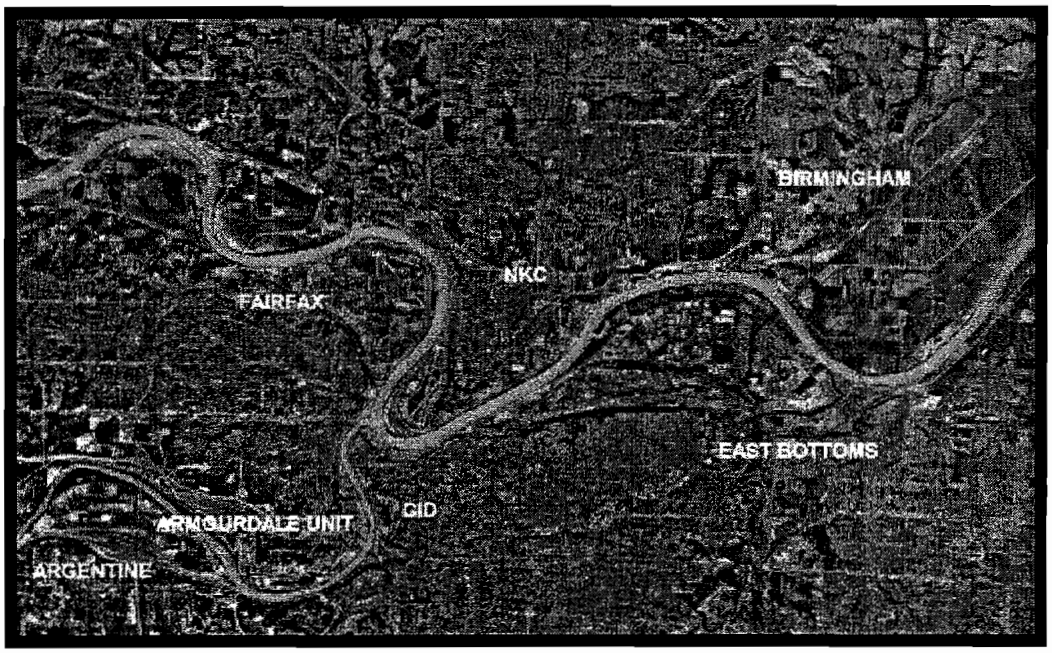
Final Environmental Impact Statement

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Missouri and Kansas Rivers



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The responsible lead agency is the Kansas City District, Corps of Engineers. The USEPA, Region VII, is a participating coordinating agency as addressed in CEQ regulations 40CFR1501.6.

Abstract: The Corps, at the request and with the cooperation of the five distinct non-Federal sponsors of the seven levee units in the Kansas City metropolitan area, has undertaken this study of the Kansas Citys, Missouri and Kansas, Flood Damage Reduction Study, Missouri and Kansas Rivers. This existing levee system protects areas in the Cities of Kansas City, North Kansas City and Birmingham, Jackson and Clay Counties, Missouri, and in the City of Kansas City, Wyandotte County, Kansas. The Corps is undertaking this study under the authority of Section 216 of the 1970 Flood Control Act.

The purpose of this study is to determine whether one or more plans for improving the level of flood damage reduction is technically viable, economically feasible, and environmentally acceptable, or if no action is warranted. Failure of any part of the existing flood damage reduction system during a major flood would have significant adverse impacts on the human environment, including property damage and potential loss of human life. Considering these potential significant impacts on the human environment, and in accordance with the National Environmental Policy Act, the Corps initiated preparation of a Draft Interim Feasibility Report and Draft Environmental Impact Statement (DIFR/DEIS). The DIFR and DEIS presented an analysis of several alternatives considered during scoping and a detailed analysis to determine what action, or if any action, is warranted to minimize the potential for loss of human life and property damage related to failure of the levee system in the event of a major flood. Proposed alternatives identified to improve flood damage reduction reliability include: levee raise with pump station modifications or replacement to include floodwalls, stoplog gaps, top caps, and rock toe; pressure relief wells; floodwall modification using buttresses; new sheetpile wall; buried collector system; and the no action alternative. Comments on the DIFR/DEIS were accepted until 17 July 2006. This final Interim Feasibility Report and Final Environmental Impact Statement (fIFR/FEIS) identifies a combination of the alternatives listed above as the Corps' preferred alternatives of the Recommended Plan, presents the environmental impacts associated with each of the alternatives listed above, and provides the comments received from agencies, organizations, entities and individuals in regards to the proposed project and the Corps' responses to these comments.

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Executive Summary

The seven levee units addressed for this study include: the North Kansas City, Northeast Industrial District (East Bottoms) and Birmingham units in Missouri and the Argentine, Armourdale, and Fairfax-Jersey Creek Units in Kansas. The Central Industrial District (CID) levee unit, which protects land in both Kansas and Missouri, is also addressed. These units collectively comprise the protective works that provide flood damage reduction for areas in Kansas City, North Kansas City and Birmingham, Jackson and Clay Counties, Missouri and in Kansas City, and Wyandotte County, Kansas.

This study results from interest by the local levee districts and Kansas City, Missouri for the examination of improvements to the existing line of protection which might benefit residents, business owners, landowners, and persons employed within the levee protected areas consistent with National Civil Works policy.

The existing levee system including underseepage control structures protects approximately $16 billion dollars of investment within the protected areas consisting of:

- Over 5,000 individual structures
- The employment of 90,000 individuals
- The Charles B. Wheeler Downtown Airport
- Several vital utilities
- Extensive rail and road systems within the protected areas that are of regional and National importance.

Although no overtopping occurred within the Kansas City area during the Flood of 1993, water crested near the top of the levees and floodwalls in some of the levee units. Water pressure during flood events may stress structural components, scour the levee toe, or cause the seepage of river water through the levee onto adjacent properties. Some landowners within the levee protected areas experienced intense flood fighting and observed sand boils and sink holes on their property during the 1993 Flood, indicating excessive water pressures and the seepage of river water through the levee foundation. Following the Flood of 1993, the U.S. Army Corps of Engineers (Corps/USACE), Kansas City District (KCD), received correspondence from Kansas City, Missouri expressing concern regarding the reliability of the existing flood damage reduction system.

In accordance with Engineering Pamphlet 1165-2-1 and under the authority of the Flood Control Act of 1970, the Corps has moved forward with the reevaluation of the Kansas City

levees. The feasibility study is being conducted using a 'phased approach'. The phased approach was preferred due to:

- The large magnitude of the overall study area, and numerous features under study.
- The need to seek timely authorization for critical system modifications; some of the most critical sites are being worked under Phase 1.
- The need to keep economic analysis information timely and up-to-date. This could become problematic if feasibility were attempted under a single large report to be issued sometime in the future.
- Funding: Moving forward with Phase 1 authorization efforts now will minimize the schedule impacts of the reduced Federal funding stream.
- Phasing of the various sites will allow those sponsors responsible for multiple units to spread their cost-share funding requirements (for PED and Construction) over several years rather than seeing one large bill for multiple units.

The Argentine, East Bottoms, Fairfax-Jersey Creek, Birmingham and North Kansas City units comprise the Phase I levee units and are addressed in the final interim feasibility report (fIFR). The Armourdale and Central Industrial District levee units are examined under Phase II and will be addressed in the Final Feasibility Report (FFR).

Engineering, economic and environmental analyses were conducted for the North Kansas City, East Bottoms, Birmingham, Argentine, and Fairfax-Jersey Creek levee units. The results of these analyses and recommendations to increase levee unit reliability are included in the Draft Interim Feasibility Report (DIFR) and this Draft Environmental Impact Statement (DEIS). Analyses of the Birmingham unit found no geotechnical or structural deficiencies. Therefore, no reliability improvements are proposed for this unit.

Preliminary engineering, economic, and environmental analyses have been completed for the CID and Armourdale units. Findings for overtopping risk and geotechnical/structural risk indicate the need to pursue reliability improvements for the Armourdale and CID levee units. Such improvements may involve earthen levee raises, floodwall raises, and underseepage improvements. Tentative preferred alternatives are recommended for these units within this DEIS. The final preferred alternatives recommended for these units are pending the completion of Phase II engineering, economic, and environmental studies, and will be presented in the Phase II FFR.

No overriding areas of controversy were noted during the scoping process. The majority of comments addressed the desire to use the Kansas City levees as recreational trails. The Corps does not own the levees. The levee units addressed in this study are owned and maintained by their respective levee districts. The Kansas City District provides technical assistance to the levee districts and supports dialogue between levee unit sponsors and trail proponents. However, the majority of the land adjacent to the existing levees is heavily industrialized. The levee districts and the Corps are concerned with maintaining a high degree of levee integrity and public safety, and any plans for trails must be compatible with levee integrity.

The Corps' Notice of Intent to prepare an EIS was published in the Federal Register on January 10, 2001. The Corps scoping process was conducted during the summer/fall of 2003 and included meetings with local, state and Federal agencies, organizations and the general public. On August 20, 2003, the Corps held a public information/scoping meeting at North Kansas City, Missouri to present information on the study and to receive input from the public on resources in the affected area, alternatives and potential impacts. Comments were solicited from the public at this initial meeting and accepted through a comment period, which closed on September 22, 2003.

In accordance with the National Environmental Policy Act (NEPA), KCD has prepared a final Interim Feasibility Report and Final Environmental Impact Statement for the Kansas Citys, Missouri and Kansas, Flood Damage Reduction Study, Missouri and Kansas Rivers. The U.S. Environmental Protection Agency (USEPA), Region VII, is a designated cooperating agency for this study and provided hazardous, toxic, and radioactive waste (HTRW) data and mapping, air quality information, Environmental Justice evaluation in accordance with Executive Order 12898, and DEIS review.

This study considers the impacts of proposed alternatives to determine if increasing the current level of flood damage reduction protection is technically viable, economically feasible, and environmentally acceptable, or if no action is warranted. The Recommended Plan is the combination of the National Economic Development (NED) alternatives for each of the levee units. The preferred alternatives for the Kansas River levee units (Argentine, Armourdale, and the Central Industrial District) include a levee raise to the nominal 500+3-feet along with improvements to pump stations, floodwalls and underseepage control. The preferred alternatives for the Armourdale and Central Industrial District are tentative as they will be fully evaluated under Phase II in the Final Feasibility Report. The preferred alternatives for the Missouri River levee units (Fairfax-Jersey Creek, North Kansas City, and East Bottoms) primarily address individual components of the existing system that have been identified through analyses to require overtopping and/or underseepage reliability improvements to maintain the integrity of the existing line of protection. The preferred alternatives for these Missouri River levee units include installation of relief wells and a pump station, installation of a buried collector system, strengthening of an existing floodwall and sheetpile wall replacement to improve the reliability of the existing line of protection. The preferred alternatives are components of the overall Recommended Plan.

The impacts from the Recommended Plan range depend on the characteristic of the levee unit considered and the resources within each respective levee unit. Relatively minor adverse impacts to the natural environment and aesthetics are anticipated with overall positive benefits to the socio-economic environment based on an improved level of protection to the local infrastructure. Adverse impacts are limited and are not considered significant because the project is primarily located within the existing footprint of a previously disturbed environment and within a highly industrialized and urbanized area. The Recommended Plan would impact two emergent wetlands measuring approximately 0.007 and 0.02 acres that are located landward of the existing Argentine levee and a 0.17 acre farmed wetland within the proposed borrow area. Although of low quality and diversity, these wetlands do provide limited benefits to wildlife. It is preferable to mitigate resource impacts within the project area.

To increase the flood damage reduction capabilities of the Kansas River units, levee and floodwall construction would result in increasing the height of existing overtopping features an additional 4 to 6 feet in most places potentially impacting river aesthetics in some areas. The proposed raise would further obstruct the view of industry from the Kansas River. No significant riverscape aesthetics are anticipated from the construction of underseepage improvements as these improvements are generally constructed landside and downgradient of the existing levee and are not readily viewed from the Missouri and Kansas Rivers.

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Flood Damage Reduction Study
Missouri and Kansas Rivers

1. Introduction

1.1 Project Location and History

The Kansas Citys project is a unit of the Missouri River basin comprehensive plan authorized by the 1936, 1944, 1946 and 1954 Flood Control Acts that provides flood damage reduction for the metropolitan areas of Kansas City, Missouri and Kansas City, Kansas. The design of the Kansas Citys project was predicated on the operation of the Kansas River Basin system of flood control lakes. Most of the lakes in that system are in place and operating, but two of the smaller lakes in the system (Grove and Onaga) were determined economically unfeasible and were deauthorized.

The levee units include the Argentine, Armourdale, Birmingham, Central Industrial District (CID), East Bottoms, Fairfax-Jersey Creek, and the North Kansas City unit (Figure 1-1). The protective works primarily consist of levees, floodwalls, bridge and approach alterations, and channel improvements over the lower 9.5 miles of the Kansas River and on the Missouri River from 6.5 miles upstream to 9.5 miles downstream of the mouth of the Kansas River. The 32-square-mile protected area covers the heavily industrialized floodplains of the two rivers. Each of the seven levee units that comprise the flood damage reduction system was designed and constructed in coordination with the other, but each is operationally independent. A modification to raise three of the units (Argentine, Armourdale, and Central Industrial District) was authorized by Public Law 87-874 on October 23, 1962. Complete effectiveness of the overall project is contingent on adequate reservoir control in the upper Missouri and Kansas River basins.

1.2 Levee Unit and Proposed Borrow Area Descriptions

1.2.1 Argentine Levee Unit

The Argentine Unit is located in Wyandotte County, Kansas, on the right bank of the Kansas River between approximate Kansas River miles 10.1 and 4.7 (Figures 1-2 through 1-6). Federal modification and strengthening of works originally constructed by the Kaw Valley Drainage District began in May 1951. Most of the Federal improvements, including repairs of Argentine levee unit damage from the 1951 flood, were completed by 1955. More recent improvements, separately authorized under the 1962 Modification, were completed in 1978 (the 1978 improvements included raising the heights of floodwalls, earthen levees, and associated structures in the Argentine, Armourdale and CID-Kansas levee units). The primary components of the Argentine unit are earthen levee, floodwalls, stoplog and sandbag gaps, pumping plants, and drainage structures. The overall Argentine unit is approximately 5.5 miles long. The floodwalls, in two sections, total 1,338 feet long. Most of the floodwall is about 16 feet tall. The

levee embankment consists of compacted earthen material placed in random and impervious 8080

zones. Underseepage and stability berms are located in reaches where the height of the levee, foundation strength, and hydraulic gradient require the use of such berms. The levees and floodwalls of the Argentine Unit are currently authorized to pass a maximum Kansas River flow of 390,000 cubic feet per second (cfs) coincident with a Missouri River flow of up to 220,000 cfs.

1.2.2 Armourdale Unit

The Armourdale Unit is located in Wyandotte County Kansas, along the left bank of the Kansas River from mile 7 (Mattoon Creek) to mile 0.3, near the confluence of the Kansas and Missouri Rivers (Figure 1-7). The original levees and floodwalls were constructed under the jurisdiction of the Kaw Valley Drainage District and then modified and expanded in the initial and follow-on Federal projects. The primary components of the unit consist of earthen levee, floodwalls, riprap and toe protection on riverward slopes of levees, toe drains along the concrete floodwalls, sandbag gaps, stoplog gaps, drainage structures, relief wells and pumping plants. The floodwalls are roughly 22 feet high (varies) and are approximately 6,600 feet long. The levees in three sections total about 5.8 miles long with a sandbag gap between the two sections upstream of the floodwall. The uppermost levee section is a tieback from high ground west of Mattoon Creek which then heads downstream to the Union Pacific Railroad tracks. The second section extends from the Union Pacific Railroad embankment near the mouth of Mattoon Creek downstream along the left bank of the Kansas River to the floodwall. The floodwall begins north of the Chicago, Rock Island and Pacific Railroad Bridge and extends downstream to connect with the third levee section. The third levee section ties back into high ground at the embankment of the Lewis and Clark Viaduct. Construction of the Federal project began in 1949 and was completed in 1951. More recent improvements, separately authorized under the 1962 Modification, were completed in 1976. The levees and floodwalls of the Armourdale Unit are currently authorized to pass a maximum Kansas River flow of 390,000 cfs coincident with a Missouri River flow of up to 220,000 cfs.

1.2.3 Central Industrial District Levee Unit

Although the CID Unit is one levee unit, it is operated and managed as two separate and distinct sections: the CID-Kansas section, and the CID-Missouri section.

The CID-Kansas section (CID-KS), is located in Wyandotte County, Kansas, and extends along the right bank of the Kansas River from mile 3.4 to the mouth, then downstream along the right bank of the Missouri River to the Missouri and Kansas State Line (Figure 1-8). The unit consists of levee sections and floodwalls, riprap and levee toe protection and a surfaced levee crown and ramps, a stoplog gap, a sandbag gap, pumping plants, drainage structures, and relief wells. The levee sections total approximately 1.7 miles long. Three sections of floodwall total about 7,900 feet. This section was originally developed by the Kaw Valley Drainage District, and initial Federal improvements entered construction in 1948. Most of the Federal improvements including repairs to levee unit damage from the 1951 Flood were completed by 1955. The most recent improvements authorized under the 1962 Modification were completed in 1979. The CID-KS section is authorized to pass a Kansas River discharge of 390,000 cfs coincident with a Missouri River flow of 220,000 cfs.

The CID-Missouri section (CID-MO) is located in Kansas City, Jackson County, Missouri. The unit extends along the right bank of the Missouri River (river mile 365.7) to the Kansas-Missouri state line (river mile 367.2). The CID-MO section consists of levees, floodwalls, a levee drainage system and pumping plants, sandbag and stoplog gaps, toe and bank protection, and slope protection on the riverward slope. The floodwall totals 1.5 miles long and the levee is about 430 feet long. The initial construction began in 1946. Significant improvements and repair of 1951 Flood damage followed the initial construction and were completed in 1955. The CID-MO section is designed to pass a Missouri River flow of 540,000 cfs.

1.2.4 East Bottoms Unit

The East Bottoms Unit is located in Kansas City, Jackson County, Missouri. The unit extends downstream along the right bank of the Missouri River from river mile 365.6, to the mouth of the Blue River, river mile 357.7, then upstream along the left bank of the Blue River to the Union Pacific Railroad embankment (Figure 1-9). The levee portion is 9.2 miles long. The floodwall portion is 2,190 feet long and either 12 or 14 feet tall. The unit includes drainage structures, stoplog gaps, pumping plants, and relief wells. The initial construction was completed in 1950. The most recent and major Federal work on the East Bottoms Unit was completed in 1974. It is designed to pass a Missouri River flow of 540,000 cfs and a 40,000 cfs Blue River flow along the southeastern Blue River tieback.

1.2.5 Fairfax-Jersey Creek Unit

The Fairfax-Jersey Creek Unit is located on the left bank of the Kansas River (Kansas River mile 0.3) downstream to the mouth of the Kansas River and along the right bank of the Missouri River from Missouri River mile 367.5 to mile 373.9 (Figures 1-10 and 1-11). The flood damage reduction features consist of about 5.3 miles of levees, 4,040 feet of floodwall, riprap and levee toe protection, a sandbag gap, stoplog gaps, drainage structures, relief wells, pumping plants and the Jersey Creek sewer pump station and shutter gate. The main floodwalls average 16 feet tall. The Fairfax Drainage District provides operation and maintenance from levee Sta. 31+50 (boundary line with Kaw Valley Drainage District) to Sta. 313+72 (bluff at upstream end of unit). The initial construction began in 1940. Numerous modifications and improvements were constructed in the late 1940s and early 1950s, the most recent significant Federal work was completed in 1955. Some limited work was completed post 1993 flood under the PL 84-99 program. The levees and floodwalls of the Fairfax-Jersey Creek Unit are designed to pass a Missouri River flow of 460,000 cfs.

1.2.6 North Kansas City Unit

The North Kansas City Unit is operated and managed as two separate and distinct sections: the "Airport section" and the "lower section" (Figures 1-12 and 1-13). Federal construction began in 1946. Several Federal improvements have been made since the initial construction. The most recent Federal work was completed post-1993 flood under the PL 84-99 program in the Airport section. The unit is designed to pass a Missouri River flow of 460,000 cfs upstream of the Kansas River confluence (Upper or Airport section) and 540,000 cfs downstream of the confluence (Lower Section).

The North Kansas City Unit (Airport Section) is located around the perimeter of the downtown airport. The Airport section is owned and maintained by Kansas City, Missouri. The alignment passes along the left bank of the Missouri River starting from river mile 369.6 to the downstream floodwall at river mile 366.2. The unit is comprised of 2.5 miles of levee, 530 ft of floodwalls, and appurtenances including drainage structures, pumping plants, and pressure relief wells. The floodwalls range from 7 to 15 feet tall.

The North Kansas City Unit portions maintained by the North Kansas City Levee District are often called the "downstream section" or "lower section" and are located in both North Kansas City and in Kansas City, Missouri. These portions include a short upper section extending downstream along the left bank of the Missouri River from the bluff just north of the Kansas City, Missouri, Waterworks intake to where the Airport section (described above) begins. After the Airport section ends, the "downstream section" resumes at the Hannibal Bridge and continues in a easterly direction along the left bank of the Missouri River to a point where the North Kansas City hillside ditch exits to the Missouri River near the Missouri River Chouteau Bridge. At the hillside ditch outlet, a long hillside tieback turns back sharply to the Northwest and runs to a termination point just west of the North Cherry Street bridge. The unit consists of 6.2 miles of levee, 310 ft of floodwalls, riprap slope protection, Rock Creek channel relocation, underseepage control measures, pumping plants, drainage structures, and stoplog gaps.

1.2.7 Birmingham Unit

The Birmingham Unit is located in Clay County Missouri on the left bank of the Missouri River, approximately 12.4 miles downstream from the mouth of the Kansas River (Figure 1-14). The major flood damage reduction components include an 11 (eleven) mile levee, 430 feet of floodwalls, riprap slope protection, pumping plants, drainage structures, sandbag gaps, stoplog gaps, underseepage control and stability berms. The Birmingham levee unit is designed to pass a Missouri River flow of 540,000 cfs. The original Birmingham unit was developed by the Birmingham Drainage District. The Federal project in 1952 raised and strengthened the upstream section of the levee. The downstream section was strengthened and modified in 1954 and 1955.

1.2.8 Proposed Borrow Area

Implementing the levee unit preferred alternatives would require using borrow soil from a location close in proximity to the existing levee alignment to minimize haul distance and access existing local haul routes. The use of conventional scrapers, front end loaders, backhoes and haul trucks would be more economical than dredging materials from the Missouri River.

The proposed borrow area measures approximately 276 acres and is owned by Water District Number One (WaterOne) of Johnson County, Kansas (Figure 1-15). The proposed borrow area is located adjacent to the right descending bank between Kansas River miles 11 and 13, Wyandotte County, Kansas. The borrow area is accessed from south 74th Street via Holliday Drive and Interstate 435. Levee access from the proposed borrow area would route from Inland Drive to South 59th Street.

The primary uses of the land are lime storage from the water treatment process and active row-cropping. WaterOne treats water from the Kansas River and occasionally the Missouri River. Because these two water sources are hard waters, one of the treatment processes used by

WaterOne is the addition of lime to "soften" the water by removing the carbonate hardness in the water. Lime softening is conducted by adding a form of lime that precipitates out the carbonate hardness. The result of this process is "softened" water and a lime residual (water and calcium carbonate) that must be removed from the treatment process. WaterOne's lime residuals are stored in large lagoons and allowed to dry. After the drying process, which may take a few years, the dried material is excavated and the lagoons are cleared for future use. The excavated material may be transported to a landfill, used as a fill on construction sites, soil amendment on farmland, or other commercial use. Row cropping within the proposed borrow is conducted under a lease agreement. Thus, existing disturbance within the proposed borrow area includes excavating, hauling, grading, and disk harrowing.

1.3 Purpose and Need

The entire system of seven levee units withstood the Flood of 1993. However, some elements of the system were seriously challenged as the flood crested. This flood experience raised a concern that the levees may provide less than the level of protection for which they were designed. Following the Flood of 1993, Kansas City, Missouri, sent letters to the Kansas City District expressing concern regarding the effectiveness of the existing flood damage reduction system. Section 216 of the 1970 Flood Control Act provided continuing authority to examine completed Federal projects to determine whether the projects are providing benefits as intended.

Argentine

Hydrology and hydraulics models, geotechnical and structural analyses, and risk and uncertainty study methods were used to ascertain the existing reliability of the Argentine levee unit and to determine the appropriate engineering measures necessary for overtopping and reliability improvements. Hydrology and hydraulic investigations indicated the need for overtopping reliability improvements. For an existing levee system, such improvements are accomplished through: 1) Raising the levee and/or 2) improving river channel discharge capacity. Geotechnical and structural investigations revealed that levee failure could result from geotechnical and structural sources, as well as failure as a result of overtopping. Therefore, incorporating a levee raise and the technically appropriate engineered solutions for levee stability and underseepage control were determined to accomplish reliability improvements. In addition to the results of engineering studies, factors that affected the alternatives formulation process included economics, the presence of HTRW near the levee, real estate constraints (such as railroad trackage or structures), and the presence of riparian habitat adjacent to the existing levee.

Three levee raise alternatives were identified for the Argentine unit. The alternatives include raising the existing levee to the nominal 500-year+0, nominal 500-year+3, and nominal 500-year+5 level of protection. These raise alternatives include underseepage control features such as buried collectors, relief wells, stability berms, underseepage berms and filter blankets. A typical range of three raises is examined for purposes of allowing economic optimization.

Armourdale

The flood damage reduction components of the Armourdale unit primarily consists of earthen levee and floodwall. During the 1993 flood event, water crested near the top of the floodwall and earthen berms at the lower end of the Kansas River (downstream near the Missouri River). Preliminary analyses indicate that risk of overtopping is the primary concern with this

unit. A landside levee raise and floodwall modifications or replacements are engineering solutions that would increase overtopping protection. I-walls would be constructed on earthen berms where there is insufficient area for a landside levee raise. Structural evaluations are ongoing.

Central Industrial District

Similar to the Armourdale unit, the flood damage reduction of the CID unit primarily consists of earthen levee and floodwall. The majority of floodwall on the Kansas portion of the CID was constructed on concrete and timber piles. Preliminary pile strength and risk computations showed that these walls may have significant risk under extreme load conditions or have been raised to their maximum level as authorized by the 1962 mod. Under prior projects, the section of floodwall that extends upstream from the Chicago, Rock Island and Pacific Railroad Bridge to the end of the unit near the Seventh Street Bridge was raised and buttressed. The floodwall raises at the time of construction may have been considered the maximum that was possible without replacing the existing floodwalls.

The Missouri portion of the CID unit contains two concrete floodwalls constructed on concrete piles that are separated by the Hannibal Bridge. Preliminary analyses have not found geotechnical or structural deficiencies. Therefore, the preliminary determination is that the modification or replacement of these floodwalls is not required.

East Bottoms

Consultation with local industry within the East Bottoms levee unit protected area revealed that serious flood fighting activity was conducted during the 1993 flood event, particularly between Stations 365+00 and 435+00. Property owners inside of the levee at this location reported multiple sand boils with large areas of excessive seepage. Landside piping (see glossary) was reported to measure 20 feet in diameter. The 1993 flood did not reach the top of the levee in this area. However, a full head of water pressure to the top of the levee may have lead to catastrophic underseepage failure of this area and all other areas inside the East Bottoms unit. High river stages on the Blue River could most certainly result in full head on the section of the East Bottoms levee that aligns with the Blue River. The Blue River has historically risen as rapidly as 4 feet per hour. High water event observations, underseepage analysis and soils data indicate that reliability improvements in the form of underseepage control would be the required solution for the East Bottoms unit.

Fairfax-Jersey Creek Board of Public Utilities Floodwall

During the 1993 flood event, water crested approximately 3 feet below the top of the BPU floodwall located between stations 287+85 and 302+32. No visible deformations of the floodwall were observed. This floodwall is constructed on a pile foundation. Field tests were conducted to ascertain the reliability of the floodwall. Pile capacity analysis, pile strength analysis and risk computations determined that pile capacity and strength become unacceptable as water elevations meet and exceed elevations of the 1993 event. Therefore, foundation modifications or floodwall replacement/modification would be required to achieve an acceptable pile capacity and strength for floodwall integrity and safety during high flow events.

Fairfax-Jersey Creek Sheetpile Wall

The sheetpile wall that supports the riverside foreshore located between Stations 23+30 and 29+99 is visibly deteriorated and its reliability is questionable. The integrity of the sheetpile wall was assessed by URS Corporation to determine the existing condition of the wall. The evaluation identified failure of the tieback connections and extensive rusting of the structure (URS Corporation, 2004). An evaluation of the wall by the Corps determined that the foundation of the wall consisted of sands, and that the wall is passively stable without the tieback connections (Corps, 2004).

The scour potential of the Missouri River was realized during and after the Great Flood of 1993. The scour potential along the sheetpile wall was determined using USGS stream measurements taken before and after the 1993 flood to calculate the change in mean bed elevation. A scour depth of about 5-feet can be expected to occur along the sheetpile wall during severe flood events.

The risk of sheetpile wall failure was modeled and its reliability during a high water event was determined questionable. A high water event similar to 1993 would result in riverbed scour and channel degradation proportionally to the sheetpile wall and subsequent sheetpile wall failure. By the time wall failure could be detected, channel velocities would rapidly remove the foundation sands behind the wall. The rapid removal and undermining of sand bank materials would then result in failure of the foreshore bank and interior flood damage. Thus, there exists a sufficient risk of failure to consider design solutions to strengthen this portion of the Fairfax-Jersey Creek levee unit.

Fairfax-Jersey Creek Downstream Tieback

Project sponsors have requested that the Corps review the possibility of making a permanent tieback improvement at the extreme lower end of the Fairfax-Jersey Creek unit. Original project tieback measures have been compromised over the past decades. Tieback improvements may involve a short segment of 3 ft high floodwall or embankment under the Lewis & Clark viaduct area. Tieback improvements may be included as a Phase II action. The analyses conducted for this feature and resulting recommendation will be included in the Final Interim Feasibility Report and the Final Environmental Impact Statement.

North Kansas City – Harlem and National Starch

Property owners within the protected area of the levee from Station 210+00 to Station 275+00, which includes both the Harlem area and the National Starch site, reported serious floodfighting activity during the 1993 flood event. Excessive water pressures below pavement and building slabs resulted in uncontrolled piping of silt foundation blanket materials. In one building near the National Starch property, a standpipe was constructed to offset the excessive water pressure and reduce the piping potential. In another location inside of the National Starch property, sewer piping collapsed resulting in the creation of multiple sinkholes inside the protected area. The 1993 flood did not reach the top of levee in these problem areas. A full head to the top of the levee may have lead to catastrophic underseepage failure of this area and all contiguous areas inside of the North Kansas City levee unit. Similar to the East Bottoms unit, underseepage analysis and soils data indicated that effective reliability improvements in the form of underseepage control would be the required engineered solution.

Birmingham Levee Unit

Findings for the Birmingham unit in regards to overtopping, geotechnical and structural reliability indicate that this unit adequately complies with the authorization intent. This unit's performance was also determined reliable in respect to the performance level of the other units within the overall system. The current Birmingham levee unit reliability is consistent with the planning objectives of the feasibility study. Therefore, the no action alternative is the preferred alternative and no Federal improvements are recommended. Continued operation, maintenance and repair will be periodically conducted to maintain the reliability of this levee unit.

1.4 Authority

This study is being conducted under the authority provided by Section 216 of the 1970 Flood Control Act. This Act provides authority to reexamine completed civil works projects. Section 216 reads as follows:

> *"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects, the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to the significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying structures or their operation, and for improving the quality of the environment in the overall public interest."*

Section 216 of the 1970 Flood Control Act provided continuing authority to examine completed Federal projects to determine whether the projects are providing benefits as intended.

1.5 Prior Studies

Several studies and reports have been completed pertaining to the study area and surrounding areas. These reports were used to gather information regarding the levee units and past flood events.

Operation and Maintenance Manuals:

- Argentine Unit, August, 1979
- Armourdale Unit, December, 1979
- Birmingham Unit, June, 1956
- CID KS Unit, July, 1980
- CID MO Unit, March,1981
- East Bottoms Unit, January, 1978
- North Kansas City Unit, August, 1976
- North Kansas City Unit (Lower Section), September, 1978

Flood Plain Information Report, Kansas River, Kansas, Junction City to the Mouth, Kansas City District, U.S. Army Corps of Engineers, April 1956. This report evaluated flood hazards along the Kansas River from Junction City downstream to the confluence with the Missouri River in Kansas City, Kansas. This document examines the hydrology and hydraulics of the Kansas River Valley.

Review Report on the Kansas River, Appendix IV, Hydrology, September 1960. This report examines the hydrology on the Kansas River as part of the extensive study to review the adequacy of the Kansas River and downstream flood damage reduction systems. This study was authorized by Congress in 1953.

Senate Document No. 122, 87th Congress, 2nd Session, Kansas River and Tributaries, Kansas, Nebraska and Colorado, U.S. Army Corps of Engineers, August 1962. This is the final report submitted to Congress, which reviews the Kansas River and tributaries, Kansas, Nebraska, and Colorado, which was requested by resolution of the Committee on Public Works, United States Senate, adopted on August 20, 1953 and June 16, 1954.

The Great Flood of 1993 Post-Flood Report, Lower Missouri River Basin, Kansas City District, U.S. Army Corps of Engineers, September 1994. Appendix E of this report covers floods that occurred within the boundaries of the Kansas City District from March through August of 1993. The report presents a picture of the Great Flood of 1993 to be used in the analysis of the flood damage reduction system on the lower Missouri River and Tributaries.

Annual Report of Reservoir Regulation Activities, Summary for 1997-1998, Kansas City District, U.S. Army Corps of Engineers, Water Control Section. This report summarizes the 1997-1998 regulation activities at storage projects operated for flood control under direction of the Corps of Engineers, within the boundaries of the Kansas City District.

1.6 Project Sponsors

Sponsorship of the Kansas Citys Local Flood Damage Reduction Project is dispersed among five non-Federal sponsoring organizations as shown in Table 1-1.

Table 1-1. Kansas Citys Local Flood Damage Reduction Project non-Federal Sponsors

Argentine	• Kaw Valley Drainage District
Armourdale	• Kaw Valley Drainage District
Birmingham	• Birmingham Drainage District
Central Industrial District (MO & KS)	• City of Kansas City, Missouri • Kaw Valley Drainage District
East Bottoms	• City of Kansas City, Missouri
Fairfax-Jersey Creek	• Fairfax Drainage District • Kaw Valley Drainage District
North Kansas City	• North Kansas City Levee District • City of Kansas City, Missouri

1.7 Cooperating Agencies

The United States Environmental Protection Agency (USEPA) is a designated cooperating agency for this study. The USEPA Region VII provided hazardous, toxic, and radioactive waste (HTRW) data and mapping, air quality information, an Environmental Justice evaluation in accordance with Executive Order 12898, an EIS mailing list for public involvement and environmental justice purposes, and DEIS review.

1.8 Agency Consultation

An agency scoping meeting was held at the Kansas City Federal Building on August 7, 2003. A total of 35 individuals from local, state, and federal agencies and organizations attended. Six comments were received from this meeting and three additional letters were received during the scoping period from agencies. The comments and the Corps' response to these comments are located in Appendix B.

In accordance with the Fish and Wildlife Coordination Act (FWCA) as amended, the Corps has consulted with the United States Fish and Wildlife Service (USFWS) throughout the course of this study. The USFWS provided scoping comments, existing conditions information, and alternatives evaluations. The Planning Aid Letters (PALs), draft and final FWCA reports and supplement letter received from the USFWS and Corps responses are included in Appendix C. The final FWCA report (FCAR) is herein referred to as the coordination report (CAR) within this FEIS.

1.9 Public Involvement

1.9.1 Public Meetings, Public Notices, and Comment Period

A mailing list was complied that consisted of members of government agencies, nongovernmental groups, businesses, legislators, local governments, and interested citizens to inform the public of the proposed project. In addition to the Corps mailing list, the USEPA provided an additional mailing list for public involvement and environmental justice purposes. This combined mailing list was included in Section 7 of the DEIS.

The notice of intent (NOI) to prepare an environmental impact statement was published in the *Federal Register* on January 10, 2001 (Appendix D). A public scoping meeting was held at the North Kansas City Community Center on August 20, 2003. A total of 43 individuals including citizens, news media personnel, and government agency representatives attended the meeting. Ten comments were received during the public scoping comment period via email, the scoping meeting, and letters. The comments and the Corps' responses to these scoping comments are located in Appendix B.

The notice of availability (NOA) for the draft environmental impact statement (DEIS) was published in the Federal Register on June 2, 2006 (Appendix D). Public meeting announcements were published in the Kansas City Star (June 2, 2006) and the Lawrence Daily Journal-World (June 2, 2006) and posted on the Kansas Citys Levees project website (http://www.nwk.usace.army.mil/projects/7levees). Notification of the public meeting was sent to the entities and individuals on the EIS mailing list. Public meeting legal notices are located in Appendix D. The public meeting was held at the Reardon Center, Kansas City, Kansas on July 13, 2006. A total of 49 individuals including citizens and governmental agency representatives attended the public meeting.

