannot exceed elevation 415) would spread these pathogens around. The ponding employed during the operation of the interim risk reduction measures would also facilitate the spread of this material (interim ponding elevations also do not exceed elevation 415). Under the proposed permanent relief well plan, interim ponding would no longer be required, and the potential water-borne spread of such pathogens would result from normal fluctuations.

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. As mentioned above, a minor increase in temperatures of surface water bodies is expected to occur after the proposed permanent relief well plan would be constructed; the resulting increase would approximate the typical temperature in isolated water bodies located on the protected side of levees that are subject to seasonal rather than year-round groundwater influence.

3. Effects on Biota

a. Primary Production, Photosynthesis. Temporary minor impacts to primary production and photosynthetic processes are expected to occur during construction activities. The project area is in large part a big mud flat due to soft ground conditions created be excessive groundwater underseepage, and is unsupportive of persistent herbaceous vegetation. After the proposed permanent relief well plan is constructed, ground conditions are expected to become firmer and more normal, and supportive of such vegetation as well as some woody species. Primary production is then expected to increase.

b. Suspension/Filter Feeders. A temporary reduction in benthos production is expected.

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, the seeding of work areas following construction, dewatering of the project area, and hydraulic segmentation of the project area into three separate reaches.

D. Contaminant Determinations. Sampling was conducted in the upper portion of the Wood River levee system in September of 2009 in the area of uncontrolled underseepage. 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.

The construction of the interim risk reduction measures, along with the interim ponding operations, has not affected any hazardous, toxic, or radioactive wastes within the Upper Wood River levee-protected area.

During construction of the proposed permanent relief wells plan, a contingency plan would be developed to handle any unexpected encounter with contaminated materials. During the installation of the proposed features, such as relief wells, excavated materials would be monitored to determine if any contaminants of concern are present that might require such materials to be considered a special waste. A Site Health and Safety Plan, and a Quality Control Plan would be required, discussed with contractors, and implemented to avoid any environmental hazards.

E. Aquatic Ecosystem and Organism Determinations

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

2. Effects on Benthos. Except for the main ditch leading to the pump station, no aquatic areas with benthos would be affected by the project on a temporary basis; no permanent effects on benthos are expected.

3. Effects on Nekton. The term "nekton" refers basically to larger, free-swimming aquatic organisms, such as fishes. Fish species inhabiting the detention basin reflect poor water quality conditions, and include common carp, mosquito fish, and probably Asian carp. Dewatering of the project area during construction of the proposed permanent relief well pan is expected to result in the mortality of some fish. Because the project area would be segmented into three separate construction areas, this impact is expected to be minor.

4. Effects on Aquatic Food Web. Construction activities are not expected to disrupt the aquatic food chain as the localized water quality is poor.

5. Effects on Special Aquatic Sites

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

b. Wetlands. The footprint for constructed interim project features affecting jurisdictional wetlands is about 1 acre. The same for the proposed permanent relief well plan is about 30.5 acres. A compensatory wetland mitigation plan is included as part of the proposed permanent relief well plan to offset the loss of wetlands due to interim as well as proposed permanent features.

c. Mud Flats. By late 2009, prior to the start of interim ponding, mud flats had replaced much of the cattail vegetation located between the levee and the

main ditch. It is expected that following discontinuation of the interim ponding and construction of the proposed final risk reduction measures, the mud flats would diminish in area and transition back to shallow marshes and wet meadows.

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. Eight species listed for this county are applicable to the project area (Table C-A-4). There is no designated critical habitat within Madison County for any of these species.

It is the St. Louis District's opinion that the proposed project will not adversely impact any of the eight federally listed species that might occur in the project area, provided that conditions for the protection of the Indiana bat, northern long-eared bat, and decurrent false aster are implemented.

Tree clearing would be required for the Relief Wells Alternative (Tentatively Selected Plan), including some trees with suitable maternity roosting characteristics. Tree felling would need to be restricted to the colder months when maternity roosting by Indiana bats as well as northern long-eared bats in trees does not occur (October 1 to March 31). With this restriction, the Relief Wells Alternative (Tentatively Selected Plan) “may affect, but is not likely to adversely affect” the Indiana bat and northern long-eared bat.

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 6 years 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.

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

Common Name (Scientific Name)	Status	Habitat
Indiana bat (*Myotis sodalis*)	E	Caves, mines (hibernacula); small stream corridors with well developed riparian woods, upland forests (foraging)
Northern long-eared bat (*Myotis septentrionalis*)	T	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Least tern (*Sterna antillarum*)	E	Bare alluvial and dredged spoil islands
Eastern massasauga (*Sistrurus c. catenatus*)	PT	Graminoid dominated plant communities (fens, sedge meadows, peatlands, wet prairies, open woodlands, and shrublands)
Pallid sturgeon (*Scaphirhynchus albus*)	E	Large rivers
Spectaclecase mussel (*Cumberlandia monodonta*)	E	Shallow areas in larger rivers and streams
Decurrent false aster (*Boltonia decurrens*)	T	Disturbed alluvial soils
Eastern prairie fringed orchid (*Platanthera leucophaea*)	T	Mesic to wet prairies

7. Other Fish and Wildlife. Given the urban setting, a variety of animal species use 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. Species such as great and snowy egrets, Canada geese, various dabbling ducks, turkey, and white-tailed deer that are relatively common now are expected to remain so.

8. Actions to Minimize Impacts. As required under Section 404 of the Clean Water Act, a compensatory wetland mitigation plan is included as part of the proposed permanent relief well plan to offset the loss of wetlands due to interim as well as proposed permanent features.

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. Discharges in areas of permanent water would not occur because a dewatering plan would be in effect within all construction areas. There is no need to develop a mixing zone determination for the discharge sites since they would temporarily lack 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. 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 would 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 would 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 would not impact this kind of recreation.

d. Aesthetics. Construction activities would have minor impacts on the aesthetic quality of the project area during the duration of the work. Noise and exhaust would 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 would 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) EMP-HREP projects (i.e., 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 underseepage corrections for the Melvin Price Reach of the Upper Wood River Levee 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. Alternatives for permanent corrections to underseepage problems were considered since 2010, and these fell into three general kinds of solutions: seepage berms, relief wells, and cutoff walls. For this re-evaluation of the project, two of these solutions were evaluated – relief wells and a cutoff wall. 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 mitigation. Between these two solutions, the relief wells plan presents the greatest potential for impacts to waters of the United States, whereas the cutoff wall plan would not directly impact any natural resources such as wetlands. A comparison of alternatives by cost (construction and operations and maintenance) shows that the cutoff wall plan is roughly four times greater than the relief well plan. No practicable alternative to the proposed relief well plan exists which meets the study objectives, is cost effective, and does not involve the discharge of fill or dredged materials into waters of the United States.

C. Compliance with Applicable State Water Quality Standards. Water quality certification under Section 401 of the Clean Water Act will be required from the Illinois Environmental Protection Agency. The certification 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 proposed relief well plan is not expected to adversely affect any of the eight federally listed endangered, threatened, or candidate species or their critical habitat, provided that

restrictions pertaining to the Indiana bat, northern long-eared bat, and decurrent false aster are implemented.

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 corrections for the Melvin Price Reach of the Upper Wood River Levee 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.

_____ _____

Date

Anthony P. Mitchell
Colonel, U.S. Army
District Commander

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

APPENDIX EA-C

HABITAT EVALUATION AND COST ESTIMATE/INCREMENTAL COST ANALYSIS FOR PROJECT MITIGATION

APPENDIX TO ENVIRONMENTAL ASSESSMENT

MELVIN PRICE REACH OF WOOD RIVER LEVEE UNDERSEEPAGE DESIGN DEFICEINCY CORRECTIONS PROJECT SUPPLEMENTAL REPORT UPPER WOOD RIVER LEVEE MADISON COUNTY, ILLINOIS

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December 2015

HABITAT EVALUATION AND COST ESTIMATE/INCREMENTAL COST ANALYSIS FOR PROJECT MITIGATION

SUPPLEMENTAL REPORT
MELVIN PRICE REACH OF WOOD RIVER LEVEE
UNDERSEPPAGE DESIGN DEFICINECY CORRECTIONS REPORT
MADISON COUNTY, ILLINOIS

DECEMBER 2015

Table of Contents

1. Introduction

This appendix provides the documentation of the habitat evaluation and quantification process that was conducted to evaluate the effects on aquatic and terrestrial natural habitats of the interim risk reduction measures (Interim Operation Plan) as well as the alternative final risk reduction measures (Cutoff Wall and Relief Well Plans) for the Melvin Price Reach of the Wood River Levee Underseepage Design Deficiency Corrections Project, located in Madison county, Illinois. Active participants included biologists from the St. Louis District of the Corps of Engineers; the U.S. Fish and Wildlife Service, and the Illinois Department of Natural Resources.

Per USACE Engineer Regulation 1105-2-100 dated 22 April 2000, quantification of habitat changes is required in the impact assessment process; the use of certified planning models to capture habitat changes is also a requirement. To assess environmental impacts, habitat models for selected fish and wildlife species have been developed to quantify habitat changes resulting from project features.

Wildlife based models were used to evaluate the effects of project features on species at the project area. This was done because aquatic and terrestrial habitats would be affected by some or all of the interim and proposed project features. The U.S. Fish and Wildlife Services' Habitat Evaluation Procedures ("HEP") (USFWS 1980) were used to quantify changes to aquatic and terrestrial habitats, including direct and indirect effects.

Because the result of the habitat evaluation shows that there would be a net loss in habitat value due to these plans, these habitat losses would require compensatory mitigation. To assist in developing mitigation, a second habitat evaluation was conducted to quantify the benefits of establishing compensatory mitigation habitats, from which mitigation benefits would need to offset the habitat losses at the proposed levee project area.

