ENVIRONMENTAL ASSESSMENT
WITH
DRAFT FINDING OF NO SIGNIFICANT IMPACT

FINAL REMEDIAL MEASURES
TO CONTROL UNDERSEEPAGE ALONG EAST CANAL LEVEE
CHAIN OF ROCKS CANAL, MISSISSIPPI RIVER
MADISON COUNTY, ILLINOIS

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1.0 INTRODUCTION In April 1996, the Planning Division of the St. Louis District circulated for public comment and review an Environmental Assessment (EA), Section 404(b)(1) Evaluation, and Draft Finding of No Significant Impact (FONSI) for a proposed project entitled "Remedial Measures to Control Underseepage Along East Canal Levee, Chain of Rocks Canal, Mississippi River, Madison County, Illinois." This request for public comment and review was conducted to initiate compliance with the National Environmental Policy Act and other Federal environmental laws and executive orders.

Written comments were received from seven parties. Neither the U.S. Fish and Wildlife Service nor the Illinois Department of Natural Resources expressed any objection to the proposed work. The former requested that a description of potential impacts to the threatened bald eagle be included in the biological assessment, and that potential impacts to the threatened decurrent false aster be avoided should wetland mitigation be proposed for the vicinity of Horseshoe Lake in Madison County. IDNR requested that opportunities for on-site wetland mitigation on Corps lands along the Mississippi River be explored, and that opportunities for beneficial use of dredged material be pursued in conjunction with project implementation. The Illinois Department of Agriculture advised the Corps not to use prime farmland for wetland mitigation, recommended the consideration of FEMA buy-out properties on Chouteau Island for wetland mitigation, and requested the opportunity to review the wetland mitigation plan before it made a final determination of compliance with state farmland preservation requirements. The Illinois Historic Preservation Agency advised that a phase I archaeological reconnaissance survey was required. Both Chouteau Township and the Chouteau, Nameoki & Venice Drainage and Levee District expressed support for the project, as did the Tri-City Regional Port District, although the latter expressed concerns about potential project impacts on existing port facilities and plans for future port expansion.

After consideration of these comments, the District's Engineer in Charge signed a FONSI on May 21, 1996, for the proposed work as described in the EA of April 1996. Along a parallel line, the District's Regulatory Branch circulated a public notice (P-2018) dated July 8, 1996, describing the proposed project as part of that office's effort to attain project compliance with the Clean Water Act. The work in these documents was described as occurring in two phases. The first phase - relocation of an existing drainage ditch in two segments, replacement of the same ditch with buried pipe in three segments, rehabilitation of existing relief wells, and filling of low depressions with dredged sand - was implemented during the period November 1996-April 1997. The proposed second phase has been reformulated since April 1996, and the revised proposal is the focus of this document. Because the proposed modifications to the

second phase will give rise to environmental impacts in areas not described in the April 1996 EA, this EA and accompanying documents are being circulated for public review and comment.

1.1 Project Location The project is located within the St. Louis Metropolitan Area in Madison County, Illinois, and is east of St. Louis, Missouri, and west of Granite City, Illinois. The project area includes the East Canal Levee of the Chain of Rocks Canal and the landside area immediately adjacent to this levee; this is the location of all remedial measures to control underseepage. The canal is located along the left descending bank of the Mississippi River between river miles 184.3 and 194.3 above the confluence of the Ohio River (see Plates 1-3). The project area also includes the Mississippi River adjacent to the East Canal Levee. This includes the Chain of Rocks Canal as well as the river's natural channel from the mouth of the Missouri River (river mile 195) down to the Merchant's bridge (river mile 183). Chouteau and Gabaret Islands are immediately west of the canal, and are also included within the project area.

1.2 Project Background The Chain of Rocks Canal was constructed over 40 years ago as part of a navigation project to by-pass a hazardous section of the Mississippi River. The navigation bypass was accomplished by constructing: 1) the Chain of Rocks Canal, about eight miles long with a bottom width of 300 feet; 2) two levees on each side of the canal; 3) Locks No. 27, which consists of a 110-foot wide and 1,200-foot long main lock and a 110-foot wide and 600-foot long auxiliary lock; and 4) appurtenant project features, including a harbor inset along the canal, and construction of the Chouteau, Nameoki, and Venice pump station.

In constructing the navigation canal, the local levee systems were disrupted. New levees were constructed on each side of the canal and tied into existing levee systems. These canal levees serve two purposes: they provide a navigation channel during all river stages, and they provide protection for four levee and drainage districts. The West Canal Levee provides protection to two non-Federal levee systems: the Chouteau Island Levee District, and Gabaret Island Levee District. The East Canal Levee provides flood protection to two Federally constructed levee systems: the East St. Louis and Vicinity Flood Protection System, administered by the Metro East Sanitary District, and the Chouteau, Nameoki, and Venice Drainage and Levee District. As a component of the flood protection system, the East Canal Levee protects an area of about 85,000 acres that includes the cities of East St. Louis and Granite City, Illinois. The general project features are located on Plates 1-2.

1.3 Authorized Canal Levee Designs The West and East Canal Levees were constructed with dredged sand fill obtained from the canal excavations, and capped with a thin layer of topsoil for the grass turf cover. The levee section consists of a 20-foot crown width with a 14-foot wide road, levee side slopes of 1 vertical on 4 horizontal, 100-foot wide stability berms on both sides of the levee, and 1 vertical on 3 horizontal berm toe slopes. The authorized net levee grade for the East Canal Levee is elevation 442.5, which includes 3 feet of freeboard, and the existing average levee grade is elevation 445.0, presumably overbuilt for anticipated settlement. The authorized net levee grade for the West Canal Levee is elevation 439.5.

1.4 Existing Underseepage Controls Before implementation of the phase one remedial measures, the underseepage control system for the East Canal Levee consisted of six interior ponding areas and 203 installed relief wells along most of the levee's landside berm (see Plates 1-3). Interior ponding was designed to use the abandoned landside levees (referred to as sub-levees) behind the new Federal East Canal Levee (see Plates 3-4, 5.1-11.1). The Corps of Engineers acquired permanent flood easements on these sub-levees and adjacent private lands between the sub-levees and the East Canal Levee. These six ponding areas were designed for different maximum ponding levels, ranging between elevation 407 in the Melvin Price Support Center (Granite City Army Depot) on the south end, and elevation 420 in the Tri-City Regional Port District's area. The phase one repairs implemented during August 1996-April 1997 include the following remedial measures:

a. Rehabilitation of 155 existing relief wells, replacement of 36 existing relief wells, and placement of riser extensions on 105 existing relief wells, along the toe of the landside seepage berm of the East Canal Levee.

b. Construction of two segments of new drainage ditch to bypass the existing drainage ditch along the landside toe of the East Canal Levee, one at the north end of the Tri-City Regional Port District and the other just south of the Chouteau, Nameoki, and Venice pump station.

c. Replacement of four segments of the existing drainage ditch along the East Canal Levee with a reinforced concrete pipe. From south to north, one segment lies in the Mel Price Support Center, two are in the Tri-City Regional Port District, and the fourth is located three-fourths of a mile south of Chouteau Slough. Sand was placed around the concrete pipe to fill the ditch and immediately adjacent low areas, and affected a total of about 35 acres.

d. Filling of about 25 acres of low depressions along the landside of the East Canal Levee at three locations with dredged sand. From north to south, sand was placed in about 7 acres within the Mel Price Support Center, about 4 acres in the Tri-City Regional Port District, and about 14 acres of low depressions on the west side of Chouteau Slough. A borrow site (a hill of old dredge disposal material) to the immediate west of Chouteau Slough was used by the contractor.

The quantity of sand needed for the last three measures was about 600,000 cubic yards. Sand was hydraulically dredged from the Mississippi River from sand bars in a side channel located between Gabaret and Mosenthien Islands, and piped to the construction site across Gabaret Island and the Chain of Rocks Canal.

1.5 Current Problems The underseepage problem is primary, and local drainage problems are secondary.

Underseepage Problems After the floods of 1973, 1993, and 1995, it became apparent that underseepage controls for the East Canal Levee did not perform as intended. During these high water events, sand boils or "quick-sand like conditions" developed along the toe of this

levee throughout much of its nine mile length. In an evaluation of underseepage controls, the St. Louis District (1995) concluded that some of the original design assumptions were invalid, and the system was not designed to current standards. Factors of safety associated with underseepage conditions that existed prior to the implementation of phase one measures were only a fraction of those required. With the phase one remedial measures now in place, the factors of safety have been increased, but not to current design standards.

Local Drainage Problems The Chouteau, Nameoki, and Venice (CN&V) pump station has had difficulty keeping up with flows from relief wells and storm water under present conditions. The original designs for the CN&V pump station, which was designed and constructed with federal funds, anticipated that it would pump storm water runoff and a small amount of seepage from its drainage area. Currently, the pump station must pump flows from relief wells, underseepage waters from private lands, and storm water runoff.

1.6 Purpose of Proposed Action The purpose of the proposed action is to complete the District's plan to remediate underseepage controls for the East Canal Levee along the Chain of Rocks Canal in accordance with today's standards, and remove flow from relief wells and underseepage waters within the project area. The proposed final repairs would eliminate the need to flood the six interior ponding areas as a means of controlling underseepage.

1.7 Limits of Scope The scope of this Environmental Assessment is limited geographically to the vicinity of the proposed improvements along the East Canal Levee, as well as the adjacent Chain of Rocks Canal, Mississippi River, and Chouteau/Gabaret Islands. The area of proposed final remedial measures is a relatively narrow strip of land that abuts the land side of the East Canal Levee over the levee's nine-mile length. The physical boundaries of this area are the Chain of Rocks Canal on the west, the Cahokia Diversion Canal on the north, the abandoned levees (sub-levees) on the east, and a U-shaped bulge in the East Canal Levee on the south, immediately downriver of Locks No. 27. Over the canal's length, the width of this area ranges from about 400 feet to 3,500 feet, reflecting the zigzag alinement of the sub-levees with respect to the East Canal Levee.