The draft Feasibility Report and DEIS were made available on the project website, at local libraries, and via mail upon request. Comments on the draft interim feasibility report and the DEIS were received during a 45-day comment period via email, the public meeting, and letters. The comment period ended July 17, 2006. Comments were received from agencies,

tribal governments, organizations and individuals. Comment from tribal governments and governmental agencies included the Osage Tribe of Oklahoma, Pawnee Nation, Missouri Department of Conservation, Kansas Department of Wildlife and Parks, Kansas Department of Health and Environment, US Environmental Protection Agency, Natural Resources Conservation Service, Federal Aviation Administration, US Department of the Interior, US Coast Guard, Missouri Department of Natural Resources, Kansas Department of Transportation, and Kansas City, Missouri Parks and Recreation Department. Photocopies of these comment letters on the DEIS from agencies and tribal governments and Corps responses are located in Appendix E.

1.9.2 Public Comments and Responses

The Council on Environmental Quality (1978) guidelines for implementing the National Environmental Policy Act requires agencies to respond to "substantive" comments. For this project a comment is considered substantive if it meets any of the following criteria:

- It questions, with reasonable basis, the accuracy of information.
- It questions, with reasonable basis, the adequacy of environmental analysis.
- It presented reasonable alternatives other than those proposed in the plan.
- It would cause changes or revisions in the preferred alternative.

During the public involvement process, over 150 comments were received from individuals and community organizations. The vast majority of their comments addressed the need for increased public access and recreational opportunities along the Kansas and Missouri, which primarily included the inclusion of hiking and biking trails in and along the riverfront and levees. Representative comments from individuals and organizations and Corps responses are located in Appendix E. Some individuals and organizations expressed ideas that were outside the scope of this project. This input is important to the Corps, and where applicable, it can be taken into account in future plans. However, no response is provided to out-of-scope comments.

Many of the pro-access comments were similar and the issues identified by these comments are summarized below.

1) Issue: Levee districts, which depend to a large degree on public funding, should allow general public access to riverfront areas via trails. Allowing public access via trails is one of the best ways for levee districts to enhance public use of the watercourse.

2) Issue: By allowing public access to levees, security will improve (*Security concerns are often cited by levee districts when discussing public access to levees*).

3) Issue: Trails are important for health, the economy, and tourism of Kansas City.

4) Issue: Constructing new levee trails are an important part of larger plans to connect other interstate trails to Kansas City. River crossings and connection with new levee trails are an important part of the four-state trail plan to connect St. Louis, Kansas City, Topeka, St. Joseph, and Omaha.

Although public trail access has been raised as a public interest within the project area, there are no significant agency or public objections, or unresolved issues regarding the proposed Recommended Plan. If local trail proponents desire a local (limited Federal involvement) approach to trail implementation, then recreational proponents must continue to meet with the officials of the local levee districts and further seek some mutual understanding of the constraints and opportunities associated with recreational opportunities. To be successful, this discussion must lead to agreement on the local financial responsibility for the operation and maintenance costs associated with trail implementation. Such discussions should recognize the range and numbers of flood protection facilities and access requirements for the specific levee unit. If agreement on a potential local trail plan is reached by all parties, then the individual levee districts must formally submit to the Corps a request for technical review of the locally-developed trail plan. The Corps technical oversight review would identify any components of the proposed plan that might compromise operation, maintenance, or performance of the levee system in accordance with its primary function to provide flood protection to the areas behind the levee.

During this feasibility study, the Corps has sought to ensure that, as practical, the Recommended Plan does not preclude future development of recreational opportunities. The implementation timing of the Recommended Plan should be considered by local trail proponents. The Corps supports beneficial and compatible recreation development in the Metropolitan area, including trail systems that interconnect the region. The Corps will continue to work with recreation interests and the levee districts to facilitate better mutual understanding and cooperation where possible.

1.9.3 Kansas City District Corps of Engineers Statement Regarding Public Access to Levee Properties in the Kansas Citys Local Flood Protection Project

Several public comments received during the feasibility study recommend the development of recreational hike/bike trails on the existing levee system. These comments ranged from stating that the Corps should encourage or facilitate the development of a recreational hike/bike trail system on the existing levees to the Corps should fund trails on the existing levee system or even require that levee districts construct or allow trails on the existing levee system.

Several commenters provided examples where hike/bike trails were located on Federal levees. Some commenters noted that locating hike/bike trails on the levees would emphasize Kansas City's tie with the two river systems that have played such a major role in the development of our community. They also noted that the recreational trail system could actually increase support for, and awareness of, the benefits provided by the existing levee system. Commenters also noted the aesthetic benefits associated with the river and adjacent riparian timber. The following provides the Kansas City District's position regarding public access and levees and how a recreational component (hike/bike trails) was considered during this study:

1. The Corps is neither a proponent of, nor an opponent to, the incorporation of a recreational trail system into any given levee unit. The Corps has no authority to require that levee districts construct or allow recreational hike/bike trails on the existing levee system. In the Kansas City District, the local sponsors own and operate the Federal levees that the Corps of Engineers

constructed. The local sponsors (in some cases drainage districts, in some cases municipalities) pay for the maintenance of those systems. In other parts of the nation, this is not always the case. Therefore, the circumstances of other Federal levee systems are not necessarily analogous to the circumstances within the Kansas City District.

2. The Corps of Engineers does not own the levee units but monitors for compliance the operation and maintenance of the levee system in cooperation with the local levee districts. This oversight is primarily to ensure that the existing levee system will perform as designed during a flood event. The Corps makes annual inspections of each levee unit and reviews plans submitted by the levee districts for work on or adjacent to the levees. The standards used as basis for this oversight and inspections are contained in the following referenced citations: TITLE 33-NAVIGATION AND NAVIGABLE WATERS, Chapter II – Corps of Engineers, Department of the Army, Part 208 – Flood Control Regulations, MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS. In summary, Part 208 emphasizes efficient operation and maintenance of levees, floodwalls, drainage structures, gates, valves, floodways, channels, pumping plants, and other flood control facilities. Failure of a levee district to maintain the levee unit in a manner consistent with the operation and maintenance manual or to allow modification on or adjacent to the levee without the required engineering review and approval from the Corps could result in that levee unit being ineligible for Federal funds for repairs should it be damaged during a major flood.

3. Currently, within the Kansas City District there are recreational hike/bike trails at the Federal levee units in both Lawrence and Manhattan, Kansas. These trails provide numerous recreational opportunities and both receive fairly high usage and are popular in their communities. However, the levee systems in the Kansas City metropolitan area are in many cases immediately adjacent to extensive industrial development, utilities, and transportation infrastructure. Given the ongoing Global War on Terror and associated security concerns, there are several industrial complexes, key utilities, and transportation lines adjacent to the levee systems that would be sensitive to increased public access.

4. Concerns have been raised by the levee districts regarding the following: liability, litter/dumping; trespassing on adjacent landowners; security of businesses; damage or vandalism to levee structures; erosion of the levee embankment; sources of funding for operation and maintenance of the trail; and conflicts between recreational users and relatively frequent operation and maintenance work on the levees. An additional concern of the levee districts is that the primary purpose of the levee system would be subordinated by adding another purpose. The Kansas Citys levee system provided significant protection of the economic investment in our community during the Great Flood of 1993. This line of protection has saved lives, prevented billions of dollars in physical damages, and maintained economic and employment opportunities for a large vital portion of the metropolitan area. The levee owners and the constituents they serve remain adamant that the primary reason for the existence of this critical infrastructure must remain a central focus.

5. The Kansas City levees feasibility study was authorized under Section 216 of the 1970 Flood Control Act, which provides authority to reexamine completed civil works projects. The feasibility study as currently constituted is an engineering focused study that reviews the existing

engineering features to identify and make flood risk reduction recommendations. An extensive recreational study (necessary for any significant Federal involvement in recreational recommendations) is not included within the current cost share funding.

6. At this time, it is the Corps' understanding that funding arrangements for the operation and maintenance costs associated with the implementation of a levee trail system have not been fully agreed upon by trail proponents and the levee districts involved with this study. Neither has any formal proposal for a recreational/trail study (to include Federal (Corps) involvement) been presented to the Kansas City District. In a study authorized under Section 216 a dollar amount up to 10% of the total project cost can be utilized for recreational development. This would include study, design, and construction costs. The costs of a proposed recreational development are shared with the local sponsor on a 50% local and 50% Federal basis. There is currently no authority for the Corps to fund a recreational component on the levee system at 100% Federal costs. The development of a reasonable local financing plan that addresses recreational study, design, construction, and operation and maintenance costs is a necessary prerequisite for Corps involvement in any proposed trail action.

1.9.4 Local Levee District Access Policies

Fairfax Drainage District

Numerous maintenance activities occur within the Fairfax Drainage District. The levee right of way, flood protection features, transportation infrastructure and utility crossings must be maintained by the Fairfax Drainage District and other authorized entities in accordance with governing criteria. Many pump stations are located along the line of protection that require regular maintenance. In addition to pump station operation, maintenance and repair, the District performs regular weed control, relief well testing, access road maintenance and high voltage electrical equipment inspection and maintenance.

Other infrastructure maintenance activities are conducted by authorized and permitted entities such as: Union Pacific Railroad for track maintenance and train operation; Board of Public Utilities for high voltage line and transformer inspection and maintenance, power pole replacement, and utility meter reading; Williams Pipe Line for maintenance of an interstate high pressure gas transport line; Conoco-Phillips for monitoring and environmental cleanup activities; and KDOT & MoDOT for maintenance of overhead twin 7th Street Bridges.

These authorized maintenance and operational activities are deemed essential to keep transportation and utility infrastructure in compliance with governing safety and operational regulations. Recreational activities are not permitted on Fairfax Drainage District properties because it is felt that public access would compromise the safety and maintenance precautions currently in place. Open levee access is unacceptable to the District as it will leave the District subject to property damage and open to liability for the safety of those who may venture onto, or off of the levee.

Kaw Valley Drainage District

Some Kaw Valley Drainage District properties may be able to accommodate recreational uses under certain authorized circumstances. However, general public access and use of levee roads, which are the center of inspection and maintenance activities, would not be permitted

under any circumstance due to safety concerns. District and authorized maintenance vehicles log approximately 94 miles on the levee roads each day. Currently, the District allows only a limited number of authorized users including utilities, railroad, and operation contractors on the levee roads.

Industrial property owners adjacent to the levees include chemical plants, manufacturing plants, and railroads. These property owners have expressed concern to the District about security and activities on or near the levees. These industrial property owners are routinely consulted before any activities on or near the levees are authorized for purposes other than routine maintenance.

North Kansas City Levee District

For security and liability reasons, any contractor, utility or other individual who desires access to North Kansas City Levee District right-of-way must have an approved *Temporary Access Permit*. Permit applications are processed by contacting the Secretary to the Board Supervisors or an access request can be downloaded at www.nkclevee.com. Applicants are required to submit their name, contact information, a description of the proposed work, drawings and specifications as applicable, a $1000 permitting fee, and a Certificate of Insurance naming the District as an additional insured party. Permit applications are subject to review and approval by the levee District Engineer, Secretary to the Board, and the Board of Supervisors.

1.9.5 Existing Project Area Recreational Activities and Developments

The following summarizes recreational activities and projects occurring in or near the Kansas Citys levees project area. These activities and developments are sponsored and funded by Federal, state and local government agencies and local organizations. Many of these recreational projects and activities are supported in some form by the local levee districts.

Kansas State School for the Blind

The Kaw Valley Drainage District provides levee access to the Kansas State School for the Blind so students can use floodwalls for artistic displays.

Armourdale 5K Run/Walk

The Armourdale 5K Run/Walk is sponsored in association with the Armourdale Renewal Association's Parade which is held every 5 years to celebrate the recovery from the 1951 flood. This year (2006) was the 55th year since the 1951 flood and the inaugural year for the 5K Run/Walk event. The event had approximately 30 participants and started at 18th and Kansas Ave near the Proctor and Gamble Manufacturing facility with a 1 ½ mile up and back route located along the Armourdale Levee Unit. The Kaw Valley Drainage District supported and authorized public access for this event.

Cancer Action 5K Run

The Fairfax Drainage District provides support for the annual Cancer Action 5K Run that takes place on public roads in the Fairfax Industrial District.

Boulevard Brewing Company Brew to Brew Run
The Boulevard Brewing Company sponsored their 12th annual Brew to Brew Run in March, 2006 to benefit the Cystic Fibrosis Foundation. The 44-mile relay begins at Boulevard's Kansas City Brewery and ends at the Free State Brewery in Lawrence, Kansas. The Kaw Valley Drainage District authorizes access to portions of the Argentine and Armourdale levee units to facilitate this fund-raising event.

Berkley Riverfront Park
This new 17 acre park is located near the downtown and river market area along the right bank of the Missouri River. Plans were recently proposed by the Port Authority of Kansas City to enhance the park with an increase in the size of the green lawn for festivals and to create a 1.5 acre natural amphitheater with seating for up to 5,300 people. The new design will enhance the park as a regional destination for festivals and for visitor access to the river.

Kaw Point Lewis and Clark Historic Park
The new Lewis and Clark Historic Park at Kaw Point (just upstream of the confluence of the Kansas and Missouri Rivers) provides opportunities for public access to the Missouri and Kansas River confluence area. The first phase of the park is now complete and includes a public boat launch facility. Habitat preservation and enhancement is encouraged by designated walking trails and associated signage. Historical interpretation and visitor support services are also provided. When entirely completed, the Kaw Point park will be tied to the regional trail system with a lawn amphitheater, Lewis and Clark Pavilion, Discovery Expedition encampment and scenic overlook. Access to the park is provided by the Kaw Valley Drainage District and the Fairfax Drainage District. Both Districts also assisted with preparations for the Lewis and Clark bicentennial celebration.

Kansas and Missouri River Clean-Up Efforts
The Kaw Valley Drainage District provides authorized public access for clean-up of the Missouri and Kansas Rivers. In October 2005, Kaw Point Park was the center of a major bi-state river clean up effort coordinated by the Missouri River Relief organization with support from numerous local, state and federal agencies and organizations. The clean-up effort included 356 volunteers who removed seven tons of trash along 14 miles of the Missouri River and 2 miles on the Kansas River. In addition to this effort, local environmental groups are provided authorized periodic access for clean-up along the lower banks of the Kansas River.

Riverfront Heritage Trail
The Riverfront Heritage Trail is currently under development and includes a bi-state nine mile corridor of green spaces, pedestrian and bicycle paths, historical markers, and public artworks designed to link and enhance the historic, cultural and recreational resources to the Kansas City's downtown riverfront. The Spirit of Kansas City Regional Scenic Byway will interweave an auto route with the Riverfront Heritage Trail. Trailheads will provide easy access for the driver to stop, park and then cycle or walk the Heritage Trail System. Funding for the Heritage Trail project has come from numerous sources including both Missouri and Kansas Departments of Transportation, EPA, City of Kansas City Missouri, Unified Government of Wyandotte County, Kansas City, Kansas, and numerous private funding sources. This trail system is strongly

supported by the City of Kansas City, Missouri. The City provided several designated public access points along the area between the CID-Missouri and East Bottoms levee units.

Missouri River Canoe and Kayak Race
A canoe and kayak race across the State of Missouri "The Missouri River 340" was held August 2 - 6, 2006. The race started near Kaw Point and ended in St. Louis, Missouri. This was the first annual race event for canoeists and kayakers on the Missouri River.

Annual American Royal Barbecue and Fireworks Display
The City of Kansas City, Missouri (Missouri portion of the CID) and the Kaw Valley Drainage District (Kansas portion of the CID) provides support and shared property and facilities use with the American Royal during the American Royal Barbecue and Fireworks Display. A fireworks display is conducted from the Armourdale unit. The American Royal Barbecue is the opening event of the American Royal. Spread over 20 acres in Kansas City's historic Stockyards and Central Industrial District, the contest has nearly 500 teams competing in four culinary contests. The Royal is the largest barbecue contest in the world and draws both national and international contestants and barbecue enthusiasts.

American Royal Horse Riding Association
The Fairfax Drainage District provides authorization for the American Royal Horse Riding Association to conduct their organized horseback ride along the Fairfax levee from Atchison, Kansas to Hale Arena in Kansas City, Missouri.

Kansas City Rowing Club Boat House and Dock
The Kaw Valley Drainage District has provided authorized access for the Kansas City Rowing Club boat house and dock facility along the Kansas River for the past 17 years. The boat house provides storage of kayaks and boats for both members and non-members that use the Kansas River for recreational rowing. Rowing events are scheduled for all age groups throughout most of the year. The all-volunteer Rowing Club provides rowing opportunities to residents of the Kansas City metropolitan area. The club is a member of the United States Rowing Association.

1.10 Concept Proposal for Recreation Study

The Corps is neither a proponent, nor an opponent to, the incorporation of a recreational trail system into any given levee unit. The Corps recommends that local entities initiate a separate recreational/trail study that fully addresses issues such as determining the most appropriate river access points given the need for maintaining an adequate flood protection system, levee district property rights and adjacent property ownership concerns, public safety and security, life-cycle funding, and which quantifies and compares the costs of implementation in regards to economic, recreational, and quality of life benefits of various alternative plans. The study should consider the following planning factors:

- General public access versus limited use for organized activities. The levee districts in many cases currently support authorized organized recreational access.

- Analysis of proposed trail purpose. A trail purpose (or purposes) should be designated and include the type of trail (hike/bike/equestrian, etc.), number of expected users, and an

analysis of compatible versus incompatible use. Potential trail use by persons who desire to engage in additional forms of recreation such as hunting and off-road use should be addressed. Determinations should be made in concert with public involvement regarding one- or two way traffic, allowing dogs or other pets onto trails, and similar considerations. If this type of analysis is not accomplished, then the potential for trail use conflicts will arise (trail use conflicts has proven to be a major problem in other areas when general public access is made available).

- Trail Design. Trail material alternatives and maintenance requirements should be examined to determine feasibility and cost. The need for, and proposed locations of, potential trail amenities such as trash cans and rest rooms should be addressed.

- Develop a proposed trail location and implementation timetable: Evaluate various implementation alternatives. If it is determined that a trail should be divided into segments for study purposes, funding, or implementation, then the segments should be prioritized.

- Examine other recreational uses and forecast desired or potential recreational enhancements or future facilities including, but not limited to: rest areas, new trail alignments, canoe portages, aesthetic improvements, conversion of surface (i.e. grass to granular stone), construction of ramps or amenities for persons with disabilities, parking lots, picnic tables, lighting, reflective tape or markers, signage, etc. This should also include an assessment of potential recreational impacts to levee function and maintenance requirements, existing natural habitat and historic resources, and affects on surrounding communities.

- Safety and Security. A comprehensive analysis of potential safety and security hazards associated with any proposed increase in recreational use must be conducted. This would include at a minimum, an assessment of potential trail-use hazards such as steep unprotected slopes, erosion and erodible soils, open pits and vaults, hazardous utility crossings (especially interstate electrical and gas lines), hazardous waste locations and restrictions, railroad operational hazards, the potential for inadvertent chemical and biohazard release, and the continuing use of levee roads trails by numerous types of maintenance and construction vehicles. A history of criminal activity within proposed recreational areas should be evaluated, along with the potential for personal or property crime if general public access were granted. The costs associated with mitigation or reduction of these potential hazards should be developed in concert with recognized risk control and legal liability specialists.

2. Alternatives

2.1 Overview

To determine the adequacy of the existing flood damage reduction system hydraulic, geotechnical, structural, and risk and uncertainty analysis was conducted. The results of these analyses, and observations and effects of historic and recent flood events, were used to formulate the engineered solutions and technically feasible alternatives that could improve the flood damage reduction reliability of each respective levee unit.

Alternatives to achieve the project purpose of improving the reliability of the Kansas Citys protective works were identified at the beginning of the planning process. These alternatives were screened and refined throughout the planning process and additional alternatives were examined. Alternatives were analyzed and compared in consideration of completeness, efficiency, effectiveness, acceptability, and risk and uncertainty. Alternatives were also evaluated and compared for maximizing benefits to the National Economy and their impact on the environment. The plan with the highest net benefits is considered the NED plan, assuming technical feasibility, environmental soundness, and public acceptability (USACE, 1988).

2.2 Non-preferred Alternatives by Levee Unit.

2.2.1 Argentine Levee Unit

Kansas River Tree Removal. The existing levees along the Kansas River are the result of 1962 modifications of the original levee designs. The 1962 modifications were a result of the overtopping of the Kansas Citys units along the Kansas River in the 1951 flood. The left and right overbanks along the reach extending from river mile 3.5 to the upstream end of the Argentine unit have become overgrown with mature trees, thereby reducing the conveyance of the Kansas River from the 1962 design. The alternative of removing all of the trees throughout the Kansas Citys reach of the Kansas River (at least 185 acres) was investigated to determine the potential reduction in water surface profiles by restoring the Kansas River channel to a condition similar to that of 1962. The Corps' Hydraulic Engineering Center's River Analysis System (HEC-RAS) computer modeling was used to estimate the effectiveness of tree removal on the hydraulics of the Kansas River. Modeling results indicated that a limited improvement of conveyance is possible with the tree removal alternative. Tree removal would adversely impact riparian habitat availability along the lower Kansas River levee units. According to the USFWS CAR, riparian woodland is a high value habitat and the clearing of riparian vegetation would significantly damage fish and wildlife resources and their habitat and that compensatory mitigation should be undertaken for unavoidable impacts (Appendix C). This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, tree removal did not receive further consideration.

Kansas River Tree Removal and Channel Modification. The channel modification alternative assumes that any channel modifications would include tree clearing. HEC-RAS modeling results indicated a limited conveyance improvement. Tree removal and channel modification would impact riparian habitat availability in the Argentine unit. As mentioned in the preceding paragraph, the USFWS regards riparian woodland as a high value habitat and it is

their opinion that the clearing of this resource would significantly damage fish and wildlife resources and their habitat and require compensatory mitigation (Appendix C). Similar to the tree removal only alternative, this alternative was considered less effective and less acceptable than other alternatives examined. Therefore, tree removal and channel modification did not receive further consideration.

Levee Raises. All of the proposed levee raises (nominal 500-year+0, nominal 500-year+3, and nominal 500-year+5) provide for overtopping reliability, stability and underseepage control improvements. The nominal 500-year+0 raise alternative would result in less land disturbance than the other raise alternatives. The nominal 500-year+5 raise alternative would result in a high degree of land disturbance, hazardous waste impacts, and building and railroad trackage relocations. The effectiveness of these alternatives increases as the levee height increases. However, the 500-year+3 raise is deemed the most efficient raise because it provides the highest net economic benefits at reasonable cost. As such, the other raises were not considered.

No Action. The no action alternative is unacceptable as it does not provide for overtopping and underseepage improvements to the existing line of protection. The Argentine levee unit protects a heavily industrialized and urbanized zone of Kansas City, Kansas, which includes chemical, petroleum, and transportation-related industry. The Argentine levee, at various locations along the existing levee, could fail as a result of not implementing structural or geotechnical measures, or overtopping reliability improvements. In the absence of Federal action addressing levee improvements, a high water event could result in the release of a variety of industrial chemicals and significantly impact the natural and human environment within and downstream of this unit. Levee failure would result in significant impacts to a water quality, fisheries and wildlife, extensive property damage and potential loss of human life. Significant impacts to the National economy could occur as one of the busiest railyards in the United States would be at least temporarily shutdown. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, the no action alternative did not receive further consideration.

2.2.2 Armourdale Levee Unit

The preliminary alternatives formulated for the Armourdale thus far are presented below. No alternatives have been screened out. Engineering, economic, and environmental analyses are ongoing. All of the alternatives formulated for this unit will be discussed in the final feasibility report (FFR) and the final environmental impact statement (FEIS).

Flood Fight. The flood fight alternative requires a stockpile of sandbags to be stored near areas with high uplift potential and areas observed in the 1993 flood to have a high probability of overtopping. However, floodfighting is an unreliable and unacceptable alternative compared to engineered solutions, as flood fighting would not prevent underseepage failure. Therefore, the flood fight alternative did not receive further consideration.

Landside Levee Raise and Floodwall Modification or Replacement. As discussed in section 1.2.2, the existing flood damage reduction of the Armourdale unit is primarily earthen levee and floodwall. Preliminary alternatives formulated for this unit include raise scenarios of

500+0, 500+1, 500+2, and 500+3. Floodwalls would be modified or replaced. I-walls would be installed near the top of the levee in areas of proposed levee raises with insufficient real estate for landside expansion. In addition to levee and floodwall modifications, these raises may include pump plant modification and/or replacement, and the installation of relief wells or a buried collector system to relieve underseepage pressures. No raise scenarios have been screened out for the Armourdale unit.

No Action. The no action alternative is unacceptable as it does not effectively provide for reliability improvements designed to prevent overtopping and underseepage failure of the Armourdale unit. Failure of this levee unit would result in significant impacts to the natural and human environment within, and downstream of this unit. Levee failure would result in the release of a variety of industrial chemicals adjacent and downstream of this unit that would cause significant impacts to water quality and fisheries and wildlife. In addition to economic impacts from business closures and property damage, Armourdale has a relatively high percentage of minority and low income residents and sensitive populations that would be significantly impacted by levee failure and the resulting business closures, property damage, and the potential loss of human life. Therefore the no action alternative did not receive further consideration.

2.2.3 Central Industrial District Levee Unit

The preliminary alternatives formulated for the CID-Kansas unit thus far are presented below. No alternatives have been screened out. Engineering, economic, and environmental analyses are ongoing. All of the alternatives formulated for this unit will be discussed in the final feasibility report and the final environmental impact statement (FEIS).

Flood Fight. The flood fight alternative requires a stockpile of sandbags to be stored near areas observed in the 1993 flood to have a high probability of overtopping. However, floodfighting is an unreliable and unacceptable alternative compared to engineered solutions, as flood fighting would not prevent underseepage failure.

Landside Levee Raise and Floodwall Modification or Replacement. The existing flood damage reduction of the CID unit is primarily earthen levee and floodwall. Preliminary alternatives for this unit include raise scenarios of 500+0, 500+1, 500+2, and 500+3 to improve overtopping reliability. Floodwalls would be modified or replaced. No I-walls would be installed for the CID levee improvements. Pump plants, relief wells, and a buried collector would provide underseepage control. No raise scenarios have been screened out for the Central Industrial District.

No Action. As its name implies, the Central Industrial District is a heavily industrialized unit that contains many businesses that conduct a variety of manufacturing processes. The no action alternative is unacceptable as it does not provide for overtopping and underseepage improvements to increase the reliability of the existing protection. The no action alternative could result in levee failure, which would significantly impact the natural and human environment within and downstream of this unit. Levee failure would result in extensive property damage, unemployment, significant impacts to water quality, fisheries and wildlife, and the potential loss of human life.

2.2.4 East Bottoms Levee Unit

Flood Fight. The flood fight alternative requires the storage of 4,000 sand bags on site to be placed in areas observed in the 1993 flood to have a high probability of underseepage risk. This alternative is the least expensive with no engineering effort required. However, floodfighting is an unreliable and unacceptable alternative compared to engineered solutions, as flood fighting would not prevent underseepage failure. Therefore, the flood fight alternative did not receive further consideration.

Sheetpile Wall. The sheetpile wall alternative would consist of installing approximately 232,500 square feet of sheetpiling down to bedrock (approximate 75 foot depth) along the riverside toe from Station 396+00 to 427+00 to control underseepage during flood events. This alternative would extend the seepage path of water that seeps through the soil to the toe of the levee, and construction could be completed within the existing right-of-way, outside of all existing SWMUs. However, sheetpile installation is a relatively expensive alternative that is less effective for underseepage control than the installation of pressure relief wells. In addition to the high expense of materials and labor, variable bedrock depth could complicate the installation process and considerably increase the cost of effectively implementing this alternative. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, this alternative did not receive further consideration.

Slurry Cut-Off Wall. This alternative would consist of constructing a 3-foot wide slurry wall to bedrock depth (approximately 75 feet) along the riverside toe from Station 396+00 to 427+00 to control underseepage during flood events. The variables associated with slurry cut-off wall construction are similar to sheetpile wall construction. This alternative would extend the seepage path of water that seeps through the soil to the toe of the levee, and construction could be completed within the existing right-of-way, outside of all existing SWMUs. A slurry wall is a relatively expensive alternative, and the costs associated with construction could greatly increase due to variable bedrock depth. The performance of a slurry cut-off wall is wholly dependent upon construction quality. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, the slurry cut-off alternative did not receive further consideration.

No Action. The no action alternative is unacceptable as it would not provide a means of controlling seepage through the levee. A high water event could result in conditions similar to those observed in 1993. Multiple sand boil formation, excessive seepage, and landside piping could compromise the integrity of the levee. The Blue River typically rises fast during high water events. If water reaches the top of the levee, particularly between stations 365+00 and 435+00, catastrophic underseepage failure of the levee could occur. Chemicals used in various manufacturing process chemicals could enter the Blue and Missouri Rivers, thereby impacting water quality, fisheries and wildlife. Levee failure could result in unemployment and adverse economic impacts on the regional economy. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, the no action alternative did not receive further consideration.

2.2.5 Fairfax-Jersey Creek Levee Unit

There are two features requiring flood damage reduction reliability improvements within the Fairfax-Jersey Creek levee unit. These include the Board of Public Utilities floodwall and the Fairfax-Jersey Creek sheetpile wall.

Board of Public Utilities Floodwall

Flood Fight. Floodfighting would be accomplished by sandbagging sections of floodwall displaced by floodwaters. Floodfighting is not considered a viable alternative because it is not an effective solution for potential floodwall failure. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, the flood fight alternative did not receive further consideration.

New Floodwall. The existing floodwall would be perforated at utilities locations to provide more hydrologic control of the wall under extreme flood conditions. A new floodwall constructed landside of the existing floodwall would include a higher capacity pile system and stronger structural elements. The new floodwall would connect to the existing wall at utilities locations. There is a limited area available for new floodwall construction, primarily due to the extensive utilities located in the area of Stations 290+00 to 295+00. In addition to the limited space and numerous utilities relocations, a new floodwall would be very expensive due to the large amount of excavation, raw materials and labor required. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, this alternative did not receive further consideration.

Foundation Soil Modification with Jet Grouting. Jet grouting or pressure grouting is used in a variety of construction applications to modify soil properties, but it is not considered a long-term, viable solution for floodwall strengthening. Jet grouting was used on flood damage reduction features after the 1993 flood with very limited success. Due to the limited shear capacity of the existing concrete piles, the entire floodwall foundation (4,039 feet) would require grout injection. In addition to the questionable effectiveness of jet grouting, controlling the pressure of the injection to simultaneously achieve sufficient grouting without damaging existing utilities and water intakes would be difficult. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, this alternative did not receive further consideration.

Temporary Earthen Fill. This alternative consists of placing earthen fill behind the floodwall as water rises and removing it when high water recedes. Temporary earthen fill is not considered a viable alternative, because the weight of the fill needed for effective flood damage reduction would excessively stress the structural components of the wall. Therefore, this alternative did not receive further consideration.

Construct New Earthen Levee Adjacent to the Existing Floodwall.

Permanently establishing an earthen levee adjacent to the existing floodwall is not considered a feasible alternative due to insufficient space available for levee construction. Therefore, this alternative did not receive further consideration.

No Action. The no action alternative is unacceptable because it does not provide for improvements that would increase the structural reliability of the floodwall during a flood event. The Board of Public Utilities floodwall protects an energy production and drinking water treatment facility. In the absence of a Federal action, drinking water, utilities, Missouri River water quality, fish and other aquatic organisms could be significantly impacted by a failed floodwall depending on the extent of flooding. Floodwall failure would result in soil and portions of the floodwall entering the Missouri River. A high water event could also result in broken pipelines and the release of water treatment chemicals, waste and other deleterious material into the adjacent riparian area, wetlands, and waterway. Floodwall failure could also result in unemployment and the potential loss of human life. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, the no action alternative did not receive further consideration.

Fairfax-Jersey Creek Sheetpile Wall

Flood Fight. Although flood fighting is the least expensive alternative, it is not considered an effective solution because the reaction time to failure is considered unachievable. Based upon geotechnical risk analysis, catastrophic failure of the sheetpile wall would occur before any flood fight efforts could be mobilized to provide protection. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, the flood fight alternative did not receive further consideration.

Construct a Closed Cell Sheet Pile Wall Landside of the Existing Wall. New sheetpile would be driven landside of the existing wall by a crane and existing sheetpile would be removed at wall intersections. The open and closed cell designs are practical solutions, with the difference being cost and level of reliability. Closed cell construction is considered more reliable, but is more expensive than the open cell design due to the additional lengths of sheetpile required to close the cells. The open cell solution provides the reliability required at a lower cost for effective flood damage reduction. Therefore, this alternative did not receive further consideration.

Construct a New Wall Using Auger Cast Piles and Tiebacks. Piles would be placed landside of the existing sheetpile wall. A top cap comprised of concrete would be cast on top of the piles, and the tiebacks would be grouted into the soil. This alternative would incur construction costs much greater than the preferred open cell wall design due to the difficult procedures required to ensure internal tensioning of the support structures for proper installation. Therefore, this alternative is less acceptable than the installation of a closed cell sheetpile wall. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, this alternative did not receive further consideration.

No Action. The no action alternative is unacceptable as it would not provide a means to stabilize the land behind the existing floodwall. In the absence of a Federal action, scouring at the toe of the existing sheetpile wall could result in catastrophic underseepage failure of the wall during a high water event. Sheetpile wall failure would result in a large portion of the right bank of the Missouri River sloughing into the River thereby comprising the adjacent land and structures and impacting water quality and fish and other aquatic organisms due to an increase in sediment bed load and solids within the water column. Recreation could also be adversely

impacted by sheetpile wall failure. Kaw Point Park is located downstream of the sheetpile wall. A significantly greater construction effort, resulting in increased noise, dust, and emmissions would be required to repair the riverbank relative to just driving a new sheetpile wall. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, the no action alternative did not receive further consideration.

2.2.6 North Kansas City Levee Unit - Harlem

Flood Fight. Implementing the flood fight alternative would require stockpiling 2,000 sandbags to be placed in areas observed to exhibit high uplift during the 1993 flood. Floodfighting with sandbags is the least expensive alternative and it can be accomplished within the existing right-of-way. Floodfighting is not the preferred alternative for this levee unit, because it is not an effective solution for flood damage reduction. Sandbag placement would not effectively relieve underseepage pressures and uplift would continue during high water events. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore the flood fight alternative did not receive further consideration.

Landside Seepage Berm. Constructing two seepage berms measuring 200 feet wide and 350 feet wide, to control underseepage during a flood event is an effective and relatively reliable alternative. Direct construction costs associated with this alternative are moderate. However, indirect costs such as extending the right-of-way, conducting subsurface investigations, structural demolition, and relocating utilities, residences and businesses greatly increase the total cost and the logistics associated with this alternative. Constructing a landside seepage berm would disrupt the local community the greatest due to the short-term and long-term implications of implementing this alternative. This alternative was considered less effective and less environmentally acceptable than other alternatives examined. Therefore, this alternative did not receive further consideration.

Pressure Relief Wells. This alternative consists of installing stainless steel relief wells to a depth of approximately 75 feet along the levee toe about 200 feet apart. Relief wells would collect the seepage and portable pumps would be used to pump seep water over the levee via access provided by six manholes. A permanent right-of-way is not required as this alternative can be implemented with a temporary construction easement. Relief wells are a highly effective mechanism used to prevent seepage. However, pressure relief well performance is highly dependent upon the quality of construction, and the long-term maintenance costs associated with this alternative are greater than installing a buried collector system. Therefore, this alternative did not receive further consideration.

No Action. The no action alternative is unacceptable as it does not provide a means to control underseepage through the levee. In the absence of implementing the preferred alternative to control seepage through the levee, a high water event could result in conditions similar to those observed in 1993 for North Kansas City. Catastrophic underseepage failure of the levee would flood North Kansas City and release large amounts of sediment and manufacturing chemicals and materials into the Missouri River. Due to the major residential, commercial and industrial development in the City of North Kansas City, Missouri, the no action alternative could result in significant adverse affects to the economy due to unemployment and the potential loss of human life. Therefore, the no action alternative did not receive further consideration.

2.2.7 North Kansas City Levee Unit– National Starch

Flood Fight. The flood fight alternative requires a stockpile of 109,200 sand bags on site to be placed near areas that exhibited high uplift during the 1993 flood. Flood fighting requires the least short-term cost and this alternative does not require extending the existing right-of-way. However, flood fighting is not an effective solution as a high potential for flood damage remains after implementing this alternative. Therefore, the flood fight alternative did not receive further consideration.

Landside Seepage Berm. Landside seepage berm construction is a very expensive alternative with many negative aspects. A landside seepage berm is not as effective as pressure relief wells in relieving foundation pressures and the costs of extending the right-of-way, modifying structures, and relocating structures are very high. Additional considerations include:

- Structural demolition and disposal would require an assessment of the need for a regulated disposal site.
- Subsurface investigations would be required to identify blanket thickness for berm design refinement and to develop more reliable underseepage flow quantities for well design.
- National Starch plant operations could require a temporary shutdown, thereby potentially impacting the local community and economy.
- Land disturbance would total approximately 23 acres.

Because other alternatives were considered less expensive and more effective, this alternative did not receive further consideration.

Buried Collector System. A buried collector was deemed technically inadequate for this site because the significant underseepage pressures that have been observed at the site extend beyond the typical zone of influence of a buried collector. An alternative that increases the effectiveness of handling the underseepage pressures experienced at the National Starch site consists of pressure relief wells and a pump station. Therefore, this alternative did not receive further consideration.