2. Habitat Evaluation

Introduction. HEP includes the use of numerical models that evaluate the quality and quantity of particular habitat for species selected by team members. The qualitative component of the analysis is known as the habitat suitability index (HSI) and is rated on a 0.0 to 1.0 scale, with higher values indicating better habitat for that species. 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 project plans, historical conditions, 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 × Acres = HUs). Habitat units are calculated for specific target years to forecast changes in habitat values over the life of the project with- and without-project conditions. When HSI scores are not available for each year of analysis, a formula that requires only target year HSI and area estimates is used (USFWS 1980). This formula is:

$$\int_0^T HU\ dt \equiv (T_2 - T_1)\left[\left(\frac{A_1H_1 + A_2H_2}{3}\right) + \left(\frac{A_2H_1 + A_1H_2}{6}\right)\right]$$

Where:

$$\int_0^T HU\ dt = CumulativeHUs$$

T_1= first target year of time interval

T_2 = last target year of time interval

A_1 = area of available habitat at beginning of time interval

A_2 = area of available habitat at end of time interval

H_1 = habitat suitability index at the beginning of time interval

H_2 = habitat suitability index at end of the time interval

3 and 6 = constants derived from integration of HSI × Area for the interval between any two target years

This formula was developed to precisely calculate cumulative HUs when either HSI or area or both change over a time interval, which is common when dealing with the unevenness found in nature. Habitat Unit gains or losses are annualized by summing the cumulative HUs calculated using the above equation across all target years in the period of analysis and dividing the total (cumulative HU) by the number of years in the life of the project (i.e., 50 years). This calculation results in the Average Annual Habitat Units (AAHUs) (USFWS 1980).

The effects of each project plan or alternative (net AAHUs) are then determined by subtracting with-project conditions (AAHUs) from without-project conditions (AAHUs).

In preparation of using the HEP, the evaluation team conducted a site visit. They also reviewed aerial photography and topographic maps. During the field evaluation, assumptions were developed regarding existing conditions, future-without project conditions, and projected with-project conditions relative to habitat changes over time.

The aquatic habitats in the project area that would be affected by project plans and alternatives include: herbaceous wetland, shrub-scrub wetland, forested wetland, and riparian (main ditch) habitats. Terrestrial habitats that would be affected include bottomland hardwood forest (not wetland) and developed areas. For the project area, herbaceous wetland habitat was broken down into three subcategories: wet meadow, shallow marsh, and deep marsh. In a similar fashion, forested wetland habitat was divided into wet-mesic and wet forested wetland subtypes. Each habitat was evaluated separately.

The fox squirrel (*Sciurus niger*), slider turtle (*Trachemys scripta*), and mink (*Mustela vison*) were selected as evaluation species for this project. The slider turtle and mink were used to represent herbaceous wetland, shrub-scrub, and riparian (main ditch) habitats. All three species were used to represent forested wetland habitats, and the fox squirrel was employed to represent bottomland hardwood forest habitat. Published HSI models were used for the fox squirrel (Allen, 1982), slider turtle (Morreale and Gibbons, 1986) and mink (Allen, 1986; Devendorf and Yeager, 2013).

Per USACE Engineering Circular 1105-2-407 dated 31 May 2005, the HEP methodology and models used in the impact analysis for this project have been approved for use as planning tools for habitat impact assessment of Corps water resource projects (USACE, 2015).

General habitat preferences for these species include: open forest habitats with a variety of mast trees (fox squirrel); quiet water, 3 to 6 feet deep, with soft bottom and abundant vegetation (slider turtle); and vegetated wetlands associated with small natural streams (mink).

A number of habitat variables included in these models would likely reflect potential changes to project area habitats. Examples of such variables are percent cover of emergent and submerged vegetation; percent tree, shrub, and/or persistent emergent herbaceous vegetation canopy closure; percent of year with surface water present; water depth; water regime; water temperature; percent canopy closure; riparian disturbance; percent canopy closure of hard-mast producing trees; average dbh of overstory trees.

For the purpose of impact analysis, the period of analysis was established as 60 years. To facilitate comparison, target years were established at 0 (existing conditions, 2009), 1, 9, 10, 13, 35, and 60 years. Target years 1 and 9 were established to represent the first and final year of interim measures. For final risk reduction measures, target year 10 was established to represent the first year of construction, target year 13 for the first year post-construction, and target year 35 for any expected long-term changes. These same target years were then used across all habitat types to standardize data analysis, as well as at any potential mitigation site. HSIs and cumulative HUs for each evaluation species were calculated at each of these target years.

Final calculations included determining the acreage of existing cover types as well as acreage of cover types affected by project plans and alternatives, using topographical data, project plans, land coverage data files, and aerial photography (including historical). Habitat suitability index scores (HSIs) were calculated for each species used in the HEP models. In evaluations that included multiple species, the HSIs were averaged then multiplied by the appropriate acreage to generate HUs and cumulative HUs (see above equation). The cumulative HUs were then annualized to yield AAHUs for with and without project conditions.

General Assumptions and Habitat Characteristics

The following general assumptions were made during the habitat evaluation: (1) target years of 0 (existing condition), 1, 9, 10, 13, 35, and 60 (future without and future with project conditions) are sufficient to analyze HUs and characterize habitat changes over the estimated period of analysis; (2) the No Action Alternative assumes that no mitigation features would be instituted; (3) the evaluation or target species were selected based on habitat type, project objectives, and mitigation location; (4) generated HSI values are a fair representation of the quality of habitat in all target years and for all future conditions with or without a project; and (5) water input to the system is solely reliant on precipitation, runoff, City of Alton Combined Sewer Overflow discharges, and ground water; (6) under future without and future with project conditions, the acreages of herbaceous wetland and forested wetland habitats will not change, i.e., undergo natural succession (forestation).

Specific Assumptions

The following specific assumptions were made during the habitat evaluation: (1) river level or pool management of the adjacent Mississippi River will not change over the period of analysis, such that the nature and rate of groundwater underseepage along the levee will not change; (2) water level management within the pump station's detention basin will not change over the period of analysis; (3) as the Interim Operation Plan has been fully developed, no additional direct impacts to project area resources will occur; (4) although interim features were constructed in various years (2010, 2014, 2015), they were regarded in the evaluation as occurring in 2010 to minimize the number of target years; (5) where interim features such as dikes and pads are to be removed once a final alternative is completed, the affected sites would be restored to their original condition to allow for natural regeneration; (6) as part of the Relief Well Alternative, placement of sediments excavated from the main ditch will result in temporary impacts to disposal sites located in herbaceous wetlands (currently mud flats) as the disposal sites are expected to naturally revegetate and function as shallow marsh habitat; (7) the alternatives will eliminate groundwater sheet flow across some wetlands habitats, i.e., wet meadow and higher forested wetland; (8) by eliminating soft ground conditions, the alternatives will allow marsh habitat that currently resembles mud flats to become naturally vegetated and support a dense growth of herbaceous plants species; (9) a total of 5 acres of trees in wet forested wetland will die due to interim ponding; (10) during interim operations, the covertype for areas of dead trees due to ponding will change from wet forested wetland to "deep marsh" herbaceous wetland at target year 9, and after a final alternative is constructed, will change back to the wet forest wetland covertype at target year 35; (11) the City of Alton will not construct a new wetland treatment sewage facility within the project area.

Results

Interim Risk Reduction Measures.

This analysis focused on the period of time when interim measures are assumed to remain in effect (TY 1 through TY 9, or 2010-2018).

The HEP evaluation assessed the effect of interim ponding on the suitability of affected habitats relative to the habitat requirements of the three evaluation species. For herbaceous wetland, shrub-scrub, and forested wetland habitats, interim ponding has increased habitat suitability indices (TY1, TY9) to some extent for either the mink and slider turtle or all three species (Table EA-C-1). In contrast, fox squirrel HSIs for bottomland hardwood forest habitat remained unchanged, and mink HSIs for riverine habitat (main ditch) dropped slightly.

Acres of habitat by type for target years TY 0 – TY 9 are provided in Table EA-C-2. The acreage of trees killed by interim ponding have been regarded as changing to deep marsh herbaceous wetland habitat ("mudflats").

Final Risk Reduction Measures
This analysis focused on the period of time once interim measures ceased and construction starts, and thereafter for 50 years (TY 10 through TY 60, or 2019-2069).

Relief Well Alternative (Tentatively Selected Plan).

Due to the reduction in underseepage pressures, the loss of surface water in wet meadow herbaceous wetland and wet-mesic forested wetland would have a notable adverse impact on habitat suitabilities of the mink and slider turtle (Table EA-C-1). Also, the expected change in relative abundance of percent cover of herbaceous vegetation in deep marsh habitat is reflected in the slight increase in HSIs for the mink (Table EA-C-1). Regarding the placement of sediments excavated from the main ditch into marsh ("mudflat") disposal sites, deep marsh disposal sites are expected to experience slight gains in HSIs, whereas shallow marsh disposal site HSIs are expected to slightly decrease (Table EA-C-1). Little to no change in HSIs for the three evaluation species is expected in shrub-scrub, wet forested wetland, bottomland hardwood forest, and riverine (main ditch) habitats (Table EA-C-1).

Acres of habitat by type for these target years are provided in Table EA-C-2.

The habitat analysis evaluated the combination of the interim risk reduction measures with the proposed relief well plan over a 60 year period of analysis (Table EA-C-3).