The area of proposed improvements is located within sections 16, 17, 20, 21, 28, 29, 30, 31, 32 of township 4 north, range 9 west; sections 6 and 7 of township 3 north, range 9 west; and sections 12, 13, 14, and 23 of township 3 north, range 10 west, of the third principal meridian. This area encompasses about 1,825 acres, of which about 1,610 acres are owned by the Federal government as part of the navigation project. Along the east side of the canal, the project area also includes about 150 acres of non-federal lands for which the Corps obtained a flowage easement to pond water in the six ponding areas during high water events. These easement lands include the sub-levees (owned by the Chouteau, Nameoki, and Venice Drainage and Levee District), and privately owned land along these sub-levees. This same area also includes about 65 acres of privately owned lands for which flowage easements were not obtained.

2.0 RECOMMENDED PLAN AND ALTERNATIVES

2.1 Recommended Plan The recommended plan for final remedial measures consists of (see Plates 3-4, 5.1-11.1):

a. Construction of extensions of the existing seepage berm, and filling of low depressions, along the landside of the East Canal Levee. Fill placed in depressions and as berm extensions will add more weight at the ground surface of the affected areas, which will diminish the force of groundwater hydrostatic pressures. Most seepage berm extensions will be 150 feet wide, but others will be wider, with the widest at 400 feet. Most extensions and fills will be 5 feet thick, but in some areas the thickness will range up to 10 feet above existing grade. The quantity of fill needed will be 890,000 cubic yards, and will consist of dredged sand. Areas affected will encompass a total of about 146 acres. About 60 acres of the areas proposed for berms and fills were filled with sand to a lower elevation as part of phase one repairs. Areas to be affected are (from south to north):

Area	Berm Extension or Fill	Acres Affected	Area Filled during Phase one Repairs?
1B	berm ext. - 150 feet wide	5.5	no
2A	berm ext. - 150 feet wide	16.0	yes, but only north half
2B	fill	2.1	yes, but less than 0.5 acre
3A	berm ext. - 230 feet wide	6.3	no
3B	berm ext. - 150 feet wide	14.7	yes
3C	berm ext. - 150 feet wide	14.7	yes
3D	berm ext. - 150 feet wide	11.0	yes
3E	berm ext. - 150 feet wide	1.8	yes
4A	berm ext. - 150 feet wide	4.0	yes
4B	berm ext. - 150 feet wide	5.5	yes
5A	berm ext. - 230 feet wide	7.6	no
5B	berm ext. - 150 feet wide	5.5	no
5D	berm ext. - 400 feet wide	24.8	no
6B	berm ext. - 150 feet wide	2.9	no
6C	berm ext. - 155 feet wide	3.7	no
6D	berm ext. - 160 feet wide	8.3	no
6E	berm ext. - 230 feet wide	11.2	no
		Total 145.6	

Sand needed for berms and fills will be hydraulically dredged from the Mississippi River from sand bars at one or perhaps two sites: the side channel located between Gabaret and Mosenthien Islands (the same as for phase one repairs), and possibly along Duck Island, just downstream of the confluence with the Missouri River. Sand obtained from the side channel will be piped to the construction site across Gabaret Island and the Chain of Rocks Canal.

Dredging there will be conducted in the same manner as for phase one repairs, by creating a series of large, deep holes concentrated in the lower half of the side channel. The dredge pipe that crosses the canal will be submerged and lying on the channel bottom. At Duck Island, a sand bar extending from the upper to the lower ends of the island and along its east side may be dredged.

b. Replacement of topsoil on berm extensions and fills. Sand placed for berm extensions and fills will be covered with about one foot of topsoil for turf reestablishment with material either stripped from in place or from topsoil stockpiles created during phase one repairs. Topsoil replacement will affect about 160 acres. In Area 4B about 14 acres of a borrow area (an old hill of dredge disposal material) created during phase one repairs will be covered with topsoil. Stripped topsoil will be stockpiled landside of proposed berm extensions and fills in a linear berm-like fashion, to act as a containment structure to keep dredged sand and effluent from entering any adjacent wetlands.

c. Installation of 24 new relief wells, and replacement of 20 poorly functioning relief wells, along the toe of the landside seepage berm of the East Canal Levee. This work will permit more seepage water to come up to the ground surface during high water events, thereby relieving hydrostatic pressure on the levee and increasing the factor of safety.

d. Installation of riser extensions on 170 existing relief wells, and 17 reinforced concrete pipe manhole extensions on buried concrete pipe, located in berm extension and fill areas along the toe of the East Canal Levee. These extensions are needed to accommodate the proposed berms and fills.

e. Construction of a new pump station on Chouteau Slough. This new facility will replace the existing CN&V pump station at that location, and will improve local drainage capabilities. It will be capable of pumping 155 cfs against a Mississippi River stage at top of levee.

f. Construction of drainage pipes at eight locations. To improve interior (landlocked) drainage on Federal property, pipes will be installed at five places: in Areas 5B and 5C (through the Interstate 270 and Old Chain of Rocks highway embankments), in Area 6A (through the sub-levee), and in Area 4B (at two locations adjacent to the north end of Chouteau Slough and Stanley Ditch). The other three pipes will be located in Areas 2A (Tri-City area), 3B (at the end of the ditch relocated during phase one repairs that is north of Bauer Road, where a 600-foot extension of the existing 84-inch buried reinforced concrete pipe will be placed), and 3E (at the end of the ditch relocated during phase one repairs that is just south of the existing pump station, where a 300 extension of the 72-inch reinforced concrete pipe will be placed).

g. Construction of slope protection for 4,000 feet of ditch relocated during phase one repairs. In Area 3B, unstable ditch sideslopes on the south and north sides of Bauer Road will be reshaped, and geotextile fabric and 22,000 tons of riprap will be placed on them to prevent sloughing and erosion.

h. Reconstruction of 1,500-foot long segment of existing 24-foot wide asphalt road. In Area 5B, the proposed berm extension is part of this reconstruction. During high water conditions, the road becomes impassable because underseepage water softens its base. To eliminate this condition, the road will be raised about one foot using an eight-inch layer of crushed stone capped with a three-inch layer of asphalt.

i. Relocation of utility poles. Eleven utility poles carrying electric lines will be relocated due to construction of seepage berm extensions and fills.

j. Implementation of wetland mitigation plan. Wetlands lost by phase one and proposed final remedial measures combined will be mitigated by the development of 88 acres of mitigation wetlands. About 18 acres of mitigation wetlands will be developed on existing Corps lands located on the east and west sides of the Chain of Rocks Canal. The remaining 70 acres of mitigation wetlands will be developed on agricultural lands located on Chouteau/Gabaret Islands, and will require the acquisition by the District of private property from willing sellers. Because soils suitable for wetland development on these islands occur in relatively small areas that are scattered, an acquisition of about 155 total acres is anticipated in order to acquire the required 70 acres.

2.2 Other Alternatives Considered The St. Louis District has considered a total of four alternatives for final remedial measures. Three involve varying amounts of seepage berm extensions and fills versus additional relief wells. Alternative 1 consists of 426 additional relief wells, no seepage berm extensions or fills, 20 replacement wells, drainage pipes, no riser extensions on existing relief wells, a 155-cfs pump station, and no wetland mitigation. Alternative 2 includes 280 additional relief wells, 400,000 cubic yards of dredged sand for seepage berms and fills, 20 replacement wells, drainage pipes, 109 riser extensions, a 155-cfs pump station, and no wetland mitigation. Alternative 3, the recommended plan, consists of 24 additional relief wells, 890,000 cubic yards of sand for seepage berm extensions and fills, 20 replacement wells, drainage pipes, 170 riser extensions, a 155-cfs pump station, and wetland mitigation. As Alternative 4, a slurry wall was investigated to eliminate all underseepage during flood events. The slurry wall would accomplish this by forming an impermeable barrier under the levee. The District also considered land-based sources of borrow to be used as fill for construction of seepage berm extensions and fills. If, for example, earthen material were to be borrowed one foot deep from adjacent land, Alternatives 2 and 3 would require 248 acres and 552 acres, respectively, of borrow sites.

3.0 DESCRIPTION OF RESOURCES The following section is an overview of the existing resource conditions in the project area. Additional information on the physical, biological, cultural, and socioeconomic characteristics of the Metro East Area is found in USACE (1981, 1982, 1994*a*).

3.1 Physiography and Topography The site of the proposed final measures is located within the Mississippi River floodplain in the northern American Bottom, and within a landform called the "ridge and swale region" (Yarbrough, 1974:19), the zone of geologically most recent erosion and deposition by the river. Prior to settlement, this landform was characterized

by low swamps and sloughs, and higher natural levees and sand bars. Swales typically consist of unconsolidated silty clays, whereas ridges are made of sands and silts. Examples of this ridge and swale topography lie within the project area.

Low ground extends across most of the project area between the East Canal Levee and the sub-levees; elevations here range from about 405 to 415 feet NGVD. Portions of a ridge extend into the middle and northern potions of this area from the east, and its surface varies from about 420 to 430 feet NGVD. The low portion of this area exhibits ditches, drainage swales, and a remnant of an old side channel (now called Chouteau Slough). Water elevations within these drainageways are maintained at elevations of 408 feet NGVD or lower. The crown of the East Canal Levee (445.0 NGVD) is up to 35 feet higher than the adjacent low area to the east, whereas that of the sub-levees is about five to ten feet higher than adjacent ground. The original ground surface has been raised from one to about five feet at several sites on the east side of the East Canal Levee in the vicinity of the I-270 bridge where dredge material was disposed in the past.

Ground elevations on Chouteau and Gabaret Islands are similar to those on the east side of the canal. Much of the land on these islands is protected from flooding by levee systems consisting of the federal West Canal Levee and private levees in the Chouteau Island and Gabaret Island Drainage and Levee Districts. The private levees extend up to about 425 feet NGVD. Elevations within an operational landfill on Chouteau Island extend up even further.