No Action. The no action alternative is unacceptable as it does not provide for control of underseepage through the levee and the effective means to return seepwater into the Missouri River. Catastrophic underseepage failure at the National Starch site could result in flooding North Kansas City. Significant impacts to water quality and fish and other aquatic organisms would occur with the release of large amounts of sediment and manufacturing chemicals and materials into the Missouri River. Due to the major residential, commercial and industrial development in the City of North Kansas City, Missouri, the no action alternative could result in substantially adversely affecting the economy due to unemployment and the potential loss of human life. Therefore, the no action alternative did not receive further consideration.

2.2.8 Birmingham Levee Unit

The engineering analyses conducted for the Birmingham unit indicated that the overtopping, geotechnical and structural reliability of this unit adequately complies with the original authorization intent. Therefore, no alternatives were proposed for this levee unit. The no action alternative was considered the preferred alternative for the Birmingham levee unit.

2.3 Preferred Alternative by Levee Unit

The Recommended Plan is the combination of preferred alternatives for each of the levee units that provide effective overtopping and underseepage control. The selected alternatives for the levee units are presented below in Table 2-1. Descriptions of the preferred alternatives are discussed in sections 2.3.1 through 2.3.9.

Table 2-1. Levee Unit Preferred Alternatives

Levee Unit	Preferred Alternative
Argentine	Nominal 500+3 levee raise alternative including underseepage control measures.
East Bottoms	Pressure relief wells.
Fairfax-Jersey Creek Floodwall	Floodwall strengthening with an additional row of piles and a foundation slab extension.
Fairfax-Jersey Creek Sheetpile Wall	Open cell, driven sheetpile wall.
North Kansas City - Harlem	Buried collector system.
North Kansas City - National Starch	Pressure relief wells and a pump station.
Armourdale	The tentatively preferred alternative is the nominal 500-year+3 ft. levee raise with underseepage controls.
Central Industrial District	The tentatively preferred alternative is the nominal 500-year+3 ft. levee raise with underseepage controls.
Birmingham	No action alternative.

Section 102 of NEPA, 42 U.S.C. Section 4332 (1994) mandates that the Corps as an executive agency, comply with the policies set forth in the Act. The Corp's assessment of the compliance of the proposed Recommended Plan with applicable laws and regulations is presented below in Table 2-2.

Table 2-2
Compliance of the Recommended Plan with Environmental Protection Statutes and Other Environmental Requirements

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

NOTES:

a. Full compliance. Having met all requirements of the statute for the current stage of planning (either preauthorization or postauthorization).

b. Partial compliance. Not having met some of the requirements that normally are met in the current stage of planning.

c. Noncompliance. Violation of a requirement of the statute.

d. Not applicable. No requirements for the statute required; compliance for the current stage of planning.

2.3.1 Argentine Levee Unit

Nominal 500-year+3 Levee Raise Including Underseepage Controls.

The preferred alternative for the Argentine unit is the nominal 500-year+3 levee raise to improve overtopping reliability with pump station and levee improvements to increase stability and provide underseepage control. The nominal 500-year+3 levee raise alternative provides the greatest level of protection at the most economical cost and has been identified as the NED plan. Levee improvements consist of the modification or replacement of 3 pump stations followed by 6 different types of levee modifications to include floodwalls, I-walls, stoplog gaps, top cap raise, landside levee raise with berm, and landside levee raise with no berm (Figures 1-2 through 1-6). A rock toe would be constructed in areas of railbed congestion to avoid costly railbed displacement. Argentine levee unit improvements were primarily determined through existing conditions, underseepage and stability analyses, the avoidance of impacts to HTRW, and the avoidance of impacts to the Argentine riparian foreshore. The nominal 500-year+0 levee raise requires less land disturbance than the other raise alternatives as the toe of the new levee would not extend as far landward as the nominal 500-year+3 and nominal 500-year+5 alternatives. Less borrow would be required for this raise, and impacts to wetlands would be avoided. Wetland impacts are discussed in sections 3.2.2 and 4.11. Impacts to HTRW are avoided with the nominal 500-year+0 and are avoided or otherwise minimized for the nominal 500-year+3 raise alternative. The nominal 500-year+5 raise alternative would require more real estate, land disturbance, and potential HTRW impacts than the nominal 500-year+0 and nominal 500-year+3 raises. All of the raise alternatives avoid impacts to the Argentine foreshore.

2.3.2 Armourdale Levee Unit

The tentative preferred alternative for this unit is the nominal 500-year+3 landside levee raise, which includes underseepage control improvements, to provide equal levels of protection among the Kansas River units. The existing flood damage reduction of the Armourdale unit is primarily earthen levee and floodwall. This raise would include increasing the height of the existing earthen levee and floodwall replacement. I-walls would be installed near the top of the levee in areas of proposed levee raises with insufficient real estate for landside expansion. In addition to levee and floodwall modifications, this raise could include pump plant modifications and/or replacement, and the installation of relief wells or a buried collector system to relieve underseepage pressures. I-walls would be constructed in the levee crest. Floodwall excavation would occur up to approximately 50 feet landward of the toe of the existing levee. The placement of borrow soil would occur up to about 75 feet landward of the toe of the existing levee for the earthen levee raise.

2.3.3 Central Industrial District Levee Unit

The tentative preferred alternative is the nominal 500-year+3 landside levee raise, which includes underseepage control improvements, to provide equal levels of protection among the Kansas River units. The existing flood damage reduction of the CID unit is primarily earthen levee and floodwall. This raise would include increasing the height of the existing earthen levee and floodwall replacement. No I-walls would be installed for the CID levee improvements. Pump plants, relief wells, and a buried collector would provide underseepage control. The placement of borrow soil would occur up to about 75 feet landward of the toe of the existing levee for the earthen levee raise.

2.3.4 East Bottoms Levee Unit

Pressure Relief Wells. Relief wells would be installed along the toe of the levee between Stations 405+00 and 420+00 (Figure 1-9). This alternative is an augmentation to an existing collector system. Relief wells provide an effective solution to control underseepage that can be completed within the existing right-of-way. To perpetuate reliability, routine well maintenance would be conducted annually and complete well replacement would be required approximately every 40 years. Relief wells are a more cost-effective solution that requires less excavation and land disturbance than implementing a sheetpile wall or slurry cut-off wall as a preferred alternative. Relief wells and a buried collector system have a similar construction footprint and would result in an equitable land disturbance of about two acres. Although a buried collector system would be a more economical alternative, it does not meet technical requirements for this unit as relief wells can relieve pressure to a lower level than a buried collector system. Therefore, relief wells provide a higher level of protection against underseepage pressures and levee failure than a buried collector and are considered the environmentally preferred alternative.

2.3.5 Fairfax-Jersey Creek Levee Unit Board of Public Utilities Floodwall

Additional Row of Piles and Foundation Slab Extension. An additional row of auger cast piles would be installed on the landward side of the pile cap. A foundation slab extension would be implemented to facilitate pile installation. Additional piles and the slab extension would be installed the entire length of the existing floodwall between Stations 287+85 and 302+32 (Figure 1-10). The preferred alternative is considered the environmentally preferred alternative. This alternative requires less long-term land disturbance than a temporary earthen fill, as the fill would need to be placed during high water events and subsequently removed. Constructing a new earthen levee adjacent to the existing floodwall would require a similar degree of disturbance as the preferred alternative, as both of these alternatives would require construction along the entire length of the existing floodwall. Foundation soil modification with jet grouting would require less land disturbance than the aforementioned alternatives, but the long-term effectiveness of this alternative is questionable.

A new floodwall constructed landside of the existing floodwall would require a greater land disturbance than the preferred alternative due to a larger footprint required for construction and numerous utilities relocations. Pumphouse Number 1, an abandoned, historic structure that is potentially eligible for listing on the National Register of Historic Places (NRHP), would likely require demolition or receive incidental construction damage as a result of new floodwall construction.

All of the alternatives would require the basement of the abandoned pump house to be filled with sand and the lines grouted closed to prevent any water from backflowing into the basement from the water intake and damaging the structure.

2.3.6 Fairfax-Jersey Creek Levee Unit Sheetpile Wall

Open Cell Sheet Pile Wall Landside of the Existing Wall. The open cell design is the most economical alternative that provides the required flood damage reduction reliability. Sheetpile would be driven into the existing stability berm landside of the existing sheetpile wall between Stations 23+30 and 29+99 using a crane deployed on a barge (Figure 1-11). A driven

sheetpile system forgoes the need for tieback anchors, thereby reducing the cost of this alternative, and decreasing the amount of land disturbance required for construction. The open and closed cell sheetpile wall designs require a similar land disturbance for installation, so either could be considered the environmentally preferred alternative. Using an open cell sheetpile wall as the preferred alternative is more economical than both the closed cell sheetpile wall design and constructing a sheetpile wall using auger cast piles and tiebacks, while providing wall stability and flood damage reduction reliability.

2.3.7 North Kansas City Levee Unit - Harlem

Buried Collector System. An underground water collection system consisting of perforated pipe would be installed the full length of the levee between Stations 212+00 to 239+40 along the landside toe to intercept seepage (Figure 1-12). Six manholes would be placed along the system to collect the seepwater. Portable pumps would pump the seep water over the levee.

A buried collector system at this location is considered to be a more appropriate alternative than a series of relief wells and a pump station, because the underseepage pressures measured do not necessitate relief wells at this location. The landside seepage berm alternative would result in the construction of two berms measuring 200 feet wide and 350 feet wide would cause the most land and social disturbance as structural demolition and the relocation of utilities, residences, and business would be required for this alternative. A buried collector does not require new right-of-way, as a temporary right-of-way would suffice for construction requirements. Buried collector installation and relief well installation and pump station construction would result in similar construction impacts. The primary benefits of a buried collector system relative to pressure relief wells at this location include the cost savings associated with long-term maintenance and the protection of piping at the levee toe. Therefore, a buried collector can be considered the environmentally preferred alternative.

2.3.8 North Kansas City Levee Unit - National Starch

Relief Wells and Pump Station. Pressure relief wells and a pump station would be installed into the existing stability berm along the toe of the levee between Stations 255+95 and 274+10 (Figure 1-13). Installing relief wells at this location would provide a highly effective mechanism to control underseepage. To perpetuate reliability, routine well maintenance would be conducted annually and total well replacement would be required approximately every 40 years. A buried collector system does not meet the technical requirements for this levee unit, as it cannot relieve pressure to the required level, as provided by pressure relief wells. Installing relief wells and a pump station would not require a potential temporary shutdown of the National Starch plant, utilities or structures modifications and/or relocations. Relief well and pump station installation are more economical and induce less impacts than seepage berm construction. Although additional real estate would be acquired for a construction easement and a permanent inspection/maintenance easement, land disturbance would be limited to 2 acres, as opposed to the 23-acre land disturbance associated with seepage berm construction. A similar land disturbance would result from the construction of relief wells and a pump station or a buried collector. Installing relief wells and a pump station is considered the environmentally preferred alternative compared to a buried collector because it is more effective at preventing underseepage failure than a buried collector.

2.3.9 Birmingham Levee Unit

No Action. Findings for the Birmingham unit in regards to overtopping, geotechnical and structural reliability indicate that this unit adequately complies with the authorization intent. This unit's performance was also determined reliable in respect to the performance level of the other units within the overall system. The current Birmingham levee unit reliability is consistent with the planning objectives of the feasibility study. Therefore, the no action alternative is the preferred alternative, and no Federal improvements are recommended. Continued operation, maintenance and repair action will be periodically conducted to maintain the reliability of this levee unit.

3. Affected environment

3.1 Physical-Chemical Environment

3.1.1 Geology and Minerals

The project area is predominantly an alluvial floodplain underlain by bedrock of the Pennsylvanian System, Kansas City Group. Pennsylvania strata generally consist of interbedded sandstone, shale, limestone, clay, and coal. Limestone is the most abundant resource present in the Kansas City Group, and it is locally mined for materials primarily used for road and highway construction.

In addition to limestone, sand and gravel are locally important mineral resources. The historic production of these resources is from floodplain and in-channel deposits of major streams. Crushed limestone has replaced stream gravels as the predominant coarse aggregate in cement. Upland terrace and glacial deposits are important sources of sand and gravel in the southeastern and northwestern portions of Missouri. The counties located within the study area are considered major producers of crushed stone, and construction sand and gravel.

3.1.2 Water Resources and Water Quality

Water resources within the Kansas Citys Local Flood Protection Project area include portions of the Missouri, Kansas, and Blue Rivers, Jersey Creek; Rock Creek; and Barber Creek. The Missouri River drainage upstream of Kansas City measures approximately 489,162 square miles. The drainage upstream of Sioux City, Iowa, near Gavins Point Dam, is approximately 314,617 square miles. Smithville Lake controls about 213 square miles of the Little Platte River tributary drainage in Missouri. Except for Smithville Lake and groups of small lakes in the vicinity of Lincoln and Omaha Nebraska, the drainage between Gavins Point and the Kansas Citys is uncontrolled. The uncontrolled drainage area downstream of the lowermost main stem dam and upstream of the Kansas Citys measures about 174,332 square miles.

The Kansas River basin upstream of Kansas City, Kansas, contains about 60,060 square miles of surface area. Approximately 59,154 square miles of this area is modified by reservoirs. As previously discussed, 18 reservoirs within the Kansas River basin impact the flows at Kansas City. The Kansas River basin and associated tributaries are predominately located in a wide valley of well-developed agricultural lands used for general agriculture.

The Kansas River is a major right-bank tributary of the Missouri River that begins at the confluence of the Republican River and Smoky Hill Rivers near Junction City, Kansas. The Kansas River flows 170.5 miles to its mouth in Kansas City, Kansas, where it joins the Missouri River at river mile 367.4 between the Fairfax-Jersey Creek and Central Industrial District Levee Units.

The Blue River is a major right-bank tributary of the Missouri River located at river mile 358.0, adjacent to the East Bottoms Levee Unit. The Blue River is formed by the confluence of Wolf Creek and Coffee Creek in eastern Kansas and measures approximately 40 miles long with a watershed of about 270 square miles.

Jersey Creek is an intermittent tributary of the Kansas River located adjacent to the Missouri Pacific Railroad in the highly urbanized watershed of the Central Industrial District, just north of the confluence of the Missouri and Kansas Rivers. Barber Creek is an intermittent stream that enters the Kansas River at river mile +/- 9.9, upstream of the Turner Memorial Bridge. Rock Creek is mapped as a perennial stream that enters the Missouri River at river mile +/- 356.9 via an old Missouri River channel.

In accordance with the Clean Water Act, states are responsible for adopting water quality standards for their jurisdictions. Water quality standards are used to establish water quality criteria to protect and maintain the designated uses of water resources. Section 305(b) of the Clean Water Act requires states to produce water quality inventories that assess progress in achieving water quality objectives. Section 303(d) of the CWA requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required.

The origination of water pollution is generally divided into point and nonpoint sources. Point source pollution originates from a specific location and is generally easy to identify and control (i.e., sewage treatment and manufacturing plants). Nonpoint source pollution originates from diverse sources such as agricultural and urban areas and is not generally traceable to a specific source. Common pollutants of the water resources within the study area include sediment, nutrients, bacteria, pesticides, and various hazardous materials (solvents, industrial wastes, etc.). However, these materials and their constituents are generally present in levels that do not exceed the standards promulgated by the states of Missouri and Kansas.

Project area water resources that are 303(d) listed as impaired waters by MDNR and KDHE include the Missouri River, Kansas River, and Blue River. The inclusion of these resources as impaired waters is related to the protection of warm water aquatic life and human health and is associated with fish consumption advisories due to contaminants in fish tissue exceeding current acceptable standards. Jersey Creek water quality is assessed by KDHE, but it is not a 303(d) listed stream.

The Missouri River segment within the project area is 303(d) listed as impaired due to excess levels of chlordane and polychlorinated biphenyls (PCBs). Chlordane is a pesticide that primarily enters surface waters primarily through urban and agricultural runoff. PCBs are industrial compounds that enter surface water via both point and nonpoint sources.

The Kansas River segment within the vicinity of the project area is 303(d) listed as impaired due to an excessive copper concentration. Copper is a point and nonpoint source pollutant. Concentrations exceeding water quality standards are generally related to the transport of sediment, especially under high flow conditions.

The Blue River segment within the project area is 303(d) listed as impaired due to excess levels of chlordane. The Missouri Clean Water Commission classified the Blue River as a "Metropolitan No-Discharge Stream" in 1967. This designation has prevented new point sources from being permitted to discharge into the river, although existing discharges continued to be permitted.

Jersey Creek, Barber Creek, and Rock Creek water quality is assessed by KDHE, but these were not listed as 303(d) streams.

3.1.3 Air Quality

In accordance with the Clean Air Act, the USEPA set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to the environment and public health. The six principal pollutants, also known as "criteria" pollutants, include: ozone, lead, particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide.

Air quality in Kansas and Missouri currently meets the USEPA's accepted levels of criteria pollutants. Kansas City, like other metropolitan areas, has experienced ozone problems since the late 1970s. The Kansas City area was designated a submarginal ozone attainment area under the Clean Air Act Amendments of 1990. Ozone nonattainment was primarily attributed to both stationary and mobile emissions. After demonstrating compliance with the ozone standard in 1992, the Kansas City area was redesignated to attainment and the area encompassing Clay, Jackson and Platte Counties in Missouri and Johnson and Wyandotte Counties in Kansas was included in the Kansas City ozone maintenance area. The original Kansas City Maintenance Plan for Control of Ozone for Missouri and Kansas was approved by the USEPA on June 23, 1992.

On January 13, 2004, the USEPA approved the Kansas City Ozone Maintenance Plan–Second Ten Year Plan for Kansas and Missouri as part of each State's Implementation Plan (SIP) for Clean Air Act compliance to maintain the ozone standard and attainment status. There are currently several air quality-monitoring sites in the Kansas City area that monitor a variety of pollutants in addition to criteria pollutants for NAAQS compliance. Ozone standards are measured in one-hour and eight-hour averages. Although Kansas City's air quality is currently in compliance with all NAAQS, modeling conducted by the states of Kansas, Missouri and Mid America Regional Council in 2004 illustrates the area's sensitivity to emissions of ozone precursors of volatile organic compounds (VOCs) and nitrogen oxides (NOx).

USEPA redesignated Johnson, Linn, Miami, and Wyandotte Counties in Kansas, and Cass, Clay, Jackson, and Platte Counties in Missouri to attainment for the 8-hour ozone standard in 2005 (Federal Register, Volume 70, No. 27). This redesignation was proposed as a result of attaining 8-hour ozone NAAQS compliance for the 2001-2004 timeframe.

3.1.4 Noise

Ambient noise levels are generally dependent upon the level of urban development and associated activities conducted within a given area. Noise levels can range from low to high due to the highly developed nature of the project area, which includes major industry and associated access routes via highways and roads, rail lines, and an airport. Ambient noise levels within the project area are variable and generally dependent upon the type and level of activity occurring in a particular portion of the study area within a certain timeframe. Existing noise within the project area includes but is not limited to railroad, aircraft and vehicular traffic, industrial processes, construction and agricultural activities. Potential sensitive noise receptors include residences, parks, churches, schools, hospitals, hotels, and libraries.

3.1.5 Visual Quality

The project area is heavily industrialized and primarily includes features of low to moderate aesthetic value. The majority of the landscape is dominated by industry adjacent to the existing levee system. Areas with established communities are located near industrial development. The Kansas and Missouri Rivers within the project area contain floodplain forest, sand bars, islands, and bluffs, which provides natural diversity to the river corridor landscapes. Cropland, grassland, and forested land are established in portions of the rivers' floodplains.

Existing levees and flood damage reduction mechanisms that have been installed to prevent bank or levee erosion (i.e., sheet piling, floodwalls, rip-rap) interrupt the natural character of the river systems. However, flood damage reduction features have been in-place for many years and in many instances may blend with the riverscape and adjacent development. Armoring with rock rip-rap is an example of introducing materials that do not naturally occur within the river corridors and may be considered aesthetically displeasing to recreational river users. The contrast of rip-rap and other flood damage reduction features within a river corridor generally becomes less evident over time with the process of weathering and the establishment of vegetation.

3.1.6 Soils and Prime Farmland

Soils within the project area have primarily developed as a result of the wind-borne deposition of fine-grained material (loess) and the deposition of material on land by streams (alluvium). Loess deposits are visible on the exposed valley walls adjacent to the Missouri River. Missouri River floodplain soils belong to the Haynie-Urban land-Leta association, and the Onawa-Haynie-Eudora association characterizes Kansas River soils. Both soil associations generally consist of deep, nearly level, well drained to somewhat poorly drained soils comprised of river-deposited sand, silt, and clay.

Numerous soil series are located within the proposed project area. Prime farmland is defined by the USDA-NRCS as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. Prime farmland generally has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks.

Prime farmland is permeable to water and air, is not excessively erodible or saturated with water for a long period of time, and either does not flood frequently or is protected from flooding. Prime farmland can be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas (SSM, USDA Handbook No. 18, October 1993). Prime farmland within the project area is dominated by, but is not limited to the Haynie, Leta, Gilliam, and Eudora soils series.

Mapped soil units within the proposed borrow area include Haynie silt loam, Eudora complex, and Sarpy-Haynie complex (Zavesky and Boatright, 1977). Haynie silt loam and Eudora complex soils are considered prime farmland. The Sarpy-Haynie complex is classified as farmland of statewide importance. Therefore, most soil units within the proposed borrow area are mapped as prime farmland.

3.1.7 Hazardous Waste Management

The Kansas Citys levee project encompasses a large area of highly industrialized and commercialized property. In such highly industrialized areas, hazardous waste can be present on properties that are adjacent to levees.

The HTRW Site Assessment performed as part of the Feasibility Study evaluates the HTRW areas of concern with respect to the proposed Feasibility Study alternatives. This assessment identifies the nature and extent of contamination, which could directly impact the proposed Feasibility Study alternatives. The assessment includes a document search, a site evaluation, and a field investigation for select areas.

To identify all the HTRW areas of concerns, the following activities were performed as part of the document search and site evaluation:

- Reviewed the Reconnaissance Report – HTRW Assessment dated August 1999 and the corresponding database search dated January 22, 1999.
- Reviewed the HTRW Follow-up Investigation dated November 1999 and the corresponding database search dated September 1999.
- Reviewed information obtained from an USEPA and KDHE website database searches.
- Reviewed documents obtained from USEPA – Region VII files and conducted personal interviews with EPA representatives concerning Harcros Chemical, Inc. and Sinclair Oil.
- Reviewed documents obtained from KDHE files and conducted personal interviews with the KDHE representatives concerning Burlington Northern Santa Fe Railroad (BNSF) and Fairbanks Morse Pump Corporation.
- Reviewed documents and information obtained from BNSF Railroad and met with BNSF Railroad representatives.
- Reviewed information provided by Board of Public Utilities (BPU) for the Quindaro Power Plant and met with BPU representatives.
- Reviewed documents obtained from Bayer Corporation and met with Bayer representatives.
- Met with MDNR to discuss the Feasibility Study alternatives with respect to the Bayer Corporation.
- Conducted telephone interviews with representatives from Harcros Chemical, Inc., Sinclair Oil, BNSF Railroad, and Bayer Corporation.

- Reviewed the following aerial photograph:
  1993 Flood photos for Argentine, NKC, and East Bottoms Levees
  Harlem section of NKC Levee - 1958, 1965, 1976 and 1986
  Argentine Levee - 1951, 1954, 1970, and 1983
- Reviewed Corps of Engineers correspondence files for each of the Phase I levee units. The files included correspondence from adjacent landowners on work performed within 500 feet of the levee centerline.
- Conducted site visits to the following locations:
  Argentine Levee
  Burlington Northern Santa Fe Railroad property
  BPU Property on the the Fairfax-Jersey Creek Levee
  Harlem Section of the North Kansas City (NKC) Levee
  Bayer Corporation Property on the East Bottoms Levee

The Argentine Levee has five known sites adjacent to the levee under Resource Conservation and Recovery Act (RCRA) Corrective Action or voluntary cleanup. The Fairfax/Jersey Creek Levee lies to the north of the Board of Public Utilities, which has had past spills into the Missouri River downstream of the proposed levee floodwall. National Starch is protected by the North Kansas City Levee and is a RCRA permitted facility. The East Bottoms Levee wraps around the Bayer Facility, which is undergoing RCRA Corrective Action.

3.1.7.1 Argentine Levee Unit

The Argentine Levee Unit protects a heavily industrialized zone of Kansas City, Kansas. The following properties have been identified as undergoing either RCRA Corrective Action or Voluntary Clean up.

- Ashland Chemical – RCRA Corrective Action
- Harcros Chemical – RCRA Corrective Action
- Sinclair Oil Corporation – Voluntary Cleanup
- Fairbanks Morse Corporation – Voluntary Cleanup
- Burlington Northern Santa Fe Railroad – Voluntary Cleanup

Ashland Chemical operates a chemical storage facility. It currently has an air-stripper on site to remediate groundwater contamination originating from the property. Underground storage tanks have been removed from the site.

Harcros Chemical, formerly Thompson-Hayward Chemical Corporation, also has known groundwater contamination. The company operates a chemical plant that produces a wide variety of chemicals. The property is currently in the Corrective Measures Study phase. A groundwater extraction and treatment system is in place on site to capture and remediate groundwater plumes migrating from the site to the Kansas River. Nine solid waste management units (SWMUs) lie on both sides of the levee. Two underground storage tanks are listed in the Kansas Department of Health and the Environment Leaking Underground Storage Tank database as active status. These have not been remediated at the last update of the Leaking Underground Storage Tank database, which occurred December 5, 2005.

Sinclair Oil Corporation is a former oil refinery that currently operates a petroleum storage facility. This site has a network of groundwater monitoring wells that are located within the levee construction footprint. The most recent sampling has detected volatile organic compounds (VOCs), halogenated VOCs, semi-volatile organic compounds (SVOCs), pesticides, and herbicides in the groundwater. VOCs were detected above maximum contaminant limits (MCLs) in the groundwater wells near the Kansas River. Boring logs for the temporary piezometers installed in August of 2003, noted petroleum at various depths. They were drilled near the edge of the plumes to define the extent of the contamination. The depths to groundwater ranged from 11.5 feet to approximately 40 feet below ground surface. The facility plans to install a groundwater containment system to intercept the plumes.

Fairbanks Morse Pump Corporation lies outside of the construction footprint for the levee but also had groundwater contamination extending from its facility to the Kansas River. Fairbanks Morse manufactures pumps and small motors for public works and industrial installations. These plumes are traveling to the northeast extending to just east of the Overnite Trucking facility. The plumes are primarily chlorinated VOCs and petroleum related VOCs. The company is permitted by the USEPA as a RCRA small quantity generator and has had numerous compliance violations. According to the Toxic Release Inventory System database, chromium, nickel, copper, and manganese have been released from the facility. A Leaking Underground Storage Tank is also listed for this site, and it is currently being monitored by KDHE. No corrective action has been initiated for the Leaking Underground Storage Tank or the groundwater plumes.

The Burlington Northern Santa Fe (BNSF) Railroad has a diesel shop facility for refueling and repairing engines. This facility is a RCRA-permitted large quantity generator with numerous compliance violations. A diesel spill was reported in June of 1997 and was remediated. The investigation by BNSF of this site is ongoing. Past borings have shown the presence of hydrocarbons in the soil ranging from an odor to the soil to a "pudding-like" contaminant visible in the sample. Waste has also been buried in scattered areas near the facility's water treatment tanks. Groundwater is also impacted by petroleum hydrocarbons. Geoprobe borings were drilled around a 9' by 9' stormwater culvert. During this investigation, total petroleum hydrocarbons and benzene were detected above KDHE action levels for soil. Other chemicals detected included barium, lead, arsenic, and fluorene. Currently, there is an oil-water separator on site to treat all waste and stormwater before it is discharged into the river or sewer system.

Other sites adjacent to the Argentine Levee Unit may have been impacted by past industrial activities. These sites were identified from site visits along the levee or from historical aerial photos and include:

- Auto Salvage Yards
- E&M Transwood Truck and Trailer Repair
- Roadway Express

The Auto salvage yards are located on the landward side of the levee and include an abandoned building. This building has the appearance of an auto body shop or a service station.

No information could be found for this structure. Therefore, an underground storage tank could be present. As determined from aerial photographs, the auto salvage yards extend towards Kansas Avenue on the landward side of the levee, and downriver to the BNSF Railroad. The vehicles sit out in the elements and could leak any fluids still left in the engine or gas tank.

E & M Transwood Truck and Trailer Repair is a service center for large vehicles and trailers. This site has a history of spills from leaking underground tanks. These have been remediated and closed by KDHE. During a site visit, however, a gas or diesel pump station was located behind the service shop. An underground tank remains in active use. If damage occurred to the tank or the pipework, hydrocarbons could leak into the subsurface soil and groundwater.

Roadway Express is a trailer storage yard and service center for semi-trucks and trailers. This facility has had numerous spills in a 10-year period. A leaking underground storage tank was also remediated. Five other underground storage tanks remain on the site and are actively used. However, the underground storage tank locations are unknown.

3.1.7.2 **Fairfax-Jersey Creek Levee** Unit

The Board of Public Utilities operates a power plant just south of the Fairfax Levee. The main area of operations is over 100 feet from the floodwall construction footprint. Numerous spills have occurred in this area from the transformer, turbines, and valves on other equipment. Some of these spills flowed into a stormwater sewer and reached the Kansas River. Two Leaking Underground Storage Tanks were removed and soils were remediated in 1989 and 1993. The Board of Public Utilities is permitted as a small quantity generator and was issued violation notices in 1987 and 1994. The Williams Company has three petroleum pipelines that run parallel to the existing floodwall on the riverward side. No spills have occurred from these pipelines.

3.1.7.3 **North Kansas City Levee Unit**

The National Starch Company is located just north of the North Kansas City Levee. The facility produces cornstarch for distribution. The facility has a National Pollutant Discharge Elimination System (NPDES) permit to discharge wet corn milling, condensation flows, non-contact cooling water, and stormwater runoff into the Missouri River and has a flow of 8 million gallons/day. From the USEPA website, National Starch was listed in the TRIS, Aerometric Information Retrieval System (AIRS), and Underground Storage Tank databases. National Starch has had a past air release of propylene oxide from one of its stacks. It is listed in AIRS and is permitted to release 100 tons/year of cornstarch. National Starch is also permitted as a RCRA Large Quantity Generator. The property has one 30,000 gallon Underground Storage Tank that is currently in use. A past geotechnical investigation around the site noted a petroleum odor in a soil boring from a depth of 9' to 25.5' below ground surface. This was found in a containment area a few hundred feet from the levee, but no tank was present at the site. None of the borings conducted closer to the river showed any type of contamination, which indicates that there is not a plume reaching the river. No additional investigation is recommended.

3.1.7.4 **East Bottoms Levee Unit**

The Bayer Crop Science facility manufactures various insecticides, herbicides, and fungicides for agricultural purposes. Since late 1980, numerous investigations have been

conducted at the site. Investigations include a RCRA Facility Assessment, a RCRA Facility Investigation (RFI) and a Corrective Measures Study (CMS) Work Plan. Based on the information presented in these documents, there is known soil and groundwater contamination present at the site. Three SWMUs and three Areas of Concern (AOC) have been identified at the Bayer facility. The SWMUs are former land disposal units, which have been capped with soil. The contaminants found in the soil at the SWMUs are primarily VOCs, SVOCs and pesticides. AOC-1 is located in the southern portion of the drainage ditch. Relatively low levels of SVOCs and pesticides were detected in the shallow soil along the bottom of the ditch. AOC-3 and AOC-4 are potentially impacted by historical releases of wastewater. Sampling results from these areas were not available. Since the CMS has not been developed, there is no recommended corrective action planned for the contaminated soils at this time.

There are two known groundwater plumes at the Bayer facility. Both of these plumes are associated with the former land disposal units. The primary constituents detected in the groundwater are VOCs, SVOCs and pesticides. The VOCs include benzene, toluene, xylenes, and chlorinated solvents. There are a total of 30 groundwater monitoring wells and three extraction wells at the Bayer site. As an interim measure for groundwater containment, Bayer pumps from the two plume areas to recover impacted groundwater and stabilize groundwater migration. The extracted groundwater is treated at the on-site wastewater treatment facility and discharged to the Missouri River through an underground piping and permitted NPDES outfall. The final corrective measures for the groundwater cleanup have not been developed.

A groundwater investigation was done by USACE to determine if any chemicals would impact preferred alternative along the stretch of levee adjacent to the Blue River. The analysis showed only manganese was present above the secondary MCLs in the groundwater. USACE results for manganese were similar to previous Bayer groundwater sampling rounds. Since manganese is not a contaminant of concern at Bayer, this will also not impact the relief wells proposed for the Kansas City Levees project.

3.1.7.5 Armourdale

The Proctor & Gamble Manufacturing Company (P&G) has conducted business adjacent to the Armourdale unit since 1911. An investigation of the Kansas Groundwater Monitoring Network in 1988 by KDHE found that two active monitoring wells contained concentrations of VOCs above Kansas Action Levels (KALs) and MCLs. These wells were sampled again in 1990, 1991, and 1992, and were found to have much lower concentrations. In the 1994 Site Inspection Prioritization, KDHE recommended No Further Remedial Action for the groundwater issues at these wells. In 2005, both wells were plugged. No remedial action has occurred to address the groundwater. Therefore, a plume may be present beneath this area. An HTRW Follow-Up Investigation (Hydrogeologic, 1999) lists P&G as a medium priority for RCRA Corrective Actions and is a permitted site for treatment, storage, and chemical disposal.

During a site visit by the Corps and the Kaw Valley Drainage District (KVDD) on August 12, 2005, numerous above ground storage tanks (ASTs) were observed near the property fence line. A firefighting practice area is located on the riverside of the levee and is listed as Solid Waste Management Unit (SWMU) #9 in USEPA documents. A large amount of debris and waste was dumped and buried in this area prior to the practice area construction. Two other

areas of concern include a past spill into the Kansas River and the other is in proximity of the water storm sewers. Little information is known about these two sites.

Based on the groundwater data collected by KDHE, the installation of relief wells as underseepage controls should be avoided between stations 45+00 and 75+00. Since the plume has not been clearly identified, a smaller restrictive area could be established with additional investigations if relief wells are required. If construction occurs on the riverward side, the debris and dumped solid waste should be removed and replaced with suitable fill material. All waste is considered either construction or municipal waste and can be taken to a solid waste landfill. A few ASTs on the southern portion of the property may require removal and, depending on their contents, tank closure by KDHE before construction begins.

Auto salvage yards are located next to the levee toe from stations 111+00 to 116+50. The Reconnaissance Report and Follow-Up Investigation did not have any information on this site. This site was not listed as an area of concern in any of the VISTA, USEPA, or KDHE databases. These areas should be more fully investigated to ensure that the surface and subsurface soil is clean in the levee footprint.

Trimodal (a.k.a. Great Lakes Container Corporation and Container Recycling, Inc.) cleans and stores drums on site in close proximity to the levee toe. This property is listed in the CERCLIS database as a Superfund site, but is currently listed as no further action planned. In the Follow-Up Investigation, the company was listed in many USEPA databases for LUSTs, RCRA violations, and USTs. Numerous RCRA violations were documented from 1986 to 1994. A USEPA cleanup was initiated by the USEPA in the late 1990s. This property was capped to prevent exposure to contaminants around 2001. From USEPA reports and letters, some soil contamination from lead and PCBs exists on this property. It is recommended that any type of excavation or installation of relief wells for subsurface underseepage control be avoided. If underseepage drainage is required, additional granular material could be placed over the existing gravel. Coordination with the USEPA on berm placement over the cap area is also recommended.

Midwest Cold Storage (formerly Williams Meat Company) operates a food storage facility within the Armourdale unit. The Reconnaissance Report and Follow-Up Investigation did not have any information for this property. A UST was removed from the property in 1990. During a site visit, a propane tank and transformer were observed on the landside of the levee. The area around the transformer may require further inspection before construction to ensure that PCB contamination is not present. No additional concerns were identified for this property.

PBI Gordon Corporation is located between stations 278+00 and 293+00. Ground disturbance should be avoided within this area. Soils excavated from this area may need to be tested prior to disposal. Some soil may require hazardous waste disposal. Additional groundwater investigation should be conducted prior to the expansion of the existing subsurface relief well system. ASTs would also need to be removed, which would involve soil sampling for tank closures.

3.1.7.6 Central Industrial District

Preliminary hazardous waste information for the CID unit was provided in the Final Report HTRW Follow-Up Investigation for the Cities of Kansas City, Missouri and Kansas, conducted by HydroGeologic, Inc (1999). The CID is known to contain hazardous waste contamination. Soil and groundwater contamination has been caused by spills of diesel fuel and fuel oil as well as by LUSTs. The Kansas City Street Division Garage (Garage) was the site of a leaking UST in 1996, which resulted in the release of about 1,350 gallons of diesel fuel onto the pavement at the site. This material entered a drainage ditch and flowed off-site. The impacted area was approximately 2- to 3-feet wide by 750-feet long by 6-inches deep. Groundwater monitoring wells were installed and sampled. Contaminants were identified in five monitoring wells. The groundwater was monitored at this site quarterly for 2 years. KDHE files for LUST facilities indicated that a leak was reported at the Garage and that the site was being monitored. KDHE records for USTs indicated that three USTs were temporarily out of service. Neighboring properties had reported UST leaks and chemical spills that had subsequently been remediated and closed by the KDHE.