After comparing the difference in AAHUs under future with-project conditions versus future without-project conditions, the habitat analysis shows an overall decrease in AAHUs for herbaceous wetland (-2.44), forested wetland (-2.38), and bottomland hardwood forest habitats (-0.10), which indicates the relief well project would negatively affect the evaluation species. The analysis also shows a slight overall increase in AAHUs for shrub-scrub (0.09) and riverine (0.03) habitats, which indicates the alternative would slightly benefit the evaluation species in these areas. Due to the decreases in AAHUs for the evaluation species, compensatory mitigation to offset these losses would be required for herbaceous wetland, forested wetland, and bottomland hardwood forest habitats.

Table EA-C-1. Habitat Suitability Indices for Interim Operation Plan and Relief Well Alternative (Tentatively Selected Plan).

Evaluation Species	Habitat Type	Future Without Project							Future With Project						
		TY0	TY1	TY9	TY10	TY13	TY35	TY60	TY0	TY1	TY9	TY10	TY13	TY35	TY60
Mink	HW: wet meadow (410-412)	0.77	0.77	0.77	0.77	0.77	0.78	0.78	0.77	0.80	0.83	0.42	0.00	0.00	0.00
Slider turtle	HW: wet meadow (410-412)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.00	0.00	0.00	0.00
Average		**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.58**	**0.60**	**0.21**	**0.00**	**0.00**	**0.00**
Mink	HW: shallow marsh (408-410)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.15	0.00	0.00	0.00	0.00
Slider turtle	HW: shallow marsh (408-410)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.33	0.29	0.00	0.04	0.04	0.04
Average		**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.29**	**0.22**	**0.00**	**0.02**	**0.02**	**0.02**
Mink	HW: shallow marsh (408-410) disposal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.15	0.00	0.00	0.00	0.00
Slider turtle	HW: shallow marsh (408-410) disposal	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.33	0.29	0.00	0.00	0.00	0.00
Average		**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.29**	**0.22**	**0.00**	**0.00**	**0.00**	**0.00**
Mink	HW: deep marsh (407-408)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.20	0.16	0.00	0.02	0.09	0.09
Slider turtle	HW: deep marsh (407-408)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.29	0.27	0.00	0.04	0.04	0.04
Average		**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.25**	**0.22**	**0.00**	**0.03**	**0.07**	**0.07**
Mink	HW: deep marsh (407-408) disposal site Reach 1	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.20	0.16	0.00	0.02	0.09	0.09
Slider turtle	HW: deep marsh (407-408) disposal site Reach 1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.29	0.27	0.00	0.04	0.04	0.04
Average		**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.25**	**0.22**	**0.00**	**0.03**	**0.07**	**0.07**
Mink	HW: deep marsh (407-408) disposal site Reachs 2&3	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.20	0.16	0.00	0.02	0.09	0.09
Slider turtle	HW: deep marsh (407-408) disposal site Reachs 2&3	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.29	0.27	0.00	0.02	0.02	0.02
Average		**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.25**	**0.22**	**0.00**	**0.02**	**0.06**	**0.06**
Mink	DSW: shrub-scrub	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.18	0.61	0.63	0.00	0.19	0.19	0.20
Slider turtle	DSW: shrub-scrub	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.50	0.50	0.00	0.08	0.08	0.08
Average		**0.13**	**0.13**	**0.14**	**0.14**	**0.14**	**0.14**	**0.14**	**0.13**	**0.56**	**0.57**	**0.00**	**0.14**	**0.14**	**0.14**
Mink	DFW: wet-mesic forested wetland (410-412)	0.64	0.64	0.65	0.65	0.65	0.66	0.67	0.64	0.64	0.65	0.32	0.00	0.00	0.00
Slider turtle	DFW: wet-mesic forested wetland (410-412)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.00	0.00	0.00	0.00
Fox squirrel	DFW: wet-mesic forested wetland (410-412)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Average		**0.22**	**0.22**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.22**	**0.34**	**0.35**	**0.12**	**0.01**	**0.01**	**0.01**
Mink	DFW: wet forested wetland (408-410)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.42	0.00	0.00	0.00	0.00
Slider turtle	DFW: wet forested wetland (408-410)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.26	0.24	0.00	0.04	0.04	0.04
Fox squirrel	DFW: wet forested wetland (408-410)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Average		**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.25**	**0.23**	**0.01**	**0.02**	**0.02**	**0.02**
Fox squirrel	DF: bottomland hardwood forest (412-415+)	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**
Mink	Riverine (main ditch)	0.34	0.34	0.35	0.35	0.35	0.36	0.38	0.34	0.30	0.30	0.30	0.31	0.39	0.40
Slider turtle	Riverine (main ditch)	0.20	0.20	0.20	0.20	0.20	0.20	0.16	0.20	0.20	0.20	0.20	0.20	0.20	0.16
Average		**0.27**	**0.27**	**0.28**	**0.28**	**0.28**	**0.28**	**0.27**	**0.27**	**0.25**	**0.25**	**0.25**	**0.26**	**0.30**	**0.28**
Mink	Riverine (main ditch): cleanout + ACM	0.34	0.34	0.35	0.35	0.35	0.36	0.38	0.34	0.30	0.30	0.22	0.28	0.39	0.40
Slider turtle	Riverine (main ditch): cleanout + ACM	0.20	0.20	0.20	0.20	0.20	0.20	0.16	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Average		**0.27**	**0.27**	**0.28**	**0.28**	**0.28**	**0.28**	**0.27**	**0.27**	**0.25**	**0.25**	**0.21**	**0.24**	**0.30**	**0.30**

Table EA-C-2. Habitat Acres for Interim Operation Plan and Relief Well Alternative (Tentatively Selected Plan).

Habitat Type	Future Without Project							Future With Project						
	TY0	TY1	TY9	TY10	TY13	TY35	TY60	TY0	TY1	TY9	TY10	TY13	TY35	TY60
HW: wet meadow (410-412)	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.58	19.58	16.37	16.37	16.37	16.37
HW: shallow marsh (408-410)	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	18.91	18.91	11.10	11.10	11.10	11.10
HW: shallow marsh (408-410) disposal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.53	4.53	4.53	4.53
HW: deep marsh (407-408)	54.96	54.96	54.96	54.96	54.96	54.96	54.96	54.96	54.26	59.26	46.04	46.04	41.04	41.04
HW: deep marsh (407-408) disposal site Reach 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	7.00	7.00	7.00
HW: deep marsh (407-408) disposal site Reachs 2&3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.58	6.58	6.58	6.58
DSW: shrub-scrub	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.67	1.67	1.67	1.67
DFW: wet-mesic forested wetland (410-412)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.08	14.08	14.08	14.08
DFW: wet forested wetland (408-410)	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	1.30	0.98	0.98	5.98	5.98
DF: bottomland hardwood forest (412-415+)	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	31.90	31.90	31.41	31.41	31.91	31.91
Riverine (main ditch) - no change	10.98	10.98	10.98	10.98	10.98	10.98	10.98	10.98	10.98	10.98	7.28	7.28	7.28	7.28
Riverine (main ditch) - cleanout + ACM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.70	3.70	3.70	3.70
Total Habitats Evaluated	160.34	160.34	160.34	160.34	160.34	160.34	160.34	160.34	158.83	158.83	150.73	150.73	151.23	151.23
Acres Replaced by Project Features									1.51	1.51	9.61	9.61	9.11	9.11

Table EA-C-3. Average Annual Habitat Units (AAHU) for Interim Operation Plan and Relief Well Alternative (Tentatively Selected Plan).

		Herbaceous Wetland							
		Wet meadow (410-412)	Shallow marsh (408-410)	Shallow marsh (408-410): disposal site	Deep marsh (<408)	Deep marsh (<408): disposal Reach 1	Deep marsh (<408): disposal Reaches 2&3	**Herbaceous Wetland Total**	**Scrub-Shrub Wetland (<408)**
Future	SUM of HUs =	458.62	22.92	0.00	98.93	0.00	0.00	**580.46**	**15.46**
Without	Life of project =	60	60	60	60	60	60	**60**	**60**
Project	**AAHUs =**	7.64	0.38	0.00	1.65	0	0.00	**9.67**	**0.26**
Future	SUM of HUs =	113.99	54.07	0.17	231.69	19.26	14.90	**434.07**	**20.72**
With	Life of project =	60	60	60	60	60.00	60	**60**	**60**
Project	**AAHUs =**	1.90	0.90	0.00	3.86	0.32	0.25	**7.23**	**0.35**
	NET AAHUS =	-5.74	0.52	0.00	2.21	0.32	0.25	**-2.44**	**0.09**

		Forested Wetland			Bottomland Hardwood Forest (412-415)	Riverine		
		Forested Wetland (410-412)	Forested Wetland (408-410)	**Forested Wetland Total**		Riverine (main ditch)	Riverine (main ditch): cleaned out	**Riverine Total**
Future	SUM of HUs =	206.18	8.82	**215.00**	**311.04**	179.51	0.00	**179.51**
Without	Life of project =	60	60	**60**	**60**	60	60	**2.99**
Project	**AAHUs =**	3.44	0.15	**3.58**	**5.18**	2.99	0.00	**3.03**
Future	SUM of HUs =	58.33	13.76	**72.09**	**305.17**	129.02	52.20	**181.23**
With	Life of project =	60	60	**60**	**60**	60	60	
Project	**AAHUs =**	0.97	0.23	**1.20**	**5.09**	2.15	0.87	**3.02**
	NET AAHUS =	-2.46	0.08	**-2.38**	**-0.10**	-0.84	0.87	**0.03**

Cutoff Wall Alternative.

This alternative would have no direct impacts to natural habitats since the cutoff wall would be constructed on the riverside of the levee in the existing grassy levee right of way.