3.2 Land Use/Land Cover Land use/land cover for the 1,825-acre area on the east side of the canal, and estimates of areal coverage by type, are summarized as follows: industrial park (12 percent, of which a little more than half is grassy), levees (28 percent, including seepage berms), roads (3 percent), agriculture (7 percent), residential (3 percent), golf course (6 percent), natural habitats (41 percent, in various degrees of disturbance). The St. Louis District's interim land use plan for navigation pool 27 (USACE, 1994*b*) addresses all Federal property within the project area. Land use classification of Federal property is allocated to one of five categories: project operations, recreation, multiple resource management - low density recreation, multiple resource management - vegetative management, and environmentally sensitive area. Because the land use plan's management unit boundaries generally correspond with the limits of the ponding areas along the East Canal Levee, land use/land cover is presented in more detail by ponding area or other land parcels, generally from south to north.

East Canal Levee. This parcel of land is allocated for project operations, and includes the levee (with seepage berm on both sides). It extends from the south to the north end of the project area over a distance of about nine miles. The parcel envelops about 540 acres, and is grass covered except for a road on top. Excluded from this parcel as well as the project area is the Tri-City Regional Port District's harbor, which is an inset along the Chain of Rocks Canal immediately upriver of Locks No. 27.

Parcel including Ponding Area 1. This parcel is allocated for recreation, and extends from the U-shaped bulge in the East Canal Levee north to 20th Street. It is called the Melvin Price Support Center Recreation Area in the land use plan. It contains about 125 acres, most of

which have been developed as a golf course by the Granite City Army Depot; some of the base housing also is found in this area. About 7 acres of low depressions in the golf course were filled with dredged sand during phase one repairs, and a 350-foot segment of pipe was also installed within the Support Center.

Ponding Area 2. The land use allocation for this ponding area is project operations. The area extends from 20th Street north to Rock Road. It includes about 120 acres, all of which are within the Tri-City Regional Port District's industrial park. Much of this ponding area has been developed. During phase one repairs, about 3,300 feet of existing ditch was replaced with reinforced concrete pipe, and about 4 acres in and along the new pipe and old ditch were filled with sand.

Ponding Area 3. This ponding area is also allocated for project operations, and extends from Rock Road to the north, past Bauer Road, to a sub-levee just south of the CN&V pump station at the south end of Chouteau Slough. It includes about 270 acres. The reach from Rock Road to Bauer Road is also within the Port District. About 50 acres of industrial development and grassy areas are found south of a east-west railroad spur crossing through the middle of this 120-acre reach. The area north of the track is designated for port expansion, and consists of a 55-acre agricultural field and about 10 acres of disturbed habitats. The 150-acre reach from Bauer Road to the sub-levee consists of open fields and young successional forest in roughly equal proportions. During phase one repairs, segments of new ditch were constructed in the vicinity of Bauer Road (4,800 feet) and the existing CN&V pump station (3,100 feet); two segments of old ditch (950 and 3,900 feet) were replaced with pipe and buried with sand.

Ponding Area 4. Multiple resource management - low density recreation is the land use allocation for this area. It encompasses about 60 acres and extends from the sub-levee just south of the CN&V pump station to the north end of Chouteau Slough. The slough occupies about 15 acres, and the remainder of the area consists of bottomland forest and disturbed areas from phase one repairs, where about 14 acres of low depressions were filled with sand, and a hill of old dredge material was used as a borrow site (about 14 additional acres).

Ponding Area 5. This ponding area extends from the north end of Chouteau Slough to a point north of the Interstate 270 crossing over the canal. Land use allocation is split among two management categories. The reach from the slough to the I-270 bridge is allocated to multiple resource management - vegetative management, and includes about 140 acres of open fields with scattered trees and small fragments of bottomland forest. Within this reach are two small parcels of private property for which the Corps obtained flowage easements; a residence is located on each parcel. The remainder of the ponding area extends north of the I-270 bridge, and includes about 65 acres of open fields that have been planted with small trees of bottomland species. This reach is allocated to multiple resource management - low density recreation, and includes a parking area for visitors. No phase one measures were implemented here.

Ponding area 6. This 275-acre area extends north of the previous ponding area up to the north end of the canal (or tip of Chouteau Island). About 200 acres of this area are allocated to

multiple resource management - vegetative management, and include open field planted with native prairie grasses, and a few small blocks of bottomland forest. The remainder of the area is allocated to the environmentally sensitive area category, and consists of a 75-acre rectangular block of timber called the American Bottoms Environmental Area. No phase one measures were constructed here.

Area 7. This 15-acre area extends north of the previous ponding area up to the Cahokia Diversion Canal. It is allocated to multiple resource management- vegetative management, and includes old field habitat and a 4-acre pond surrounded by a narrow strip of bottomland forest (the location of the old CN&V pump station). Similarly, this area was not affected by any phase one repair measures, nor were any of the other lands that follow.

Flowage Easement Lands, East Side of Canal. Roughly one-third of this 150-acre area consists of the sub-levees, which are vegetated by grass, trees, and brush. Another third or so consists of agricultural land and residences, many of latter being concentrated along the east side of Chouteau Slough along Old Rock Road. Two small parcels of easement lands with residences are located within Ponding Area 5. The remainder of easement lands are located within the Tri-City Regional Port District, and consist of grassy areas with scattered trees and some cropland.

Private Property, East Side of Canal. A narrow rectangular area of private property lies within the project area immediately north of Bauer Road, east of Ponding Area 3, and west of the sub-levees. This 65-acre area is topographically high, and no flowage easement was necessary. About half is residential, and the remainder agricultural.

Chouteau and Gabaret Islands. These two islands abut one another, and encompass about 5,000 acres, of which about 2,400 acres are protected by the Chouteau Island levee system, and about 800 acres by the Gabaret Island levee system. Most of the land protected by levees is agricultural, while some is occupied by inactive and ongoing landfills, natural habitats, and a few old borrow pits. Roughly half the land outside the levee systems is agricultural, and the remainder is natural habitats, most of which are wooded. Interstate 270 crosses Chouteau Island in an east-west fashion. After the 1993 flood, Madison County acquired about 150 acres of FEMA buy-out properties on Chouteau Island. They consist of about six parcels located within the levee system, most of which are north of I-270. Most of the buy-out properties had previously been residential, were cleaned of flood debris and are reverting to natural habitats. About 1,220 acres on the islands are Federal lands acquired for the navigation project. They consist of the grassy West Canal Levee (781 acres), two areas allocated as dredge disposal areas (116 acres), a low water dam recreation area by the Mississippi River (14 acres), and four areas allocated to multiple resource management - vegetative management (308 acres). The dredge disposal sites are natural habitats vegetated by trees, shrubs, and herbaceous growth, but more than half of these areas have been previously disturbed. The vegetative management areas consist almost entirely of natural habitats.

3.3 Hydrology and Hydraulics The East Canal Levee provides 500-year flood protection to the project area and adjacent Metro East. The private levee systems on Chouteau and Gabaret

Islands provide about 15- and 10-year flood protection, respectively. Interior drainage on the east side of the canal is handled by a series of natural drainage ways, ditches, and pump stations. Two pump stations are located at the toe of the East Canal Levee, and interior drainage is pumped into the Chain of Rocks Canal during storm and flood events. The pump station on Chouteau Slough is operated by the Chouteau, Venice, and Nameoki Drainage and Levee District. A second station, located at the south end of the project area and operated by the Mel Price Support Center, pumps interior drainage from Ponding Area 1 and the City of Granite City.

As part of the levee system, a series of relief wells is located along the landside toe of the East Canal Levee. About 191 currently functional wells relieve hydrostatic pressure on this section of the East Canal Levee during flood events by allowing groundwater to flow to the surface, thereby inundating low lying land. The seepage control system within the project area also includes seven interior ponding areas (described in paragraph 1.4 above).

Currently, there is no capability to pump interior drainage from any of the ponding areas except Area 4. During the 1973, 1993, and 1995 floods, the inability to remove seepage from Ponding Areas 2, 3, 5, and 6 incurred costs and/or damages to many of the Tri-City Regional Port District businesses as well as private land owners because of the long duration these areas were covered by deep ponded water. Under low stage conditions on the Mississippi River, interior drainage flows south through the drainage ditch along the East Canal Levee by gravity to the Mel Price Support Center, where it is discharged into the Chain of Rocks Canal below Lock No. 27 through a 48-inch gravity outlet. Under high stage conditions, interior drainage from Ponding Areas 2, 3, 5, and 6 is stored until low stages on the Mississippi return, and gravity drainage is restored. Also, interior drainage on Federal property in Ponding Areas 5 and 6 has no direct access to Chouteau Slough or the drainage ditch that begins south of the slough.

As explained in paragraph 1.2, the construction of the navigation canal disrupted the local levee systems in that area, including the Chouteau, Nameoki, and Venice Drainage and Levee District. Part of the navigation project was to build a new pump station, ditching and drainage structures to allow CN&V to continue to provide adequate drainage to the district. The CN&V district drains about 4,500 acres. When the existing pump station was built, the drainage area was almost entirely agricultural, but currently, considerable development has occurred, especially near I-270 and Illinois Highway 3. The area drains into a remnant of Long Lake and Stanley Ditch. Stanley Ditch then drains into Chouteau Slough which is adjacent to the East Canal Levee. The CN&V pump station is located at Chouteau Slough. The existing pump station has three pumping units, with a total low head capacity of 75 cfs (11,300 gpm/unit) and a total high head capacity of 50 cfs (7,500 gpm/unit). The pump station was designed to operate between elevation 405.0 and 410.0 feet NGVD. The natural storage in the CN&V drainage area was taken into account in the design of the existing pump station. The CN&V levee commissioner has indicated that development in the district has increased runoff and may have reduced ponding storage.

3.4 Groundwater and Water Quality Depth to groundwater within the project area is

governed by the elevation of the water surface in the adjacent Chain of Rocks Canal, which normally lies at 400 feet NGVD. Conditions of perched groundwater occur in the project area where layers of clays overlie sands and silts, and in the vicinity of interior drainageways, such as Chouteau Slough, which is maintained between 405 and 410 feet NGVD. Recent data describing quality of surface waters within the project area, such as Chouteau Slough and surrounding ditches, are not available. However, because the surrounding watershed is intensively developed for agriculture and also supports substantial residential and commercial/industrial development, water quality parameters would be expected to reflect this type of land use.