3.1.7.7 Proposed Borrow Area

The area of proposed borrow is currently owned by WaterOne, which provides drinking water to Johnson County, Kansas. A portion of the property is leased for agricultural purposes. Lime products are stockpiled in 5-acre monofills in the southern portion of the property. The monofills extend to 20 feet deep and are covered with a 10-foot thick soil cap. There are no known hazardous waste issues with the lime product. Soil samples from the proposed borrow area were analyzed for VOCs, metals, pesticides, herbicides, and SVOCs. All parameters tested were below action levels. No contamination was found at the other locations during the soil sampling investigation. Therefore, soils on this property are suitable to use as borrow material for levee modifications. Monofills would not be used for soil borrowing purposes.

3.1.8 Cultural Resources

Cultural resources are defined as the broad pattern of events, real properties, and cultural life ways or practices that have significance to humans. Buildings and places where significant events occurred, archeological sites containing significant information about human activities, traditional places or activities that hold special significance, and folkways which are practiced as either cultural or life sustaining, are all part of the broad category features of groups of people.

3.1.8.1 Archeological and Historical Background

The earliest identified human occupation in the vicinity of the study area in eastern Kansas and western Missouri is the Paleo-Indian period dating from approximately 12,000 to 8,000 B.C. Evidence of these sites in the vicinity of the study area is scarce and consists of only a few isolated projectile point finds. It is likely that additional Paleo-Indian sites are present within the Kansas and Missouri River area. However, these sites are likely deeply buried.

The Archaic period is divided into the Early, Middle, and Late periods. The Early Archaic period (8,000 to 5,000 B.C.) is characterized as a period of increased subsistence diversification following mega fauna extinction at the end of the Pleistocene. Like the Paleo-Indian period, evidence of these sites within the Blue River area is sparse and usually consists of isolated projectile points. Additional Early Archaic sites are likely also present but like possible

Paleo-Indian sites, they are deeply buried in the Kansas and Missouri River drainages in the Kansas City area. The Middle Archaic period (5,000 to 3,000 B.C.) is a period of increasing diversification of exploited plant and animal resources and ecological niches. These sites are generally small, but are more numerous in the study area than sites from earlier periods. The Late Archaic (3,000-1,000 B.C) is marked by increased social complexity and further diversification. These sites are typically larger and more numerous than the preceding periods. The distinctive Nebo Hill site types appear during the Late Archaic.

The Early and Middle Woodland periods (1,000 B.C.- A.D. 500) are characterized by larger and more numerous sites, long distance trade, and reliance on cultivated plants. In addition, the use of ceramics, creation of burial mounds, and ornate ceremonial objects were developed during this time period. The Middle Woodland (ca. A.D. 1-500) also saw the development of the Kansas City Hopewell, a large distinctive cultural complex that was centered in the area of present day Kansas City. Sites of this period are commonly found in and along the Kansas and Missouri River drainages in the Kansas City area and include large village sites and small short-term specialty sites. The Late Woodland (A.D. 500-1000) is marked by increased reliance on hunting and gathering of wild plants and animals, smaller site size, and increased mobility. The reason for the shift to increased mobility and reliance on hunting and gathering is unclear but may be related to an over stressed environment. Late Woodland sites are smaller than the sites of the previous Middle Woodland period but are common throughout the study area.

The Mississippian period (A.D.1000 to 1700) is marked by the emergence, development, and fall of complex societies and large ceremonial centers, such as Cahokia near present day St. Louis. Sites of Mississippian period have been identified near the study area. A number of these sites have been intensively investigated, including the May Brook Site (23JA43), Seven Acres site (41JA115), and the Vaughn-Estess Site (23JA269).

The historical period within the study area begins at the point of European contact, roughly in 1700. At the time of contact, the eastern study area was the approximate border of the Kansa tribe situated to the west and the Osage located to the east and southeast. At the time, the Kansas City area was mainly Osage hunting territory and was only lightly occupied. Spain and France had control of the region during the 18th Century, during which time the area was utilized primarily for trade with the tribes and fur trapping.

In 1803, the United States obtained the land in the study area from France as part of the Louisiana Purchase. Following the purchase, numerous explorers passed through the region, the most notable being the Lewis and Clark Corps of Discovery expedition of 1804-1806 that passed along the Missouri River near the beginning and end of their journey. In 1808, Fort Osage was established near the confluence of the Little Blue and Missouri Rivers by William Clark to protect the new territory and nearby US Factory Trade House, which was operated by George Sibley. Other trading posts were located within the study area. The most prominent trading post was established by Francois Chouteau in 1821, west of the confluence of the Missouri and Blue Rivers.

By the mid-1820's, the Osage (1808) and the Kansa (1825) had ceded their territory in the region to the United States. A number of eastern tribes, including the Shawnee, Delaware,

Wyandots, Miami, Ottawa, Kickapoo, Potawatomi, Iowa, Sac and Fox, Wea, and Peoria, passed through the study area after having been forced westward from their traditional homelands. Several missions were created for these tribes near the study area.

A number of important trails serving commercial trade and westward migrations crossed the area. The most prominent of these trails, the Santa Fe Trail, began in 1821 as a route of trade between Santa Fe, then Mexico, and the United States. The trail remained an important economic link for the next 60 years until it became obsolete following establishment of the railroad in the area. Other important trails in the area include the Oregon and California Trails. Through much of the area these trails overlapped, diverging to their respective routes farther to the west.

Numerous battles and skirmishes occurred within the Kansas City area during the Civil War. Many of these engagements were small-scale battles or guerrilla actions. The largest battle in the area, also the largest fought west of the Mississippi River, were the Battles of the Big Blue and Westport, Missouri on October 22 and 23, 1864. This series of battles occurred as the result of an attempt by the South, under the command of General Sterling Price, to capture Kansas City or Leavenworth, Kansas, for the Confederacy to divert northern troops from other theaters in the war. The campaign ultimately failed and the defeat proved to be the last major battle of the war in Missouri.

In the late 19th and early 20th Century land use in the area shifted from an agricultural, residential, and light commercial base to increasingly industrial. Also, the Kansas City Stockyards developed in the West Bottoms area of Kansas City as a major cattle export center to Chicago and destinations east. The second half of the 20th Century saw increased industrial development.

3.1.8.2 Previous Investigations

A review of the National Register of Historic Places found no historic properties listed within or near the study area. In addition, a review of topographic site location maps from the Kansas and Missouri State Historic Preservation Officers found no previously recorded archeological sites or historical structures within or immediately adjacent to the proposed study area.

Adjacent to the Fairfax floodwall project area are two remaining structures of the former Quindaro water processing plant—a pump house and a water intake structure. Both structures are approximately 100 years old.

Adjacent to the proposed borrow area are two human burials that will be provided a construction buffer of 300 feet to avoid impacting the burials.

3.1.8.3 Cultural Resource Coordination

Numerous cultural resource investigations have been conducted within the vicinity of the study area. The majority of the past investigations have been relatively small-scale archeological investigations, primarily surveys, associated with federal or federally funded projects. Other projects include archeological National Register testing projects, data recovery excavations, and monitoring of archeological work at known cultural resource locations.

During site visits, the Corp's Kansas City District Cultural Resources Program Manager (CRPM) identified no historic properties or other cultural resources in any of the six proposed project locations. In addition, each area was found to have little likelihood for intact archeological deposits because of previous disturbances. The CRPM recommended no further work for any of the proposed areas and the SHPOs concurred (Appendix G).

The former pump house within the vicinity of the Fairfax floodwall was within a former alternative area for the project. However, project plans have been modified to avoid the pump house. Although the structure itself is outside of the area of potential effect, the project will require that the subterranean pump room in the pump house be filled with sand to prevent seepage. The water intake structure was never within the proposed project limits and will remain undisturbed.

The Corps has initiated consultation with affiliated federally recognized Native American tribes. Additional consultation would be conducted for any archeological site, traditional cultural property, or other historical property accidentally discovered in the project areas during construction.

If, in the unlikely event that archeological sites are encountered during construction, work in the area of the inadvertent discovery would cease and the Corps project manager notified. The discovery would be coordinated with SHPOs and appropriate treatment measures applied.

3.2 Biological Environment

The Kansas Citys' project area is heavily urbanized and industrialized. U.S. Fish and Wildlife Service comments and the Corps' draft response are in Appendix C of this DEIS.

3.2.1 Floodplain Terrestrial Habitat

The study area is located primarily within the Glaciated Plains and Big Rivers natural divisions (Nelson, 1987). Prior to channelization and development, meandering rivers formed complex ecosystems that contained a variety of natural communities such as marshes, sloughs, islands, sandbars, and bottomland forests. Bottomland forest occupied extensive floodplains of the Missouri and Kansas Rivers. Floodplains were dominated by a variety of tree species including eastern cottonwood (*Populus detoides*), silver maple (*Acer saccharinum*), willow (*Salix*), hackberry (*Celtis occidentalis*), ash (*Fraxinus*), elm (*Ulmus*) and river birch (*Betula nigra*). Mixed hardwood forests with a dominating oak (*Quercus*) component were generally associated with higher, adequately drained, and less disturbed terraces (Nigh and Schroeder, 2002). Bottomland hardwood tree species included swamp white oak (*Q. bicolor*), bur oak (*Q. macrocarpa*), pin oak (*Q. palustris*), American elm (*Ulmus americana*), and big shellbark hickory (*Carya laciniosa*).

The floodplain at the confluence of the Missouri and Kansas Rivers contains only remnants of the bottomland forests likely present in the project area in pre-settlement times. Three vegetation types generally dominated the project area. Floodplain forests were dominated by cottonwood-willow (*Populus-Salix*). Upland vegetation included oak-hickory-maple forest (*Quercus-Carya-Acer*), with openings of bluestem prairie (*Andropogon-Panicum-Sorghastrum*).

Although the project area's floodplains have been largely cleared for development, there are bands of riparian forest habitat located riverward of some of the Kansas Citys' units. The largest areas of native vegetation are located riverward of the Birmingham and East Bottoms Levee Units in Missouri and the Argentine and Fairfax-Jersey Creek Levee Units in Kansas. Predominant tree species found in these riparian bands include cottonwood, willows, box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), silver maple, and American sycamore (*Platanus occidentalis*). The understory primarily includes reproduction of these species, plus some red mulberry (*Morus rubra*). The ground layer in the riparian bands varies from sparse to dense vegetation and primarily contains poison ivy (*Toxicodencron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), honeysuckle (*Lonicera* spp.), and greenbrier (Smilax), among others (USFWS Planning Aid Letter (PAL), July 1999). Within the Argentine unit, approximately 185 acres of riparian woodland are located riverward of the existing levee. In their CAR, the USFWS stated that riparian woodland is a high value habitat and the clearing of riparian vegetation would significantly damage fish and wildlife resources and their habitat ant that compensatory mitigation should be undertaken for unavoidable impacts to riparian and wetland impacts (Appendix C).

Remnants of the "oak-hickory-maple" upland forest vegetation type are present on the steep hillsides adjacent to the Kansas and Missouri River floodplains. In addition to sugar maple, white and black oak, and hickories for which this upland vegetation type is named, other hardwood species present include American sycamore, beech (*Carpinus caroliniana*), black walnut (*Juglans nigra*), bur and chinkapin oak (*Quercus muehlenbergii*), hackberry, American and slippery elm (*Ulmus americana* and *Ulmus rubra*), hawthorn (*Cretageus*), honey locust (*Gleditsia triacanthos*), redbud (*Cercis canadensis*), and dogwood (*Cornus*). The understory consists of regeneration of the above species and the ground layer includes, among others, violets (*Viola* spp.), poison ivy, Virginia creeper, greenbrier, and honeysuckle.

3.2.2 Wetlands

Wetland locations, classifications, and acreages were determined by overlaying study area maps with National Wetlands Inventory (NWI) maps. NWI maps are generally used as a reference for locating existing wetlands. Reconnaissance surveys and a field delineation were conducted to verify the presence or absence of NWI wetlands and additional wetlands located within or adjacent to the project area for impact determination. Due to development within the project area, much wetland acreage has been converted into impervious surface.

There are four wetlands within the project area that are located within, or adjacent to areas proposed for construction. Three wetlands are located within the Argentine unit, and one wetland is located within the proposed borrow area. An open water/scrub-shrub/emergent wetland of unknown acreage is located between stations +/- 110+00 to 120+00 on Harcros Chemicals property. This wetland was likely created for detention, as it is bermed to the west, and bordered by a fence. Monitoring wells are located within the western and southern portion of the wetland. Due to its location within the landscape adjacent to industry and the adjacent fenceline, the functions provided by this wetland may include surface water storage and limited wildlife habitat.

A 0.007-acre linear, emergent wetland dominated by cattails (*Typha* sp.) and curly dock (*Rumex crispus*) is located in a maintained area between the fenceline and the levee toe, station 140+00. A 0.02-acre linear emergent wetland dominated by reed canarygrass (*Phalaris arundinaceae*) and cattails (*Typha* sp.) is located along the fenceline at station 155+00. These wetlands are not visible from the river. A 0.17-acre farmed wetland located within the proposed borrow area was identified by the USFWS in their CAR (USFWS, 2005). The area of proposed borrow has not been delineated for potential wetlands by the NRCS. The functions of these wetlands consist of limited wildlife habitat.

3.2.3 Fisheries

Missouri River fish populations have been significantly effected by channel alterations in the project area. Kansas River populations have also been impacted, although to a lesser degree. Most indigenous fish species still remain, but have suffered serious population declines. Both rivers' fisheries are characterized by species typical of large, turbid rivers. The USFWS Draft PAL (1999) describes the dominant game fish species: smallmouth buffalo (*Ictiobus bubalus*), common carp (*Cyprinus carpio*), river carpsucker (*Carpiodes carpio*), shortnose gar (*Lepisosteus platostomus*), and channel catfish (*Ictalurus punctatus*). Gizzard shad (*Dorsoma cepadianum*) is the dominant forage species. Other game species present are the flathead and blue catfish (*Pylodictis olivaris* and *Ictalurus furcatus*), white crappie (*Pomoxis annularis*), freshwater drum (*Aplodinotus grunniens*), longnose gar (*Lepisosteus osseus*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*). Other forage and nongame species present include various minnows and shiners.

3.2.4 Wildlife

The avifauna of the study area includes permanent residents, summer residents, transients, and winter residents. The USFWS (1999) stated that the project area provides year-around habitat for approximately 31 bird species, with another 67 species using the project area for nesting and another 14 species as winter residents only. Over 110 species use the corridor over the study area for fall migration. Summer resident species associated with aquatic habitats include waterfowl, wading birds, and selected passerines. Summer waterfowl are dominated by wood ducks which nest in wooded bottomlands and rear their young in nearby aquatic habitats. Nesting by other waterfowl, primarily mallards, is minor. Wading birds, such as the great blue heron and green heron, utilize shallow areas as foraging habitat. Waterfowl and shorebirds dominate transient species associated with aquatic habitats. The most numerous and impressive migration is that of the snow goose, particularly in the spring. Other species present during migration include the Canada goose, mallard, and pintail.

Mammals associated with the remaining wooded riparian habitat include the white-tailed deer, eastern cottontails, and red and gray squirrels. Aquatic and terrestrial furbearers are important parts of the ecosystem, and those present in the area include the beaver, mink, and muskrat (dependent on the aquatic habitat) and opossum, coyote, raccoon, and striped skunk (dependent on terrestrial habitat). However, small mammals, such as mice, voles, rats, and bats account for the majority of the species present. The white-tailed deer is the only naturally occurring large mammal still common in developed urban areas. Eastern wild turkeys are present in the open, less developed floodplain areas (e.g., the Birmingham and East Bottoms Levee Units).

Amphibians that may be present within the study area include the tiger salamander, bullfrog, leopard frog, plains toad, northern cricket frog, striped chorus frog, plains spadefoot toad, western chorus frog, and plains leopard frog.

Reptiles that may be found in the study area include the snapping turtle, ornate box turtle, painted turtle, rough-scaled lizard, prairie skink, Great Plains skink, six-lined racerunner, and glass-snake lizard. The black rat snake, prairie ringneck snake, eastern hognose snake, racer, bullsnake, prairie kingsnake, common watersnake, red-sided garter snake, copperhead, and timber rattlesnake may also occur within the project area.

3.2.5 Threatened and Endangered Species

Four Federally-listed threatened or endangered species were reported by the USFWS as dependent on the Missouri and Kansas Rivers and their floodplains within the study area: the threatened bald eagle (*Haliaeetus leucocephalus*), threatened piping plover (*Charadrius melodus*), endangered least tern (*Sterna antillarum*) and endangered pallid sturgeon (*Scaphirhynchus albus*) (USFWS, 1999). The piping plover is the only species with designated critical habitat. However, none of its critical habitat is located within, or adjacent to the study area (50 CFR 17).

In 2000, the USFWS issued the "Missouri River Biological Opinion on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System" (BiOp). The BiOp included jeopardy findings for the plover, tern, and pallid sturgeon and recommended a series of "Reasonable and Prudent Alternative, Reasonable and Prudent Measures to Minimize Take" and "Conservation Recommendations." They included recommended actions for the interior least tern, piping plover, pallid sturgeon and the ecosystem in general that the USFWS believed will avoid jeopardizing the continued existence of the three species.

Bald Eagle

The bald eagle migrates through and temporarily over-winters near large water bodies in or near the study area. According to the PAL (1999), this species can be found within the study area primarily during fall and winter when migrating birds utilize areas along the Missouri, Kansas, and Big Blue Rivers for feeding and resting. The Kansas River has nesting pairs of bald eagles, with parents and young remaining in the area through the spring and summer months. Trees greater than 12 inches in diameter at breast height adjacent to these waterways are used by bald eagles for night roosts, resting and hunting perches. No critical habitat has been designated for the bald eagle. The bald eagle is currently proposed for de-listing under the Endangered Species Act. Although de-listing is a possibility, the bald eagle is still protected under several Federal laws.

Piping Plover

The piping plover is a seasonal spring and fall migrant through portions of Kansas and Missouri along the Kansas and Missouri Rivers, with nesting on the Kansas. Plovers are associated with unvegetated shorelines, sandbars, and mudflats. The first known breeding record

for the piping plover on the Kansas River occurred in 1996 when two pairs of plovers nested on sandbar habitat. This habitat was on a new channel created by the high water in 1993. The new nesting in Kansas on the Kansas River is a southern extension of their breeding range.

Interior Least Tern

The interior least tern utilizes similar habitat as piping plovers in the same geographic regions of Kansas and Missouri. There are no records of least terns nesting on the mainstem Kansas River before 1996 when they were observed near river mile 131.0. Since then, colonies or individual pairs have continued nesting each year in the middle sections of the river (approximately river mile 65.0 to 140.0, most frequently from approximately river mile 75.0 to 130.0). Birds have relocated and used different sandbars throughout this time period in response to continued revegetation of sandbar habitats. Nesting interior least tern populations on the Kansas River have remained small (8-10). No critical habitat has been designated for the interior least tern.

Piping Plover and Interior Least Tern Nesting Sites

There are no known nesting sites for either the piping plover or least tern within the study area. On the Kansas River the closest documented nesting site was located between Lawrence and Topeka, Kansas greater than 10 miles upriver from the project area. However, that site has been inactive for several years. Current active nest sites on the Kansas are located near Wamego, Kansas in Pottawatomie County. On the Missouri River, the nearest active nest sites are located near Ponca State Park in northeastern Nebraska.

Pallid Sturgeon

The pallid sturgeon is a moderately large, bottom-dwelling (benthic) fish species that may occur in low numbers in portions of the Missouri River and Kansas River. There are no records to indicate that pallid sturgeon have ever occurred in the Blue River (Dryer and Sandvol, 1993). Pallid sturgeons inhabit the mainstem Missouri River, and have entered the lower Kansas River during floods. Since the 1950s, only five documented pallid sturgeon have been sampled from the lower 40 miles of the Kansas River, all during late March and early April of 1952. Due to habitat modifications and physical barrier (e.g. Johnson County Weir), it is unlikely that the pallid sturgeon currently occurs in the Kansas River due to habitat modifications and physical barriers (e.g. Johnson County Weir), except during high flows. It is believed that the pallid requires sandbars, chutes, and backwater areas for reproduction. Due to its migratory nature, the pallid sturgeon may occasionally be present within the rivers adjacent to the proposed construction areas. There is no designated critical habitat for the pallid sturgeon.

State Listed Species

In addition to the federally listed threatened and endangered species listed above, Kansas and Missouri maintain state lists of species of conservation concern. State of Kansas threatened and endangered species listed for Wyandotte County are in Appendix D. The State of Missouri no longer uses the 'threatened' designation. Missouri species are either designated as "State Endangered", and/or assigned a state rank, which denotes the level of concern for each species' continued existence in Missouri.

A numeric rank of S1 through S5 is assigned to species based upon their relative endangerment (Missouri Natural Heritage Program, 2005). Natural Heritage Database results for Jackson and Clay Counties are listed in Appendix D.

3.3 Socio-Economic Environment

The Kansas City metropolitan area has a diverse and varied economic base. As a centrally located market, it is a major warehouse and distribution hub, and a leading agribusiness center. It ranks first in the nation as a farm distribution center and as a market for hard wheat. In addition to its agribusiness activities, the metropolitan area has major industrial activities such as auto and truck assembly, steel and metal fabrication, and food processing. The metropolitan area also fosters a growing non-manufacturing sector. Wholesale and retail industries and service organizations are now chief employers in the area. The socioeconomic characteristics of the project area are described by levee unit below.

The metropolitan area has a major network of interstates and major highways that provides excellent access to each of the levee units. The CID Unit is accessed by means of Interstate 70 on the north, by Interstate 35 on the West, and by Interstate 670, which crosses the center portion of the protected area. U.S. Highway 69 and Interstate 35 provide access to the Argentine Unit, and U.S. 69, U.S. 169, and Interstate 70 serve the Armourdale Unit. Interstate 70 and the Fairfax Bridge/U.S. 69 provide major highway access to the Fairfax-Jersey Creek Unit. Missouri Highway 210, Burlington Avenue, the Paseo and Heart of America Bridges, and Interstates 35 and 435 provide access to the North Kansas City Unit. The East Bottoms Unit is served by Interstates 29, 35, and 435, and the Birmingham Unit has ready access by means of Missouri Highway 210 and Interstates 29, 35 and 435. Kansas City International Airport, less than 20 miles north of the study area, is easily accessible via the interstate system and major rail service is available to each of the units, and the Charles B. Wheeler (Downtown) Airport is located in the North Kansas City Unit. The Greater Kansas City Area is generally considered to be the nation's second largest rail center, second only to Chicago, IL. The trunk lines serving Kansas City have main line tracks in the areas protected by the Kansas City Levees. Greater Kansas City is also among the top five trucking centers in the nation.

Census 2000 data for 17 census tracts were compiled to describe the socioeconomic characteristics of each levee unit area as well as for the overall study area. Census 2000 data were also compiled for counties in the study area and for the Kansas City, Missouri and Kansas Metropolitan Statistical Area (KC MSA). Although census tracts cover areas that may typically be somewhat larger than the area protected by a levee unit, census tract data are considered to be generally representative of the protected area data and characteristics.

3.3.1 Argentine Unit

Land Use and Location

The Argentine Unit is located on the right bank of the Kansas River in Wyandotte County, Kansas. The unit protects the Argentine industrial district in the Kansas City, Kansas metropolitan area that includes major industrial and commercial development. The Argentine rail yard, one of the busiest in the nation, is located in this unit. A residential area is also

protected. Census tracts 428 and 438.04 approximate the area protected by the Argentine Unit. These census tracts cover about 4.1 square miles of land area.

Population, Income and Employment Characteristics

The Argentine Unit census tracts had a resident population of nearly 3,481 persons in the year 2000, a decline of about 2.5% from the population living in the area in 1990. The median age ranges from 28.3 to 35.0, and the percent of population 65 years of age and over is about 13.2 percent as compared with 11.4 percent for the KC MSA. Approximately 34 percent of the Argentine population is under the age of 18 years. Median household income in 1999 was not available for one census tract. The other census tract had a median household income of $24,740, compared with $33,784 for Wyandotte County and $46,193 for the KC MSA. Approximately 26.4 percent of the Argentine population lives below poverty level, higher than for the KC MSA (8.5%) and Wyandotte County (16.5%). There were 10,700 people working in the Argentine industrial area in 2000 representing a growth of 7.4% in employment over the 1990 level of 9,960. Employment is expected to continue to increase over the next decade in the Argentine Unit area.

Housing Characteristics

There are 3,481 housing units in the census tracts that cover the Argentine Unit. These units have a vacancy rate of 7.1 percent, higher than the 6.3 percent rate for the KC MSA, and lower than the 9.4 percent vacancy rate for Wyandotte County. The median value of owner occupied housing units was not available for one census tract and was $67,600 for the other census tract, compared with $54,300 for Wyandotte County and $104,700 for the KC MSA. A lower percentage of housing units were built before 1940 in the Argentine Unit (7.2%) compared with housing units in the KC MSA (12.9%) and in Wyandotte County (18.8%).

3.3.2 Armourdale Unit

Land Use and Location

The Armourdale Unit is located on the left bank of the Kansas River in Wyandotte County, Kansas. This unit protects the Armourdale area of the City of Kansas City, Kansas. Facilities of the Kansas City, Kansas Board of Public Utilities are located in this study area as well as major railroad yards and main line tracks. Census tracts 425.01, 425.02, and 426, with a land area of 3.8 square miles, cover the area protected by the Armourdale Unit.

Population, Income and Employment Characteristics

Population in the Armourdale Unit decreased from 3,478 in 1990 to 3,213 in 2000 (7.6 % decrease). The median age for residents in the census tracts in the Armourdale Unit ranges from 27.6 years to 77.0 years. In comparison, the median age for the KC MSA is 35.2 years and 32.5 years for Wyandotte County. Approximately 7.9 % of the population is over 65 years old. This is lower than the 65 years and older percentage for the KC MSA and for Wyandotte County (11.4 % and 11.7 % respectively). Approximately 33.2 % of the total population in the Armourdale Unit is in the under 18 years of age category, compared with 26.6 % for the KC MSA, and 28.5 % for Wyandotte County. Median household income in the Armourdale Unit census tracts ranges from $27,524 to $102,264. Median household incomes for Wyandotte County and the KC MSA are $33,784 and $46,193, respectively. A higher percentage of the

Armourdale Unit population is below poverty level (35.2 %) compared with 8.5 % in the KC MSA and 16.5 % in Wyandotte County.

About 6,700 people work in the Armourdale area (2000 estimates), an increase of 1.6 % over the 1990 employment level. The resident labor force in Armourdale is primarily employed in production/transportation and service occupations.

Housing Characteristics

The 1,109 housing units in the Armourdale Unit had a vacancy rate of 11.1 %, higher than the 9.4 % vacancy rate for Wyandotte County and the 6.3 % rate for the KC MSA. The median value of owner occupied housing units ranged from $22,600 to $162,500 compared with a median value of $54,300 for Wyandotte County and $104,700 for the KC MSA. More than 32 % of the housing units in the Armourdale Levee Unit were built before 1940 compared with 18.8 % for Wyandotte County and 12.9 % for the KC MSA.

3.3.3 Fairfax-Jersey Creek Unit

Land Use and Location

The Fairfax-Jersey Creek Unit is located on the right bank of the Missouri River in Wyandotte County, Kansas. This unit protects the Fairfax Industrial District in the Kansas City, Kansas metropolitan area. Census tract 400.01 approximates the area protected by the Fairfax-Jersey Creek Unit and covers about 3.8 square miles.

Population, Income and Employment Characteristics

Few or no persons currently live in the Fairfax industrial area. There were 11,180 people working in this industrial area in 2000 representing an increase of 6.5 % over the 1990 employment in this area. Employment in this levee unit is expected to remain fairly stable over the near term.

Housing Characteristics

No housing data was provided for census tracts in this levee unit area in the 2000 census.

3.3.4 Central Industrial District Unit, Missouri and Kansas

Land Use and Location

The Central Industrial District Unit (CID) is located on the right banks of the Missouri and Kansas Rivers near their confluence. The protected area lies on both sides of the state line between Missouri and Kansas, and includes the central industrial districts of both the City of Kansas City, Missouri and the City of Kansas City, Kansas. The protected area encompasses census tracts 1, 2 and 400.02. These tracts have a land area of 1.8 square miles. Kemper Arena, the American Royal Building, and world headquarters for a major manufacturing company are located in this protected area.

Population, Income and Employment Characteristics

In 2000, the CID had a population of 936 representing a very significant increase (1027.7%) over the 1990 population of 83 persons. This population increase appears to be

primarily a result of a popular trend of developing industrial warehouses and commercial buildings in this area for residential use. The CID is currently one of several "loft-living" areas being developed in the Kansas City metropolitan area. Population is expected to continue to increase in the CID area as a result of this trend.

The CID census tracts median age ranges from 29.5 to 32.4, compared with the KC MSA median age of 35.2. The lower median ages for these census tracts may be attributable to the fact that the CID attracts young professionals interested in loft-style living. Residents under the age of 18 years comprise about 1.7 % of total population in the CID, compared with 26.6 % for the KC MSA, 28.5 % for Wyandotte County, and 25.8 % for Jackson County. The CID % of population age 65 and over was only 0.8 % of total population, significantly lower than Wyandotte County (11.7%), Jackson County (12.5%), and the KC MSA (11.4%). Median household income in the census tracts in the CID (1999 dollars) ranged from $34,464 to $36,625. The CID median incomes were lower than the median income for Jackson County Missouri ($39,277) and the Kansas City metropolitan area ($46,193), but higher than for Wyandotte County Kansas ($33,784). The CID had a lower percentage of the population living below poverty level (9.3%) compared with 11.9 % and 16.5 % for Jackson and Wyandotte Counties respectively. However, the CID percentage was slightly above the 8.5 % for the KC MSA.

In the year 2000, there were 7,494 persons working in the CID, representing a 12 % decline from an employment level of 8,516 in 1990. An increase in employment in the CID would be expected with the increasing resident population and the accompanying small commercial businesses that are required to support the growing resident population. Current ongoing and planned near-future commercial development in the area will also likely encourage increases in employment in the CID. The resident CID population labor force is predominately employed in management and professional occupations, followed by sales and office occupations.

Housing Characteristics

According to the 2000 census there were a total of 517 housing units in the CID with a residential vacancy rate of only 3.7 %. This housing vacancy rate was lower than the rates for Wyandotte County (9.4 %), Jackson County (7.6 %), Clay County (4.8 %), and the KC MSA (6.3%). Reflecting the historic nature of the CID area, Census 2000 data indicates that more than 80 % of the housing units in the CID were built before 1940 compared with 12.9 % for the KC MSA.

3.3.5 North Kansas City Unit

Land Use and Location

The North Kansas City Unit is located on the left bank of the Missouri River in Clay County, Missouri. This unit protects the Downtown Airport, a portion of the City of North Kansas City, Missouri, major railroad yards, and Kansas City Power and Light Company power plant facilities. Census tracts 200 and 201, with a land area of 6.1 square miles, cover the protected area.

Population, Income and Employment Characteristics

In the year 2000, there were 4,882 persons residing in the North Kansas City Unit area. This was an increase of 13.6 % over the 1990 population of 4,299. The median age range of North Kansas City Levee Unit census tract residents is 27.3 years to 36.9 years. Median age for the KC-MSA is 35.2 years, and 35.0 years for Clay County. Approximately 13.7 % of the population in this levee unit area is in the 65 years and older age category, higher than the 10.8 % in this age category for Clay County and the 11.4 % for the KC MSA. Residents under eighteen years of age in the North Kansas City Unit account for about 7.5 % of total population compared with 25.8 % for Clay County and 26.6 % for the KC MSA. Population is expected to experience some growth over the next decade due to the new higher density housing currently planned and under development in this area. Additionally, since North Kansas City offers many services geared to attract retirees to the area, an increase in the senior population would also be expected. The North Kansas City Unit census tracts had 1999 median household incomes ranging from $22,379 to $29,526, significantly below the median incomes for the KC MSA ($46,193) and for Clay County ($48,347). Approximately 12.2 % of the North Kansas City Unit population is below poverty level, compared with 8.5 % for the KC MSA and 5.5 % for Clay County.

In 2000, approximately 26,703 people worked in the levee unit area. This is an increase of 3.2 % over the 1990 employment of 25,886. The labor force population residing in this levee unit had higher unemployment rates in 2000 (ranging from 5.4 to 6.2 %) than Clay County with 3.3 %, and the KC MSA with a rate of 2.9 %.

Housing Characteristics

In 2000, there were a total of 2,933 housing units in the North Kansas City Unit area. The vacancy rate for these housing units (9.2%) was higher than the 4.8 % vacancy rate for Clay County and the 6.3 % rate for the KC MSA. This higher vacancy rate may be due in some part to the anticipated and currently ongoing removal of some lower density units that are being replaced by new higher density units in one area of the North Kansas City Unit. The median value of owner occupied housing ranged from $78,100 to $112,500, compared with the KC MSA median value of $104,700 and the Clay County median value of $104,900. A higher percentage (20.3%) of houses in the North Kansas City Unit were built before 1940 compared with 12.9 % in the KC MSA and only 6.1 % in Clay County.

3.3.6 East Bottoms Unit

Land Use and Location

The East Bottoms Unit is located on the right bank of the Missouri River in Jackson County and protects an industrialized area of the City of Kansas City, Missouri, and some smaller residential areas. Data for census tracts 3, 4, 5.01 and 5.02 were used to describe the protected area. The land area covered by these census tracts is 10.3 square miles.

Population, Income and Employment Characteristics

Approximately 3,277 persons lived in the East Bottoms Unit in the year 2000, a decline of 19.1 % from the 1990 population of 4,054. The median age of residents in these census tracts ranges from 29.5 to 39.6 years, compared with a median age of 35.2 for both the KC MSA and

Jackson County. The percent of population 65 years of age and older (13.7 %) is higher than for the KC MSA (11.4 %) and Jackson County (12.5%). The percent of population under the age of 18 years (28.4%) is above the percentages for the KC MSA and Jackson County (26.6% and 25.8% respectively). The 1999 median household incomes for these census tracts range from $21,786 to $36,875, lower than median household income for the KC MSA ($46,193) and for Jackson County ($39,277).

About 20,147 persons worked in the East Bottoms Unit in 2000, an increase of 8.3 % over the 1990 employment of 18,601 persons. The resident labor force in the East Bottoms Unit census tracts had higher unemployment rates in 2000 (13.5% to 26.6%) than for the KC MSA (2.9%) and Jackson County (5.7%). The resident labor force is employed primarily in the production/transportation occupations, followed by service occupations.

Housing Characteristics

The vacancy rate of 17.5 % for the 1,534 housing units in the East Bottoms Unit was nearly three times the KC MSA vacancy rate of 6.3 % and near two and a half times the Jackson County housing vacancy rate of 7.6 %. Median owner occupied housing value for the census tracts ranged from $15,000 to $92,500, lower than the median value of $104,700 for the KC MSA and $85,000 for Jackson County. Nearly 48 % of housing units were built prior to 1940, compared with 12.9 % for the KC MSA and 18.7 % for Jackson County.

3.3.7 Birmingham Unit

Land Use and Location

The Birmingham Unit is located on the left bank of the Missouri River in Clay County, Missouri. This unit protects the village of Birmingham, rural agricultural areas, and a recently developed industrial park. Data for census tracts 207 and 215 are representative of the protected area for this unit. These census tracts have a land area of about 18.9 square miles.

Population, Income and Employment Characteristics

The 2000 population in the Birmingham Unit was approximately 4029 persons, a 10.1 decline from the 1990 population of 4,481. The median age for the census tracts in the Birmingham Unit ranged from 35.3 to 36.0 years, slightly higher than the KC MSA median age of 35.2 and the Clay County median age of 35.0. The percent of total population aged 65 years and above (8.6%) is less than for the KC MSA (11.4%) and Clay County (10.8%).

In contrast, Birmingham residents under the age of 18 years account for 27.5% of total population, higher than the 26.6 % for the KC MSA and 25.8 % for Clay County. The 1999 median household income for these census tracts ranged from $48,333 to $48,463, above the KC MSA median income of $46,193, and comparable to Clay County median income of $48,347. About 6.1 % of the population is below poverty level, compared with the 8.5 % for the KC MSA and 5.5 % for Clay County.

In 2000, approximately 11,112 people worked in the Birmingham Unit. This was a significant increase (more than 102%) over the 5,490 workers in 1990. The resident labor force in the Birmingham Unit area had unemployment rates ranging from 4.2 to 6.5 %, higher than the

KC MSA rate of 2.9 % and the Clay County rate of 3.3 %. Primary occupations for Birmingham Unit residents are in the sales/office worker category, followed by management/professional occupations.

Housing Characteristics

Birmingham housing units totaled 1,528 in 2000. Housing units had a vacancy rate of 3.3 %, which is lower than the vacancy rate of 4.8 % for Clay County and 6.3 % for the KC MSA. The median value of owner occupied housing units ranged from $69,300 to $80,700, significantly less than the median value of $104,700 for the KC MSA and $104,900 for Clay County. About 4.2 % of the housing in the Birmingham Unit was built before 1940, compared with 12.9 % for the KCMSA and 6.1 % for Clay County.

Table 3-2 on the following page summarizes population, employment and housing characteristics of the areas protected by the levee units located on the Kansas side of the Kansas City metropolitan area. For comparison purposes, data for Wyandotte County and for the KC MSA are also displayed. Table 3-3 provides the same characteristics for levee units located on the Missouri side of the Kansas City metropolitan area. Data for Jackson and Clay Counties in Missouri and the KC MSA are shown for comparison purposes. The CID unit, located on both sides of the state line, is included in both tables.