Like the Relief Well Alternative, due to the reduction in underseepage pressures, the loss of surface water in wet meadow herbaceous wetland and wet-mesic forested wetland would have a notable adverse impact on habitat suitabilities of the mink and slider turtle (Table EA-C-4). Also, the expected change in relative abundance of percent cover of herbaceous vegetation in deep marsh habitat is reflected in the slight increase in HSIs for the mink (Table EA-C-4). Little to no change in HSIs for the three evaluation species is expected in shrub-scrub, wet forested wetland, and bottomland hardwood forest habitats (Table EA-C-4).

For the Cutoff Wall Alternative, acres of habitat by type for these target years are provided in Table EA-C-5.

Table EA-C-4. Habitat Suitability Indices for Interim Operation Plan and Cutoff Wall Alternative.

Evaluation Species	Habitat Type	Future Without Project							Future With Project						
		TY0	TY1	TY9	TY10	TY13	TY35	TY60	TY0	TY1	TY9	TY10	TY13	TY35	TY60
Mink	HW: wet meadow (410-412)	0.77	0.77	0.77	0.77	0.77	0.78	0.78	0.77	0.80	0.83	0.42	0.00	0.00	0.00
Slider turtle	HW: wet meadow (410-412)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.00	0.00	0.00	0.00
Average		**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.58**	**0.60**	**0.21**	**0.00**	**0.00**	**0.00**
Mink	HW: shallow marsh (408-410)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.15	0.00	0.00	0.00	0.00
Slider turtle	HW: shallow marsh (408-410)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.33	0.29	0.00	0.04	0.04	0.04
Average		**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.29**	**0.22**	**0.00**	**0.02**	**0.02**	**0.02**
Mink	HW: deep marsh (407-408)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.20	0.16	0.00	0.02	0.09	0.09
Slider turtle	HW: deep marsh (407-408)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.29	0.27	0.00	0.04	0.04	0.04
Average		**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.25**	**0.22**	**0.00**	**0.03**	**0.07**	**0.07**
Mink	DSW: shrub-scrub	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.18	0.61	0.63	0.00	0.19	0.19	0.20
Slider turtle	DSW: shrub-scrub	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.50	0.50	0.00	0.08	0.08	0.08
Average		**0.13**	**0.13**	**0.14**	**0.14**	**0.14**	**0.14**	**0.14**	**0.13**	**0.56**	**0.57**	**0.00**	**0.14**	**0.14**	**0.14**
Mink	DFW: wet-mesic forested wetland (410-412)	0.64	0.64	0.65	0.65	0.65	0.66	0.67	0.64	0.64	0.65	0.32	0.00	0.00	0.00
Slider turtle	DFW: wet-mesic forested wetland (410-412)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.00	0.00	0.00	0.00
Fox squirrel	DFW: wet-mesic forested wetland (410-412)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Average		**0.22**	**0.22**	**0.23**	**0.23**	**0.23**	**0.23**	**0.23**	**0.22**	**0.34**	**0.35**	**0.12**	**0.01**	**0.01**	**0.01**
Mink	DFW: wet forested wetland (408-410)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.42	0.00	0.00	0.00	0.00
Slider turtle	DFW: wet forested wetland (408-410)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.26	0.24	0.00	0.04	0.04	0.04
Fox squirrel	DFW: wet forested wetland (408-410)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Average		**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.25**	**0.23**	**0.01**	**0.02**	**0.02**	**0.02**
Fox squirrel	DF: bottomland hardwood forest (412-415+)	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**

Table EA-C-5. Habitat Acres for Interim Operation Plan and Cutoff Wall Alternative.

Habitat Type	Future Without Project							Future With Project						
	TY0	TY1	TY9	TY10	TY13	TY35	TY60	TY0	TY1	TY9	TY10	TY13	TY35	TY60
HW: wet meadow (410-412)	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.58	19.58	19.70	19.70	19.70	19.70
HW: shallow marsh (408-410)	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	18.91	18.91	19.10	19.10	19.10	19.10
HW: deep marsh (407-408)	54.96	54.96	54.96	54.96	54.96	54.96	54.96	54.96	54.26	59.26	59.96	59.96	54.96	54.96
DSW: shrub-scrub	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
DFW: wet-mesic forested wetland (410-412)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
DFW: wet forested wetland (408-410)	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	1.30	1.30	1.30	6.30	6.30
DF: bottomland hardwood forest (412-415+)	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	31.90	31.90	31.90	31.90	32.40	32.40
Total Habitats Evaluated	149.36	149.36	149.36	149.36	149.36	149.36	149.36	149.36	147.85	147.85	148.86	148.86	149.36	149.36
Acres Replaced by Project Features									1.51	1.51	0.50	0.50	0.00	0.00

Table EA-C-6. Average Annual Habitat Units (AAHU) for Interim Operation Plan and Cutoff Wall Alternative.

		Herbaceous Wetland				
		Wet meadow (410-412)	Shallow marsh (408-410)	Deep marsh (<408)	**Herbaceous Wetland Total**	**Scrub-Shrub Wetland (<408)**
Future	SUM of HUs =	458.62	22.92	98.93	**580.46**	**15.46**
Without	Life of project =	60	60	60	**60**	**60**
Project	**AAHUs =**	7.64	0.38	1.65	**9.67**	**0.26**
Future	SUM of HUs =	115.61	62.13	269.97	**447.70**	**22.26**
With	Life of project =	60	60	60	**60**	**60**
Project	**AAHUs =**	1.93	1.04	4.50	**7.46**	**0.37**
	NET AAHUS =	-5.72	0.65	2.85	**-2.21**	**0.11**

		Forested Wetland			**Bottomland Hardwood Forest (412-415)**
		Forested Wetland (410-412)	Forested Wetland (408-410)	**Forested Wetland Total**	
Future	SUM of HUs =	206.18	8.82	**215.00**	**311.04**
Without	Life of project =	60	60	**60**	**60**
Project	**AAHUs =**	3.44	0.15	**3.58**	**5.18**
Future	SUM of HUs =	59.03	14.14	**73.17**	**309.16**
With	Life of project =	60	60	**60**	**60**
Project	**AAHUs =**	0.98	0.24	**1.22**	**5.15**
	NET AAHUS =	-2.45	0.09	**-2.36**	**-0.03**

The habitat analysis for the Cutoff Wall Alternative also evaluated the combination of the interim risk reduction measures with this permanent plan over a 60 year period of analysis (Table EA-C-6).

After comparing the difference in AAHUs under future with-project conditions versus future without-project conditions, the habitat analysis shows an overall decrease in AAHUs for herbaceous wetland (-2.21), forested wetland (-2.36), and bottomland hardwood forest habitats (-0.03), which indicates the relief well project would negatively affect the evaluation species. The analysis also shows a slight overall increase in AAHUs for shrub-scrub (0.11) habitat, which indicates the alternative would slightly benefit the evaluation species in this covertype. Due to the decreases in AAHUs for the evaluation species, compensatory mitigation to offset these losses would be required for herbaceous wetland, forested wetland, and bottomland hardwood forest habitats.

Mitigation Required

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

The amount of mitigation required (acres) to offset the unavoidable losses described above was developed to allow for the development of mitigation costs, which would be factored into the overall cost of each alternative. To develop mitigation amounts (acres), HSIs were developed using the same evaluation species (mink, slider turtle, fox squirrel) for a hypothetical off-site compensatory mitigation site (Table EA-C-7).

In order to apply the three HEP models, assumptions were made about the hypothetical mitigation site: 1) the mitigation site would be located in current cropland; 2) cropland would surround the parcel on most sides whereas some natural habitat would border at least one side; 3) suitable soils would be present for wetland restoration, i.e. hydric; 4) site conditions would allow for the restoration of wetland hydrology or enhancement of surface water; 5) soil conditions would allow for the satisfactory establishment of native plant species including emergent/herbaceous and woody wetland species; 6) mitigation construction or implementation would take one year.

Habitat suitability indices were developed for a 50-year period, TY 10 – TY 60 (Table EA-C-7). TY 10 was regarded as year 1 or the year of mitigation construction/implementation, and TY 13 and TY 35 were intermediate years.

Using these HSIs, the acreages required to offset the AAHU losses presented above for the two alternatives were computed for a 60-year project life (Table EA-C-8). Under future with project conditions, target years TY 0 – TY 9 represent current conditions, i.e. cropland.

Table EA-C-7. Habitat Suitability Indices for Hypothetical Off-Site Mitigation Site.

Evaluation Species	Habitat Type	Future Without Project							Future With Project						
		TY0	TY1	TY9	TY10	TY13	TY35	TY60	TY0	TY1	TY9	TY10	TY13	TY35	TY60
Mink	emergent herbaceous wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.45	0.45
Slider turtle	emergent herbaceous wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12	0.12	0.12
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.27**	**0.29**	**0.29**
Mink	wet-mesic forested wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.06
Slider turtle	wet-mesic forested wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12	0.12	0.12
Fox squirrel	wet-mesic forested wetland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.96
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.06**	**0.24**	**0.38**
Fox squirrel	bottomland hardwood forest	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.65**	**0.96**

Table EA-C-8. Habitat Losses (AAHU) and Mitigation Required (acre) for Relief Well and Cutoff Wall Plans.