3.5 Socioeconomic Resources Other than the navigation project, the project area includes significant socioeconomic resources. The Melvin Price Support Center envelops 125 acres at the south end of the project area. The 300 acres to the north of the Center are developed by the Tri-City Regional Port District as an industrial park. The park is immediately adjacent to a harbor built as an inset along the Chain of Rocks Canal, and provides access to barge, rail, and highway transportation. Bulk liquid products and bulk dry materials are stored and transferred at the port. About 50 residences are within or immediately adjacent to the project area on the east side of the canal. They are concentrated north of the industrial park and south of the I-270 bridge crossing over the canal. Roads that provide access to the project area are secondary, and are either maintained by the Corps or local townships. Utilities that pass through the project area on the east side of the canal include two electric lines, two pipelines, three gaslines, one waterline, a sanitary sewerline, and a telephone cable. Several thousand acres of farmland are located on Chouteau and Gabaret Islands, and an active landfill is found on Chouteau Island.

3.6 Soils and Prime Farmland About 55 acres leased by the Corps to Tri-City Regional Port District for future expansion are in rowcrops. Most of the 150 acres of private land within the project area is farmed. Within the project area on the east side of the canal, there is a complex mosaic of about 15 different kinds of soils (USDA-SCS, 1986). The names of these soils are grouped here according to the type of prime farmland status they have been assigned (USDA-SCS, 1991). All soils found on Chouteau and Gabaret Islands are also found on the east side of the canal, but on the islands (both within and outside the levee systems), they are classified as “frequently flooded” (USDA-SCS, 1986).

Prime soils not requiring any improvements with regard to drainage or flood protection (with mapping unit symbol in parentheses) include Tice silt loam, rarely flooded (284), Landes very fine sandy loam (304B), Raddle silt loam (430A), and Riley clay loam (452A).

Soils that are prime where drained include Beaucoup silty clay loam, occasionally flooded (70), Darwin silty clay, occasionally flooded (71), and Nameoki silty clay loam (592A).

Soils that are prime where protected from flooding, or flooding occurs less often than once in two years during the growing season, include Sarpy variant loamy fine sand (6092B) and Landes variant very fine sandy loam (6304A).

Soils that are prime where drained, and either protected from flooding or flooding occurs less often than once in two years during the growing season, include McFain silty clay (248), Wakeland silt loam (333), Beaucoup silty clay loam, frequently flooded (3070), and Darwin silty clay, frequently flooded (3071).

Soils that are never considered prime include loamy Orthents (802B and 802E), Beaucoup silty clay loam, wet (1070), Darwin-Urban land complex (2071), Nameoki-Urban land complex (2592A), and Nameoki silty clay loam, frequently flooded (3592A). The last soil is considered important.

The project area is protected from Mississippi River flooding by the East Canal Levee. Interior flooding is minimal because most drainage entering the project area arrives through Stanley Ditch, which flows into Chouteau Slough; water elevations in the slough are maintained by the CN&V pump station below 408 feet NGVD, and there is little adjacent land below this elevation. No subsurface or surface drainage systems exist on Corps lands within the project area for the purpose of draining land for agricultural production. The ditch along the East Canal Levee that extends from the CN&V pump station south through the industrial park is the only surface feature capable of draining adjacent soils. Therefore, soils that are prime within the project area include Tice (284), Landes (304B), Raddle (430A), Riley (452A), Sarpy Variant (6092B), and Landes Variant (6304A). The Beaucoup (70), Darwin (71), McFain (248) and Wakeland (333) soils are prime only where they are drained. On Chouteau and Gabaret Islands, the private levee systems protect the soils there from frequent river flooding, and the Beaucoup (3070) and Darwin (3071) soils are also prime where drained.

The extent of each of these 15 soil mapping units on Corps lands east of the Chain of Rocks Canal has not been computed, but relative abundances of a similar group of 16 soil types have been calculated for 3,100 acres of Federal lands along both sides of the canal: Orthents (802E) - 48 percent; Tice (284) - 8 percent; Beaucoup (3070) - 7 percent; Darwin (3071) and Sarpy Variant (3092B) - each 6 percent; Nameoki (592A) and Orthents (802B) - each 5 percent; Nameoki (3592A) and Sarpy Variant (6092B) - each 4 percent; McFain (248) and Riley (452A) - each 3 percent; Landes (304B) - 1 percent; Beaucoup (70), Darwin (71), Raddle (430A), and Landes Variant (6304A) - all less than 1 percent (USACE, undated).

3.7 Biological Resources Emerson and Johannessen's (1984) large scale map of nineteenth century vegetation zones of the northern American Bottom shows bottomland forest over the entire project area east of the canal, except for the narrow river edge zone along the old Chouteau Slough or side channel, which was dominated by willow trees (White et al, 1984). Wet bottomland prairie dominated much of the Bottom to the east of the project area. On a finer scale, many of the soils occurring within the project area are classified as mollisols (USDA-SCS, 1986) that generally developed over time under grass or a mixture of grass and trees (which means historical bottomland prairie). However, the occurrence of nineteenth century prairie in the Bottom was associated with broad expanses of Darwin silty clay, which are not found within the project area but occur to the east. The complex mosaic of soils within the project area is reflective of the historically active channel belt, and was most likely

vegetated by bottomland forest (Lopinot, 1996).

Terrestrial and Aquatic Habitats. The biological resources present within the project area have been affected to varying degrees by past activities, including the navigation project as well as agricultural, commercial, industrial, and residential development. No biological resources are present within the southernmost 300 acres on the east side of the canal (the 125-acre parcel around Ponding Area 1, the 120-acre Ponding Area 2, and a 50-acre portion of Ponding Area 3 south of the east-west railroad spur), according to the District's natural resource inventory of Federal lands (USACE, undated).

On the east side of the canal, the inventory describes about 680 acres of terrestrial, aquatic, and wetland habitats that are found in the remainder of the project area. About 650 acres support terrestrial habitats, which include about 190 acres of forested and 460 acres of open habitats. Wetlands, here considered a subset of terrestrial habitats, include about 325 acres. Aquatic habitats envelop about 30 acres, and include Chouteau Slough and less than 10 acres of ditch along the East Canal Levee. Management plans have been developed by the St. Louis District to preserve, protect, and restore terrestrial, aquatic, and wetland resources on Federal lands within the project area (USACE, undated).

In Ponding Area 3, rowcrops are planted in the 55-acre agricultural field located between the east-west railroad spur and Bauer Road. A 30-acre triangular parcel, also within Ponding Area 3 and immediately north of Bauer Road, was farmed up to about 1990, and has since been restored to natural vegetation consisting of a variety of grasses and herbaceous species. A segment of realigned ditch was cut through the 55- and 30-acre parcels during phase one repairs. In a 40-acre tract at the north end of Ponding Area 3, there is about 13 acres of forest consisting of cottonwood and bur oak in the canopy, and hackberry, elm, and bur oak in the understory. About 27 acres are an old agricultural field that now supports a stand of small mulberry and dogwood trees, and an open area of grasses and herbaceous species. During phase one repairs, a segment of realigned ditch was also constructed through the 40-acre area.

About 20 acres within Ponding Area 4 are forested. About fifteen acres of forest occupying an old dredge disposal site that supported such dominant tree species as osage orange, elm, hackberry, and cottonwood, was removed during phase one repairs. The remaining forested area consists of cottonwood, sycamore, and silver maple as dominants in the canopy, and elm, hackberry, and hickory in the intermediate and understory layers (USACE, 1992*b*). Aquatic habitat here is represented by the 15-acre remnant of the old Chouteau Island side channel, now isolated from the Mississippi River by the East Canal Levee.

Ponding Area 5 includes about 50 acres of bottomland forest; tree species include cottonwood, silver maple, willow, elm, and sycamore (USACE, 1992*b*). There are about 80 acres of old agricultural fields recently restored to wet prairie and bottomland forest, and about 30 acres of dredge disposal sites planted with switchgrass.

Ponding Area 6 is the most important potion of the project area in terms of biological resources. The area is relatively large, and supports about 95 acres of bottomland forest. A

75-acre timbered tract has been designated as an ecologically sensitive area because it is one of the most representative remnants of presettlement bottomland forest in this highly developed region. Tree species here include green ash, hackberry, willow, pin oak, mulberry, elm, cottonwood, shingle oak, and eastern red cedar (USACE, 1992*b*). About 140 acres of previously farmed land has been restored to wet prairie and bottomland hardwoods since the early 1990s. About 15 acres of dredge disposal areas have been planted with switchgrass, and about 25 acres along utility easement rights of way are in various stages of succession.

Area 7 consists of about eight acres of successional habitat, and a 4-acre shallow pond surrounded by about three acres of bottomland forest.

During the flood of 1995, interior drainage that ponded in Ponding Areas 3, 5 and 6 could not be removed until after a relatively long period of time. This standing water caused the death of some trees in these areas. Standing water conditions in these same areas can also develop during nonflood conditions because of the absence of drainage structures (culverts) that could remove excess drainage.

On Chouteau and Gabaret Islands, most biological resources are found outside the private levee systems, and much of these natural areas are on Corps property. Habitat types include bottomland forest, old sloughs, old fields, scour holes created during levee breaches, and borrow pits. The flood of 1993 inflicted notable mortality upon trees on these islands, especially cottonwoods. The Chain of Rocks Canal is not considered suitable habitat for many species, but the adjacent Mississippi River consists of main channel, main channel border, and side channel aquatic habitats.

Wetland Habitats. About 325 acres of wetlands subject to Section 404 of the Clean Water Act exist on Corps lands in Ponding Areas 3, 4, 5, 6, and Area 7 on the east side of the canal. These areas are included in the description of terrestrial habitats, but receive a separate discussion here. McFain silty clay and Beaucoup silty clay loam underlie these wetlands, with McFain being most common. About 130 acres of these wetlands are forested, whereas the remainder are herbaceous, and can be described as either wet prairie, wet meadow, shallow marsh, emergent, or farmed wetland. Wetlands in Ponding Areas 3 and 4 from Bauer Road to the north end of Chouteau Slough are degraded by unauthorized all terrain vehicle use and occasional fires.