Table 3-2. Population, Employment and Housing Characteristics for Kansas Units 2000

	CID MO-KS Unit	Argentine Unit	Armourdale Unit	Fairfax-Jersey Cr Unit	Wyandotte County, KS	Kansas City, MO KS MSA
Population 2000	936	3,481	3,213	NA	157,882	1,776,062
% Chg 1990-2000	1,027.7%	-2.5%	-7.6%	NA	-2.5%	12.2%
Households 2000	483	1,282	986	NA	59,700	694,468
% Chg 1990-2000	1,458.1%	-3.0%	-23.0%	NA	-2.9%	14.1%
Average Number of Persons per Household	1.9	2.7	3.3	NA	2.6	2.5
Median Age— (range for multiple census tracts)	29.5 to 32.4	28.3 to 35.0	27.6 to 77.0	NA	32.5	35.2
% Under Age 18	1.7%	34.0%	33.2%	NA	28.5%	26.6%
% Over Age 65	0.8%	13.2%	7.9 %	NA	11.7%	11.4%
1999 Median Household Income—(range for multiple census tracts)	$34,464 to $36,625	NA to $24,740	$27,524 to $102,264	NA	$33,784	$46,193
% Population Living Below Poverty Level (1999)	9.3%	26.4%	35.2%	NA	16.5%	8.5%
% Unemployed Resident Labor Force— (range for multiple census tracts)	NA	8.3%	NA to 8.3%	NA	8.2%	2.9%
Housing Units 2000	517	1,380	1,109	NA	65,892	740,884
Housing Vacancy Rate	3.7%	7.1%	11.1%	NA	9.4%	6.3%
Median Value of Owner Occupied Housing— (range for multiple census tracts)	NA	NA to $67,600	$22,600 to $162,500	NA	$54,300	$104,700
% Housing Units Built Before 1940	80.6%	7.2%	32.4%	NA	18.8%	12.9%

NA – Information Not Available
Source: Census 2000

Table 3-3. Population, Employment and Housing Characteristics for Missouri Units 2000

	CID MO-KS Unit	North Kansas City Unit	East Bottoms Unit	Birmingham Unit	Jackson County, MO	Clay County, MO	Kansas City, MO KS MSA
Population 2000	936	4,882	3,277	4,029	654,880	184,006	1,776,062
% Chg 1990-2000	1,027.7%	13.6%	-19.1%	-10.1%	3.4%	19.9%	12.2%
Households 2000	483	2,669	1,282	1,478	266,294	72,558	694,468
% Chg 1990-2000	1,458.1%	7.4%	-17.6%	-2.3%	5.6%	23.0%	14.1%
Average Number of Persons Per Household	1.9	1.8	2.6	2.7	2.4	2.5	2.5
Median Age—(range for multiple census tracts)	29.5 to 32.4	27.3 to 36.9	29.5 to 39.6	35.3 to 36.0	35.2	35.0	35.2
% Under Age 18	1.7%	17.5%	28.4%	27.5%	25.8%	25.8%	26.6%
% Over Age 65	0.8%	13.7%	13.7%	8.6%	12.5%	10.8%	11.4%
1999 Median Household Income-(range for multiple census tracts)	$34,464 to $36,625	$22,379 to $29,526	$21,786 to $36,875	$48,333 to $48,463	$39,277	$48,347	$46,193
% Population Living Below Poverty Level (1999)	9.3%	12.2%	27.5%	6.1%	11.9%	5.5%	8.5%
% Unemployed Resident Labor Force— (range for multiple census tracts)	NA	5.4% to 6.2%	13.5% to 26.6%	4.2% to 6.5%	5.7%	3.3%	2.9%
Housing Units 2000	517	2,933	1,534	1,528	288,231	76,230	740,884
Housing Vacancy Rate	3.7%	9.2%	17.5%	3.3%	7.6%	4.8%	6.3%
Median Value of Owner Occupied Housing—(range for multiple census tracts)	NA	$78,100 to $112,500	$15,000 to $92,500	$69,300 to $80,700	$85,000	$104,900	$104,700
% Housing Units Built Before 1940	80.6%	20.3%	47.6%	4.2%	18.7%	6.1%	12.9%

Source: Census 2000

Table 3-4 below displays estimates of employment in the year 2000 in each levee unit and the study area as a whole, and the percent change in employment between 1990 and 2000.

Table 3-4. 2000 Estimates of Employment

Unit	Employment	% Change 1990-2000
Argentine Unit	10,700	7.4%
Armourdale Unit	6,700	1.6%
Birmingham Unit	11,112	88.7%
CID MO-KS Unit	7,494	-12.0%
East Bottoms Unit	20,147	8.3%
Fairfax-Jersey Creek Unit	11,180	6.5%
North Kansas City Unit	26,703	3.2%
Study Area Total	**94,036**	**9.4%**

Source: Mid America Regional Council

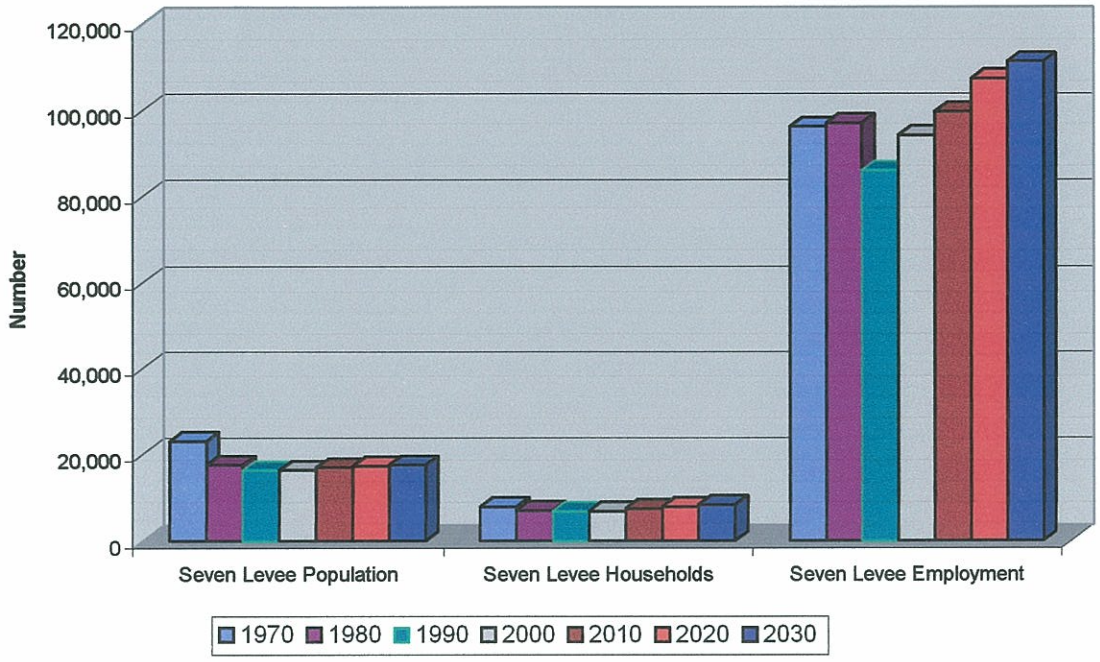
3.3.8 Study Area General Trends in Population, Household and Employment

Census data for the time period 1970 to 2000 and Mid-America Regional Council (MARC) forecasts (2010 to 2030) for the sixteen census tracts in the study area were used to describe general trends in population, households and employment. MARC is the metropolitan planning organization for the bi-state Kansas City region. MARC also serves as the association of city and county governments and its Board of Directors represents eight counties and 114 cities in the bi-state metropolitan Kansas City region. MARC provides long range planning and public policy coordination services, technical assistance, and seeks to foster understanding and cooperation in the metropolitan area on issues that extend beyond the jurisdiction of a single city, county or state.

In 1970 the study area levee units had a total population of 23,124 persons and 7,952 households. Between 1970 and 1990, the total population and number of households in the study area declined. This trend in the study area was reflective of the national trend that occurred in the 1970's and 1980's when there were population shifts to areas outside of central city areas. After 1990 the population and number of households began to stabilize and by 2000 had increased to 16,351 persons and 6,912 households in the study area. Fluctuations also occurred in study area employment, with an overall decline from a 1970 level of 96,069 to 85,949 by 1990 and then increasing in the year 2000 to a level of 94,035. Based on MARC forecast data for the period 2000 to 2030, total employment in the seven levee unit study area is expected to increase steadily. Population and number of households in the area are expected to experience steady but modest growth.

Figure 3-1 below displays the general trends in population, households and employment, 1970 to 2030 for the study area as a whole (all seven levee unit areas).

Figure 3-1
Seven Levee Area Population, Household, and Employment Trends
1970-2030



In 1970 the study area levee units had a total population of 23,124 persons and 7,952 households. Between 1970 and 1990, the total population and number of households in the study area declined. This trend in the study area was reflective of the national trend that occurred in the 1970's and 1980's when there were population shifts to areas outside of central city areas. After 1990 the population and number of households began to stabilize and by 2000 had increased to 16,351 persons and 6,912 households in the study area. Fluctuations also occurred in study area employment, with an overall decline from a 1970 level of 96,069 to 85,949 by 1990 and then increasing in the year 2000 to a level of 94,035. Based on MARC forecast data for the period 2000 to 2030, total employment in the seven levee unit study area is expected to increase steadily. Population and number of households in the area are expected to experience steady but modest growth.

3.3.9 Navigation

The Missouri River Bank Stabilization and Navigation Project (BSNP), authorized by Congress in the Rivers and Harbors Act of 1945 was designed to prevent bank erosion and channel meandering and to provide reliable commercial navigation on the Missouri River. The purpose was to secure a continuous, 9-foot deep by 300-foot wide navigation channel for 735 miles from Sioux City, Iowa to the Missouri River mouth near St. Louis, Missouri.

Barge shipment began on the Lower Missouri River in early 1900s. The river reach between Sioux City and Omaha accounts for approximately 10% of the Missouri River origin destination freight tonnage. The reach between Omaha and Kansas City has accounted for about 40%, and the Kansas City to St. Louis reach has accounted for approximately 50% (Corps, 1998a). Major commodities transported on the Missouri River include agricultural products (farm and food products); chemicals, including fertilizers; petroleum products, manufactured goods, including building products such as cement; and bulk materials such as sand, gravel, and materials used to maintain the Missouri River BSNP.

The State of Missouri is typically an origin or destination for over half of Missouri River commercial tonnage, which excludes sand and gravel and waterway materials. About 120 docks and terminals are located on the lower Missouri River and approximately one-half of these are located are located near and downstream of Kansas City. The Port of Kansas City serves as an origin or destination for about one-third to as much as one-half of Missouri River commercial tonnage. The Kansas River is classified as a navigable stream, but no commercial navigation operates on its waters. The Blue River is defined as a Phase I navigable stream by the Corps (historically navigable), and it is listed as having up to 4 miles of navigable water (MDNR 1986).

Navigation on the Missouri is limited to the ice-free season, with a full season normally extending from April 1 to December 1 at the mouth. A full-service target flow of 41,000 cubic feet per second (cfs) is considered adequate to maintain the channel with little or no dredging. Tuttle Creek, Milford, and Perry Lakes are periodically utilized to supplement Missouri River flows below Kansas City to meet the navigation requirement and to conserve water in the main stem lakes. The navigation supplementation was taken primarily from Tuttle Creek this past year, followed by Perry Lake. Supplemental releases were stopped as the navigation season ended at the Kansas City reach on October 11, 2004.

Annual navigation benefits vary considerably. The range is from about $16 million for an extended navigation season to a low of about -$3 million in several years of the 1930 to 1941 drought. The average annual Missouri River navigation benefits for the Kansas City reach for the 100-year period from 1898-1997 totals approximately $6.03 million, in comparison to Sioux City ($1.20 million), Omaha ($0.91 million), and Nebraska City ($0.66 million) (Corps, March 2004).

3.3.10 Recreation

Recreation in and along the Missouri and Kansas Rivers is access limited and primarily involves boating and fishing, plus some hiking, canoeing and kayaking (primarily on the Kansas River), wildlife/bird watching, and nature interpretation. Drought or low water levels can shorten the seasonal timeframe for boat-oriented recreation because some boat ramps are inaccessible during non-navigation periods. Similar to the Missouri and Kansas Rivers, Blue River access is considered limited, although 27 miles of the Blue River corridor is in public ownership.

A 1980 proposal by the Heritage Conservation and Recreation Service (now part of the National Park Service) recommended the designation of the lower Kansas River as a "recreational river" and made a component of the National Wild and Scenic Rivers System. The plan proposed acquisition of acreages at the western end of the Argentine Levee Unit between the Turner and I-635 bridges to be used as the downstream takeout point for the recreational river. The 57-mile

reach of the lower Kansas River located between I-635 and the Delaware River was listed on the Nationwide Rivers Inventory (NRI) in 1982, and has the potential for inclusion in the National Wild and Scenic Rivers System (http://www.nps.gov/ncrc/programs/rtca/nri/). In accordance with CEQ Memorandum, August 10, 1980, which addresses the protection of rivers in the NRI, potential adverse effects to the Kansas River were considered during the planning process.

Advocacy for increased recreational facilities within the Kansas City region has been increasing since 1991, when the local chapter of the American Society of Landscape Architects (ASLA Prairie Gateway chapter) introduced MetroGreen. MetroGreen is a proposed 1,144-mile interconnected system of public and private open spaces, greenways and trails designed to link existing trail segments within Leavenworth, Johnson and Wyandotte counties in Kansas and Cass, Clay, Jackson and Platte counties in Missouri to provide increased travel options for walkers, joggers, and cyclists. Segments of 13 MetroGreen trails consisting of over 85 miles have been constructed within the Kansas City metropolitan area. Many trail segments originate in a park and are subsequently lengthened to connect to additional parks or features to provide a contiguous trail system. Proponents of the trails and greenways system have proposed the development of recreational hike and bike trails on the existing levee system. There are currently no recreational facilities located on the existing levee units.

Existing recreational facilities within the immediate vicinity of the project area include segments of the Riverfront Heritage Trail, associated interconnected parks, and a variety of parks that are not connected to the Trail. The Riverfront Heritage Trail is a 10-mile bistate system of riverfront pedestrian and bicycle (multi-use) trails that comprise the hub of the downtown Kansas City trail system. Parks connected to the Trail include Lewis and Clark Historic Park (Kaw Point Park), Richard L. Berkley Riverfront Park (Berkley Park), Case Park (Clark's Point), Huron Park, and River Bluff Park. Berkley Park is the northeast terminus of the trail, which extends west along the Missouri River to the River Market and forks into two directions: south outside of the protected area, and west into the CID.

Kaw Point Park and Berkley Park are the only parks connected to the Trail that are located within the protected area. Kaw Point Park is located in the Fairfax Levee Unit adjacent to the CID Levee Unit. Berkley Park is located in the East Bottoms Levee Unit. Parks located within the protected areas of levee units are presented below in Table 3-5.

Table 3-5. Parks Located Within the Levee Units

Levee Unit	Park	Riverfront Heritage Trail Connection
Argentine	Clopper	No
	Emerson	
	Alvery	
	Ruby	
	Silver City	
Armourdale	Kaw	No
	Shawnee	
CID: MO-KS	West Terrace	No
East Bottoms	Riverfront (Berkley)	Yes
	Nicholson	No
	Heim	
Fairfax-Jersey Creek	Lewis and Clark Historic (Kaw Point)	Yes
North Kansas City	Macken	No
	Children's Fountain	
	Dagg	
	River Forest	

Sources: Unified Government of Wyandotte County and Kansas City, Kansas. 2005.
City of Kansas City, Missouri. 2004.

3.3.11 Utilities

The project area contains numerous utilities that provide drinking water, fuel, power, and other necessities to the greater metropolitan Kansas City area. The Argentine levee unit is the only unit in this study that contains utilities proposed for relocation over the levee due to their existing alignment below the levee. The location and nature of the proposed relocations include the following:

- Station 12+80 – A 12" gas line buried 14 feet below the levee toe will be relocated over the levee.
- Station 36+20 – A 4" gas line buried 10 feet below the levee toe will be relocated over the levee.
- Sta 71+80 – An 8" petroleum line buried 14 feet below the levee toe will be relocated over the levee.
- Sta 214+70 – A 24" gas line buried 4 feet below the levee toe will be relocated over the levee.
- Sta 215+20 – A 10" water line buried 6 feet below the levee toe will be relocated over the levee.

These relocations will be conducted landside of the Kansas River. Relocation of these utilities will not require work within waters of the U.S.

4. Environmental Consequences

4.1 Overview

The seven levee units that comprise the protective works of Kansas City, Kansas and Kansas City, Missouri, were constructed between the 1940's and the mid 1950's. The protective works have been part of the landscape for at least 50 years. Improvements to these levee units vary considerably, and were accomplished from the early 1940's to the late 1970's. The recommended project plan is a combination of preferred alternatives selected for each levee unit. The environmental consequences of these individual alternatives under the recommended plan are discussed below.

4.2 Geology

4.2.1 Argentine Levee Unit Alternative

No significant impacts to geology would be anticipated from the preferred alternative selected for the Argentine levee unit. The nominal 500-year+3 levee raise and construction of underseepage control measures would include the construction of buried collectors at three locations, modifications to two pump plants, and the removal and replacement of one pump plant. Geology would not be impacted because the excavation and construction activities associated with any of the proposed alternatives would be conducted within the soil layers above bedrock. No post-construction impacts to geology would be anticipated from the levee raise or operation or underseepage controls within the Argentine unit.

4.2.2 East Bottoms Levee Unit Alternative

No significant impacts to geology would be anticipated from the preferred alternative selected for the East Bottoms levee unit. The preferred alternative is the installation of pressure relief wells along the landside levee toe. Drilling through the soil to bedrock depth or to a depth just above bedrock (80 to 120 feet) would be required to facilitate relief well installation. No impacts to geology would be anticipated as drilling would be conducted through the soil layers to a depth above bedrock. No post-construction impacts to geology would be anticipated from the operation of pressure relief wells.

4.2.3 Fairfax-Jersey Creek BPU Floodwall Alternative

No significant impacts to geology would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek BPU Floodwall. The construction of an additional row of piles and a foundation slab extension would require shallow excavation within the soil above bedrock. No post-construction impacts to geology would be anticipated as a result of the pile installation and foundation slab extension.

4.2.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant impacts to geology would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is the installation of a new, open cell sheetpile wall landside of the existing wall. Sheetpile would be driven into the existing stability berm through the soil to a depth above bedrock. No post-construction impacts to geology would be anticipated from sheetpile wall installation.

4.2.5 North Kansas City Unit – Harlem Alternative

No significant impacts to geology would be anticipated from the preferred alternative selected for the North Kansas City levee unit–Harlem site. A buried collector would require relatively shallow excavation. No drilling to bedrock or to a depth above bedrock would be required. No post-construction impacts to geology would be anticipated from the buried collector operation.

4.2.6 North Kansas City – National Starch Site Alternative

No significant impacts to geology would be anticipated from the preferred alternative selected for the National Starch site. The preferred alternative for this unit is the installation of pressure relief wells and pump station construction to control underseepage pressures. Drilling through the soil layers to bedrock depth or to a depth just above bedrock (80 to 120 feet) would be required to facilitate relief well installation. Shallow excavation would be required for pump station construction. No post-construction impacts to geology would be anticipated from the operation of pressure relief wells and a pump station.

4.2.7 Armourdale Levee Unit Raise Alternatives

No significant impacts to geology would be anticipated from any of the raise alternatives proposed for the Armourdale unit. The tentative preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. All alternatives would require a landside earthen levee raise, floodwall modification or replacement, I-wall installation, pump station modification or replacement, and relief wells to be installed to control underseepage pressure. Relief well installation is the only construction activity that would require intensive drilling, and similar drilling would be conducted for each raise alternative. Drilling through the soil layers to bedrock depth or to a depth just above bedrock (80 to 120 feet) would be required to facilitate relief well installation. No post-construction impacts to geology would be anticipated from any levee raise alternatives or the operation of underseepage controls.

4.2.8 Central Industrial District Levee Unit Raise Alternatives

No significant impacts to geology would be anticipated from any of the raise alternatives proposed for the Central Industrial District levee unit. The tentative preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. All alternatives would require a landside earthen levee raise, floodwall modification or replacement, pump station modification or replacement, and relief wells to be installed to control underseepage pressure. No I-walls would be installed for the CID levee improvements. Relief well installation is the only construction activity that would require intensive drilling, and similar drilling would be conducted for each raise alternative. Drilling through the soil layers to bedrock depth or to a depth just above bedrock (80 to 120 feet) would be required to facilitate relief well installation. No post-construction impacts to geology would be anticipated from any levee raise alternatives or the operation of underseepage controls.

4.2.9 Proposed Borrow Area

No significant impacts to geology would be anticipated from the no action alternative or any of the alternatives that require soil borrowing. Excavation depths within the proposed borrow to facilitate the construction of the preferred alternative are not anticipated to exceed ten feet. The depth of bedrock is variable and estimated at 80 to 120 feet below the ground surface. No impacts

to geology as a result of soil borrowing to construct the preferred alternative are anticipated to occur after borrow activities are completed.

4.3 Water Resources and Water Quality

For all of the preferred alternatives proposed for the levee units, there is a low probability for the inadvertent loss of a small amount of soil into the adjacent waterway or terrestrial habitat. Temporary erosion controls such as silt fencing and staked straw bales would be used to divert flow from exposed soils, temporarily store flows, or otherwise minimize erosion and sediment runoff from construction areas to prevent the introduction of sediment and construction debris into the adjacent waterway, wetlands, and riparian resources. Disturbed areas would be graded and seeded with grass (brome, rye, and fescue) upon the completion of construction. Best Management Practices would prevent the introduction of fuel, or chemicals from construction equipment into the adjacent waterway. To further avoid or otherwise minimize impacts to water resources and water quality, construction equipment would be operated to minimize the loss of soil, petroleum products, or other deleterious material into the waterway and adjacent resources.

In regards to groundwater within the project area, the regional groundwater profile during nonflood period will be located below the top of ground is going to be variable depending on the seasonal rainfall. The flow of the groundwater will be directed towards the nearest creek or river. During periods of high river stages this flow pattern will be affected by the elevation of the river. When the river elevation exceeds the high bank of the riverside foreshore of the line of protection, it is assured that the groundwater profiles will reverse direction and start to flow towards the landside of the line of protection. The elevation of the top of the groundwater will be dependent on the thickness of the confining blanket of silts or clays overlying the foundation sands. At some river stage above the base of the levee or floodwall, the groundwater will reach the top of landside ground surface resulting in a saturated condition. At all higher river levels the groundwater will flow from the riverside to the landside.

4.3.1 Argentine Levee Unit Alternative

No significant impacts to water resources or water quality would be anticipated from the preferred alternative selected for Argentine unit. The preferred alternative for this unit is the nominal 500-year+3 levee raise and underseepage controls. The construction of overtopping reliability improvements including earthen levee, floodwalls and I-walls, would be primarily conducted from the top of the existing levee, or landside of the existing levee, which would contain soil and sediment and prevent their introduction into the Kansas River. Pump station replacement and underseepage control features would serve to return Kansas River seepwater back into the River. Work to be potentially conducted below the ordinary high water mark (OHWM) of the Kansas River involves the replacement of the box culvert that comprises the outfall of the Argentine pump station. This work would be subject to considerations pursuant to Section 10 of the Rivers and Harbors Act. This levee unit has been extensively studied to determine the nature and location of contamination from hazardous waste. Contaminated material including soil, storage tanks, and other media is planned for removal and proper disposal to prevent the contamination of the adjacent waterway and terrestrial resources. Any trash or contaminated soil encountered during construction must be excavated and disposed of in an appropriate landfill.

4.3.2 East Bottoms Levee Unit Alternative

No significant impacts to water resources and water quality would be anticipated from the preferred alternative selected for the East Bottoms unit. The preferred alternative is the installation of relief wells landside and downgradient of the existing levee within the existing right-of-way, which would provide containment for disturbed soil during construction. This alternative is an augmentation to an existing water collection system. A relief well system would collect Blue River water that seeps through the levee, and subsequently discharge the water back to the Blue River using portable diesel pumps to keep the seepage flow off-site. Groundwater contamination is known to be present within the area of proposed construction.

To determine the potential impact to water quality as a result of relief well construction and operation, a groundwater investigation was conducted January 25th to 26th, 2005. Temporary wells were constructed at the riverward levee toe and screened at the groundwater surface, bedrock contact, and at an intermediate level between the two at three locations. Analytes tested in the groundwater include: VOC's, SVOC's, pesticides, organopesticides, herbicides, and total metals. Only metals were found to be above the MCLs for drinking water standards. Past groundwater sampling investigations performed by Bayer also found elevated levels of metals with respect to the MCL for drinking water standards and these levels may be indicative of natural background concentrations. No other contaminants were present in the groundwater above the MCLs for drinking water standards for the sampled locations.

The location of the proposed relief wells is located a considerable distance west- and upgradient of known contaminant plumes. Results indicate that the proposed relief wells would not impact the existing groundwater plumes under transient or flowing conditions. Low levels of contaminants in the groundwater indicate that water discharged from the relief wells during flood conditions does not constitute a substantial environmental risk. No significant impacts to water resources or water quality would be anticipated from the construction and operation of relief wells to provide underseepage control for the East Bottoms levee unit.

4.3.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant impacts to water resources and water quality would be anticipated from the preferred alternative proposed for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative consists of strengthening the existing floodwall by installing an additional row of piles and a foundation slab extension from the landward side of the existing floodwall, which would provide containment for sediment and debris during construction. The preferred alternative is not anticipated to impact water resources or water quality during the construction process, or post-construction.

4.3.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant impacts to water resources and water quality would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. New open cell sheetpiling would be driven into the soil landside of the existing sheetpile wall from the river using a crane. A small amount of soil may incidentally enter the Missouri River as a result of sloughing while driving new sheetpile, excavating, and filling voids. A temporary, localized increase in turbidity could occur during sheetpile installation. However, no significant impacts to water resources or water quality are anticipated and the new sheetpile wall would prevent the adjacent land from

sloughing into the river during a high water event due to sheetpile wall failure as a result of scouring along the existing sheetpile wall.

4.3.5 North Kansas City Levee Unit – Harlem Alternative

No significant impacts to water resources and water quality would be anticipated from the preferred alternative selected for the Harlem area. The preferred alternative for this site is the construction of a buried collector system along the landside toe of the levee to intercept seepage. Buried collector installation would occur landside and downgradient of the existing levee between the levee and the fence that borders the adjacent property, which would contain disturbed soil and prevent it from entering the Missouri River. The buried collector would operate only during flood events. Water from the Missouri River that seeps through the levee would be collected and pumped back into the river using portable diesel pumps. The quantity of water that would be returned to the river is variable and depends on the amount of water that seeps through the levee. No hazardous waste is located in the area of the proposed construction. No significant impacts to water resources and water quality are anticipated as a result of the construction or operation of the buried collector. The construction of this underseepage control feature would protect North Kansas City from underseepage failure of the levee at Harlem and the release of large amounts of sediment and manufacturing chemicals and materials into the Missouri River.

4.3.6 North Kansas City Levee Unit – National Starch Site Alternative

No significant impacts to water resources and water quality would be anticipated from the preferred alternative selected for the National Starch site. The preferred alternative for this site is the installation of pressure relief wells and the construction of a pump station. The pressure relief wells and pump station would be constructed landside and downgradient of the existing levee, which would help prevent soil and construction debris from entering the Missouri River. Drilling to a depth of 80 to 100 feet would be required for relief well installation. Shallow excavation would facilitate pump station construction.

An outlet structure may be constructed riverside at the toe of the levee and a conveyance path may be excavated to allow pumped seep water to reenter the river. If constructed, the conveyance path would be lined with rock to protect the bank from eroding and headcutting towards the levee. A similar outlet design is present upstream at +/- station 272+00 to discharge seep water from the existing pump stations.

After construction, the relief well system would collect river water that seeps through the levee during flood events and discharge it back over the levee into the Missouri River. Water quality would not be adversely impacted from this process. There is no known soil or groundwater contamination that would be impacted by relief well or pump station installation or operation. Past geotechnical investigations have been conducted around the site. None of the borings close to the river showed any type of contamination, which indicates there is not a plume reaching the river. No additional investigation is recommended.

4.3.7 Armourdale Levee Unit Raise Alternatives

No substantial impacts to water resources and water quality would be anticipated from any of the raise alternatives proposed for the Armourdale unit. All raise alternatives would require a landside earthen levee raise, floodwall modification or replacement, I-wall installation, pump

station modification or replacement, and relief wells or a buried collector system to relieve underseepage pressure. The tentatively selected preferred alternative for Armourdale is the 500year+3 levee raise. This alternative provides overtopping protection for the Armourdale unit and equals the levee raise height selected for the Argentine unit, and the proposed raise of the Central Industrial District levee unit. With the exception of floodwall replacement, excavation to facilitate construction would be conducted landside of the levee. Floodwall replacement requires an approximate seventy-five foot excavation riverside of the existing floodwalls. A small amount of soil may inadvertently enter the Kansas River during excavation, borrow placement or construction and result in a localized, temporary increase in turbidity. However, no significant impacts to water resources or water quality would be anticipated from the construction of the preferred alternative. No adverse post-construction impacts from the preferred alternative are anticipated. The preferred alternative would protect the Armourdale unit from overtopping and underseepage failure of the levee. Levee failure would significantly impact water quality within and downstream of the Armourdale levee unit.

4.3.8 Central Industrial District Levee Unit Raise Alternatives

No substantial impacts to water resources or water quality would be anticipated from any of the levee raise alternatives formulated for the CID unit. Similar to the Armourdale alternatives, the CID alternatives consist of incremental levee raises. The tentatively selected preferred alternative for CID is the nominal 500year+3 levee raise. This alternative provides overtopping protection for the Armourdale unit and equals the levee raise height selected for the Argentine levee unit and the proposed raise of the Armourdale levee unit. With the exception of floodwall replacement, excavation to facilitate construction would be conducted landside of the levee. Floodwall replacement requires an approximate thirty foot riverside excavation. I-walls would not likely be constructed for improvements to the CID levee unit. A small amount of soil may inadvertently enter the Kansas River during excavation, borrow placement or construction and result in a localized, temporary increase in turbidity. However, no significant impacts to water resources or water quality would be anticipated from the construction of the preferred alternative. No adverse post-construction impacts from the preferred alternative are anticipated.
Water that seeps through the levee would be pumped back into the Kansas River during high water events using portable diesel pumps. The preferred alternative would protect the CID from overtopping and underseepage failure of the levee. Levee failure would significantly impact water quality within and downstream of the CID levee unit due to the heavily industrialized nature of this unit.

4.3.9 Proposed Borrow Area

Soil borrowing is not anticipated to significantly impact water quality. Existing activities within the proposed borrow area includes excavating, hauling, grading, and disk harrowing. Concurrent excavation and hauling activities would be conducted when practicable during construction. Excavation would occur landside of the foreshore adjacent to the Kansas River toward the interior of the borrow area, and the surrounding land elevation would provide for additional soil containment. Therefore, if on-site soil stockpiling would need to occur, sediment would be contained on the land and would not runoff into the Kansas River and impact water quality. Temporary erosion control features and Best Management practices as mentioned in section 4.3 would be used to avoid, or otherwise minimize impacts water resources and water quality.

4.4 Air Quality

No significant impacts to air quality would be anticipated from any of the preferred alternatives, or tentatively preferred alternatives proposed for the Kansas Citys' levee units. All of the preferred alternatives would cause a short-term, temporary air quality impact from construction as a result of emissions and dust generated from the operation of excavators, haul trucks, graders and similar earth moving heavy equipment. Levee raise preferred alternatives would be anticipated to have a greater construction related air quality impact relative to non-levee raise preferred alternatives as increased emissions and dust would likely be generated due to greater borrow soil requirements and construction material requirements. Increased dust would occur on haul roads and areas of clearing and excavation, especially if construction was conducted during a dry period. The watering of road segments could be implemented to minimize the impact of dust and windblown particulate matter associated with construction. Implementation of the preferred alternative would conform to National Ambient Air Quality Standards. Post-construction air quality impacts are not anticipated to be significant. These impacts would result from the operation of pump plants and portable, diesel powered pumps used to pump seep water out of buried collector systems and back into the Missouri, Kansas, or Blue Rivers during flood events.

4.5 Noise

4.5.1 Argentine Levee Unit Preferred Alternative

No significant noise impacts would be anticipated from the preferred alternative selected for the Argentine levee unit. Noise impacts as a result of the nominal 500-year+3 levee raise would be anticipated to be adverse but would primarily consist of short-term, construction noise impacts. The proposed levee improvement alternatives would be located primarily adjacent to commercial industry. Sensitive noise receptors include the residential areas located adjacent to stations +/- 0+00 to 30+00, and station 285+00. These residences are located adjacent to the Argentine rail yard. Work proposed near station 285+00 includes floodwall and stoplog gap removal and replacement, and I-wall and buried collector construction. This construction would be conducted north of the rail yard trackage. Construction proposed between stations +/- 0+00 and 30+00 would consist of I-wall construction and stoplog removal and replacement. This construction would be conducted south of the rail yard trackage. Noise buffering is provided by the width of the existing right-of-way, which increases the distance between the construction and the residences, and the dense trees that border the northern portion of the subdivision. No significant noise impacts are anticipated from the operation of levee improvements.

4.5.2 East Bottoms Levee Unit Preferred Alternative

No significant noise impacts are anticipated from the preferred alternative selected for the East Bottoms levee unit. The preferred alternative for this unit is the installation of pressure relief wells. Noise impacts would primarily consist of short-term construction noise. The location of relief well installation is adjacent to the Bayer CropScience Manufacturing, Research and Development Center (Bayer), which is developed on 236 acres of land just north of the Blue River. No residences or sensitive noise receptors are located within the vicinity of the proposed construction area. The installation of pressure relief wells is anticipated to blend with the existing noise generated by manufacturing processes and associated activities. No significant noise impacts are anticipated from the operation of pressure relief wells.

4.5.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant noise impacts are anticipated from the preferred alternative selected for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative is to strengthen the existing floodwall with an additional row of piles and a foundation slab extension. Noise impacts are anticipated to be temporary, construction related impacts. Sensitive noise receptors in the vicinity of construction include an apartment complex and cemetery. The apartment complex is located south of Esplanade Street and the Union Pacific Railroad trackage within the 66115 zip code, about 0.3 miles south of the area of proposed construction. Memorial Park Cemetery is located at 3223 North 18th Street, about 0.2 miles southwest of the proposed construction. The apartment complex and cemetery should receive noise buffering due to the distance of these facilities from the proposed construction and the trees that surround these areas. The BPU infrastructure adjacent to the floodwall would serve as a barrier to reduce noise propagation from the construction area. Existing noise within the vicinity of the proposed construction, apartment complex, and cemetery includes railroad and truck traffic to facilitate industry.

No significant noise impacts are anticipated due to the distance between the sensitive noise receptors and the proposed construction area, existing noise buffers and existing sources of periodic noise within this area. Upon completion of the floodwall improvements, there would be no further noise impacts as a result of project requirements.

4.5.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant noise impacts are anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is the installation of an open cell sheetpile wall. Noise impacts are anticipated to short-term and temporary as a result of construction activities. Adverse noise impacts from construction are anticipated due to the location of Kaw Point Park near the area of proposed construction. Noise impacts to recreation as a result of the preferred alternative selected for this feature are discussed below and in detail in section 4.17.4. For the open and closed cell sheetpile wall installations, the use of a hydraulic or vibratory pile driver would be anticipated to significantly lessen the noise impact of sheetpile driving.

The location of sheetpile installation is adjacent to an industrial area primarily used for food processing, storage, and transport, which receives moderate to heavy truck traffic. Additional existing noise sources include vehicular traffic (Interstate 70, Fairfax Trafficway, and associated roads), and periodic air traffic to and from the Downtown Airport. Sensitive noise receptors within the vicinity of the proposed construction area include adjacent businesses, residences and Kaw Point Park.

The impulse noise generated from sheetpile driving would contrast the traffic and manufacturing noise, and periodic aircraft noise within the area. The nearest residences are located about 0.5 miles west of the sheetpile wall. Residents within the 66101 zip code, located outside of the Fairfax-Jersey Creek protected area, may receive noise impacts from construction-related activities. However, potential impacts are not anticipated to be significant due to the distance between residents and the area of proposed construction. The distance from the sheetpile wall to residences will lessen the construction noise levels. Kaw Point Park and associated walking trails are located approximately 0.1 miles from the proposed construction area. Construction activities and noise may temporarily annoy canoeists or boaters on the Kansas and Missouri Rivers, and park

visitors, particularly if sheetpile installation were conducted during the spring or summer months. Conducting sheetpile installation during the fall-winter seasonal timeframe, in which the Missouri and Kansas Rivers and park are less utilized, would lessen the impact of construction-generated noise. Adjacent businesses will be subject to short-term construction noise. Noise levels would return to their previous level following construction.

4.5.5 North Kansas City Levee Unit – Harlem Alternative

No significant noise impacts are anticipated from the preferred alternative selected for the North Kansas City levee unit Harlem area. The preferred alternative at this location is the installation of a buried collector system. The noise generated from the construction of this feature would result from excavation. The location of proposed construction is between the Hannibal Bridge and the A.S.B. Bridge, which are adjacent to the Broadway Bridge and Heart of America Bridge, respectively. The Downtown Airport is located just west of the Broadway Bridge. An active Norfolk and Western rail line is located north of the proposed construction. The area adjacent to the proposed construction is comprised primarily of businesses, and some residences, within the 64116 zip code. Light industrial manufacturing processes, including metal fabrication (i.e., forming, grinding, and welding) occur adjacent to the proposed construction. Vehicular, rail, and air traffic are relatively common within this area.