Habitat Type	Relief Well Plan		Cutoff Wall Plan	
	AAHU Loss	Mitigation Acres Required to Offset Loss	AAHU Loss	Mitigation Acres Required to Offset Loss
Herbaceous wetland	-2.44	10.7	-2.21	9.7
Forested Wetland	-2.38	12.8	-2.36	12.7
Bottomland hardwood forest (not wetland)	-0.10	0.2	-0.03	0.1
Total	**-4.92**	**23.7**	**-4.60**	**22.5**

This habitat evaluation in support of project impact assessment and mitigation planning would be revisited and updated as necessary during the Preconstruction, Engineering, and Design (PED) phase to ensure any new or changed project features are reflected in the analysis. The Corps would continue to coordinate with the agencies during the PED phase to fully incorporate adequate fish and wildlife conservation measures and that project features can be adequately evaluated with regards to impacts to fish and wildlife resources and/or sufficiency in achieving mitigation.

3. Mitigation Planning

Under Section 2036(c)(1) of the WRDA of 2007, the Corps is obligated to consider the use of a mitigation bank to fulfill compensatory mitigation requirements for Federal projects. The policy states that "The service area of a mitigation bank, to the maximum extent practicable, shall be in the same watershed as the habitat impacted by the Civil Works project. If the mitigation credits are not available in the same watershed or there are compelling reasons to provide mitigation in a different watershed, the documentation of the analysis and of the rationale for that decision should be included in the project decision document."

The project area is located in southwest Illinois within the U.S. Geological Survey HUC 07110009 Peruque-Piasa watershed. Although there is an existing mitigation bank within the Peruque-Piasa watershed in Illinois, it does not have any available wetland credits, but potential credits are listed (RIBITS, 2015). Similarly, there is no other bank with a service area (primary, secondary, or tertiary) that overlaps with the project area. Furthermore, there is no in-lieu fee program in this part of the state which could provide mitigation credits.

Given that no mitigation bank is currently available that could serve the needs of this project, the Peruque-Piasa watershed along with adjacent watersheds were investigated for suitable parcels in Illinois. Coordination with the U.S. Fish and Wildlife Service and the Illinois Department of Natural Resources on previous Metro East civil works projects requiring mitigation has identified agency preferences for two general locations in Madison County, Illinois, in the Metro East – in the vicinity of Horseshoe Lake, and at Chouteau Island.

The process of locating potentially suitable wetland mitigation sites involves the consideration of a number of factors, such as current land use, zoning, geomorphology, soil suitability (i.e., historically hydric/previously wetland), prime farmland status, potential presence of cultural resources or HTRW materials, willingness of seller, and land values. Based on the experience of the St. Louis District over the last 10-15 years in acquiring mitigation sites, potentially suitable sites in the Metro East having a high "density" of suitable soils are often located in areas zoned for industrial/commercial use, where prevailing land asking prices are relatively high compared to the Federal government's determination of fair market value. For such potential sites willing sellers are not to be found.

In contrast, potentially suitable sites with a low "density" of suitable soils can be present in areas zoned for agricultural use, and potentially willing sellers can be found. In the two instances where the St. Louis District has acquired parcels for mitigation projects associated with Metro East levee underseepage projects, for every acre of land obtained, about 40 percent of that acre consists of soils suitable for wetland restoration. At these acquired mitigation sites, ridge and swale topography is present, where historic wetlands occurred in the swales and "upland" floodplain habitats occupied the ridges.

The proposed off-site compensatory mitigation site located on Chouteau Island (Appendix EA-D) consists of ridge and swale topography.

4. Mitigation Costs

Presently, the cost per credit for mitigation banks located within the St. Louis District ranges roughly from $25,000 to $35,000 per credit. Assuming one credit is equivalent to one acre, the cost for mitigating at a bank for this project, if one were available, would roughly range from about $625,000 to $875,000.

The estimated cost of implementing the proposed mitigation plan includes about $1,040,000 for wetland construction (minor site excavation/grading, low berm construction, herbaceous and tree plantings), including a 30 percent contingency and Engineering and Design (17 percent) and Supervision and Administration (10 percent) costs. Estimated land costs are about $400,000. Total estimated costs are about $1,440,000, for an average of about $58,000 per acre.

This average cost per acre is considerably more than the present prevailing cost per acre at a mitigation bank. In order to minimize mitigation costs for this project, potential use of a mitigation bank would be revisited during the Preconstruction, Engineering, and Design (PED) phase.

5. Cost Effectiveness/Incremental Cost Analysis

A cost effectiveness analysis was carried out for a previous approved levee underseepage project in the Metro East with very similar impacts to herbaceous wetland, forested wetland and bottomland hardwood forest habitats (USACE, 2012). The analysis was developed to determine the "best buy" options for establishing vegetation on the proposed compensatory mitigation site. The analysis focused on estimated costs and expected habitat benefits on a per acre basis for four tree planting alternatives and two herbaceous planting alternatives. The alternative methods of tree planting included ball and burlap, root production method seedling, bare root seedling, and broadcast seed. The alternative methods of herbaceous vegetation planting included live plugs and broadcast seed.

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.

The cost effectiveness analysis showed that the root production method seedling alternative was the "best buy" for establishing trees ($891 average annual cost per AAHU). For herbaceous wetland plantings, the live plug alternative was the "best buy" ($1,931 average annual cost per AAHU). The mitigation plan for this previous approved project incorporated these "best buy" alternatives for establishing vegetation on the proposed mitigation site.

This analysis is incorporated by reference and the results will be applied to the proposed compensatory mitigation site for this study.

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APPENDIX EA-D

MITIGATION PLAN

APPENDIX TO ENVIRONMENTAL ASSESSMENT

MELVIN PRICE REACH OF WOOD RIVER LEVEE UNDERSEEPAGE DESIGN DEFICEINCY CORRECTIONS PROJECT SUPPLEMENTAL REPORT UPPER WOOD RIVER LEVEE MADISON COUNTY, ILLINOIS

U.S. Army Corps of Engineers, St. Louis District
Regional Planning and Environmental Division North
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December 2015

MITIGATION PLAN

SUPPLEMENTAL REPORT
MELVIN PRICE REACH OF WOOD RIVER LEVEE
UNDERSEPPAGE DESIGN DEFICINECY CORRECTIONS REPORT
MADISON COUNTY, ILLINOIS

Table of Contents

1. Introduction

The ongoing interim risk reduction measures (Interim Operation Plan) and the proposed plan for permanent risk reduction measures (Relief Wells Plan) for the Melvin Price Reach of the Wood River Levee Underseepage Design Deficiency Corrections Project, located in Madison county, Illinois, would directly and indirectly adversely impact various natural habitats in the project area.

Based on the HEP evaluation (Appendix EA-C), an overall net loss in habitat value would occur in herbaceous wetland, forested wetland, and bottomland hardwoods forest. These unavoidable adverse impacts would require compensatory mitigation totaling 23.7 acres (Table EA-D-1).

Table EA-D-1. Unavoidable habitat losses (AAHU) by habitat type and corresponding mitigation required (acres).

Habitat Type	Habitat Loss in Average Annual Habitat Units (AAHU)	Equivalent Habitat Gain in Compensatory Mitigation (Acres)
Herbaceous Wetland	-2.44	10.7
Forested Wetland	-2.38	12.8
Bottomland Hardwood Forest (non-wetland)	-0.10	0.2
Total	**-4.92**	**23.7**

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 Melvin Price Reach of the Wood River Levee Underseepage Design Deficiency Corrections Project.

2. Objectives

The project area consists of the Upper Wood River Levee District's levee system and associated right of way. The goal is to mitigate for direct impacts to approximately 8.15 acres of herbaceous wetland, 1.25 acres of forested wetland, and 1.0 acre of non-wetland bottomland hardwood forest, as well as for indirect impacts to about 16 acres of herbaceous wetland and about 14 acres of forested wetland. Current ecological problems for the project area's biological resources, including herbaceous wetland, forested wetland, and non-wet bottomland hardwood forest are: fragmentation and degradation resulting from altered hydrologic regimes that depart from natural conditions, the addition of sediments and 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 environmentally protected land, and with establishment of vegetation it would create a larger contiguous block of habitat.

3. Site Selection

The proposed mitigation location in relation to the impacted project area is shown in Figure EA-D-1. The specific site, shown in Figure EA-D-2, is located on Chouteau Island, which is about 10 miles north of downtown St. Louis. The proposed mitigation site is approximately 60.0 acres.

The project area is located within the U.S. Geological Survey HUC 07110009 Peruque-Piasa watershed, whereas the proposed mitigation site is located a short distance to the south within the HUC 07140101 Cahokia-Joachim watershed

Background. Chouteau Island is part of the "Chouteau Island in the Confluence Greenway" Challenge Partnerships Program*. The Challenge Partnership Program provides opportunities for non-federal public and private groups and individuals to contribute to, and participate in, the operation and/or management of recreation facilities and natural resources at Corps water resource development projects.

Chouteau Island and two adjacent islands (Mosenthien and Gabaret) encompass approximately 5,500 acres of land. Due to the islands' proximity to Interstate 270, they

are considered a primary gateway to the Confluence Greenway, which is a 200-square-mile system of parks, conservation areas, trails, and recreations areas that span 40 miles on both sides of the Mississippi and Missouri Rivers in the St. Louis region. Currently The City of Madison, Illinois Department of Natural Resources, and the U.S. Army Corps of Engineers own land on Chouteau Island, Mosenthein Island, and Gabaret Island. Over 60 percent of Chouteau Island is owned by state and federal agencies while 100 percent of Gabaret and Mosenthien Islands are publicly owned.

The agencies involved with the development of the Chouteau Island complex are trying to utilize all aspects of the islands hydro-geological features, environmental significance, habitat expanse, and cultural and historical resources. Some of the goals are to create educational and interpretive opportunities; improve hiking, biking, equestrian and water-based access; protect, restore, improve and expand animal, plant, and river habitat to enhance biodiversity; preserve the islands role as a green gateway; encourage a habitat that is beneficial to wildlife, interpretation, education and recreations; preserve and restore the island complex in a manner that is environmentally and economically sustainable, as well as numerous other goals.