Ponding Area 3 includes about 6 acres of farmed wetland within the 55-acre agricultural field (about 0.8 acre was lost during ditch relocation work during phase one repairs), and about 14 acres of wet meadow/shallow marsh to the immediate north of Bauer Road (about 3 acres was also lost due to the ditch work). In the 40-acre tract at the north end of this ponding area, there are about 17 acres of wet meadow consisting of sedges and other herbaceous species, and six acres of forested wetland dominated by cottonwood and dogwood (about 2.5 acres of herbaceous and 2 acres of forested wetlands were lost in this area during phase one construction). In Ponding Area 4, about 1 acre of forested wetland dominated by small dogwoods was lost during phase one repairs. In Ponding Area 5, there are about 5 acres of forested wetland just north of Chouteau Slough (they lie in the location of the old side

channel), and about 14 acres of forested wetland north of I-270 adjacent to the Corps parking lot (these wetlands also lie in the location of the old side channel). About 23 acres of the agricultural fields restored by natural succession in Ponding Area 5 are also wetland. Ponding Area 6 consists of about 95 acres of forested wetlands, and about 130 acres of wet meadows and shallow marshes established by natural succession and some prairie plantings. Area 7 includes about four acres of emergent wetland and three acres of forested wetland.

During implementation of phase one remedial measures (August 1996-April 1997), groundwater monitoring wells were installed and monitored at five transects located in wetlands adjacent to the two realined ditch segments. Each transect was placed perpendicular to the new ditch to determine if the assumption made in the April 1996 EA that wetlands in McFain soils were drained laterally up to 150 feet from top of bank was valid. Monitoring before, during, and after ditch construction did not detect any changes in groundwater elevations in wells located at top of bank, or 30, 55, 80, and 150 away from top of bank. Therefore, the assumption that indirect losses to wetlands occurred through lateral drainage was shown to be incorrect, and only direct losses or "footprints" of features in wetlands were counted as adverse impacts.

Flora and Fauna. No comprehensive survey of plants and animals inhabiting Federal lands within the project area exists. Plants are described in general terms in the discussion of terrestrial habitats. Notable wildlife include white-tailed deer, turkey, rabbit, resident and migratory waterfowl, and a variety of nongame mammals, birds, reptiles and amphibians that are typical of floodplain habitats. Wetlands within Ponding Areas 4, 5, and 6, particularly forested ones, are used by waterfowl as migratory or brood habitat. Neotropical migratory land birds nesting in bottomland forest probably use the majority of forest remnants to some degree during migration, but only the larger tracts in Ponding Area 6 would be expected to offer suitable nesting habitat for some species, such as the northern parula warbler and prothonotary warbler. Habitat value of some wetlands close to private residences has been limited because of periodic unauthorized all-terrain vehicle use, burning, and illegal hunting (USACE, undated).

Illinois state endangered or threatened species that are known from Madison County from recent sightings or specimens include one invertebrate, 12 vertebrates, and four plants (IDNR, 1996). One of these species, the decurrent false aster, is also Federally threatened, and is discussed in the biological assessment for Federally listed species under Part 5.0.

Classification	Common Name (Scientific Name)	Habitat Used: with Details
Mussels		
Threatened	Butterfly mussel (Ellipsaria lineolata)	Aquatic: sand or gravel substrates of large rivers, especially in bars in current
Fish		

Endangered	Lake sturgeon (Acipenser fulvescens)	Aquatic: bottoms of lakes and large rivers, usually in water 4-9m deep
Reptiles and Amphibians		
Threatened	Timber rattlesnake (Crotalus horridus)	Primary, forest: forested areas with bluffs and rock outcrops, upland forests or crop fields
Endangered	Eastern massasauga (Sistrurus catenatus)	Prairie, forest, wetland: wet prairies, bogs, swamps and rarely dry woodlands
Threatened	Illinois chorus frog (Pseudacris streckeri illinoensis)	Prairie, wetland: open sandy areas of river lowlands
Birds		
Threatened	Great egret (Casmerodius albus)	Wetland, forest, aquatic: rookeries are in floodplain forests, foraging occurs in floodplain lagoons of major rivers
Endangered	Little blue heron (Egretta caerulea)	Wetland, forest: stands of young trees forming dense thickets
Endangered	Snowy egret (Egretta thula)	Wetland, forest: lowland thickets or forests
Threatened	Common moorhen (Gallinula chloropus)	Wetland, aquatic: freshwater marshes, canals, quiet rivers, lakes and ponds with emergent aquatic vegetation
Endangered	Least bittern (Ixobrychus exilis)	Wetland: shallow freshwater lakes and marshes
Endangered	Black crowned night heron (Nycticorax)	Wetland, forest, aquatic: bottomland forest
Threatened	Pied billed grebe (Podilymbus podiceps)	Wetland, aquatic: fairly large, well vegetated lakes, ponds, sluggish streams, marshes
Endangered	Yellow-headed blackbird (Xanthocephalus)	Wetland: moderately dense stands of cattails and bulrushes with interspersed open water for nesting
Plants		
Endangered	Royal catchfly (Silene regia)	Prairie, savanna: dry-mesic barrens, prairies, loess hill prairie
Endangered	Spring ladies' tresses (Spiranthes vernalis)	Prairie: acidic soils, prairies, old fields
Endangered	Prairie spiderwort (Tradescantia bracteata)	Prairie: dry-mesic silt & sand prairies

Some of these state listed species can be eliminated from consideration as occurring within the project area because suitable habitat currently does not exist. These include the three plant species adapted to prairies. Although wet bottomland prairie existed historically in close

proximity to the project area, this plant community most likely was not a component of the early nineteenth century vegetation occurring here (see beginning of discussion under biological resources). Wet prairie habitat existing at the present time was created since about 1990 from previously farmed land. The timber rattlesnake can be eliminated because of its preference for bluff and upland habitats. Suitable habitat for the two aquatic species (butterfly mussel and lake sturgeon) is not found within the project area, but the Mississippi River does provide habitat for them.

Chouteau Slough and surrounding forested wetlands probably provide suitable feeding habitat for the great egret, little blue heron, snowy egret, and black crowned night heron, but these four species usually nest in colonies (Bohlen, 1989), which are not found in the project area. The existence of the common moorhen, least bittern, and pied billed grebe within the project area is less certain, as they are uncommon residents in southern Illinois, although the moorhen has been known to nest in marshes in the East St. Louis area (Bohlen, 1989). Bohlen (1989) also states that the yellow-headed blackbird nests only in northern Illinois, and is a rare migrant across the state.

The eastern massasauga and Illinois chorus frog are not known from the project area (Cannon, 1996); the latter species would not be expected to inhabit sandy spots within the project area that were created by past dredge disposal operations.

3.8 Recreation That portion of the project area north of the industrial park receives recreational use from hikers and local traffic. A Corps parking lot is located north of the I-270 bridge in Ponding Area 5. No additional recreational facilities are presently planned (USACE, undated). Chouteau Slough probably is used for recreational fishing. At the south end of the project area, the Melvin Price Support Center includes a golf course, and there is a visitor center at Locks No. 27.

3.9 Historical Properties The number of prehistoric and historic cultural properties located in the vicinity of the east side of the Chain of Rocks Canal is not known because the area has not been completely surveyed. However, during the summer of 1981, a contractor surveyed a portion of the area then being considered for development by the District's St. Louis Harbor Study (USACE, 1982). Although the entire project tract identified in the harbor study was 1,500 acres in extent, the archaeological contractor examined only 250 acres. Five quadrants of about 50 acres each were selected for visual surface examination by pedestrian transect. The selection of the survey quadrants was based on geomorphic and topographic factors, with the goal being the representation of as many different land forms as possible.

The boundaries of the entire project tract for the harbor study were defined as the east bank of the Chain of Rocks Canal on the west, the east-west railroad spur north of Tri-City Regional Port District on the south, the road to the old Chain of Rocks Bridge on the north, and the Illinois Terminal railroad line on the east. While the present plans to control underseepage along the Chain of Rocks East Canal Levee will undoubtedly impact a much smaller area, the findings of the archaeological survey that was conducted within the larger St. Louis Harbor development tract are instructive and useful for the purposes of this assessment.

The 250-acre survey located six prehistoric sites probably dating to Late Woodland to Early Mississippian times (about A.D. 300 to A.D. 1000). The contractor recommended additional testing for all six sites, and considered all six potentially eligible for the National Register of Historic Places. Conducted under the same contract as the field survey was a literature search for historic sites. This search identified five extant cemeteries, monuments, or historic structures thought to be eligible for the National Register. Documents also revealed that an additional 24 historic house or building foundations should be located within the delineated 1,500 acre tract.

Based on the prehistoric site survey data, the contractor extrapolated that a total of 51 buried prehistoric sites probably exist within the 1,500-acre tract. Other estimates based on soil types or survey data from a large highway construction project suggest the possible existence of between 35 to 67 sites. The 51 buried archaeological sites estimated to exist based on the 1981 contractor's survey are all potentially eligible for the National Register of Historic Places.

3.10 Aesthetic Resources Because of its semi-rural location, the overall aesthetic quality of the project area is probably favorable to those people living in residential areas within or adjacent to the project area. The undeveloped natural habitats probably are particularly attractive to these residents as well as the visiting public, but the industrial park at the project area's southern end would not be expected to be so. Aesthetic aquatic resources include the natural channel of the Mississippi River. Other aesthetically unpleasant aspects would include littering and illegal dumping of trash, all terrain vehicle use, and vandalism on Federal property.

3.11 Air Quality The Illinois Environmental Protection Agency monitors air quality at numerous stations across the state for a variety of pollutants, including particulate matter, sulfur dioxide, ozone, carbon monoxide, lead, and nitrogen dioxide. The level or concentration of these five pollutants on a day to day basis is combined into a single number or index, called the pollutant standards index, which when reported to the public is described in easily understood terms (good, moderate, unhealthful, very unhealthful, hazardous). In 1994 and 1995, the agency's Metro East Sector, which includes Madison County, had the poorest overall air quality of eleven metropolitan areas with populations greater than 200,000 in the state (IEPA, 1995, 1996). Air quality in this sector was "good" about 50 percent of the time, "moderate" about 48 percent of the time, and "unhealthful" about two percent of the year. Ozone advisories were issued for two days in summer 1994, and four days in summer 1995 for the Metro-East area.