Sensitive noise receptors within the vicinity of the proposed construction include a potential elderly population, an apartment building, and a church. Thirteen and one-half percent of zip code 64116 is comprised of an elderly population over age 65 (Census 2000). The median age of the residents who comprise the block group between the Hannibal Bridge and the A.S.B. Bridge is about 27.3 years (Census 2000). The apartment building is located just north of the proposed construction area. The church is located approximately 0.7 miles north of the proposed construction. Construction-related noise may annoy residents adjacent to the proposed construction area.

Increased noise will occur during flood events following construction, as portable diesel-powered pumps would be used to remove water from the buried collectors. The noise generated by the pumps would not be considered significant as it would occur adjacent to the Missouri River only during flood events.

4.5.6 North Kansas City Unit – National Starch Alternative

No significant noise impacts would be anticipated from the preferred alternative selected for the National Starch site. The preferred alternative is the installation of relief wells and a pump station. The National Starch site is located between the Paseo Bridge and the Heart of America Bridge. The area of proposed construction is located adjacent to an existing haul route, active rail line, and manufacturing facilities. Construction noise is anticipated to blend with the existing noise generated by manufacturing and associated activities. No sensitive noise receptors are located within the vicinity of the proposed construction area. There is a low probability that construction would disrupt recreation on the Missouri River, due to the low amount of river recreation in this reach and the existing noise that occurs within this area. Post construction noise impacts are short-term and temporary and would consist of the operation of portable diesel pumps to return collected seepwater to the Missouri River. Pump operation is not anticipated to significantly increase the noise levels within the vicinity of the National Starch property.

4.5.7 Armourdale Levee Unit Raise Alternatives

No significant noise impacts would be anticipated from any of the alternatives proposed for the Armourdale unit. All of the proposed alternatives would cause short-term, construction related impacts. The tentatively preferred alternative for this unit is the nominal 500-year+3 levee raise including underseepage controls. A greater amount of real estate and quantities of floodwalls, I-walls, and retaining walls are generally required as the raise alternatives increase from the nominal 500year+0 to the nominal 500year+3. The increased excavation, earth moving and construction required to construct an incrementally higher raise generally results in increased noise relative to the other levee raise alternatives considered. All raise alternatives would require a landside earthen levee raise, floodwall modification or replacement, I-wall installation, pump station modification or replacement, and the same number of relief wells to be installed to control underseepage pressure. Drilling through the soil layers to a depth just above bedrock (80 to 120 feet) would be required to facilitate relief well installation. Similar drilling would be conducted for each raise alternative.

The tentatively selected preferred alternative for this unit is the 500year+3 raise. Although this alterative would generate more construction noise relative to the other alternatives proposed for this unit, noise impacts are not considered significant as the Armourdale unit is heavily industrialized, and industrial and construction noise is relatively common within this levee unit. Post construction noise would occur from the operation of diesel powered pumps during flood events for underseepage control. The operation of pumps would not be anticipated to cause a significant noise impact.

4.5.8 Central Industrial District Levee Unit Raise Alternatives

No significant impacts noise impacts would be anticipated from any of the levee raise alternatives proposed for the Central Industrial District levee unit. The tentatively preferred alternative is the nominal 500-year+3 levee raise with underseepage controls. All of the proposed alternatives would cause a short-term, temporary noise impact during construction. Similar to the Armourdale alternatives, the CID alternatives consist of incremental levee raises. An incrementally higher levee raise generally results in increased construction noise due to increased excavation and soil placement. However, the length of floodwall replacement and number of relief wells required are anticipated to be the same for all raises above the nominal 500-year+0 raise. Construction of the tentatively preferred alternative would be anticipated to emit slightly more noise relative to the other alternatives proposed for this unit. However, this levee unit is heavily industrialized and construction and post-construction impacts are not anticipated to be significant. Post construction noise would occur from the operation of diesel powered pumps during flood events for underseepage control. The operation of pumps would not be anticipated to cause a significant noise impact within this levee unit.

4.5.9 Proposed Borrow Area

Soil borrowing activities conducted within the proposed borrow area are not anticipated to generate significant noise impacts. Excavation, hauling, grading, and crop cultivation already occur within the proposed borrow area. Soil borrowing to construct the preferred alternatives would result in more intensive excavation and earth moving activities than those currently conducted within the borrow area. Similar noise levels would be generated over a longer continuous timeframe. The additional traffic noise generated from the transport of soil from the borrow area to the levee units

would be in addition to the hauling activities that already occur along the proposed haul route. This increased noise would be temporary and generally localized and is not anticipated to be significant.

4.6 Visual Quality

For all of the preferred alternatives selected for the individual levee units, the stockpiling of soil and the presence of heavy equipment required for construction would be an adverse, temporary visual impact.

4.6.1 Argentine Levee Unit Alternative

No significant visual quality impacts to visual quality are anticipated from the preferred alternative selected for the Argentine levee unit. The preferred alternative for the Argentine levee unit is the nominal 500-year+3 levee raise and underseepage controls. Floodplain encroachment was minimized by using I-walls and floodwalls for the nominal 500-year+3 levee raise. I-walls and floodwalls allow a vertical raise while minimizing and avoiding real estate impacts landside of the existing levee. An earthen levee raise designed to achieve the elevations provided by I-walls and floodwalls would require a larger horizontal footprint and terrestrial habitat impacts for levee construction. The existing Kansas Citys' levees average approximately +/- 15 feet in height. The nominal 500-year+3 levee raise alternative generally results in an approximate four to six foot raise along the existing levee and floodwalls.

The nominal 500-year+3 preferred alternative would result in a moderate visual quality impact compared to the other levee raise scenarios considered and the approximate height of the existing levee. Most of the levee is not visible from the Kansas River due to the tree growth along the River in this reach. Therefore, most levee improvements would not likely be evident to the public except during fall-winter seasonal timeframe when deciduous trees drop their leaves and river recreation is low. In areas where tree/shrub growth is not dense or is nonexistent, a levee raise could further minimize the view of industry from the river. Industry considers the levees a necessity because of the flood damage reduction they provide. Implementation of the preferred alternative will result in the construction of additional non-natural features along the Kansas River. The construction of levee improvements would require the addition of relatively permanent non-natural features adjacent to the river. Argentine is an industrialized levee unit. This impact is not considered significant as a levee and associated flood damage reduction features have been in-place within Argentine levee unit and along the Kansas River and associated waterways since the 1950's. Changes to the visual quality of the landscape adjacent to the Kansas River are not anticipated to adversely impact the potential for the inclusion of the River into the National Wild and Scenic Rivers System. Short-term construction related aesthetic impacts include the presence of heavy equipment and the stockpiling of soil.

4.6.2 East Bottoms Levee Unit Alternative

No significant impacts to visual quality are anticipated as a result of the preferred alternative selected for the East Bottoms levee unit. The preferred alternative is an augmentation to an existing collector system and consists of the installation of pressure relief wells, which would be located landward and downgradient of the existing levee. Less than one-quarter acre of maintained grass (brome, fescue, and rye), would be converted to relief wells and manholes. Relief wells generally exhibit a low profile within the landscape. Short-term construction related aesthetic impacts include the presence of heavy equipment and the stockpiling of soil. The visual impact resulting from relief

well installation is not anticipated to be insignificant due to their relatively low profile within the landscape and their installation location downgradient of the existing levee where they would not be easily viewed from the river.

4.6.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant impacts to visual quality are anticipated as a result of the preferred alternative selected for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative for this location is to strengthen the existing floodwall with an additional row of piles and a foundation slab extension. The preferred alternative would not significantly alter the existing visual quality within this reach. Floodwall improvements would be constructed landside (behind) the existing wall, and these structural modifications would not be easily viewed from the Missouri River. Short-term construction-related impacts include the presence of heavy equipment and the stockpiling of soil required for backfilling. No significant impacts to visual quality are anticipated as a result of the preferred alternative due to the location of the proposed improvements landside of the existing floodwall.

4.6.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant visual quality impacts would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The open cell sheetpile wall is the preferred alternative for this location within the Fairfax-Jersey Creek levee unit. This alternative would not be anticipated to significantly change the existing visual quality as an existing sheetpile wall is already in place. A new sheetpile wall would provide a short-term increase in aesthetics as the the existing sheetpile wall is rusted and tie-backs are exposed. The aesthetics and integrity of the new sheetpile wall would decrease over time. Short-term visual quality impacts would occur due to the land disturbance within the vicinity of the existing sheetpile wall required for construction. A crane would be deployed in the Missouri River to drive new sheetpile sections. Areas disturbed by excavation would be graded and seeded when construction is complete. The preferred alternative is not anticipated to cause significant visual quality impacts as the new sheetpile wall would be installed landside of an existing sheetpile wall. Visual quality impacts would be short-term and construction-related.

4.6.5 North Kansas City Levee Unit – Harlem Alternative

No significant visual quality impacts are anticipated from the preferred alternative selected for the North Kansas City levee unit Harlem preferred alternative. The preferred alternative is the installation of a buried collector, which would result in a minor visual quality impact, as only a manhole would be visible after backfilling of soil, grading, and seeding. This feature would be located landside and downgradient of the existing levee and would not be readily visible from the Missouri River. A portable diesel pump would be present after construction is completed during flood events to return water that seeps through the levee back into the Missouri River. Short-term construction related impacts include the stockpiling of soil and the presence of heavy equipment. The preferred alternative selected for the Harlem site is not considered significant due to its location downgradient of the existing levee and the relatively low profile of this feature within the landscape.

4.6.6 North Kansas City Levee Unit – National Starch Alternative

No significant visual quality impacts are anticipated from the preferred alternative selected for the North Kansas City National Starch preferred alternative. The preferred alternative is the installation of pressure relief wells and the construction of a pump station. These features are anticipated to have a relatively minor visual quality impact and they would not be readily visible from the Missouri River. The pressure relief wells and pump station would be constructed landside and downgradient of the existing levee. Relief wells generally exhibit a low profile within the landscape. An outlet structure may be constructed riverside at the toe of the levee and a conveyance path may be excavated and lined with rock to allow pumped seepwater to enter the river instead of eroding the land and headcutting up the riverside slope. Short-term construction related impacts include the stockpiling of soil and the presence of heavy equipment (i.e. excavators and graders). The preferred alternative is not anticipated to cause significant visual quality impacts due to their location landside of the existing levee, which is not readily visible from the Missouri River.

4.6.7 Armourdale Levee Unit Raise Alternatives

No significant visual quality impacts would be anticipated from any of the raise alternatives proposed for the Armourdale unit. All of the proposed raise alternatives would impact the visual quality of this unit. The tentatively preferred alternative for this unit is the nominal 500-year+3 levee raise including underseepage controls. The raise would be accomplished by constructing earthen levee, floodwalls, and I-walls. Floodplain encroachment was minimized by using I-walls and floodwalls for the nominal 500-year+3 levee raise. I-walls and floodwalls allow a vertical raise while minimizing and avoiding real estate impacts landside of the existing levee. New floodwall would be constructed landside of existing floodwall. The nominal 500-year+3 levee raise alternative generally results in an approximate four to six foot raise along the existing levee and floodwalls. An earthen levee raise designed to achieve the elevations provided by I-walls and floodwalls would require a larger horizontal footprint and greater potential terrestrial habitat impacts for levee construction. The nominal 500-year+3 height increase is considered moderate relative to the existing height of the overtopping reliability features within this levee unit. Underseepage controls are generally not visible after construction. Short-term construction related aesthetic impacts include the presence of heavy equipment and the stockpiling of soil. Post-construction impacts to visual quality include a moderate height increase of existing overtopping features within a heavily industrialized unit. Levee failure would result in a significant adverse impact to the aesthetics of the Armourdale levee unit.

4.6.8 Central Industrial District Levee Unit Alternatives

No significant visual quality impacts would be anticipated from any of the raise alternatives proposed for the Central Industrial levee unit. All of the proposed raise alternatives would impact the visual quality of this unit. The tentatively preferred alternative for this unit is the nominal 500-year+3 levee raise including underseepage controls and results in visual quality impacts similar to those anticipated for the Armourdale levee unit. The levee raise would be accomplished by constructing earthen levee, floodwalls. No I-walls would be constructed within the CID unit. Floodwalls would be constructed landside of existing floodwalls to allow a vertical raise while minimizing and avoiding real estate impacts landside of the existing levee. The nominal 500-year+3 levee raise alternative generally results in an approximate four to six foot raise along the existing levee and floodwalls. An earthen levee raise designed to achieve the elevations provided by floodwalls would require a larger horizontal footprint and potential increased terrestrial habitat

impacts for levee construction. The nominal 500-year+3 height increase is considered moderate relative to the existing height of the overtopping reliability features within this levee unit. Underseepage controls are generally not visible after construction. Short-term construction related aesthetic impacts include the presence of heavy equipment and the stockpiling of soil. Post-construction impacts to visual quality include a moderate height increase of existing overtopping features within a heavily industrialized unit. Levee failure would result in a significant adverse impact to the aesthetics of the Central Industrial District levee unit.

4.6.9 Proposed Borrow Area

No significant visual quality impacts would occur within the proposed borrow area as a result of the proposed levee improvements. Excavating, hauling, grading, and crop cultivation already occur within the proposed borrow area. Soil borrowing would result in more intensive excavation, earth moving, and hauling than the level of these activities currently conducted within the borrow area. Short-term, construction related visual quality impacts would occur from the increased presence of heavy equipment, stockpiling of soil, and related borrow activities. Grading would occur when soil borrowing activities are complete to level the topography of the borrow area.

4.7 Soils and Prime Farmland

4.7.1 Argentine Levee Unit Alternative

No significant impacts to prime farmland are anticipated from the preferred alternative selected for the Argentine levee unit. The preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. The majority of the soil landside of the Argentine levee is mapped as the Sarpy-Haynie complex, which is not classified as prime farmland by the NRCS (Zavesky and Boatwright, 1977). Haynie and Eudora are prime farmland soils located within the eastern portion of the Argentine unit within the proposed construction area. The area occupied by the existing levee, and the area adjacent to the existing levee is previously disturbed from levee construction. The approximate eastern one-third of the existing levee was constructed on prime farmland soils. The soil under the existing levee that is comprised of prime farmland will be left in place. Impacts to prime farmland from the nominal 500year+3 levee raise preferred alternative are not considered significant as the proposed construction would take place primarily within previously disturbed areas and the majority of prime farmland soil under the existing levee would be left in place. No post construction impacts to prime farmland would be anticipated to occur unless levee failure resulted in the loss of prime farmland to the Kansas River.

4.7.2 East Bottoms Levee Unit Alternative

No significant impacts to prime farmland are anticipated from the preferred alternative selected for the East Bottoms levee unit. The two-acre area that would be disturbed for relief well installation is mapped as urban bottomland, which is not classified as prime farmland by the NRCS. This land is previously disturbed due to construction of the levee and the Bayer facility. No impacts to prime farmland are anticipated as a result of the construction and operation of the preferred alternative due to the absence of prime farmland soils in the area of proposed construction.

4.7.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant impacts to prime farmland are anticipated from the preferred alternative selected for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative of installing an additional row of piles and pouring a foundation slab extension would result in a minor impact to

prime farmland due to the creation of impervious surface from pile and slab construction. The soil within the vicinity of the existing floodwall is mapped as Haynie silt loam, which is classified as prime farmland by the NRCS. The vicinity of the proposed construction is heavily disturbed from construction of the existing floodwall and facilities necessary for BPU to conduct energy production and water treatment processes. It is likely that prime farmland soils were excavated from the property during construction of the BPU facility and the existing soil is comprised of random fill. The area adjacent to the existing floodwall is not currently cultivated and agricultural activities will not likely occur in this area. No significant impacts to prime farmland are anticipated from the construction and operation of the preferred alternative due to the heavily disturbed nature of the area of proposed construction.

4.7.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant impacts to prime farmland are anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative of installing an additional row of piles and pouring a foundation slab extension would not be anticipated result in any impacts to prime farmland soils. The location of sheetpile installation is approximately 20 feet above the normal Missouri River elevation in an area mapped as Haynie silt loam, which is classified as prime farmland by the NRCS (Zavesky and Boatwright, 1977). However, this location is extremely and extensively disturbed from the placement of fill material on top of rip-rap to elevate this area for access road construction. Prime farmland soils may exist under layers of random fill and rip-rap. This land is not currently used for agriculture and is not anticipated to be used for agricultural purposes. No significant impacts to prime farmland would be anticipated from the construction and operation of the preferred alternative due to the severely disturbed nature of the area within, and adjacent to the proposed construction.

4.7.5 North Kansas City Levee Unit – Harlem Alternative

No significant impacts to prime farmland are anticipated from the preferred alternative selected for the North Kansas City Harlem area. The preferred alternative is a buried collector system. Prime farmland within the area of proposed construction is Haynie silt loam, which is mapped as a linear strip of land from the bank of the Missouri River landward and downgradient of the existing levee to the fenceline. The area landward (north) of the fenceline consists of residences and businesses and is classified as urban bottomland, which is not considered prime farmland. No significant impacts to prime farmland would be anticipated from the construction and operation of the preferred alternative. This area is previously disturbed from construction of the existing levee. The area of proposed construction is likely impervious fill, which may, or not have been placed on top of existing prime farmland soils. Water that seeps through the levee would be returned to the Missouri River using portable diesel pumps. No post-construction impacts to prime farmland would be anticipated.

4.7.6 North Kansas City Levee Unit – National Starch Alternative

No significant impacts to prime farmland would be anticipated from the preferred alternative selected for the North Kansas City National Starch site. The preferred alternative for the National Starch site is the pump station construction and the installation of pressure relief wells. Proposed construction would occur on impervious surface (gravel fill) and mowed grass within a levee maintenance area that is mapped urban bottomland by the NRCS, which is not considered prime farmland. An outlet structure and conveyance path may be constructed riverside of the levee in an

area Haynie silt loam, which is classified as prime farmland by the NRCS. If the conveyance path is constructed, a relatively small impact of approximately 0.37 acre would occur to prime farmland. The area of conveyance path construction is previously disturbed from levee construction and may consist of impervious fill. No significant impacts to prime farmland would be anticipated from the National Starch site preferred alternative. A small impact of 0.37 acres may occur if the conveyance path is constructed. However, this area is previously disturbed from levee construction and may not contain Haynie silt loam, the mapped prime farmland soil. No post-construction impact to prime farmland from relief well and pump station operation is anticipated.

4.7.7 Armourdale Levee Unit Raise Alternatives

No significant impacts to prime farmland would be anticipated from any of the alternatives proposed for the Armourdale unit. The tentatively preferred alternative for this unit is the nominal 500-year+3 levee raise with underseepage controls. The area adjacent to the existing levee is mapped Haynie silt loam, which is classified as prime farmland by the NRCS, and Onawa overwash, which is classified by the NRCS as prime farmland if it is drained (Zavesky and Boatwright, 1977). The area occupied by the existing levee, and the area adjacent to the existing levee is previously disturbed from levee construction. If the mapped prime farmland soil was left in place during the construction of the existing levee, the majority of it would be left in place following construction. Some existing prime farmland would be covered with borrow soil for the earthen levee raise. Borrow soil would likely consist of prime farmland soil, which is predominantly mapped within the area of proposed borrow. This land is not currently used for agriculture and is not anticipated to be used for agricultural purposes. No significant impacts to prime farmland would be anticipated from the construction and operation of the preferred alternative due to the severely disturbed nature of the area within, and adjacent to the proposed construction.

4.7.8 Central Industrial District Levee Unit Raise Alternatives

No significant impacts to prime farmland would be anticipated from any of the alternatives proposed for the Central Industrial District levee unit. All alternatives proposed would have a relatively minor impact on prime farmland. The tentatively preferred alternative for this unit is the nominal 500-year+3 levee raise with underseepage controls. The area adjacent to the existing levee is mapped Haynie silt loam, which is classified as prime farmland by the NRCS (Zavesky and Boatwright, 1977). The area occupied by the existing levee, and the area adjacent to the existing levee is previously disturbed from levee construction. If the mapped prime farmland soil was left in place during the construction of the existing levee, the majority of it would be left in place following construction. Some existing prime farmland would be covered with borrow soil for the earthen levee raise. Borrow soil would likely consist of prime farmland soil, which is predominantly mapped within the area of proposed borrow. This land is not currently used for agriculture and is not anticipated to be used for agricultural purposes. No significant impacts to prime farmland would be anticipated from the construction and operation of the preferred alternative due to the severely disturbed nature of the area within, and adjacent to the proposed construction.

4.7.9 Proposed Borrow Area

A localized impact to prime farmland would be anticipated as a result of borrow activities to implement the recommended plan. The borrow area measures approximately 276 acres and about 200 of those acres are mapped prime farmland by the NRCS. These include the Haynie and Eudora soils series. Onawa overwash is mapped in the eastern portion of the proposed borrow area and is only classified as prime farmland by the NRCS if it is drained. The Sarpy-Haynie complex is the dominant soil mapped along the foreshore. Within the area of proposed borrow, a surface area of approximately sixty acres would be excavated to a depth of about ten feet to acquire the borrow soil needed to construct the recommended plan. It is unknown whether all of the soil borrowed will be mapped as prime farmland, as the location of borrow will be located where WaterOne decides to locate their next lime storage areas. Construction of the recommended plan would result in an adverse, localized impact to prime farmland. However, additional prime farmland is mapped throughout Wyandotte and adjacent counties.

4.8 Hazardous Waste Management

Given the industrial and commercial nature of the study area, the presence of contamination was anticipated, investigated, and addressed throughout the planning process. Relatively minor areas of either verified or potential contamination such as leaking USTs (usually associated with transportation and trucking facilities) are anticipated at various locations along the length of the levee. These sites are identified within the HTRW appendix. These UST sites are expected to have typical POL non-CERCLA type contamination. Established Corps of Engineers construction procedures have the capability to effectively address such sites. Under the recommended plan, the USTs are planned for removal, the area backfilled with clean fill, and disposal action taken for contaminated material within a suitable approved landfill. The cost estimates include the costs for removal and replacement of five USTs along with appropriate contingencies.

4.8.1 Argentine Levee Unit Alternative

The HTRW appendix contains detailed information on the Argentine sites listed below. It should be noted that the HTRW appendix addresses potential contamination impacts from the perspective of the alternative(s) with the highest probability of impact to identified contaminated sites (i.e. the most extreme case). The selection of the recommended levee raise eliminated many potential impacts to the contaminated areas, as the footprint of the recommended plan in most instances is smaller than the most extreme case.

Some additional investigations are planned during PED phase for relatively minor Argentine unit properties with the potential for contamination. Testing access to some of these minor sites was not made available by the owners, and additional real estate access negotiations may be needed during PED. Should tests on these sites indicate the presence of regulated CERCLA material, then the sponsor is aware that if the site cannot be avoided, then both clean-up and the costs for any clean-up is the sponsor's responsibility.

No substantial impacts to hazardous waste are anticipated from the preferred alternative selected for the Argentine levee unit. The preferred alternative is the nominal 500-year+3 levee raise including underseepage controls.

RCRA contamination and remediation areas along the landward toe of the levee between stations 91+00 to 118+00 was the focus of avoidance measure planning as the Argentine alternatives were refined. In the recommended plan, an I-wall is used to raise the existing levee section adjacent to the contaminated area. The I-wall is located on top of the levee with sheetpile supports driven inside the levee. This approach avoids the area of contamination. Construction activities will be planned to prevent disturbance of the contamination. Access roads and work zones are planned for non-contaminated areas.

The foreshore area just north of the levee between stations 80+00 and 105+00 was originally considered as a potential borrow area, because of its close proximity. During the site evaluation process, it was determined that area should be avoided and other borrow sources be investigated. The reasons for this recommendation are 1) extensive soil testing would be required because the foreshore property is associated with a RCRA permitted facility currently undergoing soil and groundwater remediation 2) there are two SWMUs which have been identified in this area and 3) there is the potential for borrow area activities to have an adverse impact on the ongoing groundwater cleanup.

Roadway Express and E & M Transwood Truck and Trailer Repair, currently have underground storage tanks on their property between station 160+00 and 185+00. E & M Transwood has a diesel underground storage tank pad visible from the levee. These tanks lie in the area of the planned underseepage berm and would be removed before levee construction. The underground storage tanks at Roadway Express were listed in the ERIIS database search, but could not be seen from the levee road during a site visit on the Argentine levee. Any contaminated soil would also have to be excavated and hauled to a landfill. A buried collector is planned to be constructed at Station 179+50 to 183+00, but should not impact hazardous waste.

Property along Sta 200+00 to 225+00 has a history of groundwater contamination. The area is located outside the footprint of the recommended alternative. However, the presence of the groundwater contamination resulted in the elimination of a buried collector system in favor of a earthen filter blanket. The filter blanket is a surface feature which will not have any potential to affect contaminant plumes.

Around Station 220+00 to 245+00, large auto salvage yards are present. The surface soils may contain hydrocarbons and metals that have leaked from the salvaged vehicles. Solid waste may also be encountered in this area, especially towards the southern portion. The northernmost portion and the very southernmost portion of these yards would be covered with a landside levee raise and berm. The recommended plan was adjusted during final refinement to avoid one area of potential organic and metals contamination (not tested) associated with the auto salvage yards. The areas that comprise stations 223+00 to 227+00 and 243+00 to 245+00 are selected to have unsuitable soils removed and replaced. Trash or contaminated soil that is discovered must be excavated and disposed of in a landfill. An abandoned building is also located near Station 221+00 and should be demolished due to its location in the levee berm footprint. While no records revealed the prior use of the building, the appearance is one of a service station or autobody repair shop. Underground storage tanks may have been present and tank removal and soil excavation may be required.

The main Argentine pump station/box culvert construction near Sta 253+00 was planned in recognition of the POL contamination present in/around this area. This contaminated material is considered non-CERCLA. The contaminated material will be removed and replaced (with clean fill material) during construction of the replacement pump station. An appropriate landfill will be used for disposal of the contaminated excavated material. The cost estimate contains contingency and work area factors to cover this plan.

During early alternative planning, the area between Sta 260+00 to 275+00 was considered for buried collector or relief well installation to improve levee raise stability. As the development of alternatives proceeded, it was recommended that measures which introduce the possibility of migration of POL contamination in this area be avoided where possible. Refinements to the recommended plan included a rock toe for levee stability in lieu of relief wells or buried collector.

4.8.2 East Bottoms Levee Unit Alternative

No significant impacts to hazardous waste would be anticipated from the preferred alternative selected for the East Bottoms unit. Groundwater contamination is known to be present within the area of proposed construction. The preferred alternative for this levee unit is the installation of pressure relief wells along the Blue River from stationing 405+00 to 420+00. This alternative provides underseepage control and avoids impacts to ongoing contamination remediation mesures and any future corrective actions. The location of the proposed relief wells is located a considerable distance west- and upgradient of known contaminant plumes. Therefore, relief wells should have no impact on the existing groundwater plumes under transient or flowing conditions, and no significant impacts to hazardous waste would be anticipated from the construction and operation of relief wells to provide underseepage control for the East Bottoms levee unit.

4.8.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant impacts to hazardous waste would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative is to strengthen the existing floodwall with an additional row of piles and a foundation slab extension. There are no known areas of contamination within the vicinity of the existing floodwall. Therefore, no impacts to hazardous waste are anticipated from the construction or operation of the preferred alternative for the BPU floodwall.

4.8.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant impacts to hazardous waste would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is to install an open cell sheetpile wall landside of the existing sheetpile wall. There are no known areas of contamination within the vicinity of the existing sheetpile wall. Therefore, no impacts to hazardous waste are anticipated from the construction or operation of a new sheetpile wall.

4.8.5 North Kansas City Levee Unit – Harlem Alternative

No significant impacts to hazardous waste would be anticipated from the preferred alternative selected for the North Kansas City Harlem area. The preferred alternative is the installation of a buried collector. There are no known areas of contamination within the vicinity of the proposed construction. Therefore, no impacts to hazardous waste would be anticipated to occur from the construction and operation of a buried collector system.

4.8.6 North Kansas City Levee Unit – National Starch Alternative

No significant impacts to hazardous waste would be anticipated from the preferred alternative selected for the North Kansas City National Starch site. The preferred alternative is the installation of relief wells and pump station construction. There are no known areas of contamination within the vicinity of the proposed construction. Therefore, no impacts to hazardous waste would be anticipated to occur from the construction and operation of relief wells and a pump station.

4.8.7 Armourdale Levee Unit Raise Alternatives

All of the alternatives proposed for the Armourdale unit could potentially impact hazardous waste. No significant impacts to hazardous waste are anticipated from the tentative preferred alternative selected for the Armourdale unit. The tentative preferred alternative for this unit is the nominal 500-year+3 levee raise including underseepage controls. The Armourdale levee unit is heavily industrialized and is known to have areas of soil or groundwater contamination within the vicinity of the existing levee. Generally, as the level of protection increases, so does the amount of land required for construction and the potential to impact hazardous waste. Additional hazardous waste investigations will be conducted during Phase II of the proposed project. The results of these investigations will be considered in selecting the preferred alternative for the Armourdale levee unit.

4.8.8 Central Industrial District Levee Unit Raise Alternatives

All of the alternatives proposed for the CID unit could potentially impact hazardous waste. No significant impacts to hazardous waste are anticipated from the tentative preferred alternative for this unit is the nominal 500-year+3 levee raise including underseepage controls. The CID levee unit is heavily industrialized and is known to have areas of soil or groundwater contamination within the vicinity of the existing levee. Generally, as the level of protection increases, so does the amount of land required for construction and the potential to impact hazardous waste. Twenty preliminary sites were identified which require additional research to determine if hazardous or toxic issues at those sites would impact construction during the CID construction phase. These sites were identified because of their status as a hazardous waste generator or the presence underground storage tanks at a given site. No additional assessment was completed at any of the twenty sites yet and no conclusions can be drawn at this time whether any of the sites constitute a concern due to hazardous or toxic waste. Additional hazardous waste investigations will be conducted during Phase II of the proposed project. The results of these investigations will be considered in selecting the preferred alternative for the CID levee unit.

4.8.9 Proposed Borrow Area

No impacts to hazardous waste would be anticipated from borrow activities required to implement the recommended plan. Exploratory soil borings and chemical analysis sampling were conducted within the proposed borrow area January 2005. Grab samples for volatile organic compounds (VOCs) and composite samples for metals, pesticides, herbicides, and semivolatile organic compounds (SVOCs) were tested. All parameters tested were below action levels. Therefore, no impacts to hazardous waste are anticipated from the borrow activities to be conducted within the proposed borrow area.

4.9 Archaeological & Historic Resources

Because of severe previous disturbances and the lack of archaeological sites or historical structures within the project area, there would be no effect on historic properties from the no action alternative or any of the alternatives proposed for the Kansas Citys' levee units. The Corps' Kansas City District Cultural Resources Program Manager (CRPM) has recommended no further investigations be conducted within the proposed project area. The Kansas State Historic Preservation Officer and the Missouri State Historic preservation officer have concurred with this recommendation. Two areas of concern regarding historic properties include the Fairfax-Jersey Creek Board of Public Utilities floodwall and the proposed borrow area.

4.9.1 Fairfax-Jersey Creek Board of Public Utilities floodwall.

The Kansas State Historic Preservation Officer has concurred with the Kansas City District CRPM that there is no need for further investigation of this portion of the project area (Appendix C). The preferred alternative consisting of strengthening the existing floodwall with an additional row of piles and a foundation slab extension would have no effect on archeological sites or historic structures within or near the project area. Two historic structures situated immediately adjacent to the project area, a pump house and water intake, will be avoided. Because of previous disturbances in project area, there is little likelihood for the existence of archeological sites.

4.9.2 Proposed Borrow Area

The Kansas State Historic Preservation Officer (SHPO) has concurred with the Kansas City District CRPM that no survey was required for the proposed borrow area and that there is no need for further investigation of this area (Appendix A). The KSHPO determined that the proposed project should have no effect on properties listed on the National Register of Historic Places, or otherwise identified in their files. Two historic human burials are located adjacent to the proposed borrow area. The burials area will be avoided during borrow activities. A minimum 300-foot buffer is required during construction activities by the SHPO to delineate the borrowing activity from the identified burials (Appendix C).

4.10 Floodplain Terrestrial Habitat

4.10.1 Argentine Levee Unit Alternative

No significant impacts to floodplain terrestrial habitat are anticipated from the preferred alternative selected for the Argentine levee unit. The preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. The majority of the land adjacent to the levee is previously disturbed from construction of the existing levee. Impacts to floodplain terrestrial habitat primarily result from landside earthen levee raise and the construction of landside seepage berms. I-wall construction on the crown of the existing levee was incorporated into the nominal 500-year+3 levee raise to avoid further land impacts. I-walls allow a vertical raise without increasing the footprint of the existing levee. All of the levee raises proposed for this unit include similar landside and riverside excavation for floodwall replacement. The majority of land disturbance from the nominal 500-year+3 preferred alternative will result from the earthen levee raise, which includes stability berm and underseepage berm construction. The land cover in the area of reliability improvements is primarily comprised of maintained grasses. Areas disturbed as a result of the Argentine levee improvements will be backfilled, graded, and seeded with brome, rye, and fescue upon the completion of construction activities. No significant impacts to floodplain terrestrial habitat are anticipated from the preferred alternative selected for the Argentine levee unit.

The approximate 70-acre impact associated with this alternative would primarily occur to areas previously disturbed from construction of the existing levee in levee maintenance areas that are established with brome, fescue, and rye to maintain levee integrity and that are mowed periodically for levee maintenance and inspection. Mature trees removed to facilitate construction, if any, would be mitigated at a 2:1 ratio.

4.10.2 East Bottoms Levee Unit Alternative

No significant impacts to floodplain terrestrial habitat would be anticipated from the preferred alternative selected for the East Bottoms levee unit. The preferred alternative is the installation of pressure relief wells. Relief wells would be installed between the levee and the fence that borders the Bayer property. This area is landside and downgradient of the existing levee within the existing right-of-way, which is previously disturbed due to construction of the levee and Bayer facility. The land cover of the area is maintained grass. Land disturbance would consist of clearing two acres for well installation and manhole construction. No significant impacts to floodplain terrestrial habitat would be anticipated from the construction and operation of the preferred alternative. The location of proposed construction is previously disturbed due to construction of the existing levee. The spacing of wells, which is estimated between 80 and 300 feet would lessen the land conversion impact. The area that the well structures would occupy measures less than one acre. The area around the well structures would be backfilled, graded and seeded when construction is complete. Therefore, significant impacts to floodplain terrestrial habitat as a result of the construction and operation of relief wells are not anticipated.

4.10.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant impacts to terrestrial floodplain habitat are anticipated from the preferred alternative selected for the BPU floodwall. The preferred alternative selected is the installation or an additional row of piles and a foundation slab extension. The proposed construction would take place landside of the floodwall within a relatively small amount of terrestrial acreage that is dominated by fescue and mowed periodically for maintenance purposes. Although there is a a minor potential for a small amount of soil to enter the downgradient riparian areas, construction landside of the existing floodwall would provide containment for disturbed soil and construction debris. Significant impacts to floodplain terrestrial habitat are not anticipated from the construction and operation of the BPU floodwall. An area measuring approximately two acres dominated by fescue would be disturbed during construction. Disturbed areas would be seeded with brome, fescue, and rye when construction is complete.

4.10.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant impacts to floodplain terrestrial habitat is anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is the installation of an open cell sheetpile wall, which would be driven landside of the existing sheetpile wall from a crane deployed on a barge. The area of sheetpile wall installation is maintained to prevent the establishment of woody vegetation for inspection of this area to assess sheetpile wall integrity. This area is disturbed by previous access road and sheetpile wall construction, dominated by opportunistic plant species, and periodically mowed for levee and sheetpile wall inspection. The area of disturbance as a result of the proposed construction measures about 0.80 acres and would primarily impact Johnson grass, occasional sandbar willow, cocklebur, cottonwood and red mulberry saplings. No significant impacts to floodplain terrestrial habitat is anticipated due to the

installation and operation of a new sheetpile wall. The temporary land disturbance to terrestrial habitat required for construction would be buffered by the contiguous riparian habitat dominated by the aforementioned species to the north of the sheetpile area. Kaw Point, which contains both riparian vegetation and NWI-mapped forested wetlands, is located to the south of the sheetpile area. The installation of a new sheetpile wall would lessen the risk of losing terrestrial habitat to the Missouri River. Grading and seeding with grass (brome, rye and fescue) would be initiated upon the completion of construction. Opportunistic plant species would become established within disturbed areas and be periodically mowed for maintenance purposes as required prior to, and after construction of the preferred alternative.

4.10.5 North Kansas City Levee Unit – Harlem

No significant impact to terrestrial habitat is anticipated from the preferred alternative selected for the North Kansas City levee unit Harlem area. The preferred alternative is the installation of a buried collector landside of the existing levee in a levee maintenance area consisting of mowed grass (brome, fescue, and rye). An approximate five-acre area would be excavated for construction. No significant impacts to floodplain terrestrial habitat is anticipated due to the construction and operation of the buried collector. After collector installation, less than one-acre of grass habitat would be converted to relief wells and manholes. The area disturbed by construction would be graded and seeded with brome, rye, and fescue upon the completion of construction. Buried collector operation consists of collecting water from the Missouri River that seeps through the levee. Collected seepwater would subsequently be discharged back into the river using portable diesel-powered pumps.