Establishment of the proposed mitigation site at Chouteau Island would contribute to the goals of this program.

Chouteau Island is also the location for an existing Corps mitigation site. The Chouteau Island Mitigation Site (Epping property) is located to the immediate north of the proposed Mel Price mitigation site. The existing site was acquired in late 2007 to partially fulfill the mitigation requirements for the Chain of Rocks East Levee Underseepage Design Deficiency Corrections Project. At the time of acquisition it consisted of about 90 acres of cropland and seven acres of bottomland forest. About 88 acres are protected by the island's private agricultural levee system, which runs along the western portion of the site.

The site's ridge and swale topography is typical of lands bordering the river. In 2010, mitigation construction was implemented at the Epping site. On-site swales were expanded laterally by minor excavation to maximize the extent of herbaceous wetlands. Small earthen berms along the perimeter of the site have contained surface runoff to make the site wetter, especially in the swales. The remainder of the site was reforested by planting RPM of native wetland tree species. Species composition consisted of pin oak (*Quercus palustris*), overcup oak (*Quercus lyrata*), swamp white oak (*Quercus bicolor*), bald cypress (*Taxodium distichum*), persimmon (*Diospyros virginiana*), American plum (*Prunus americana*), and black walnut (*Juglans nigra*).

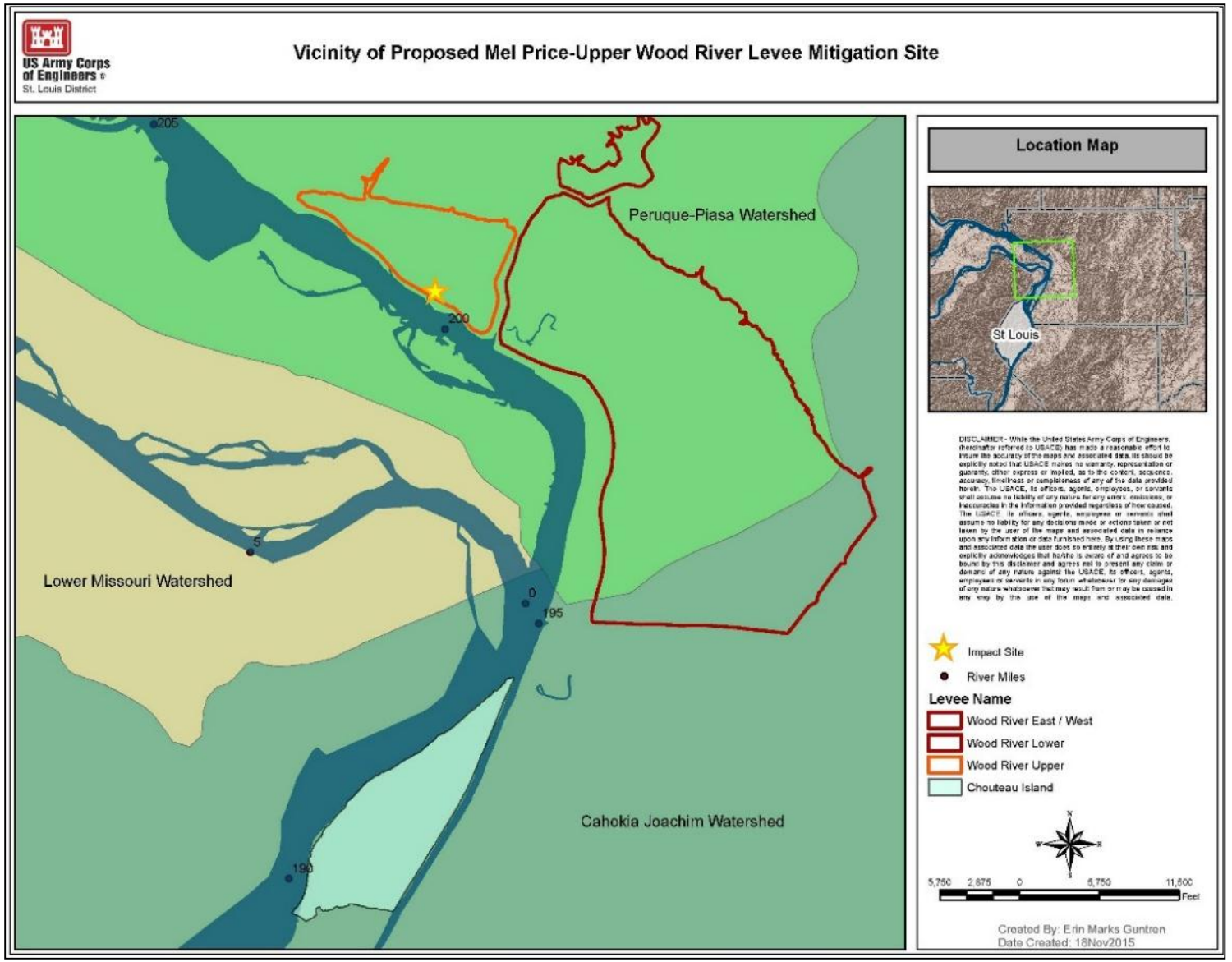

Figure EA-D-1. Chouteau Island, location of proposed mitigation site, in relation to project area.

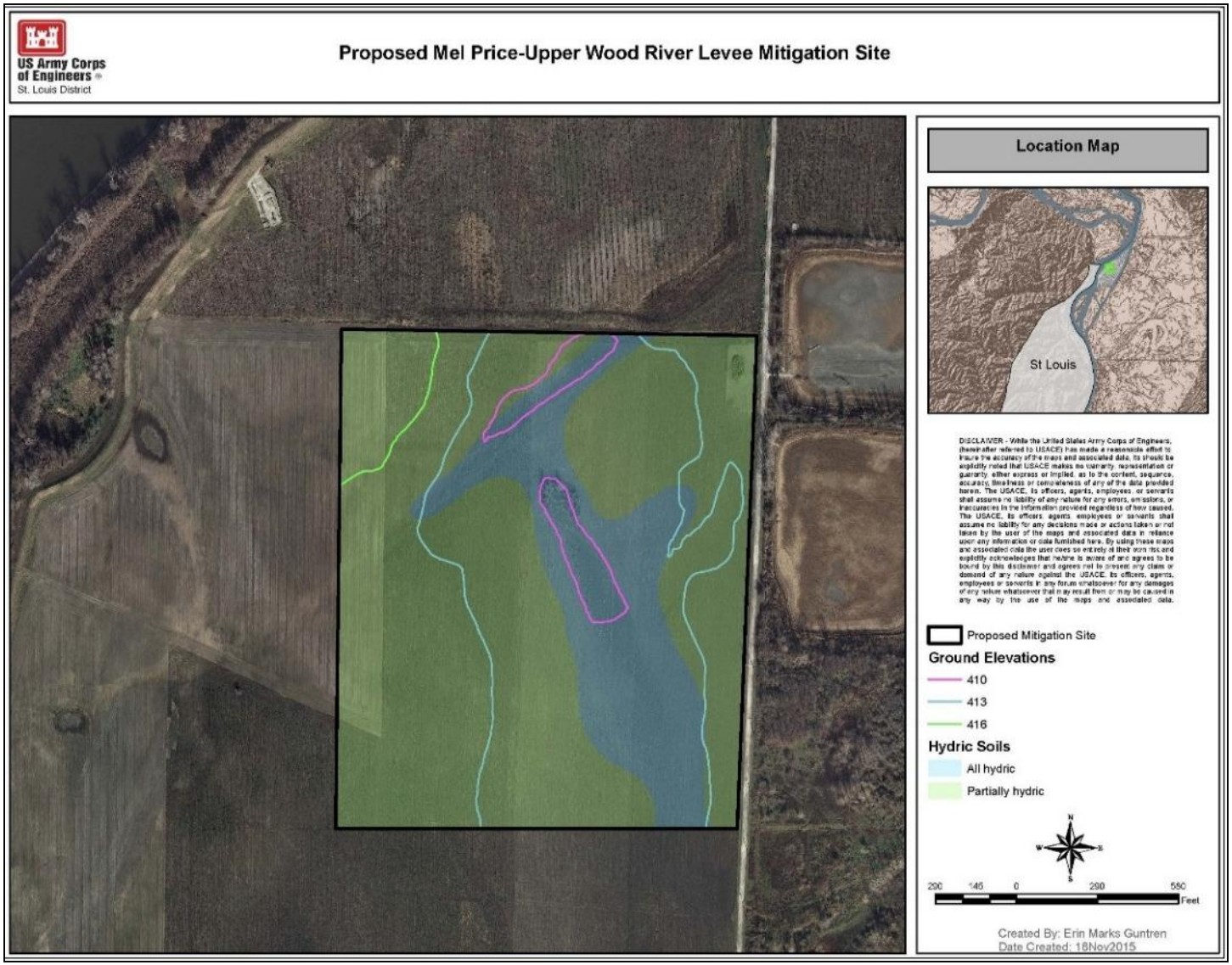

Figure EA-D-2. Proposed mitigation site at Chouteau Island, Madison County, IL.