4.0 ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION Implementation of remedial measures to control underseepage will occur in two phases. The first phase began in August 1996, and was completed in April 1997. The final phase is the proposed recommended plan (as described in section 2.1.b), and construction is scheduled to start in late 1999, and extend through most of 2002.

4.1 Physiography and Topography Minor changes to local topography will be made along

the existing landside toe of the East Canal Levee in association with construction of the seepage berm extensions. These extensions will cover a total of about 146 acres, or about 8 percent of the project area on the east side of the canal. Existing ground elevations will be raised from about five to 10 feet, depending on location. Width of existing seepage berms will be extended an additional 150 to 400 feet, depending on location. The extensions will have 1 vertical on 50 horizontal slopes, and will gently meet with existing ground surfaces.

4.2 Land Use/Land Cover The recommended plan is not expected to alter any industrial or residential land use within the project area. The berm extension at the golf course will be revegetated with a grassy cover like the rest of the course. The 146 acres of additional seepage berms will constitute an increase in new levee areas along the canal by about eleven percent. Agricultural activities in the 55-acre Tri-City expansion area will not be affected by seepage berm extensions. Construction of berm extensions and fills will cause the loss of about 64 acres of natural habitats (phase one measures such as ditch relocations and fills lead to the loss of about 25 acres of natural habitats).

4.3 Hydrology and Hydraulics Interior drainage during low stages will continue to gravity flow south to the Mel Price Support Center. The proposed culverts will provide the ability to remove excess drainage in Ponding Areas 5 and 6. The 24 additional relief wells will increase the volume of seepage water during high stage events. During high stages, the proposed pump station will handle interior drainage from Ponding Areas 2, 3, and 7 in addition to Ponding Area 4, which includes the 4,500-acre drainage area to the north and east of the project area. This pump station will be capable of pumping 115 cfs against a Mississippi River stage at top of levee. With the new seepage berms and improvements to ditches and relief wells, it will not be mandatory to maintain seepage water in the various ponding areas in order to control underseepage.

4.4 Groundwater and Water Quality The St. Louis District received Section 401 water quality certifications from the Illinois Environmental Protection Agency and Missouri Department of Natural Resources in August and September 1996 for the phase one and final measures combined. The final measures proposed at the present time do not differ substantially from those approved in these certifications, such that additional authorizations under Section 401 should not be necessary. The IEPA's National Pollutant Discharge Elimination System (NPDES) permit program also regulates storm water discharges from construction sites having ground disturbance greater than five acres. Because more than five acres will be disturbed by clearing and grubbing for the proposed final measures, the St. Louis District will apply for and receive an NPDES storm water permit for the proposed project before any land disturbances begin. Dredge effluent will be detained onsite until turbidity levels drop back down to ambient river levels, and then the effluent will be pumped back into the canal. Quality of surface waters is not expected to be impaired provided that the mandated protective measures are implemented for all construction work. Groundwater is not expected to affected.

4.5 Socioeconomic Resources The increase in the East Canal Levee's integrity afforded by the recommended plan will greatly benefit all socioeconomic resources of the project area as

well as of the entire Metro East. Because ponding will no longer be a mandatory measure for underseepage control during high stage events, businesses in the industrial park within Ponding Areas 2 and 3 will not be subject to any future flooding from stored seepage water. Certain segments of the road on top of the East Canal Levee may have to be closed temporarily during the construction process. No significant impacts to the growth of any adjacent communities or of the region are expected occur as a result of the project. A minor increase in business would be noticed in adjacent communities during the construction process. This increase would be due to purchases made for construction, as well as purchases made by construction workers for living expenses. Eleven utility poles will need to be relocated due to phase one and proposed final measures combined. The recommended plan will require the acquisition of about 155 acres of private property for development of wetland mitigation. This acquisition is proposed for Chouteau/Gabaret Islands from willing sellers.

4.6 Soils and Prime Farmland Soil types affected by the proposed construction of 146 acres of seepage berms are: Orthents (802B, 802E) - 100 acres; Beaucoup (1070) - 18 acres; Nameoki (592A) - 16 acres; McFain (248) - 6 acres; Landes Variant (6304A) - 3 acres; and Sarpy Variant (6092B) - 3 acres. The area of Nameoki soils to be affected is not drained, and therefore not considered prime. About one foot of topsoil will be stripped from all areas proposed for seepage berm extensions, stockpiled, and then replaced after the extensions are in place to provide a planting medium for turf. The use of these areas as seepage berm extensions and the proposed turf reclamation will cause the conversion of the 46 acres of non-Orthents soils to nonagricultural use.

The proposed development of 18 acres of mitigation wetlands on existing Corps lands will affect: Beaucoup (70) - 3 acres; Darwin (3071) - 3 acres; Nameoki (3592A) - 3 acres, and Sarpy Variant (6092B) - 9 acres. None of these areas are drained. The 70 additional acres of mitigation wetlands on Chouteau/Gabaret Islands that require the purchase of agricultural lands from willing sellers will also be converted to nonagricultural use. Soils suitable for wetland development on the islands include Beaucoup (3070), Darwin (3071), and presumably Nameoki (3592A). Although a total of about 155 acres are anticipated for acquisition, the areas not used for wetland development will not be converted to nonagricultural use. Proposed final remedial measures will convert 134 acres to nonagricultural use (46 acres berms, 88 acres wetland mitigation).

During phase one repairs, soils were also affected. Those affected by filling of depressions include: Orthents (802B, 802E) - 54 acres; and Riley (452A) - 14 acres. The area of Riley was filled with sand to fill a depression, and it and the 54 acres of orthents are included in the area of orthents described above to be affected by proposed seepage berms (68 of 100 acres). Construction of the two ditch realinements affected: McFain (248) - 8 acres; Orthents (802B) - 2 acres; Tice (284) and Landes (304B) - 1 acre each; and Riley (452A), Orthents (802E), and Sarpy Variant (6092B) - 0.5 acre each. Conversions to nonagricultural use from phase one measures included 27 acres. With respect to phase one and proposed final measures combined, there will be 161 acres of lands converted to nonagricultural use (134 final, 27 phase one).

Proposed final remedial measures (including only mitigation on existing Corps lands) will

result in the loss of 15 acres of soils classified as prime farmland: Sarpy Variant (6092B) - 12 acres; and Landes Variant (6304A) - 3 acres. Phase one measures led to the loss of 17 acres of prime farmlands: Riley (452A) - 14 acres; Tice (284) and Landes (304B) - one acre each; and Riley (452A) and Sarpy Variant (6092B) - 0.5 acre each. Assuming half the soils comprising the 70 acres of private lands to be acquired are drained Beaucoup (3070) and Darwin (3071) soils, then total losses of prime farmlands due to the overall project would be 67 acres.

4.7 Biological Resources Aquatic, Wetland, and Terrestrial Habitats. In terms of aquatic habitats, Chouteau Slough will not be affected by any of the proposed measures. Dredging of sand from the side channel between Gabaret and Mosenthien Islands will create a series of deep holes that will provide habitat diversity to a variety of riverine fishes. Modifications to the drainage ditch that extends from Chouteau Slough south to 20th Street in the industrial park will not affect any significant biological resources. A description of changes to terrestrial and wetland habitats from south to north follows.

No impacts to natural terrestrial habitats, including wetlands, will occur in Ponding Areas 1 through 3 (from the Mel Price Support Center up to and including the area adjacent to Chouteau Sough). Just north of Chouteau Slough, about five acres of forested wetland (abandoned side channel) will be filled to construct seepage berm extensions; an additional 2 acres of grassy areas will be filled. In the vicinity of the Chain of Rocks Road, proposed berm extensions to raise two segments of existing road will not affect any wetlands, but will eliminate about 3 acres of old field habitat and some scattered trees. Just north of I-270, about 9 acres of forested wetlands (abandoned side channel) will also be filled; about 16 acres of nonwetland grassy habitat will also be filled there. In Ponding Area 6, proposed seepage berm extensions will be constructed in wetlands, and will eliminate nearly 11 acres of herbaceous wetlands and 3 acres of forested wetlands. In Ponding Area 7, a few additional relief wells will be installed to avoid filling over one acre of forested wetlands. About one acre of bottomland (nonwetland) forest adjacent to the forested wetland will be eliminated to construct a small area of seepage berm extension.

During the construction of proposed seepage berm extensions, dredged sand and dredge effluent will be prevented from migrating into adjacent wetlands because a long, linear earthen berm consisting of stripped topsoil will have been constructed at the far limit of the berm, and will act as a physical barrier. In addition, the new pump station will allow for interior drainage that is stored temporarily in Ponding Areas 3, 5 and 6 to be removed more quickly, thus avoiding the potential for tree mortality caused by standing water. The proposed culverts will allow for the gravity-flow of excess drainage from Ponding Areas 5 and 6, but should not lead to the removal of wetland hydrology in adjacent forested and herbaceous wetlands.

To summarize, proposed final remedial measures will cause the direct loss of 28 acres of wetlands (17 forested, 11 herbaceous). Wetland losses that occurred during construction of phase one remedial measures include 10 acres (3 forested, 7 herbaceous). Overall wetland losses are therefore 38 acres (20 forested, 17 herbaceous). In terms of overall habitat changes, proposed final repairs will eliminate about 64 acres of terrestrial natural habitats (18 acres forest, 46 acres open habitats) and convert them to grassy turf. Restoration of the old bypassed

ditch segments will create about 12 acres of new grassy turf.

Proposed Wetland Mitigation. The St. Louis District has developed a wetland mitigation plan to offset the 38 acres of wetland losses. New forested wetlands will be created at the ratio of 3 to 1, and herbaceous wetlands at the ratio of 1.5 to 1. Mitigation for phase one and final repairs will consist of the development of 88 acres of mitigation wetlands (61 forested, 27 herbaceous). Mitigation will be accomplished to a minor degree on existing Corps lands. It is proposed that the balance of needed mitigation be implemented by acquisition of private agricultural lands from willing sellers on Chouteau/Gabaret Islands, and construction of mitigation wetlands on these lands. With inclusion of this mitigation, impacts to wetlands will not be significant.