4.10.6 North Kansas City Levee Unit – National Starch Alternatives

No significant impacts to floodplain terrestrial habitat are anticipated from the preferred alternative selected for the North Kansas City National Starch site. Relief well and pump station construction would occur on impervious surface (gravel fill) and mowed grass within a levee maintenance area. An outlet structure and conveyance path may be constructed riverside of the levee in an area dominated by riparian vegetation. No significant impacts to this area are anticipated due to the preferred alternative as a short-term land disturbance of about two acres would occur during construction. After construction, disturbed areas would be graded and seeded with grasses (brome, fescue, and rye). Trees impacted along the foreshore would be replaced at a 2:1 ratio. No significant impacts to floodplain terrestrial habitat would be anticipated to occur due to the operation of the preferred alternative. The pump station would discharge Missouri River seepwater back into the River only during high water events.

4.10.7 Armourdale Levee Unit Raise Alternatives

No significant impacts to terrestrial floodplain habitat are anticipated as a result of the preferred alternative selected for the Armourdale levee unit. All of the alternatives proposed for the Armourdale levee unit could potentially impact floodplain terrestrial habitat. The tentatively preferred alternative is nominal 500-year+3 levee raise including underseepage control measures. The majority of the existing flood damage reduction within this unit is earthen levee. Floodwalls are located south of the W. Kansas Avenue Bridge (approximate Kansas River miles 5.4 to 5.8), and up-and downstream of the Central Avenue Bridge (approximate Kansas River miles 1.0 to 1.9). Pump plants and closure structures are located periodically along the levee unit. Based on 2001 aerial photography, a relatively wide band of riparian vegetation is located between the Kansas

Avenue Bridge and the Interstate 635 Bridge, which eventually narrows into a linear stand of trees past the 18th Street Bridge. A relatively dense stand of trees is located landside of the existing levee west of the Seventh Street Bridge between approximate river miles 3.5 and 3.8. The tentatively preferred alternative consisting of the nominal 500-year+3 levee raise and underseepage controls may impact terrestrial habitat both landside and riverside of the existing levee and floodwalls. An earthen levee raise and seepage berm construction may require the placement of borrow soil land- and riverward of the existing levee and impact terrestrial habitat. Floodwall replacement could require excavation land- and riverside of the existing floodwall and impact terrestrial habitat.

4.10.8 Central Industrial District Levee Unit Raise Alternatives

All of the alternatives proposed for the Central Industrial District would potentially impact floodplain terrestrial habitat. This unit contains more floodwall, closure structures, and pump plants than the Armourdale unit. Based on 2001 aerial photography, floodwall modification or replacement would require excavation riverside and landside of the existing levee and floodwalls, and may impact riparian vegetation within the Kansas portion of the CID between approximate Kansas River miles 0.5 and 0.8, and 1.8 and 3.1. The construction of earthen levee, seepage berm, and other features could also impact riparian vegetation. Preliminary analyses have not found geotechnical or structural deficiencies within the Missouri portion of the Central Industrial District. Any work conducted along the existing line of protection would likely impact riparian vegetation, although it is relatively sparse both landside, and riverside of the existing protection.

4.10.9 Proposed Borrow Area

No significant impacts to the existing terrestrial habitat within the proposed borrow area would be anticipated to occur as a result of the implementation of the recommended plan due to the existing condition of the proposed borrow area. The vast majority of the area encompassing the proposed borrow area has been converted from native vegetation to farmland for many years. Lime residual storage periodically occurs on areas actively used for agricultural purposes. Due to the relative lack of typical terrestrial floodplain habitat consisting of riparian vegetation and/or wetlands, no significant impacts to terrestrial floodplain habitat are anticipated from the construction of the recommended plan.

4.11 Wetlands

4.11.1 Argentine Levee Unit Alternative

No significant impacts to wetlands would be anticipated from the preferred alternative selected for the Argentine levee unit. The preferred alternative selected for the Argentine levee unit is the nominal 500-year+3 levee raise including underseepage controls. The open water area bordered with scrub-shrub and emergent wetland vegetation located on Harcros Chemicals property between stations 110+00 and 118+00 would not be directly or indirectly impacted by the nominal 500-year+3 levee raise alternative, as it is located outside of the construction footprint at a distance from the proposed construction. A linear, emergent wetland measuring approximately 0.007 acres located between the fenceline and the levee toe at station 140+00, and a linear, emergent wetland measuring approximately 0.02 acres located along the fenceline at station 155+00 would be filled for the nominal 500-year+3 levee raise. Wetland hydrology is primarily provided by runoff from the adjacent land and direct precipitation. These wetlands are relatively small and of low quality due to the establishment of cattails (*Typha* sp.) and reed canarygrass (*Phalaris arundinaceae*). Cattails and reed canarygrass readily colonize disturbed areas and eventually form monotypic

stands, which lack plant diversity and may prevent the establishment of additional wetland plant species. No significant impacts to wetlands would occur from the construction of the preferred alternative. The wetlands impacted are relatively small and their value consists of limited wildlife habitat. To replace the acreage and value of the impacted wetlands, a mitigation ratio of 1.5:1 as suggested by the USFWS in their Draft Coordination Act Report would result in the creation of 0.21 acres of wetland that would be planted with diverse wetland vegetation such as sedges (*Carex*), smartweed (*Polygonum*) or other wetland vegetation to provide increased habitat diversity relative to the impacted wetlands. Additionally, due to the location of the existing wetlands at far landside area of the levee toe, these wetlands could recover from the placement of borrow soil. The soil of the existing wetlands would not be excavated for use in the created wetlands as the seed banks of the existing wetlands contain not so desirable plant species. Wetland impacts would occur during construction. No wetland impacts are anticipated from the operation of the nominal 500-year+3 levee raise and underseepage controls.

4.11.2 East Bottoms Levee Unit Alternative

No impacts to wetlands would be anticipated from the preferred alternative selected for the East Bottoms levee unit. The preferred alternative is the installation of relief wells for underseepage control. No wetlands are located within, or adjacent to the area of proposed construction. Therefore, no impacts to wetlands are anticipated as a result of relief well construction or operation.

4.11.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No impacts to wetlands would be anticipated from the preferred alternative selected for the BPU floodwall. The preferred alternative is the construction of an additional row of piles and a foundation slab extension to strengthen the existing floodwall. NWI-mapped wetlands within the vicinity of the proposed construction consist of two forested wetlands measuring 5.32 and 0.30 acres that are located riverside and downgradient of the most western and eastern portions of the existing floodwall. No significant impacts to wetlands would be anticipated from the construction or operation of the BPU floodwall. The proposed construction would take place landside (behind) the existing floodwall, which would provide containment for soil and debris during construction. Best management practices and the use of temporary erosion control measures would be used during construction to avoid potential impacts to the resources located downgradient of the existing floodwall. Wetland hydrology is not anticipated to be impacted by construction or operation of the floodwall. Therefore, no direct or indirect impacts to these wetlands would be anticipated from the construction and operation of the preferred alternative.

4.11.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No wetland impacts are anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is the installation of an open cell sheetpile wall landside of the existing sheetpile wall. There are no wetlands located within the vicinity of the proposed construction. Therefore, no impacts to wetlands would be anticipated from the construction or operation of the Fairfax-Jersey Creek sheetpile wall.

4.11.5 North Kansas City Unit – Harlem

No wetland impacts are anticipated from the preferred alternative selected for the North Kansas City unit Harlem area. The preferred alternative is the installation of a buried collector

system. There are no wetlands located within the vicinity of the proposed construction. Therefore, no impacts to wetlands would be anticipated from the construction or operation of the buried collector system.

4.11.6 North Kansas City Unit – National Starch Alternative

No wetland impacts are anticipated from the preferred alternative selected for the North Kansas City National Starch site. The preferred alternative is the installation of relief wells and a pump station. There are no wetlands located within the vicinity of the proposed construction. Therefore, no impacts to wetlands would be anticipated from the construction or operation of the Fairfax-Jersey Creek sheetpile wall.

4.11.7 Armourdale Levee Unit Raise Alternatives

No significant wetland impacts are anticipated from the levee raise alternatives proposed for the Armourdale levee unit. The tentative preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. Wetlands located adjacent to the existing line of protection in this unit are mapped by the National Wetlands Inventory north of the West Kansas Avenue Bridge at a distance from the existing line of protection within riparian vegetation. These wetlands appear to have been created from borrow activities within the foreshore. All of the alternatives proposed for this unit could cause minor impacts to existing wetland habitat due to excavation for floodwall replacement and the construction of underseepage controls and soil placement for earthen berm construction. Excavation or soil placement riverside of the existing levee and floodwalls would occur at a distance of approximately seventy-five feet from the levee toe and would not likely encroach into existing wetlands. I-walls and landside retaining walls are proposed to minimize levee encroachment into adjacent habitat. Indirect impacts could occur due to soil placement. The boundaries of any wetlands potentially impacted by the recommended plan would be delineated and the impacts would be mitigated for functions lost. Wetland delineation and impact assessment would be conducted prior to the release of the final feasibility report. Wetland impacts would be mitigated.

4.11.8 Central Industrial District Levee Unit Raise Alternatives

No significant wetland impacts are anticipated from the levee raise alternatives proposed for the CID levee unit. The tentative preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. Wetlands within the CID unit located adjacent to the existing line of protection are mapped by the National Wetlands Inventory on the right bank of the Kansas River between the Interstate 70 Bridge and the James Street Bridge between approximate river miles 0.4 and 0.6, and at the confluence of the Kansas and Missouri Rivers. All of the alternatives proposed for this unit could cause minor impacts to existing wetland habitat due to excavation for floodwall replacement and the construction of underseepage controls, and soil placement for earthen berm construction, which would occur up to about fifty feet from the levee toe, and would not likely encroach into existing wetlands. Landside retaining walls are proposed to minimize levee encroachment into adjacent habitat. Indirect impacts could occur due the inadvertent introduction of soil into existing wetlands. The boundaries of any wetlands potentially impacted by the recommended plan would be delineated and the functions lost would be replaced through mitigation. Wetland delineation and impact assessment would be conducted prior to the release of the final feasibility report. Wetland impacts would be mitigated.

4.11.9 Proposed Borrow Area

A farmed wetland measuring about 0.17 acres is located within the proposed borrow area. The exact location of borrow activities is undetermined and will depend upon the location of excavation for lime storage on the WaterOne property during construction. This wetland would be excavated, or otherwise impacted by borrow activities. As suggested by the USFWS in their Draft Coordination Act Report, this wetland would be mitigated at a 1:1 ratio. The wetland created for mitigation purposes would be designed to replace the functions lost due to impacts.

4.11.10 Conceptual Wetland Mitigation

Three wetlands measuring a total of approximately 0.2 acres will be impacted by the proposed recommended plan. The function of these wetlands consists of limited wildlife habitat as they are relatively small (0.007, 0.02, and 0.17 acres) and primarily dominated by plant species found over a broad range of natural communities and disturbed areas, including nuisance species. However, it is recognized that although of small size and minimal function, these wetlands provide wildlife habitat within the project area. The existing wetlands are seasonally inundated and likely provide breeding and foraging habitat for amphibians and reptiles and foraging opportunities for migratory birds and mammals.

In consultation and agreement with the USFWS regarding the mitigation ratios suggested in their CAR and the administration's goal of not net loss of wetlands, it is proposed to create 0.21 acres of emergent wetlands to compensate for the unavoidable loss of wetlands due to project requirements. It is preferred to create a wetland within the Argentine unit so that mitigation could occur relatively close to the area of impact. The Argentine foreshore was considered a potential area of wetland creation; however, the foreshore is not preferred due to HTRW present within the area and to avoid impacting existing riparian vegetation.

To replace functions lost, the created wetland would have similar physical characteristics as the emergent wetland at station 140. A linear depression measuring 0.21 acres with a depth ranging from three inches to one foot depth could be created landside, and along the levee toe where hydrology would be provided by runoff from the adjacent levee slope. Although the exact location of wetland creation has not been identified, a proposed location would be adjacent or nearby the existing impacted wetland at station 155 to take advantage of the existing wetland conditions of the area. This area receives some runoff from an adjacent parking lot and wetland conditions may be perpetuated by a perched water table. The created wetland would be seasonally inundated similar to the impacted wetlands. Wetland creation would occur during the Argentine levee raise as heavy equipment would be readily available for construction.

The created wetland would be planted with native facultative and obligate wetland species such as Pennsylvania smartweed (*Polygonum pensylvanicum*), awnless beggar ticks (*Bidens aristosa*), barnyard grass (*Echinochloa crusgalli*), meadow sedge (*Carex granularis*), and purple spikerush (*Eleocharis atropurpurea*) and monitored for mortality. In addition to providing the functions of the existing wetlands, the created wetland would provide more available forage for waterfowl and overall habitat diversity for migratory birds and mammals. The wetland mitigation plan becomes a portion of the District's adherence to the Corps' environmental operating principles (EOPs) as it will improve and enhance the environment and help sustain the limited habitat within the project area.

4.12 Fisheries

No direct impacts to fish or other aquatic organisms would be anticipated to occur from the construction of the recommended plan. All of the proposed preferred alternatives have the potential to cause short-term, temporary construction impacts to fish and other aquatic organisms due to the inadvertent loss of a small amount of soil or sediment into an adjacent waterway. Borrow soil used for the levee raise would be free of contaminants. For all alternatives proposed, stormwater pollution measures would be in compliance with the requirements of the National Pollutant Discharge Elimination System permit. Temporary erosion control mechanisms such as silt fencing and staked straw bales would be utilized to divert flow from exposed soils, temporarily store flows, or otherwise minimize erosion and sediment runoff from construction areas. Protecting adjacent riparian and wetland habitats from sediment deposition and the introduction of construction debris would minimize or avoid the introduction of such materials into these resources and the adjacent waterway. Disturbed areas would be backfilled, graded, and seeded with brome, fescue, and rye as soon as practicable after the completion of construction activities. To further minimize impacts to water quality, and fish and other aquatic organisms, equipment would be operated to minimize the loss of soil, petroleum products, or other deleterious material into the waterway. Disturbed areas would be graded and seeded with grass (brome, rye, and fescue) when construction is complete. The presence of HTRW was extensively studied to determine the nature and location of potential contamination. Hazardous waste was avoided to the extent practicable to implement the recommended plan.

4.12.1 Argentine Levee Unit Alternative

No significant impacts to fish or other aquatic organisms would be anticipated from the preferred alternative selected for the Argentine levee unit. The preferred alternative is the nominal 500-year+3 levee raise including underseepage controls. The majority of land disturbance from the nominal 500-year+3 preferred alternative would result from earthen levee raise, stability berm, underseepage berm construction, and floodwall replacement, which would require intensive excavation and backfilling of soil. I-wall construction on the crown of the existing levee, landside retaining walls, and floodwalls were incorporated into the preferred alternative to reduce land encroachment. Although riverside excavation would be required for floodwall replacement, this activity would be conducted at a distance away from the Kansas River and no work would be conducted within the river.

Although the Argentine unit has known areas of contamination, the selection of the preferred alternative eliminated many potential impacts to contaminated areas because the construction footprint is smaller than the nominal 500-year+5 alternative. Many documented locations of contamination were avoided and the risk of encountering contamination was minimized during the planning phase through the selection of underseepage controls. This unit has been extensively studied to determine the nature and extent of contamination from hazardous waste. Hazardous waste is discussed in section 4.8. The excavation and proper disposal of contaminated soil, trash, storage tanks, or other hazardous waste containers or media would be conducted before or during construction. Temporary erosion control measures and Best Management Practices as mentioned above would be used to avoid the introduction of contaminated material into waterways and terrestrial habitat. No significant impacts to fish and other aquatic organisms would be anticipated to occur from the construction and operation of the preferred alternative selected for the Argentine unit. Land disturbance would be minimized to the practicable extent and soil and

construction material would be contained to prevent their introduction into the Kansas River. The encroachment into known areas of contamination were avoided, or otherwise minimized. Known and unknown contaminated soil and media would be removed before or during construction.

4.12.2 East Bottoms Levee Unit Alternative

No significant impacts to fish or other aquatic organisms would be anticipated from the preferred alternative selected for the East Bottoms levee unit. The preferred alternative is the installation of relief wells. The location of relief well installation is landside and downgradient of the existing levee, which would provide the containment of soil and construction debris and avoid the incidental introduction of this material into the Blue and Missouri Rivers. No work would be conducted within the rivers. Known groundwater contamination is located downriver of the area of proposed construction. The installation of relief wells would not facilitate the introduction of soil or groundwater contamination into the Blue or Missouri Rivers. This alternative provides underseepage control and avoids impacts to ongoing contamination remediation measures and any future corrective actions. The location of the proposed relief wells is located a considerable distance west- and upgradient of the known contaminant plumes. Relief wells are not anticipated to impact the existing groundwater plumes under transient or flowing conditions. No significant impacts to fish or other aquatic organisms would be anticipated from the preferred alternative selected for the East Bottoms levee unit. Containment of soil and construction debris during construction would be primarily provided by the location of relief well installation landside and downgradient of the existing levee, and groundwater contamination would not be anticipated to be impacted by relief well operation.

4.12.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant impacts to fish or other aquatic organisms would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative is to strengthen the existing sheetpile wall with an additional row of piles and a foundation slab extension. The location of the proposed construction is landside (behind) the existing floodwall, which would provide containment for sediment and debris during construction. Therefore, there is a low potential for soil or construction debris to enter the Missouri River. There are no known areas of hazardous waste contamination within the vicinity of the existing floodwall. No significant impacts to fish or other aquatic organisms would be anticipated from the construction proposed to strengthen the floodwall, or the operation of the floodwall after construction. The construction disturbance would be limited to the area landside of the existing floodwall which would provide containment for excavated and borrowed soil, and no contamination is known to occur within the vicinity of the proposed construction that would need to be excavated prior to, or during construction. No work would be conducted within the Missouri River.

4.12.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant impacts to fish or other aquatic organisms would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is to install a new open cell sheetpile wall. The sheetpile wall would be driven landside of the existing sheetpile by a crane from the river. The proposed construction would impact an area of about 0.80 acres dominated by terrestrial vegetation. The vegetated slope landside of the existing sheetpile wall likely provides minimal organic input into the Missouri River from this area, as a low amount of leaf litter and debris would be available from the slope vegetation. No shading of the

river is provided from this vegetation. As discussed in section 4.12, a small amount of soil may enter the Missouri River during construction and cause a localized and temporary increase in turbidity. Voids and disturbed areas would be graded and seeded when construction is complete. There are no known areas of hazardous waste or contamination within the vicinity of the existing sheetpile wall. No significant impacts to fish or other organisms would be anticipated to occur from the construction or operation of the preferred alternative. Construction would primarily terrestrial vegetation and water quality would not be significantly impacted by the inadvertent introduction of uncontaminated soil into the river. A new sheetpile wall would prevent the river bank from sloughing into the river.

4.12.5 North Kansas City Levee Unit – Harlem Alternative

No significant impacts to fish or other aquatic organisms would be anticipated from the preferred alternative selected for the North Kansas City Harlem area. The preferred alternative is the installation of a buried collector. The location of buried collector installation is landside and downgradient of the existing levee, which would contain disturbed and borrow soil and prevent it from entering the Missouri River. The buried collector would operate only during flood events. Water from the Missouri River that seeps through the levee would be collected and pumped back into the Missouri River using portable diesel pumps. No hazardous waste contamination is known to occur within or adjacent to the area of the proposed construction, and no work would be conducted within the Missouri River. Due to the location of the proposed construction landside and downgradient of the existing levee and the absence of hazardous waste contamination, no significant impacts to fish or other aquatic organisms are anticipated from buried collector installation or operation.

4.12.6 North Kansas City Unit – National Starch Alternative

No significant impacts to fish or other aquatic organisms would be anticipated from the preferred alternative selected for the National Starch site. The preferred alternative is the installation of pressure relief wells and the construction of a pump station landside and downgradient of the existing levee, which would help prevent soil and construction debris from entering the Missouri River. An outlet structure may be constructed riverside at the toe of the levee and a conveyance path may be excavated to allow pumped seep water to reenter the river. The conveyance path would be lined with rock to protect the bank from eroding and headcutting towards the levee. This path, if constructed, would extend for a distance of about 100 feet riverside of the levee at a distance away from the Missouri River. After construction, the relief well system would collect river water that seeps through the levee during flood events and discharge it back over the levee into the Missouri River. Water quality would not be adversely impacted from this process. There is no known hazardous waste contamination within the vicinity of the proposed construction. No significant impacts to fish or other aquatic organisms are anticipated as a result of the operation or construction of the preferred alternative. Construction would be downgradient of the existing levee in an area of no known contamination.

4.12.7 Armourdale Levee Unit Raise Alternatives

No significant impacts to fish or other aquatic organisms would be anticipated as a result of any of the alternatives proposed for the Armourdale unit. All of the proposed levee raises would require a landside earthen levee raise, floodwall modification or replacement, I-wall installation, pump station modification or replacement, and relief wells or a buried collector system to relieve

underseepage pressure. The tentatively selected preferred alternative for Armourdale is the 500year+3 levee raise. Construction of earthen levee and berms would be conducted primarily on top or landside of the existing levee. Levee and berm construction would require excavation and the placement of borrow soil. Underseepage controls would be constructed landside of the existing levee. No work is proposed to be conducted within the Kansas River. The Armourdale unit is heavily industrialized and soil or groundwater contamination is known to occur within the vicinity of the existing levee. Hazardous waste and contaminated areas would be avoided to the extent practicable. All contaminated material and hazardous waste storage vessels known to occur within the levee footprint or encountered during construction would be removed and transported to an appropriate landfill. No significant impacts to fish or other aquatic organisms would be anticipated from the construction and operation of the preferred alternative. Excavation and borrow placement would be conducted at a distance away from the Kansas River. Hazardous waste and contaminated areas would be avoided to the maximum extent. Levee failure would significantly impact fish and other aquatic organisms within and downstream of the Armourdale levee unit.

4.12.8 Central Industrial District Levee Unit Raise Alternatives

No significant impacts to fish or other aquatic organisms would be anticipated as a result of any of the alternatives proposed for the Central Industrial District levee unit. All of the proposed levee raises would require a landside earthen levee raise, floodwall modification or replacement, I-wall installation, pump station modification or replacement, and relief wells or a buried collector system to relieve underseepage pressure. The tentatively selected preferred alternative for CID is the 500year+3 levee raise. Construction of earthen levee and berms would be conducted primarily on top or landside of the existing levee. Levee and berm construction would require excavation and the placement of borrow soil. Underseepage controls would be constructed landside of the existing levee. No work is proposed to be conducted within the Kansas River. This unit is heavily industrialized and soil or groundwater contamination is known to occur within the vicinity of the existing levee. Hazardous waste and contaminated areas would be avoided to the extent practicable. All contaminated material and hazardous waste storage vessels known to occur within the levee footprint or encountered during construction would be removed and transported to an appropriate landfill. No significant impacts to fish or other aquatic organisms would be anticipated from the construction and operation of the preferred alternative. Excavation and borrow placement would be conducted at a distance away from the Kansas River. Hazardous waste and contaminated areas would be avoided to the maximum extent.

4.12.9 Proposed Borrow Area

No significant impacts to fish or other aquatic organisms are anticipated due to proposed borrow area activities. Borrow soil would be excavated landward of the foreshore within the northern portion of the proposed borrow area to avoid or otherwise minimize impacts to the foreshore and water quality. Soil would not be borrowed from lime storage areas. No hazardous waste is known to occur within the proposed borrow area.

4.13 Wildlife

4.13.1 Argentine Unit Alternative

No significant impacts to wildlife are anticipated from the preferred alternative selected for the Argentine levee unit. The preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. The majority of land disturbance from the nominal 500-year+3 preferred

alternative (about 70 acres) would result from the earthen levee raise, which includes stability berm and underseepage berm construction. The areas of proposed improvements are primarily located from the levee crown to the toe, and comprised of maintained grasses including fescue, brome, and perennial rye. As discussed in section 4.1.11.1, two linear, emergent wetlands measuring 0.02 and 0.007 will be directly impacted. The study area is dominated by urban-tolerant wildlife species. Construction of the preferred alternative is anticipated to cause a temporary disturbance due to the presence of heavy equipment, and the noise and dust associated with construction. The preferred alternative avoids impacts to the large area of riparian woodland (approximately 185-acres) riverward of the existing levee, which provides abundant habitat for wildlife and would buffer the effects of the construction activities. Mature trees removed to facilitate construction would be mitigated at a 2:1 ratio. Operation of the preferred alternative would not be anticipated to significantly impact wildlife, as the operation of pumps to return seepwater to the Kansas River would only occur during flood events.

4.13.2 East Bottoms Levee Unit Alternative

No significant impacts to wildlife are anticipated from the preferred alternative selected for the East Bottoms levee unit. The preferred alternative is the installation of pressure relief wells. The area of proposed well installation is located in a maintained grassy area between the existing levee and the Bayer property fence line. The two acres of land disturbance required for well installation would be backfilled, graded and seeded with brome, rye, and fescue upon completion of construction activities. No wetland or water quality impacts are associated with the implementation of the preferred alternative. No significant impacts to wildlife are anticipated from the construction and operation of relief wells. Impacts to wildlife habitat consist of a temporary construction impact to convert less than one-quarter acre of maintained grass to relief wells and manholes. Operation would occur only during high water events.

4.13.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No significant impacts to wildlife are anticipated from the preferred alternative selected for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative is the installation of an additional row of piles and a foundation slab extension to strengthen the existing wall. The proposed construction would take place landside of the existing floodwall within a relatively small amount of terrestrial acreage that is dominated by fescue and mowed periodically for maintenance purposes. This area provides limited opportunities for the nesting and foraging of birds and mammals and likely serves as a loafing area for few common wildlife species. The area of land disturbance would be backfilled, graded, and seeded upon completion of construction. No significant impacts to wildlife are anticipated from the construction and operation of the preferred alternative. A temporary land disturbance of about two acres would be required to convert a relatively small portion of lawn to impermeable surface. The wildlife habitat landside and downgradient of the existing floodwall is comprised of riparian vegetation (cottonwood, willows, box elder, goldenrod, and others) and two forested wetlands measuring 5.32 and 0.30 acres are National Wetlands Inventory-mapped downgradient of the western- and eastern-most portions of the existing floodwall. The availability of these habitat types would buffer the temporary land disturbance of floodwall construction.

4.13.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No significant impacts to wildlife are anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is the installation of an open cell sheetpile wall, which would be driven landside of the existing sheetpile wall from a crane deployed on a barge. The area of sheetpile wall installation is disturbed by previous access road and sheetpile wall construction and is maintained to prevent the establishment of woody vegetation for inspection of this area to assess sheetpile wall integrity. The area of proposed construction measures about 0.80 acres and would primarily impact Johnson grass, and occasional sandbar willow, cocklebur, cottonwood and red mulberry saplings. This area is likely predominantly used by common birds and small mammals. No significant impacts to wildlife are anticipated as a result of the construction and operation of the sheetpile wall. Land disturbance would be buffered by the contiguous riparian habitat dominate by the aforementioned species to the north of the existing sheetpile wall. Kaw Point, which contains borth riparian vegetation and forested wetlands mapped by the NWI is located south of the existing sheetpile wall. Grading and seeding of disturbed areas with grass (brome, fescue, rye) would be completed after construction. No wetlands would be impacted by the construction and operation of the preferred alternative.

4.13.5 North Kansas City Levee Unit – Harlem

No significant impacts to wildlife are anticipated from the preferred alternative selected for the North Kansas City Harlem area. The preferred alternative is the installation of a buried collector. The buried collector would be constructed landside and downgradient of the existing levee in a levee maintenance area comprised of brome, fescue, and rye that is likely minimally used be wildlife. A temporary construction disturbance would occur as an approximate 5-acre area would be excavated for collector installation. No significant impacts to wildlife are anticipated from the construction and operation of the preferred alternative. Less than one-quarter acre of mowed grass would be converted to pumping manhole structures. The spacing of manholes, and the grading and seeding of areas in between manholes after the temporary construction disturbance, would lessen the land conversion impact to wildlife. No wetland impacts are associated with the preferred alternative. The operation of the buried collector would occur only during high water events when portable diesel pumps would be used to return Missouri River seepwater back into the River. The operation of pumps would cause a short-term, temporary disturbance to wildlife.

4.13.6 North Kansas City Levee Unit – National Starch Alternative

No significant impacts to wildlife are anticipated from the preferred alternative selected for the North Kansas City levee unit National Starch site. The preferred alternative is the construction of relief wells and a pump station. The land disturbance required for the proposed construction measures about two acres and is located primarily on gravel fill, and secondarily, on mowed grass within a levee maintenance area landside and upgradient of the existing levee. This habitat has a relatively low value to wildlife. An outlet structure and conveyance path may be constructed for seepwater drainage. Mature trees impacted, if any, would be replaced at a 2:1 ratio. No wetlands are located within or adjacent to the area of proposed construction. No significant impacts to wildlife are anticipated from the construction or operation of the preferred alternative. The existing habitat is of relatively low value to wildlife. After the temporary construction disturbance, the disturbed areas would be backfilled, graded, and seeded with brome, rye, and fescue. The operation of the relief wells and pump station would occur only during high water events and cause a temporary, short-term disturbance to wildlife.

4.13.7 Armourdale Levee Unit Raise Alternatives

All of the alternatives proposed for the Armourdale levee unit could adversely impact wildlife. The tentatively preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. Wildlife habitat within this unit adjacent to the existing flood line of protection primarily consists of riparian habitat riverside of the existing levee and floodwalls. Wetlands are mapped by the National Wetlands Inventory north of the West Kansas Avenue Bridge within the riparian vegetation. No significant impacts to wildlife are anticipated from the construction and operation of the tentatively preferred alternative. Construction would occur primarily landside of the existing protection on ground previously disturbed by construction and maintained for levee inspection. An earthen levee raise and seepage berm construction would require the placement of borrow soil primarily landward of the existing levee and impact a small acreage of wildlife habitat. Floodwall replacement could require excavation land- and riverside of the existing levee an impact a small acreage of wildlife habitat. The use of I-walls and retaining walls will decrease the amount of floodplain encroachment in some areas as a smaller construction footprint is needed for these features compared to an earthen levee raise. Construction disturbance would be temporary. The existing resources along the foreshore including riparian vegetation and NWI-mapped wetlands would buffer the construction disturbance. Impacts to these resources would be mitigated. The operation of the levee post construction is not anticipated to cause substantial impacts to wildlife.

4.13.8 Central Industrial District Levee Unit Raise Alternatives

All of the alternatives proposed for the CID levee unit could adversely impact wildlife. The tentatively preferred alternative for the CID unit is the nominal 500-year+3 levee raise and underseepage controls. No significant impacts to wildlife are anticipated from the construction and operation of the tentatively preferred alternative. Wildlife habitat within this unit adjacent to the existing line of protection primarily consists of riparian habitat. Wetlands are mapped by the National Wetlands Inventory on the right bank of the Kansas River between the Interstate 70 Bridge and the James Street Bridge between approximate river miles 0.4 and 0.6, and at the confluence of the Kansas and Missouri Rivers. Similar to the Armourdale unit, construction would occur primarily landside of the existing protection on ground previously disturbed by construction and maintained for levee inspection. An earthen levee raise and seepage berm construction would require the placement of borrow soil primarily landward of the existing levee and impact a small acreage of wildlife habitat. Floodwall replacement could require excavation land- and riverside of the existing levee an impact a small acreage of wildlife habitat. The use of I-walls will decrease the amount of floodplain encroachment in some areas as a smaller construction footprint is needed for these features compared to an earthen levee raise. Construction disturbance would be temporary. The existing resources along the foreshore including riparian vegetation and NWI-mapped wetlands would buffer the construction disturbance. Impacts to these resources would be mitigated. The operation of the levee post construction is not anticipated to cause substantial impacts to wildlife.

4.13.9 Proposed Borrow Area

No significant impacts to wildlife are anticipated from the alternatives proposed. Current land use of the proposed borrow area consists of residual lime storage and row-cropping. There is a low amount of riparian habitat located within the proposed borrow area. Borrow soil would not be excavated from the riparian area located north of the proposed borrow area. The exact location of

soil removal within the borrow area is undetermined. It is presumed that a 0.17 acre farmed wetland located within the borrow area would be excavated or otherwise impacted by borrow activities. Impacts to this wetland will be mitigated. Mature trees impacted, if any, by borrow activities would be replaced. Therefore, no substantial changes to the composition of wildlife that currently uses the proposed borrow area would be anticipated to occur under the recommended plan.

4.14 Threatened and Endangered Species

4.14.1 Argentine Levee Unit Alternative

No significant impacts to threatened and endangered species would be anticipated to occur from the preferred alternative selected for the Argentine levee unit. The preferred alternative is the nominal 500-year+3 levee raise and underseepage controls. The proposed construction is primarily located in areas maintained for levee inspection and dominated by grasses (fescue, brome, and perennial rye). Two small, emergent wetlands dominated by cattails, curly dock, and reed canarygrass will be filled as discussed in section 4.11.1. A small number of individual trees such as cottonwood, box elder, red mulberry, or other opportunistic species may be impacted by project requirements. It is unlikely that Federally-listed species reported to occur within the vicinity of the project area by the USFWS use the wetland habitat that would be filled. The piping plover and least tern utilize unvegetated wetlands, sandbars and mudflats. Of the species reported to occur within the study area by the USFWS, the bald eagle may incidentally occur within the vicinity of the Argentine levee unit due to the availability of riparian vegetation. The bald eagle could be indirectly impacted if perching or roosting is disrupted by construction. The vast majority of work would be conducted from the existing levee crown landward towards the adjacent properties. No construction would occur within the Argentine foreshore and construction impacts from preferred alternative construction would be temporary. The migratory pallid sturgeon may incidentally occur adjacent to the study area within the Kansas River. Levee unit operation is not anticipated to significantly impact pallid sturgeon or any Federal threatened and endangered species. Levee failure could result in the release of sediment and industrial chemicals onto the Argentine foreshore and into adjacent receiving waters.

4.14.2 East Bottoms Levee Unit Alternative

No impacts to Federally-listed threatened and endangered species would be anticipated from the preferred alternative selected for the East Bottoms unit. The preferred alternative is relief well installation. Relief wells would be installed between the levee and the fence that borders the Bayer property, which consists of mowed grass (brome, fescue, and rye) within the existing right-of-way. The USFWS has not documented this location or associated habitat as being used by the threatened and endangered species reported to occur within the vicinity of the project area. Due to its migratory nature, the pallid sturgeon may incidentally occur within the Missouri River adjacent to the area of proposed construction. Relief well construction and operation is not anticipated to significantly impact pallid sturgeon or any Federal threatened and endangered species. Federal threatened and endangered species are not anticipated to be impacted since they do not inhabit the habitat types that would be impacted and the pallid sturgeon is not known to occur within the Blue River.

4.14.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

No impacts to Federally-listed threatened and endangered species would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek BPU floodwall. The preferred alternative is the strengthening of the existing floodwall by constructing an additional row of piles and a foundation slab extension. Construction would be conducted landside (behind) of the existing floodwall within grasses primarily dominated by fescue. Construction behind the existing floodwall would provide the containment of soil and construction debris. This location and associated habitat are not documented as a location or habitat type that is used by the threatened and endangered species reported to occur within the project area by the USFWS. Due to its migratory nature, the pallid sturgeon may incidentally occur within the Missouri River adjacent to the area of proposed construction. No significant impacts to water resources or water quality are anticipated from construction or floodwall operation.

4.14.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

No impacts to federally threatened and endangered species would be anticipated from the preferred alternative selected for the Fairfax-Jersey Creek sheetpile wall. The preferred alternative is to install an open cell sheetpile wall landside of the existing sheetpile wall. As described in section 4.10.4 this location is a levee maintenance area that is periodically cleared for inspection. Habitat in the vicinity of the existing sheetpile wall is primarily Johnson grass with occasional sandbar willow, cocklebur, cottonwood and red mulberry saplings. No impacts to Federally threatened and endangered species would be anticipated from the construction or operation of the sheetpile wall. This location and associated habitat are not documented as a location or habitat type that is used by the threatened and endangered species reported to exist in the study area by the USFWS. Due to its migratory nature, the pallid sturgeon may incidentally occur within the Missouri River adjacent to the area of proposed construction. No significant impacts to water resources or water quality would be anticipated from construction or sheetpile wall operation. A new sheetpile wall would stabilize the existing bank and prevent the sloughing of the bank into the river.

4.14.5 North Kansas City Levee Unit – Harlem Alternative

No impacts to Federal threatened or endangered species would be anticipated from the preferred alternative selected for the North Kansas City levee unit Harlem area. The preferred alternative is the construction of a buried collector, which would be installed landside and downgradient of the existing levee in a levee maintenance are dominated by grasses (brome, fescue, and rye). This location and associated habitat are not documented as a location or habitat type that is utilized by the threatened and endangered species reported to occur within the project area by the USFWS. Due to its migratory nature, the pallid sturgeon may incidentally occur within the Missouri River adjacent to the area of proposed construction. No significant impacts to water resources or water quality would be anticipated from the construction or operation of the preferred alternative. The operation of portable diesel pumps would be temporary as the pumps would return Missouri River seepwater back into the River only during flood events.