4. Site Protection Instrument

The St. Louis District would acquire and be responsible for maintaining and protecting lands contained within the mitigation site in perpetuity. Certain uses on the property would be prohibited in perpetuity once the site has been established.

a) Prohibited Uses:

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 except as required or permitted by this Melvin Price Reach of the Wood River Levee Flood Protection Project's Mitigation Plan.
3. Cutting, removal or destruction of vegetation on the property except 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.
6. Dredging, draining, ditching, damming or in any way altering the hydrology of the Property except as required or permitted by this Melvin Price Reach of the Wood River Levee 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 Melvin Price Reach of the Wood River Levee Flood Protection Project's Mitigation Plan and that may or may not be subject to Corps of Engineers regulatory authority.

b) Allowed Uses. No other human activities that result in the material degradation of habitat within the lands covered by this Melvin Price Reach of the Wood River Levee Flood Protection Mitigation Plan will occur. Prohibited uses will not include, 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:
Approximately 8.15 acres of herbaceous wetland, 1.25 acres of forested wetland, and 1.0 acre of non-wetland bottomland hardwood forest would be directly impacted. Indirect adverse impacts would occur to additional areas of herbaceous and forested wetlands.

Wet meadows occur on relatively high ground (about elevation 412-410) and support mainly herbaceous vegetation consisting of a dense growth of forbs, such as smartweeds (*Polygonum* spp.), grasses, and sedges (*Carex* spp.). Woody species typically consist of scattered tree saplings such as green ash (*Fraxinus pennsylvanica*) and silver maple (*Acer saccharinum*). This habitat occurs mainly along the landside toe of the highway/levee in a relatively narrow band. Underseepage moves across this habitat constantly in a sheet flow fashion, with water depths typically about 2-6 inches depending on microtopography; normal detention basin ponding reaches this topographic zone infrequently.

Formerly vegetated marshes occupy the lower topographic zone bordering wet meadow wetlands (about elevation 410 and below). This habitat occurs in large broad areas on the highway side of the main ditch leading to the pump station. Prior to the mid to late 2000s, cattail (*Typha latifolia*) was the dominant emergent plant. Shallow marshes (about elevation 410-408) supported a relatively dense growth of cattails with areas of open water. Deep marshes (about elevation 408-407) consisted of less dense cattails interspersed by larger areas of open water. For some time after the late 1980s, the normal water regime of these marshes was semipermanently flooded or intermittently exposed. A maintenance road that was part of the St. Louis District's 1985 Design Memorandum project and constructed along the levee side of the main ditch with a designed crown elevation of 409 acted as a berm for a number of years and caused surface waters to pond in much of the marsh area.

Since then, the maintenance road has been "breached" at a number of locations due to the erosive forces of seepage water coming from the highway and entering the main ditch. As a result, the dominant water regime of marsh habitat has changed to temporarily flooded from detention basin ponding; when not inundated, the ground is saturated due to underseepage. When no detention basin ponding is present, groundwater entering this habitat type follows topographic depressions in the mudflats to form rivulets.

Forested wetlands are a relatively minor component along the landside of the riverfront levee. They typically border areas of deep or shallow marsh, and often occur near the landside toe of the levee. Areas of forested wetland that occupy slightly lower elevations and are wetter support a lower diversity of tree species, such as willow (Salix sp.), silver maple, and green ash. Groundcover may not be present at all or

may be represented by a discontinuous layer of various sedges, forbs, and grasses. Areas of forested wetland that occupy higher ground often support a greater diversity of tree species, including silver maple, green ash, cottonwood (*Populus deltoides*), red mulberry (*Morus rubra*), and dogwood (*Cornus* sp.). Groundcover is typically dense, notably taller, and similarly greater in herbaceous plant diversity. Lower forested wetland normally experiences frequent to somewhat infrequent fluctuations in stormwater ponding. Higher areas of forested wetland are infrequently flooded, and they intercept groundwater seepage where this forest occurs along the landside toe of the levee. Lower forested wetland occurs in the approximate elevation range of 408-410 feet, and higher forested wetland in the range of 410-412 feet.

Non-wetland bottomland hardwood forest occurs in the vicinity of the East Alton pump station, at various locations on the north side of the ditch leading to the pump station, and along the smaller ditches that feed into the main ditch. This type of forest occupies elevations above approximate elevation 412 feet, and rarely experiences ponding of stormwater. Because of the relatively high ground elevations, this type of forest does not intercept groundwater seepage from the levee as sheet flow. Also, the tree roots are high enough above the prevailing groundwater table to not be influenced by saturated soil conditions. Tree species that were cleared during interim operations include hackberry (*Celtis occidentalis*), honey locust (*Gledistia triacanthos*), cottonwood (*Populus deltoides*), silver maple, green ash (*Fraxinus pennsylvanica*), red mulberry (*Morus rubra*), American elm (*Ulmus americana*), and red bud (*Cercis canadensis*). The average tree diameter at breast height (dbh) was about 7 inches (range 4-20). Groundcover is usually very dense and often includes exotic species such as bush honeysuckle.

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. Herbaceous wetlands adjacent to forested areas serve as resting and feeding areas for some migratory ducks. Turkey and white-tailed deer may also be seen.

Mitigation Site:
Chouteau Island – The specific parcel being proposed for mitigation is about 60.0 acres in size, and is situated landside of the island's levee. All of it is being maintained as cropland. The proposed site exhibits the natural ridge and swale topography of an island of the Mississippi River. Ground elevations range from about 410 to 416 feet NGVD (Figure EA-D-2). The soils at the site include two map units (Figure EA-D-2), 1) about 14 acres of "3071L - Darwin silty clay, 0 to 2 percent slopes, frequently flooded, long duration", which is classified as hydric, and 2) "3592A - Nameoki silty clay loam, 0 to 2 percent slopes, frequently flooded", which makes up the remainder of the site and is classified as partially hydric (USDA-NRCS, 2015).

Minor changes to existing topography and hydrologic regime would be needed to enhance site wetness. After discontinuation of farming, herbaceous wetland would be

situated at the lowest elevations, followed by forested wetland and then bottomland hardwood forest.

Because the site is adjacent to an existing mitigation site as well as other publically owned lands, and because of the site's position near the Mississippi/Missouri River confluence, it has great potential for increased use by numerous migratory species. The surrounding area already provides habitat for various waterfowl species, wading birds, shorebirds, neotropical migrants, and wintering and nesting bald eagles. Deer, turkey, and many small game species occur on the island.

6. Determination of Credits

The HEP evaluation quantified the habitat changes caused by the interim and proposed final measures and accounted for direct and indirect changes to aquatic and terrestrial resources (Appendix EA-C). Approximately 8.15 acres of herbaceous wetland, 1.25 acres of forested wetland, and 1.0 acre of non-wetland bottomland hardwood forest would be directly impacted. Indirect adverse impacts would occur to an additional 16 acres of herbaceous wetlands and 14 acres of forested wetlands. Based on the HEP evaluation, an overall net loss in habitat value would occur in herbaceous wetland, forested wetland, and bottomland hardwoods forest (Table EA-D-1). Based on the HEP evaluation, these unavoidable adverse impacts would require compensatory mitigation totaling 23.7 acres (Table EA-D-1).

7. Mitigation Work Plan

The proposed mitigation work plan would be very similar to that of the existing mitigation site located to the immediate north. On-site swales would be expanded laterally by minor excavation to maximize the extent of herbaceous wetlands. Minor excavation of additional areas below elevation 413 would be done to maximize the extent of forested wetlands. Small earthen berms along the perimeter of the site would be constructed across swales to contain surface runoff to make the site wetter, such as on the south side.

The 10.7 acres of the wettest hydric soil areas would be planted with native emergent wetland species. Emergent vegetation should include a variety of species listed in Table EA-D-2. A mix of at least 15 of these species should be planted.

Within the remaining hydric soil and excavated areas, 12.8 acres of forested wetland would be established by planting RPM seedlings of native wetland tree species. Species composition would consist of pin oak, overcup oak, swamp white oak, bald cypress, persimmon, American plum, and black walnut.

The remainder of the site would also be planted RPM seedlings of native bottomland hardwood tree species. Wetland tree species would be planted with a mixture of softwood species, such as green ash, hackberry, and box elder (*Acer negundo*).

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.

Table EA-D-2. Representative emergent wetland species for mitigation site.

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

8. Performance Standards

To compensate for unavoidable impacts to herbaceous wetland, forested wetland, and bottomland hardwood forest habitats, the site must show progression from the current state of row crops towards a stable emergent wetland, forested wetland, and bottomland hardwood forest. Specific features that could be measured to show the progression and satisfy ecological success include basic hydrology of the site, plant survival, and vegetation composition. Ecological success at this mitigation site is comprised of four parts – herbaceous wetland, forested wetland, bottomland hardwood forest, 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.

Forested Wetland and Bottomland Hardwood Forest:

Forested wetland and bottomland hardwood forest survival rates can decrease in areas located behind levees. Although the proposed mitigation site is located behind existing levees, existing bottomland hardwoods in the vicinity of the areas have remained stable and healthy.

Forested wetland and bottomland hardwood 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.

Herbaceous Wetland:

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

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 herbaceous wetland, forested wetland, and bottomland hardwood forest mitigation sites are planted, which will constitute year one.

Herbaceous 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.

Forested Wetland and Bottomland Hardwood Forest:

For the first five years, an annual forest survey will be conducted during the growing season. In the first year, ten points will be randomly selected within the reforested section of the mitigation area. Each of these points will form the center of a permanent square 1/5th acre vegetation sampling plot. If plots overlap or extend beyond the mitigation site boundaries, additional random points shall be selected until five suitable plots are found. The GPS coordinate for the center of each plot will be recorded to allow for relocation of the plot in subsequent years. All planted trees within the subplot shall be tagged with an aluminum label indicating species and month and year of planting. Tags shall be permanently placed on or adjacent to planted trees using a method that will not impair tree growth. All planted seedlings within the five plots will be monitored annually and species, state (alive/dead), height, and basal diameter recorded. All invasive species with $\geq$ 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 forested wetland and bottomland hardwood forest 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.