Forested Slough Wetlands. Construction of forested slough habitat will take place on the islands. Three acres will be located on existing Corps property at the south end of Gabaret Island, and the other 40 acres will occur on private property. Creation of 43 acres of slough habitat will require the excavation of a depression about 200-300 feet wide by about 4 feet deep in areas of underlying clays, such as the Nameoki silty clay loam. Excavated material will be available for construction of seepage berm extensions. Reforestation of these excavated areas will involve either natural succession by tree species such as cottonwood, willow, and silver maple, or the planting of 2-gallon containerized seedling trees at a minimum 20-foot spacing (109 trees per acre).

Other Forested Wetlands. The other 18 acres of forested wetlands (without slough topography) will be located on both sides of the canal. On the east side, three acres will be sited on Corps property in a small watershed in Area 5B. The other 15 acres will located on private lands on the west side of the canal in poorly drained or somewhat poorly drained soils. The construction of low berms or shallow depressions to pond surface water may be required on somewhat poorly drained soils. These areas will be planted with 2-gallon containerized seedling trees on a 20-foot spacing using species such as pin oak, bur oak, swamp white oak, and green ash.

Herbaceous Wetlands. Twelve of these 27 acres of wetlands will be located on existing Corps lands. Nine acres will be created on the east side in Area 5A by excavation of nonwetlands down to the elevation of adjacent herbaceous wetlands and addition of an impermeable layer. Three acres will be established on the west side of the canal on Corps property at the lower end of Gabaret Island. The other 15 acres will be located on private property on the islands on poorly drained or somewhat poorly drained soils. Revegetation of these areas will involve natural succession. Natural succession was used successfully by the District's Rivers Project Office in Area 6 as a means of reestablishing wetland vegetation.

Wetland Mitigation Acquisition. Seventy acres of private property on the islands will be needed for construction of wetlands. Because of the ridge and swale topography there (poorly permeable soils in the swales, well drained soils on the ridges, somewhat poorly drained soils at intermediate elevations), suitable sites are not located in large blocks, but rather in long linear areas that are scattered. It is estimated that 10 percent of existing

agricultural lands consists of poorly permeable soils (that support existing wetlands, farmed wetlands, or prior converted areas), 50 percent consists of well drained soils, and 40 percent consists of somewhat poorly drained soils, such as the Nameoki silty clay loam. Assuming 45 percent of existing soils are suitable for wetland development, then a total of 155 acres of private agricultural lands will need to be acquired to provide the 70 acres of mitigation. The District considered the use of FEMA buy out properties on Chouteau Island for mitigation, but these areas do not appear to be suitable for wetland development.

Flora and Fauna. Loss of the 5-acre and 9-acre forested wetlands (in the vicinity of the I-270 bridge to seepage berm extensions) represents loss of migratory and brood habitat for waterfowl, and migratory habitat for neotropical migratory land birds. These birds as well as a variety of other wildlife expected to use these forested wetlands will be either displaced to adjacent habitats, or destroyed if unable to flee. It is unlikely that the proposed work will physically harm the great egret, little blue heron, snowy egret, or black-crowned night heron, although the overall loss of 20 acres of forested wetlands may represent a loss of potential feeding habitat (which is present elsewhere in the project area). The butterfly mussel and lake sturgeon will not be affected by the proposed dredging of sand from the Mississippi River.

4.8 Recreation There will be no significant impacts to recreation. Federal property designated for low intensity recreation will still be available for that use. The Corps access area located just north of the I-270 bridge is in the middle of a 25-acre seepage berm extension. The existing parking lot will be replaced after construction of the extension is completed.

4.9 Historical Properties Phase 1 field surveys for cultural, historic, and prehistoric properties were conducted in 1981 and 1985 and resulted in the identification of approximately 50 historic and prehistoric sites. Although none of these sites have been listed on the National Register of Historic Places, many have not yet been formally evaluated for significance. However, the proposed final remedial measures will not impact any known, potentially NR eligible sites. In addition, most of the proposed final measures, such as replacement of existing relief wells and installation of new ones, will occur within areas that have been impacted by previous construction.

Also, some of the proposed seepage berm extensions are located in areas that are considered wetlands or contain standing water. During any normal Phase I survey for archaeological sites or historic resources, areas of standing water and wetlands are not examined or tested. It is not reasonable or prudent to require trenching or testing in these areas prior to construction because, generally, these wetlands are remnants of old river channels. However, during construction of the phase one remedial measures, a Corps of Engineers archaeologist monitored excavations in the wetland areas not previously surveyed because it was possible that an historic shipwreck or pre-European watercraft may have been encountered. During this monitoring, no historic sites or properties were found.

The Illinois State Historic Preservation Officer (SHPO) reviewed the project described in the April 1996 EA, and agreed that no historic properties will be impacted. In addition, if any

changes are made to the planned location of any components of the proposed project, Corps of Engineers archaeologists will reevaluate the changes and recommend survey, site avoidance, or whatever action is warranted given the historic or archaeological resource. The St. Louis District will coordinate with the SHPO, and the District will comply with the National Historic Preservation Act of 1966 and 36 CFR 800.

When a specific area(s) is selected to be used for wetland mitigation, and a plan for wetland development for that site(s) is developed, the District will comply with all existing Federal Historic Resources legislation. In these situations, the first step will be to contact the Illinois State Museum and determine prior archaeological survey coverage in the wetland mitigation area, and the locations of any known historic or prehistoric sites. Planning can then proceed, and site avoidance is then possible. If certain sites cannot be avoided, their eligibility for the National Register of Historic Places will have to be determined. Following formal eligibility determinations, project plans may be adjusted to avoid some sites, while impacting others that were found to be ineligible.

If a wetland mitigation project area has not been surveyed in the past, then a new Phase I survey will be necessary, and one will be accomplished prior to any construction impacts. However, areas that normally contain standing water are not subjected to Phase I surveys, per formal survey guidelines available from the State Historic Preservation Office. Surveys may also be unnecessary if an area chosen for wetland mitigation is a recent ground surface which has been impacted by the main river channel within the last 50 to 100 years. In such cases, hydrographic survey records and other District documents would indicate that a Phase I survey is not warranted because there is little to no chance for prehistoric or intact historic deposits to be present. In these cases, it is standard procedure in the St. Louis District to monitor excavations and other activities during construction in the rare event that a buried or submerged historic shipwreck or protohistoric river vessel is encountered. Finally, it is important to note that any project requiring an EA (or EIS) also warrants a Letter Report to the SHPO. Any wetland mitigation project which constitutes an environmental impact will be reported to and coordinated with the Illinois SHPO.

4.10 Aesthetic Resources Residential areas are very close to the location of some proposed project features. Homes are within 500 feet of the proposed location of the new pump station, and near some of the seepage berm extensions. Heavy equipment of various types will be used to build these features, and noise will be generated during operation. Most of this equipment will be down on the ground, but some may be needed on top of the East Canal Levee. Heavy equipment noise generated from atop the levee would carry farther than that generated below on the ground. The duration of the construction period for each of the recommended seepage control measures is likely to be several weeks to several months. The District will confine construction operations to daylight hours when practicable to minimize noise impacts to adjacent residential areas. From a visual standpoint, implementation of the proposed measures is not expected to mar the aesthetic appearance of the project area. Therefore, no significant impacts to aesthetic resources are anticipated.

4.11 Air Quality During the construction process, diesel-powered heavy equipment will

generate exhaust while in operation. In addition, earthen work is likely to generate dust when conditions are dry and windy. These impacts are expected to be minor and temporary. The new pump station will operate by electricity, and will not affect air quality.

4.12 Relationship of the Proposed Project to Land-Use Plans The recommended plan is consistent with the District's interim land use plan for navigation pool 27 (USACE, 1994*b*).

4.13 Adverse Effects Which Cannot Be Avoided Construction of seepage berm extensions into the 5-acre and 9-acre forested wetlands near I-270 is presently unavoidable. Geotechnically it is not possible to sufficiently reduce expected hydrostatic pressures in these two areas even with the installation of many additional relief wells in combination with mandatory ponding of seepage water; modeling of pressure changes caused by a variety of potential measures showed that only berms performed adequately in these two areas. Also unavoidable is the establishment and maintenance of grassy (turf) vegetation on all seepage berm extensions; the District has a policy prohibiting the growth of natural woody vegetation such as trees and bushes which could otherwise be used to replace lost woody habitats. Other unavoidable impacts include noise and exhaust generated by heavy equipment.

4.14 Short-Term Use Versus Long-Term Productivity The recommended plan does not represent a short-term use of the environment, but a long-term or permanent solution to an underseepage problem that has existed ever since the East Canal Levee was constructed over 40 years ago. This solution will necessitate an environmental cost - a loss in maintenance and enhancement of long-term biological productivity of a portion of the project area. However, maintenance and enhancement of long-term productivity is a broad goal of the proposed wetland mitigation. Project-induced wetland impacts will be compensated by the development of new wetlands that will be preserved and protected in perpetuity.

4.15 Irreversible or Irretrievable Resource Commitments Aside from the commitment of funds, labor and construction materials for remedial measures to control underseepage, there would be the irreversible loss of about 64 acres of natural terrestrial habitats. Beyond this, there is another irretrievable resource commitment. Remediation of underseepage controls along the East Canal Levee is a prime concern of the St. Louis District. The District has also recommended expansion of the Chain of Rocks harbor (USACE, 1982, 1992*a*), located immediately upriver of Locks No. 27 and integral to the Tri-City Port District Authority. Although these two projects are proceeding independently, there is an area of physical overlap between them. The proposed harbor expansion involves extending the existing harbor an additional 1,800 feet to the north, in the vicinity of Rock Road and the east-west railroad spur. The recommended plan for underseepage control proposes the construction of seepage berm extensions and relief well improvements in the area of proposed harbor expansion. In the District's view, construction of underseepage control measures is likely to begin before any work on harbor expansion commences. It is very possible that by the time any harbor expansion starts, underseepage control measures in the harbor vicinity will be completed. Construction of the harbor expansion would then require relocation of some just-completed underseepage control structures. These affected structures and the money expended to construct them would represent irretrievable resources.

4.16 Compliance with Environmental Quality Statutes The recommended plan was subject to review as to the degree of compliance with applicable environmental guidelines. The proposed action was found to be in partial or full compliance with applicable guidelines (see Table 1 on page 30). Full compliance will be achieved as noted.