Report Content:

The surveys will be documented in an annual written report that will be provided 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 herbaceous wetland, forested wetland, and bottomland hardwood forest 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.

10. Long-Term Management Plan

The St. Louis District will be responsible for maintaining and protecting lands contained within the mitigation site in perpetuity. In the event a prohibited use occurs, corrective action would conducted to return the proposed mitigation site to either an herbaceous 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 forested wetland and/or bottomland forest falls below 80% during any year following project completion, additional plantings would be needed. If tree death is caused by existing hydrology (i.e., too wet) then trees such as pin oak, bur oak, and pecan should be replaced with more water tolerant species such as box elder, river birch, black willow, cottonwood or silver maple. Supplemental plantings would continue until ecological success is met. If tree mortality is caused by invasive species (e.g., kudzu, Japanese hops, etc.) then invasive species management (hand cutting and herbicide treatment) should be implemented and trees species replanted using the species list in Section 7 above. If tree mortality is caused by disease/insect infestation, then the effectiveness of pesticide application versus replanting of resistant trees should be evaluated and one of these measures implemented.

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 five 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 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 five, then monitoring will continue annually until year 10. If targets are met at year five, then monitoring after year five would occur less frequently. The most costly alternative is presented in Table EA-D-3 below. The years that monitoring would occur if targets are met are highlighted in grey. All mitigation monitoring is considered Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R), and the costs and are 100% non-Federal costs.

Table EA-D-3. Monitoring scheme for the mitigation site. Monitoring highlighted 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
Forested Wetland and Bottomland 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 ($)		$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000	$1000
TOTAL	**$10,000 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 EA-D-4.

Table EA-D-4. 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	$4500	$4500	$4500	$4500	$4500	$4500	$4500	$4500	$4500	$4500
Invasive species management (hand removal and herbicide treatment)			$4500		$4500		$4500		$4500		$4500
Pesticide application on diseased plants or replanting of resistant trees		$2250	$2250	$2250							
Mowing to minimize competition from non-target plant species		$750	$750	$750	$750	$750					
Rehabilitation of water management features (re-routing/filling ditches, changing elevation, or adding/modifying structures)			$3750	$3750	$3750	$3750					
Estimated Cost ($)		$7500	$15,750	$11,250	$13,500	$9000	$9000	$4500	$9000	$4500	$9000
TOTAL					**$93,000 maximum**						

14. Literature Cited

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COORDINATION AND PUBLIC COMMENTS
APPENDIX EA-E

SUPPLEMENTAL REPORT
MELVIN PRICE REACH OF WOOD RIVER LEVEE
UNDERSEEPAGE DESIGN DEFICIENCY CORRECTIONS PROJECT
UPPER WOOD RIVER LEVEE
MADISON COUNTY, ILLINOIS

DECEMBER 2015

Environmental Compliance Section
Planning and Environmental Branch
Regional Planning and Environment Division North
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce St.
St. Louis, Missouri 63103-2833
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From: Becker, Drew
To: George, Timothy K MVS
Cc: Edmondson, Alan R MVS; Matthew Mangan
Subject: [EXTERNAL] Re: Mel-Price portable diesel pumps [was A&H Contracting for work near Pump Station] (UNCLASSIFIED)
Date: Monday, August 31, 2015 12:34:56 PM

Hi Tim,

I concur with your assessment. The work activities occur outside of the 660 ft. buffer distance and therefore are unlikely to disturb eagles. Additionally, the noise caused by the work is unlikely to disturb eagles based on the level of the sound and consistent nature of the sound during flood events.

Drew

Drew Becker
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On Thu, Aug 27, 2015 at 1:23 PM, George, Timothy K MVS <Timothy.K.George@usace.army.mil> wrote:

> Classification: UNCLASSIFIED
> Caveats: NONE
>
> Drew - as you can see, "next week" didn't happen, not even next month, but I did manage "next year"! Anyway, here's my updated bald eagle assessment for our Mel Price interim operation plan. Please review and comment as you see fit.
>
> I'll also be assessing separately our recently updated plan for permanently taking care of the underseepage problem at Mel Price. The updated plan involves installing 100 new relief wells to replace the 70 out there now. The wells won't be a problem with regard to the eagle nest, but I'm still waiting on details regarding other features ancillary to the wells that presumably will be closer.
>
> Any questions, please let me know.
>
> Thanks,
>
> Tim
>
> Timothy K. George
> Supervisory Ecologist
> Environmental Compliance Section (CEMVP-PD-C)
> U.S. Army Corps of Engineers, St. Louis District
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> Timothy.K.George@usace.army.mil

From:	Becker, Drew
To:	George, Timothy K MVS
Cc:	Matthew Mangan; Malone, Pat; Edmondson, Alan R MVS; Leff, Joseph A MVS
Subject:	[EXTERNAL] Re: Mel Price - final plan (UNCLASSIFIED)
Date:	Wednesday, October 14, 2015 10:05:06 AM

Hi Tim,

I agree with your assessment regarding an eagle permit. If the construction will take place within 660 feet of the nest, and it can not be conducted outside the breeding season, then a permit would be recommended by the Service.

Drew

Drew Becker
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On Tue, Oct 6, 2015 at 1:50 PM, George, Timothy K MVS <Timothy.K.George@usace.army.mil> wrote:

> Classification: UNCLASSIFIED
> Caveats: NONE
>
> Matt, Pat, and Drew,
>
> Here's drawings for the final plan (attached). The plan is laid out as I described in my previous message. The drawings display the proposed relief wells, permanent 'elevated construction access and maintenance road', groundwater flow collector system including four discharge channels leading to the main ditch, as well as removal of accumulated sediment from a portion of the main ditch. Pending approval and funding, construction is scheduled to commence in late 2017 and finish about 3 years later. Since the ground between the highway and main ditch is so saturated with underseepage groundwater, dewatering of this area will be necessary to allow for construction of some features, primarily the collector system.
>
> Drew - regarding the active eagle nest, I added a 'sticky note' to the 1st and 5th pages of the drawings displaying its location (at the lower left corner of the little box). The nearest proposed feature is a discharge channel leading to the main ditch. This channel is about 500 feet away from the nest, and more than half of it is within the 660 ft buffer (buffer not shown on drawings). At this feasibility phase of the design, we are assuming that this feature cannot be relocated outside the buffer. In terms of determining whether a take permit is needed, there is no similar existing activity within 660 ft. Therefore, I am under the assumption that a take permit would be needed if we were not to impose a seasonal restriction on the construction of this feature (construction limited to the non-nesting season, July-Dec). Later, during preparation of plans & specifications prior to construction, we will reevaluate whether this particular channel can be modified/relocated (Asher Leff, who is copied on this message, did the feasibility design). Please let me know whether you agree with my assumption that a permit would be required if we were not to impose a seasonal restriction.
>
> Matt/Pat - I am using three HEP models for this project's habitat assessment (slider turtle, mink, fox squirrel); they should also be useful for our EMP projects. After going through the variables, the great blue heron wouldn't work for Mel Price because nothing changed with the project. Also, after working with Ben McGuire here in this

office, the wood duck was just too complex to put into Excel. I'll share the results of the assessment once I finish (wetland impacts, HSIs, AAHUs, mitigation, etc). The draft EA is to be sent out for public review in late November.

Any questions, please let me know.

Thanks,

Tim

Timothy K. George
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Timothy.K.George@usace.army.mil

-----Original Message-----
From: George, Timothy K MVS
Sent: Thursday, July 09, 2015 4:58 PM
To: 'Mangan, Matthew'; 'Malone, Pat'
Cc: Edmondson, Alan R MVS; Mccain, Kathryn MVS; McGuire, Benjamin
Subject: Mel Price - final plan (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Matt and Pat,

I have an update on the final plan for our Mel Price levee underseepage project. BLUF - because it's likely there will be some permanent wetland impacts, in the near future we will need to do a habitat assessment of the project's impacts to wetlands as well as for development of a wetland mitigation plan. To accomplish this, we'll need to choose models for the habitat assessment, and schedule a site visit, assuming we want one.

FINAL PLAN: We've identified the final plan, and it will consist of relief wells only. Recall the last time we went through this exercise, the plan was relief wells in the upper half of the project area and a cutoff wall for the lower half. It was the overall cost of that previous plan that sent us back to finding something cheaper.

Our pre-engineering design of these new wells is to be completed by 21 July, and at this time no drawings are available. I'm told that although the new wells are to be located in the vicinity of the existing wells along the landside levee toe and are unlikely to be located in wetlands, there is a need to construct a permanent access road paralleling the levee toe to allow for future O&M of the wells. Such an access road is likely to impact wetlands, at least in part. Plus groundwater flowing out of these wells will be constant, and it will need to flow into a collector system (and carried to the pump station) that will be a little further landward and also is likely to have impacts. I'm guessing that roughly 5-10 acres of wetlands overall will be permanently impacted, and the impacts should be confined to a "narrow" strip bordering the levee (highway) toe. I'm told that the eventual drawings from the pre-engineering design are not likely to change much by the final design, such that the initial estimate of wetland impacts is not likely to change much.

HABITAT ASSESSMENT MODELS: The last time we used a model at Mel Price (or the other Metro East levee projects) it was WHAG, which no longer is available because it didn't get certified as a Corps planning model. Because WHAG is no longer available for use for Corps planning studies (such as EMP-HREP and this one), we're currently limited to what's already been certified or approved for our use. After looking closely at what's available for our region/area, it boils down to USFWS HEP models. Since the wetlands likely to be impacted by the

DISTRIBUTION LIST
APPENDIX EA-F

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DECEMBER 2015

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