4.17 Cumulative Impacts Other than the proposed harbor expansion and implementation of resource management plans on Corps lands within the project area, there are no other Corps projects in the vicinity. No significant cumulative impacts on the environment that are associated with these projects have been identified.

4.18 Environmental Impacts of Nonpreferred Alternatives Of the four alternatives, alternative 1 (relief wells only) would have the least environmental effect. Impacts to land use and natural habitats would be minor because there would be no seepage berm extensions or depressional fills. Alternative 2 would have impacts similar to those of alternative 3, but there would be no wetland impacts. Instead of berm extensions being constructed in wetlands, additional relief wells would be installed. Alternative 4 (slurry wall) would have minor direct effects on land use and natural habitats, but it would have substantial indirect effects. Not only would the slurry wall prevent seepage water from moving underground from the river to the levee's landside, but it would also prevent the reverse movement of underground water, from landside to the river. The underground wall would cause higher interior groundwater levels and create interior drainage problems. Problems to local sewer systems and other infrastructure would arise. Wetter habitats probably would result.

5.0 FEDERALLY ENDANGERED SPECIES: BIOLOGICAL ASSESSMENT

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District requested that the U. S. Fish and Wildlife Service (USFWS) provide a listing of Federally threatened or endangered species, currently classified or proposed for classification, that may occur in the vicinity of the Chain of Rocks Canal, Madison County, Illinois. The USFWS (Marion, Illinois suboffice), in telephone conversation with the District on 1 February 1996, provided the following list of seven species:

Classification	Common and Scientific Name	Habitat
Threatened	Bald eagle (Haliaeetus leucocephalus)	Breeding and wintering along major rivers and reservoirs
Endangered	Least tern (Sterna antillarum)	Bare alluvial and dredged spoil islands and sand/gravel bars
Endangered	Gray bat (Myotis gricescens)	Caves
Endangered	Indiana bat (Myotis sodalis)	Caves, mines; small stream corridors with well developed riparian woods; upland forests

Endangered	Pallid sturgeon (Scaphirhynchus albus)	Large rivers
Threatened	Decurrent false aster (Boltonia decurrens)	Disturbed alluvial soils
Threatened	Eastern prairie fringed orchid (Platanthera leucophaea)	Mesic to wet prairies

The USFWS also indicated that there is no designated critical habitat in the project area at this time.

Bald eagle: 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 area surrounding the confluence of the Mississippi and Illinois Rivers, about 15 miles to the northwest, receives high eagle use. Eagles are also known to overwinter in the vicinity of the project area from river miles 185.0-194.0 (USFWS, 1993*a*), but this use is restricted to Chouteau and Mosenthien Islands that border the main channel (USACE, undated). No nests are present within the project area or adjacent river reach (USACE, undated; USFWS, 1993*a*). Removal of trees on Corps lands located on the east side of the canal will not affect any perching, feeding, or roosting habitat. Implementation of the wetland mitigation is not expected to affect any trees. Therefore, the project is unlikely to affect this species.

Least tern: Recent nesting colonies of the interior least tern have been recorded from Jackson and Alexander Counties, Illinois (Herkert, 1992). Nesting areas are sparsely vegetated sand and gravel bars within a wide, unobstructed river channel. Nesting locations usually are at the higher elevations and away from the water's edge. Madison County is included within the species' former Illinois distribution (Herkert, 1992). The proposed project is unlikely to affect this species.

Gray bat: Gray bats are presently known from only several counties in west-central and extreme southern Illinois; the species' historical distribution includes Madison County (Herkert, 1992). Gray bats roost in caves year round. Winter caves are deep and vertical, and provide a large volume below the lowest entrance to act as cold air traps. A much wider variety of cave types are used during spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer of rivers or reservoirs over which the bats feed. Except for brief periods of inclement weather in early spring and possibly late fall, adult gray bats feed almost exclusively over water along river or reservoir edges. As there are no known winter or other seasonal caves in the vicinity of the proposed project area, it is unlikely that this species will be impacted.

Indiana bat: Indiana bats also winter in caves or mines, but none of these features are known in

the vicinity of Madison County (Herkert, 1992). Females use trees in the summer months as nursery roosts, and forage for insects in the tree canopy. Trees preferred for maternity roosting in Illinois have included dead individuals of species having shaggy or loose bark, and diameters at breast height (dbh) greater than 10 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 used less often. Males have been known to roost in shingle oak, sassafras, and sugar maple (Hofmann, 1994). Some dead cottonwood, silver maple, and sycamore greater than 10 inches dbh are present near the landside toe of the East Canal Levee in two areas proposed for extension of seepage berms: the 5-acre forested wetland just north of Chouteau Slough, and the 9-acre forested wetland north of the I-270 bridge. Tree felling associated with seepage berm extensions will be restricted to the colder months when maternity roosting is not known to occur (September 1 through April 30). With this restriction, the proposed project is unlikely to affect this bat.

Pallid sturgeon: This fish is found in the Mississippi River downstream of its confluence with the Missouri River. The entire stretch of river below the mouth of the Missouri River is considered potential habitat. Little is known of its habitat preferences. 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*b*). 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.

The U. S. Fish and Wildlife Service (1993*b*) noted that "Little is known about reproductive or spawning activities of pallid sturgeon. Even basic parameters such as spawning locations, substrate preference, water temperature, or time of year have not been documented. No spawning beds have been located and larval pallid sturgeon have not been recorded by investigators." The Service (1993*b*) suggested that the shovelnose sturgeon provides the closest model for determining spawning requirements. They indicated that "Because there is little information available on pallid sturgeon spawning, spawning requirements are extrapolated from what is known regarding shovelnose sturgeon spawning." Shovelnose sturgeon spawn over substrates of rock, rubble, or gravel in the main channel of the Missouri/Mississippi rivers and major tributaries, or on wing dams in the main stem of larger rivers. Shovelnose sturgeon spawning occurs from late May through June in South Dakota. In Montana, shovelnose sturgeon spawn from early June until mid-July.

Substrate sampling of the proposed dredging areas has been conducted to determine the extent of sandy bottom and the location of any gravelly or rocky areas so that the latter can be avoided. Dredging will be limited to sandy areas. Dredging at the lower end of the project area will not extend downriver of the Merchants Railroad Bridge. The proposed activity is not likely to affect the pallid sturgeon.

Decurrent false aster: The decurrent false aster is presently known from scattered localities on

the floodplains of the Illinois River, and Mississippi River from its confluence with the Missouri River south to Madison County, Illinois. Its natural habitat was the shores of lakes and the banks of streams. It appears to require abundant light. Populations presently grow on stream banks and lake shores, but are more common in disturbed lowland areas where they appear to be dependent on human activity for survival (USFWS, 1990). Because this species is not known from within the project area (USACE, undated; Cannon, 1996), the proposed project is unlikely to affect it.

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. Wet bottomland prairie apparently was not a component of the early nineteenth century vegetation within the project area, and wet prairie that does occur today was created within the last five years or so from previously farmed fields. Therefore, this plant should not be affected.

Based on our evaluation, it is the St. Louis District's opinion that the proposed project will not adversely impact any of the seven threatened or endangered species that might occur in the project area, provided that tree felling is restricted to the time of the year (September 1 through April 30) when Indiana bat maternity colonies are not present. Likewise, the action will not affect any critical habitat of these species. The USFWS will be given an opportunity to review this EA and comment on this Biological Assessment.

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7.0 COORDINATION, PUBLIC VIEWS, AND RESPONSES As noted in the introduction, the District's Planning Division circulated an Environmental Assessment, 404(b)(1) Evaluation, and Draft Finding of No Significant Impact for an earlier version of this project. Soon thereafter, the District's Regulatory Branch circulated a public notice for the project (which was since modified) as part of its process to comply with the Clean Water Act. Copies of responses from these earlier reviews are on file with the St. Louis District and available for public inspection. The St. Louis District has coordinated this project with the Tri-City Regional Port District and Chouteau, Nameoki, and Venice Drainage and Levee District. All letters of comment resulting from this present review will be filed with this document. A listing of those receiving a copy of the April 1996 EA/Draft FONSI, as well as the present documents, is given below:

Elected Officials:
- Honorable Richard Durbin
- Honorable Carol Moseley-Braun
- Honorable Jerry Costello
- Honorable Evelyn Bowles
- Honorable Steve Davis

Federal Agencies:
- Department of Agriculture, Natural Resource Conservation Service
- Fish and Wildlife Service
- Environmental Protection Agency, Region V

Illinois State Agencies:
- Department of Natural Resources
- Historic Preservation Agency
- Department of Agriculture
- Environmental Protection Agency

Local Governments:
- Mayor, City of Venice
- Mayor, City of Madison
- Mayor, Granite City
- Chair, Madison County Board
- Madison County Board, District 16
- Madison County Board, District 23
- Chouteau Township
- Nameoki Township
- Venice Township
- Metro East Sanitary District
- Chouteau, Nameoki, and Venice Drainage and Levee District

Industry, Organizations, and Individuals:
Tri-City Regional Port District
Isaac Walton League
Sierra Club
The Nature Conservancy

8.0 ENVIRONMENTAL ASSESSMENT PREPARERS

The St. Louis District (SLD) staff members responsible for preparing this document are as follows:

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Role: Introduction

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Role: Historic Properties Compliance

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Role: Introduction

Mr. Tim George, Ecologist
Experience: 7 yrs. Regulatory Branch, 7 yrs. Planning Division, SLD
Role: EA Coordinator/Environmental Impact Analysis/Endangered Species

TABLE 1. 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[2]
Clean Air Act, as Amended, 42 U.S.C. 7609	FC
Clean Water Act, as Amended 33 U.S.C. 466 et seq.	FC[1]
Endangered Species Act, as Amended, 16 U.S.C. 1531. et seq.	FC
Farmland Protection Policy Act, 7 U.S.C. 4201, et seq.	PC
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[1]
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 U.S.C. 470a, et seq.	PC[2]
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[2]
Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, CEQ Memorandum, August 11, 1980.	PC[1]

FC = Full Compliance, PC = Partial Compliance.

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