4.14.6 North Kansas City Unit – National Starch Alternative

No impacts to Federal threatened or endangered species would be anticipated from the preferred alternative selected for the North Kansas City levee unit National Starch site. The preferred alternative is the construction of a relief well and pump station landward of the existing

levee on the National Starch property, which consists of gravel fill and some mowed grass within a levee maintenance area. The bald eagle and pallid sturgeon are considered the only threatened and endangered species with the potential to occur within the area of proposed construction based on habitat availability. However, this location and associated habitat are not documented as a location or habitat type that is utilized by the threatened and endangered species reported to occur within the project area by the USFWS. Although the bald eagle is not documented to nest or roost within the riparian habitat located riverward of the proposed construction, indirect impacts could occur if a conveyance path is constructed to convey collected Missouri River seepwater back into the River and to prevent headcutting towards the levee. The path could require the excavation of up to about 0.37 acres of riparian vegetation. The pallid sturgeon may incidentally occur within the Missouri River adjacent to the proposed construction. The pump station would cause a short-term disturbance as they would only operate during flood events. No significant impacts to water resources and water quality are anticipated from relief well and pump station operation. Levee failure could result in the release of a variety of manufacturing chemicals into the waterway.

4.14.7 Armourdale Levee Unit Raise Alternatives

No impacts to Federal threatened and endangered species are anticipated as a result of any of the levee raise alternatives proposed for the Armourdale levee unit. The preferred alternative selected for this unit is the nominal 500-year+3 levee raise and underseepage controls. The wetlands mapped by the National Wetlands Inventory within this unit have not been delineated. However, they are unlikely to be viable habitat to the piping plover and interior least tern. The bald eagle and pallid sturgeon are considered the only Federal threatened and endangered species with the potential to occur within the area of proposed construction based on habitat availability. Bald eagle habitat consists of the riparian vegetation located adjacent to the existing levee and floodwalls. No bald eagle roosting or nesting has been documented within the Armourdale levee unit. Although it is unlikely, the migratory pallid sturgeon may incidentally occur within the Kansas River adjacent to the proposed construction. No significant impacts to Federal threatened and endangered species would be anticipated from the construction and operation of the preferred alternative. No significant impacts to water resources and water quality would be anticipated. Impacts to wetlands and mature riparian vegetation would be mitigated. Levee failure could result in a variety of debris and chemicals entering the Kansas River.

4.14.8 Central Industrial District Unit Levee Raise Alternatives

No impacts to Federal threatened and endangered species are anticipated as a result of any of the levee raise alternatives proposed for the Central Industrial District levee unit. The preferred alternative selected for this unit is the nominal 500-year+3 levee raise and underseepage controls. The wetlands mapped by the National Wetlands Inventory within this unit have not been delineated. However, they are unlikely to be viable habitat to the piping plover and interior least tern. The bald eagle and pallid sturgeon are considered the only Federal threatened and endangered species with the potential to occur within the area of proposed construction based on habitat availability. Bald eagle habitat consists of the riparian vegetation located adjacent to the existing levee and floodwalls. No bald eagle roosting or nesting has been documented within the CID levee unit. Although it is unlikely, the migratory pallid sturgeon may incidentally occur within the Kansas River adjacent to the proposed construction. No significant impacts to Federal threatened and endangered species would be anticipated from the construction and operation of the preferred alternative. No significant impacts to water resources and water quality would be anticipated.

Impacts to wetlands and mature riparian vegetation would be mitigated. Levee failure could result in a variety of debris and chemicals entering the Kansas River.

4.14.9 Proposed Borrow Area

No impacts to Federally-listed threatened and endangered species would be anticipated as a result of borrow activities. The bald eagle and pallid sturgeon are the only threatened and endangered species with the potential to occur within the area of proposed borrow due to habitat availability. No bald eagle roosting or nesting has been documented within the riparian vegetation within, or adjacent to the proposed borrow area. Project requirements would not impact riparian the foreshore riparian vegetation adjacent to the proposed borrow area. The migratory pallid sturgeon may incidentally occur within the Kansas River adjacent to the proposed borrow area.

4.15 Environmental Justice Overview

The Executive Order on Environmental Justice (12898) requires consideration of social equity issues, particularly any potential disproportionate impacts to minority or low-income groups. This is to ensure that issues such as culture and dietary differences are taken into consideration to ensure that adequate risk is evaluated (USEPA, 2003). As a cooperating agency, the USEPA Region VII took the lead in identifying minority populations within the project area and providing community information and contacts regarding potential Environmental Justice issues. Through past and present community outreach programs within the project area, USEPA was able to provide advice and environmental justice educational materials, a map of potential environmental justice areas within the project area (Figure 4-1), and a contact list which included minority news media, organizations, neighborhood associations, corporations, foundations, community leaders, and individuals within potential minority and low-income communities. Among those groups contacted regarding project information and public meetings were Dos Mundos Newspaper, the Kansas City Hispanic News, Guadalupe Centers, Inc., Southwest Boulevard Merchants Association, Community Action Network Centers, East Argentine/Rosedale Neighborhood Group, US Commission on Civil Rights, Department of Housing and Urban Development, Economic Opportunity Foundation, Hispanic Economic Development Corporation, Social Workers for Peace and Social Justice, the Kansas City Neighborhood Alliance, Coalition of Hispanic Organizations (COHO), National Association for Human Rights in America, and the International Relations Council. These minority groups were contacted and provided project information, notifications of public meetings, and DEIS availability.

To determine potential impacts to minority or low-income groups, the racial and income composition of the individual census tracts within, and adjacent to the study area, were examined using 2000 census data (http://factfinder.census.gov/home). For Census 2000, the Office of Management and Budget (OMB) considered race and Hispanic origin to be separate and distinct concepts, and the terms "Hispanic" and "Latino" synonymous for reporting purposes. The OMB defines Hispanic or Latino as "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race." Therefore, Hispanics/Latinos may be of any race and are not defined as an individual race category by the OMB. Persons who reported Hispanic/Latino origin are included within the seven mutually exclusive race categories used by the OMB to sum the total population, which include: (1) White; (2) Black or African American; (3) American Indian & Alaska Native; (4) Asian; (5) Native Hawaiian and Other Pacific Islander; (6) Some other race; (7) Two or more races.

Table 4-1 represents the racial composition, including the percentage of persons who reported Hispanic or Latino origin, of the individual levee units in comparison to the closest zip code(s) in which it resides. Comparison data provides insight into the demographics of an area overall while providing an understanding of areas that are often overlooked in general population data. The percentages of persons who reported "some other race" and "two or more races" were combined, and are represented in the "Other Races" column. Racial composition and Hispanic or Latino origin percentages were calculated from the census tract population data reported in section 3.4.

Table 4-1. Levee Unit Racial Composition and Hispanic/Latino Origin

Levee Unit / Zip Code(s)	% Minority	White (%)	Black or African American (%)	American Indian & Alaskan Native (%)	Asian (%)	Native Hawaiian & Other Pacific Islander (%)	[1]Other Races (%)	Hispanic or Latino Origin (%)
Argentine	**45.9**	**54.1**	**20.1**	**0.7**	**1.3**	**0.1**	**23.3**	**37.1**
66106	22.5	77.5	7.7	0.9	1.3	0.0	12.5	19.3
Armourdale	**40.5**	**59.5**	**1.3**	**1.6**	**1.3**	**0.0**	**36.2**	**75.0**
66105	40.5	59.5	1.3	1.6	1.3	0.0	36.3	50.6
Birmingham	**6.5**	**93.5**	**1.6**	**0.7**	**0.6**	**0.1**	**3.5**	**4.6**
64161	3.0	97.0	0.5	0.2	0.0	0.0	2.3	0.2
CID: MO-KS	**23.3**	**76.7**	**18.6**	**0.6**	**0.7**	**0.2**	**3.1**	**2.1**
64101, 64102 64105, 66118	21.2	78.8	25.9	0.6	0.9	0.2	4.2	4.2
East Bottoms	**35.2**	**64.8**	**9.6**	**0.7**	**16.8**	**0.4**	**7.7**	**10.8**
64106, 64120	42.4	57.6	27.1	0.9	6.9	0.2	7.3	9.6
[2]Fairfax-Jersey Creek	**0.0**	**100.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**100.0**
66115	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
North Kansas City	**18**	**82.0**	**4.7**	**0.7**	**4.1**	**0.2**	**8.3**	**8.3**
64116	13.2	86.8	3.5	0.5	4.1	0.1	4.8	5.8

Source: Census 2000

[1]Percentages are calculated from the sum of persons who reported "some other race" and "two or more races".

[2]Only one person reported to reside in the Fairfax-Jersey Creek levee unit area.

The majority of persons within the study area reported their race as "white". The Argentine and Armourdale units have the highest minority populations within the study area, and are represented by residents of Hispanic or Latino origin. These units also reported the highest percentages of residents of some other race, or two or more races. The Argentine unit reported the highest percentage of Black or African American residents followed by the CID-Missouri and Kansas unit, and East Bottoms unit. The East Bottoms reported the highest percentage of Asian residents, followed by North Kansas City. The North Kansas City, Birmingham, and Fairfax-Jersey Creek units reported the highest percentage of white residents per levee unit. Although the Fairfax-Jersey Creek unit is comprised of a white population of Hispanic or Latino origin, only one person reported to reside in this levee unit.

The core of Executive Order 12898 provides for the protection of both minority and low-income groups. Therefore, income data from section 3.3 and racial composition data from Table 4-2 were used to provide an overview of each levee unit in regards to their respective minority and income level composition. Poverty is measured as individuals with an annual income of $12,500. The Office of Management and Budget's Statistical Policy Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is poor. If a family's income is less than that family's threshold, then that family, and every individual in it, is considered poor.

Table 4-2. Levee Unit Minority Residents and Residents Living Below Poverty

Levee Unit	[1]Minority Residents (%)	Residents Living Below Poverty (%)
Argentine	45.9	26.4
Armourdale	40.5	35.2
Birmingham	6.5	6.1
CID: MO-KS	23.3	9.3
East Bottoms	35.2	27.5
[2]Fairfax-Jersey Creek	0.0	NA
North Kansas City	18	12.2

Source: Census 2000

[1]Includes residents who reported "Other Races" as described in Table 4-1.

[2]Only one person reported to reside in the Fairfax-Jersey Creek levee unit area.

NA—Information Not Available

Additional Environmental Justice Indicators

Additional environmental justice indicators such as education level, languages spoken, and percent children and elderly reveal trends about the socio-demographic aspects of a community that may be used to make generalizations about the population and the capacity of residents to cope with potential additional environmental stresses.

The level of education and/or literacy rates for the adult population provides a critical measure of the likelihood and the ability of the community to know about and participate in public meetings, to comment on written proposals and to otherwise participate in the decision-making process. If tools used to encourage public participation are not tailored to local education rates, or perceived rates, the outreach process may be ineffectual (USEPA, 2004). There are generally no significant differences between the education levels of the residents within the levee units, and the education levels of residents within the counties of respective levee units (USEPA, 2005).

Language Distribution

Information on whether languages other than English are spoken among the population, and percentage distribution of these languages, is important in determining effective public participation processes. Below is a table depicting the percent persons residing within a zip code and respective levee unit and the percent of persons who speak another language other than English at home.

Table 4-3. Levee Unit Language Distribution

Levee Unit / Zip Code	% English	% Spanish	% Asian / Pacific Island	% Indo-European
Argentine / 66106	83.6	14.0	1.5	0.8
Armourdale / 66105	57.7	40.1	1.8	0.4
Birmingham / 64161	96.8	3.2	0.0	0.0
CID: MO-KS / 64101, 64102, 64105, 66118 *(combined tabulation for all zip codes)*	93.3	4.5	3.1	4.4
East Bottoms / 64106, 64120 *(combined tabulation for all zip codes)*	80.3	11.1	8.7	3.1
[2]Fairfax-Jersey Creek / 66115	NA	NA	NA	NA
North Kansas City / 64116	87.8	4.7	2.3	4.2
Jackson County, MO	**92.4**	**4.4**	**1.1**	**1.7**
Wyandotte County, KS	**84.4**	**12.7**	**1.4**	**1.2**

Source: U.S. Census Bureau, 2000

According to the U.S. Census Bureau (2000), the most common language spoken at home, by individuals age five and over, is English with an average of 71.3% combined among all levee units. Spanish is the second language other than English that is spoken in the area with an average of 11%. Residents residing in zip code 66105 (Armourdale) rate the highest population of Hispanic or Latino ethnicity and the highest Spanish-speaking. Additionally, there is a small percentage of persons residing in the levee units that speak an Asian or Pacific Island language as the most common language spoken at home, an average of 1.8% combined among all levee units.

Sensitive Populations

Children under age five and elderly populations above age 65 are considered to be sensitive populations that may experience disproportionate impacts from environmental stressors. The table below provides insight into a subpopulation that exists within the study area in comparison to County averages. Generalizations conclude that zip code 66105 has the highest percent of children under age five and the zip code 64106 and 64120 combined account for the highest percent of residents age 65 and over.

Table 4-4. Levee Unit Sensitive Populations

Levee Unit / Zip Code	Children under age 5 (%)	Elderly over age 65 (%)
Argentine / 66106	8.6%	11.2%
Armourdale / 66105	10.7%	7.9%
Birmingham / 64161	4.9%	10.5%
CID: MO-KS / 64101, 64102, 64105, 66118	2.1%	5.2%
East Bottoms / 64106, 64120	7.5%	13.9%
[2]Fairfax-Jersey Creek / 66115	0	0
North Kansas City / 64116	6.1%	13.5%
Jackson County, MO	**7%**	**12.5%**
Wyandotte County, KS	**8.1%**	**11.7%**

Source: U.S. Census Bureau, 2000

Data and associated information used for the consideration of environmental justice was reviewed by Region VII of the U.S. Environmental Protection Agency. Given the demographic characteristics of the project area, expanded public involvement through enhanced public communication will be utilized to communicate the levee unit improvements. A list of environmental justice contacts within the project area provided by the USEPA will be used to ensure that project components will be communicated to residents who might not otherwise become aware of the project through standard methods such as public meetings and notice of availability published in the Federal Register and local newspapers.

Community Cohesion

A cohesive community can be described as a community comprised of people from different backgrounds and/or circumstances that have similar life opportunities, where positively valued diversity and a sense of belonging build strong and positive relationships between people in the workplace, in schools, and within neighborhoods. In regards to this civil works project, community cohesion is examined to determine if a change in the physical environment could potentially disrupt the continuity and quality of life within a community.

Maintaining the cohesion of existing communities within the study area is primarily dependent upon improving the current level of flood damage reduction and maintaining existing land use. As described in section 3.3, the project area is largely developed, with the industrial workforce primarily supported by commuters, and full time/long-term residents located in a variety of locations relative to the existing levee units. Industry and associated commuters are interested in the continued use of the land for business and commerce. Established residents require the continued use of the land for permanent residency. As stated in section 3.3.8 (Study Area General Trends in Population, Household and Employment) MARC forecast data indicates a steady increase in total employment, and steady/modest growth regarding population and the number of households within the seven levee units. This forecast includes the consideration of the current level of flood damage reduction provided by the existing levee system.

4.16 Socioeconomic Impacts Including Environmental Justice, Community Cohesion, and Induced Damages

4.16.1 Argentine Levee Unit Alternative

Construction of the Argentine preferred alternative would contribute to the long-term stability of the protected area. Six minor structures (outbuildings) would be located to facilitate levee improvements. There would be no impacts to the Wyandotte County tax base or the Kaw Valley Drainage District tax base due to demolition or removal of structures. With the increased levee unit reliability and performance, existing businesses would be expected to continue their existing occupancy in the Unit and new businesses and investment would be more easily attracted to the Unit in the future if vacancies occur, resulting in a stronger tax base. With continued industrial and commercial stability enhanced by the increased reliability against flooding, existing neighborhoods and populations would also be expected to remain relatively stable, barring impacts from other sources. Construction of the Argentine preferred alternative would also be expected to temporarily increase employment in the Unit. In the short term, the temporary presence of construction workers for the project may bring a temporary increase in demand for some services in the local area, but also a temporary increase in business, profits, and sales tax receipts at the local retail and service establishments. It is expected that the community service base is adequate to accommodate temporary construction workers without significant changes. Public health and safety would also be enhanced by the preferred alternative and its increased reliability against flooding. All required construction access will be by public roadway or already established levee access. Accessibility to individual businesses in the Argentine Unit would not be expected to be impacted by construction of the preferred alternative. Overall, accessibility to the levee unit areas would remain the same, but there would likely be some increased road use and increased traffic, dust, and noise during the construction period. These effects would be local and temporary, and are not expected to be significant.

Under the no action alternative, the Argentine Unit would remain vulnerable to flooding from major flood events. In the short term, in the absence of flooding, the local economy, tax base, population, and employment would be expected to remain relatively stable. However, once major flooding occurred in the Unit, long terms effects under the no action alternative could include diminishing economic stability, business interruptions that would likely jeopardize workers jobs and wages, potential losses in population and employment, and reductions in the tax base based on businesses relocating and diminished property values due to more frequent flood damage. There are also significant concerns about public health and safety, and the potential for loss of life, under the no action alternative. The no action alternative would leave one of the busiest rail yards in the nation vulnerable and with a major flood event could halt or at least significantly impede the nationwide movement of goods by rail. A major north-south interstate highway that runs through the Unit could also be shut down. Major national production centers and wholesale distribution and containerized shipping centers in the Unit would close during flooding, with major impacts to the local and regional economy and with potential to impact the broader national economy at least on a short term basis.

Compared to the other levee units, Argentine has a relatively high percentage of minority residents (45.9%), residents living below poverty (26.4%), children under the age of five (8.6%), and elderly residents over the age of sixty-five (11.2%). Argentine levee unit improvements would

be constructed primarily adjacent to industry and are not anticipated to cause any disproportionate impacts to minority or low-income groups.

Induced damages as a result of project requirements are discussed in section 4.16.10.

Implementation of the preferred alternative is not anticipated to disrupt the continuity and quality of life within a community. Levee improvements would improve the flood damage reduction provided to the businesses and residences within the Argentine levee unit protected area. Upon completion of the levee improvement, the community cohesion may increase, as levee improvements would provide a safer living environment.

Minority, low-income residents, and sensitive populations would be negatively affected by levee failure as a result of the no action alternative. However, no disproportionate impacts to minority or low-income groups are anticipated to occur as a result of implementing the no action alternative. In the absence of a Federal action addressing levee improvements, property damage, short and long-term unemployment as a result of levee failure would depend upon the nature and extent of damages to residences and businesses.

The community cohesion of residential areas could be adversely impacted by the no action alternative. Depending upon its location relative to residences and businesses, an overtopping event could adversely affect the cohesion of a community. A levee failure would result in significant impacts to community cohesion as a result of potential fatalities and the displacement of residents and business closures.

4.16.2 East Bottoms Levee Unit Alternative

Construction of the East Bottoms preferred alternative would help ensure the long-term stability of the protected area. With increased levee unit reliability against flooding, existing businesses would be expected to continue their existing occupancy and new businesses and investment would be more easily attracted in the event of future vacancies. The alternative would not require acquisition or relocation of any structures, residents or businesses, and thus no impacts to the tax base would be expected due to construction of the preferred alternative. During construction, a temporary increase in employment in the unit would be expected. The area service base is adequate to accommodate temporary construction workers without significant changes. Construction access will be by public roadway or already established levee access. In the short term there could be a short temporary impact to a railroad spur. There will also likely be some temporary increased road use and traffic, dust and noise during construction.

Implementation of the preferred alternative is not anticipated to cause any disproportionate impacts to minority or low-income groups. Relief well installation is a very localized and isolated improvement that would be conducted adjacent to industry.

Implementation of the preferred alternative is not anticipated to disrupt the continuity and quality of life within any communities. Benefits to community cohesion as a result of relief well installation may be realized. Increasing the effectiveness of the flood damage reduction mechanism facilitates the safety and continued employment of Bayer personnel by minimizing the potential for structural damage as a result of underseepage and potential levee failure.

The no action alternative would continue the study area's exposure to the threat of flooding by the Missouri River if the levee fails. The East Bottoms Unit has both residential occupants and a thriving industrial and commercial base. The businesses provide many jobs for lower income residents who live in the area and for workers residing outside the Unit in the Greater Kansas City Metropolitan Area. Major rail yards and mainline tracks would be flooded in the event of levee failure with a major flood event, potentially impacting the movement of goods and services nationwide. A north-south interstate highway running through the Unit could also be shut down. A major electric utility plant that provides service to the Greater Kansas City area, specifically on the Missouri side, and major national industries and production facilities located in the unit would be impacted and shut down. Flooding would cause business interruptions that could jeopardize workers' wages and salaries, and could seriously harm continued viability of the existing business and industry base. The local tax base would be impacted with business losses, business interruptions, and potential permanent relocation of major businesses. With little advance warning and failure of the levee, residents would lose homes and possessions, and could have difficulty finding and relocating to other affordable housing. Public safety and health, and the potential for loss of life, would be significant issues under the no action alternative.

No disproportionate impacts to minority or low income groups are anticipated to occur as a result of implementing the no action alternative. In the absence of a Federal action addressing levee seepage, work stoppages as a result of catastrophic levee failure, would be dependent upon the nature and extent of damages. The cohesiveness of the levee protected area work environment could be negatively affected if no action is taken to address the underseepage problem. Infrastructure damage or levee failure as a result no Federal action could result in work stoppages. No impacts to the community cohesion of a residential area is anticipated due to the location of the proposed construction adjacent to industry and away from residences.

4.16.3 Fairfax-Jersey Creek Board of Public Utilities Floodwall Alternative

Construction of the Fairfax-Jersey Creek BPU Floodwall preferred alternative would help ensure the long-term viability and stability of the major national, regional and local businesses and industries in the Fairfax Industrial Area. With increased levee unit reliability against flooding, existing businesses would be expected to continue their existing occupancy and new businesses and investment would be more easily attracted in the event of future vacancies. The alternative would not require acquisition or relocation of any structures or businesses, and thus no impacts to the tax base would be expected due to construction of the preferred alternative. During construction a temporary increase in employment in the unit could be expected. The area service base is adequate to accommodate temporary construction workers without significant changes. Construction access will be by public roadway or already established levee access. There may be a temporary impact to a railroad spur, and some temporary increased road use and traffic, dust, and noise would be expected in the immediate area of construction.

Short-term construction noise may be experienced by the apartment complex located south of Esplanade Street and the Union Pacific Railroad trackage within the 66115 zip code, about 0.3 miles south of the area of proposed construction. No construction-or post construction impacts to community cohesion are anticipated as a result of floodwall modifications.

The no action alternative would continue the unit's exposure to flooding based on the threat of floodwall failure during a major flood event, and subsequent flooding throughout the unit. The Fairfax-Jersey Creek Unit has an extremely large and thriving industrial and commercial base. The industries and businesses provide many jobs for Kansas City residents who live in and around the metropolitan area. A major auto manufacturing facility, the sole production site in the nation for a certain model of automobile, a utility plant that provides service on the Kansas side of the Greater Kansas City area, and other major national industries and production facilities would be impacted and potentially shut down. Flooding would cause business interruptions that could jeopardize workers' wages and salaries, and could seriously harm continued viability of the existing business and industry base. Under the no action alternative and with a major flood event the local tax base is at risk of being impacted by business losses, business interruptions, and potential permanent relocation of major businesses. With little advance warning and failure of the floodwall during a major flood event, public safety and health issues, and potential for loss of life, could be significant under the no action alternative.

No disproportionate impacts to minority or low-income groups are anticipated to occur as a result of implementing the no action alternative. Work stoppages due to inundation as a result of floodwall failure would be dependent on the nature and extent of damages. In the absence of a Federal action, the cohesion of the levee protected area work environment could be compromised by high water and potential floodwall failure. No impacts to the community cohesion of a residential area are anticipated due to the location of the proposed construction adjacent to industry and not in proximity to residences.

4.16.4 Fairfax-Jersey Creek Sheetpile Wall Alternative

Construction of the Fairfax-Jersey Creek Sheetpilewall preferred alternative would help ensure the long-term viability and stability of the major national, regional and local businesses and industries in the Fairfax Industrial Area. With increased levee unit reliability against flooding, existing businesses would be expected to continue their existing occupancy and new businesses and investment would be more easily attracted in the event of future vacancies. The alternative would not require acquisition or relocation of any structures or businesses, and thus no impacts to the tax base would be expected due to construction of the preferred alternative. During construction a temporary increase in employment in the unit would be expected. The area service base is adequate to accommodate temporary construction workers without significant changes. Construction access will be by public roadway or already established levee access. In the short term there may be a short, temporary impact to a railroad spur, and some temporary increased road use and traffic, dust, and noise would likely be expected in the immediate area of construction.

Implementation of the preferred alternative would be conducted adjacent to the river and industry. Sheetpile installation is not anticipated to cause any disproportionate impacts to minority or low-income groups. Implementation of the preferred alternative is not anticipated to disrupt the continuity and quality of life within a community. Sheetpile wall construction would improve the flood damage reduction protection provided to the residents and businesses inside of the Fairfax-Jersey Creek protected area.

The no action alternative would continue the unit's exposure to flooding based on the threat of floodwall failure during a major flood event, and subsequent flooding throughout the unit. The

Fairfax-Jersey Creek Unit has an extremely large and thriving industrial and commercial base. The industries and businesses provide many jobs for Kansas City residents who live in and around the metropolitan area. A major auto manufacturing facility, the sole production site in the nation for a certain model of automobile, a utility plant that provides service on the Kansas side of the Greater Kansas City area, and other major national industries and production facilities would be impacted and shut down. Flooding would cause business interruptions that could jeopardize workers' wages and salaries, and could seriously harm continued viability of the existing business and industry base. Under the no action alternative and with a major flood event, the local tax base is at risk of being impacted by business losses, business interruptions, and potential permanent relocation of major businesses. With little advance warning and failure of the floodwall during a major flood event, public safety and health issues, and potential for loss of life, could be significant under the no action alternative.

The sheetpile wall location is located adjacent to the river and industry. Implementation of the no action alternative is not anticipated to cause any disproportionate impacts to minority or low-income groups. No impacts to community cohesion are anticipated as a result of the no action alternative, as no communities are located within or adjacent to the area of proposed construction.

4.16.5 North Kansas City Levee Unit – Harlem Alternative

Construction of the North Kansas City-Harlem preferred alternative would help ensure the long-term stability of the protected area. With increased levee unit reliability against flooding, existing businesses and industries would be expected to continue their existing occupancy and new businesses and investment would be more easily attracted in the event of future vacancies. The many residents in the unit would continue to benefit from the jobs and the amenities offered by a stable and viable community. The preferred alternative would not require acquisition or relocation of any structures, residents or businesses, and thus no impacts to the tax base would be expected due to construction of the preferred alternative. During construction, a temporary increase in employment in the unit would be expected. The area service base is adequate to accommodate temporary construction workers without significant changes. Construction access will be by public roadway or already established levee access; however in the short term some temporary increased road use and traffic, dust and noise during construction would likely be expected.

Construction of a buried collector system will improve interior drainage for the adjacent community, including minority and low-income residents. Income and population data from 1999 indicates that the area adjacent to the proposed construction is not generally comprised of a minority population, or a population living at, or below poverty level (Census 2000). However, it is likely that some adjacent residents are either minorities, or persons living at or below the poverty level, or a combination thereof. It is not anticipated that buried collector installation will cause any disproportionate impacts to minority or low-income groups. A buried collector system is designed to pump water that seeps through the levee back over the levee during high water events.

Implementation of the preferred alternative is not anticipated to disrupt the continuity and quality of life within adjacent communities. A buried collector system would reduce the flooding risk of the adjacent communities.

The North Kansas City-Harlem no action alternative would leave the entire North Kansas City Unit vulnerable to flooding with a major flood event and levee failure at the Harlem site. The North Kansas City Unit protects major residential, commercial and industrial development in the City of North Kansas City, Missouri. The Downtown Airport and major rail yards and mainline tracks would be impacted and shut down during major flood events, levee failure, and subsequent flooding of the Unit. The general movement and distribution of goods and commodities would be impacted, not only because of rail shutdown, but also because North Kansas City has major warehouse facility development that would be flooded. Railroad tracks in the North Kansas City Unit are also heavily used for shipment of coal to powerplant facilities in the region, and thus electric service in the Kansas City area and in other areas in the region could be interrupted. Major large industries and businesses that provide many jobs in the Unit would be flooded, and would temporarily shut down in the short term. Workers salaries and wages would be interrupted in the short term, and many jobs would be lost in the long term. There would be negative impacts to local tax bases in the long term under the no action alternative because without a levee solution and with subsequent and repeated flooding during major flood events, property values would decrease, and residents, businesses and industries would eventually move out of the Unit.

Minority and low-income residents reside within the vicinity of Levee Road. Overtopping or levee failure would adversely affect a variety of races and income levels. No disproportionate impacts to minority or low-income groups are anticipated as a result of the no action alternative. Overtopping or levee failure as a result of the no action alternative would significantly impact the quality of life and cohesion of adjacent communities.

4.16.6 North Kansas City Levee Unit – National Starch Alternative

Construction of the North Kansas City-National Starch preferred alternative would help ensure the long-term stability of the protected area. With increased levee unit reliability against flooding, existing businesses and industries would be expected to continue their existing occupancy and new businesses and investment would be more easily attracted in the event of future vacancies. The many residents in the unit would continue to benefit from the jobs and the amenities offered by a stable and viable community. The preferred alternative would not require acquisition or relocation of any structures, residents or businesses, and thus no impacts to the tax base would be expected due to construction of the preferred alternative. During construction, a temporary increase in employment in the unit would be expected. The area service base is adequate to accommodate temporary construction workers without significant changes. Construction access will be by public roadway or already established levee access; however in the short term some temporary increased road use and traffic, dust and noise during construction would likely be expected.

Implementation of the preferred alternative is not anticipated to cause any disproportionate impacts to minority or low-income groups. Relief well installation is a localized improvement that would be conducted adjacent to industry. Implementation of the preferred alternative is not anticipated to disrupt the continuity and quality of life within a community. Benefits to community cohesion as a result of relief well installation may be realized. Increasing the effectiveness of the flood damage reduction mechanism facilitates the safety and continued employment of National Starch personnel by minimizing the potential for levee overtopping and underseepage failure.

The North Kansas City-National Starch no action alternative would leave the entire North Kansas City Unit vulnerable to flooding with a major flood event and levee failure at the Harlem site. The North Kansas City Unit protects major residential, commercial and industrial development in the City of North Kansas City, Missouri. The Downtown Airport and major rail yards and mainline tracks would be impacted and shut down during major flood events, levee failure, and subsequent flooding of the Unit. The general movement and distribution of goods and commodities would be impacted, not only because of rail shutdown, but also because North Kansas City has major warehouse facility development that would be flooded. Railroad tracks in the North Kansas City Unit are also heavily used for shipment of coal to powerplant facilities in the region, and thus electric service in the Kansas City area and in other areas in the region could be interrupted. Major large industries and businesses that provide many jobs in the Unit would be flooded, and would temporarily shut down in the short term. Workers salaries and wages would be interrupted in the short term, and many jobs would be lost in the long term. There would be negative impacts to local tax bases in the long term under the no action alternative because without a levee solution and with subsequent and repeated flooding during major storm events, property values would decrease, and residents, businesses and industries would eventually move out of the Unit.

No disproportionate impacts to minority or low-income groups are anticipated to occur from the no action alternative. No residential areas are located within the vicinity of proposed construction. In the absence of a Federal action addressing levee underseepage, work stoppages at the National Starch facility as a result of infrastructure or foundation damage, or catastrophic levee failure, would be dependent upon the nature and extent of damages. The cohesiveness of the National Starch work environment could be negatively affected if no action is taken to address the underseepage problem at this facility. Infrastructure damage or levee failure as a result no Federal action could result in work stoppages. No impacts to the community cohesion of a residential area are anticipated due to the location of the proposed construction adjacent to industry and away from residences.

4.16.7 Armourdale Levee Unit Raise Alternatives

Construction of the Armourdale preferred alternative would contribute to the long-term stability of the protected area. The project would likely not require acquisition or relocation of any structures, residents or businesses. Impacts to the Wyandotte County tax base or the Kaw Valley Drainage District tax base due to demolition or removal of structures are not expected. With the increased levee unit reliability and performance, existing businesses would be expected to continue their existing occupancy in the Unit and new businesses and investment would be more easily attracted to the Unit in the future if vacancies occur, resulting in a stronger tax base. With continued industrial and commercial stability enhanced by the increased reliability against flooding, existing neighborhoods and populations would also be expected to remain relatively stable, barring impacts from other sources. Construction of the Armourdale preferred alternative would also be expected to temporarily increase employment in the Unit. In the short term, the temporary presence of construction workers for the project may bring a temporary increase in demand for some services in the local area, but also a temporary increase in business, profits, and sales tax receipts at the local retail and service establishments. It is expected that the community service base is adequate to accommodate temporary construction workers without significant changes. Public health and safety would also be enhanced by the preferred alternative and its increased reliability against flooding. All required construction access will be by public roadway or already established levee access.

Accessibility to individual businesses in the Armourdale Unit would not be expected to be impacted by construction of the preferred alternative. Overall, accessibility to the levee unit areas would remain the same, but there would likely be some increased road use and increased traffic, dust, and noise during the construction period. These effects would be local and temporary, and are not expected to be significant. Implementation of the preferred alternative is not anticipated to result in disproportionate impacts to minority or low income groups, or substantially disrupt the continuity and quality of life within a community. It provides equitable levels of protection among the Kansas River units, is temporary in nature and flooding impacts are very rare in occurrence.

Under the no action alternative, the Armourdale Unit would remain vulnerable to flooding from major flood events. In the short term, in the absence of flooding, the local economy, tax base, population, and employment would be expected to remain relatively stable. However, once major flooding occurred in the Unit, long terms effects under the no action alternative could include diminishing economic stability, business interruptions that would likely jeopardize workers jobs and wages, potential losses in population and employment, and reductions in the tax base based on businesses relocating and diminished property values due to more frequent flood damage. There are also significant concerns about public health and safety, and the potential for loss of life, under the no action alternative. The no action alternative would leave a major rail yard and mainline tracks vulnerable and with a major flood event could halt or at least significantly impede the nationwide movement of goods by rail. Closure of a Board of Public Utilities facility during flooding would impact public health and safety. Major national production centers and distribution centers would be impacted during flooding, with major affect on the local and regional economy and with potential to impact the broader national economy at least on a short term basis.

Induced damages within, or adjacent to the Armourdale levee unit could occur as a result of any of the Argentine levee improvements proposed. These induced damages are discussed below in section 4.16.10. Upon completion of the levee improvements for the Kansas units, community cohesion may increase as levee improvements would provide a safer living environment.

The no action alternative would result in no improvements to the Armourdale levee unit. In the absence of improving the flood damage reduction reliability of the Armourdale unit, impacts would occur to people irregardless of race or income, and community cohesion would be compromised. Property damage and short, and long-term unemployment as a result of levee failure would depend upon the nature and extent of damages to residences and businesses. Levee failure could result in significant impacts to community cohesion as a result of potential fatalities and the displacement of residents and business closures.

Potential induced damages in the Armourdale unit result from the rare flood events and flood stages that occur above the existing top of levee elevations in these units, and would be incurred beginning with about a 300 year, or more rare, event.

4.16.8 Central Industrial District Levee Unit Raise Alternatives

Construction of the CID preferred alternative would contribute to the long-term stability of the protected area. The project would not be anticipated to require acquisition or relocation of structures, residents or businesses. Impacts to the Wyandotte County, Kansas and Jackson County, Missouri tax bases or the Kaw Valley Drainage District tax base due to demolition or removal of

structures are not expected. With the increased levee unit reliability and performance, existing businesses would be expected to continue their existing occupancy in the Unit and new businesses and investment would be more easily attracted to the Unit in the future if vacancies occur, resulting in a stronger tax base. With continued stability enhanced by the increased reliability against flooding, the small residential population in the loft areas would also be expected to remain relatively stable, barring impacts from other sources. Construction of the CID Preferred Alternative would also be expected to temporarily increase employment in the Unit. In the short term, the temporary presence of construction workers for the project may bring a temporary increase in demand for some services in the local area, but also a temporary increase in business, profits, and sales tax receipts at the local retail and service establishments. It is expected that the community service base is adequate to accommodate temporary construction workers without significant changes. Public health and safety would also be enhanced by the preferred alternative and its increased reliability against flooding. All required construction access will be by public roadway or already established levee access. Accessibility to individual businesses in the CID Unit would not be expected to be impacted by construction of the preferred alternative. Overall, accessibility to the levee unit area would remain the same, but there would likely be some increased road use and increased traffic, dust, and noise during the construction period. These effects would be local and temporary, and are not expected to be significant. Implementation of the preferred alternative is not anticipated to result in disproportionate impacts to minority or low income groups, or substantially disrupt the continuity and quality of life within a community. It provides equitable levels of protection among the Kansas River levee districts, is temporary in nature and flooding impacts are very rare in occurrence.

Under the no action alternative, the CID Unit would remain vulnerable to flooding from major flood events. In the short term, in the absence of flooding, the local economy, tax base, population, and employment would be expected to remain relatively stable. However, once major flooding occurred in the Unit, long terms effects under the no action alternative could include diminishing economic stability, business interruptions that would likely jeopardize workers jobs and wages, potential losses in the current small residential population and in employment in the CID Unit. Reductions in the tax base based on businesses potentially relocating and on diminished property values due to more frequent flood damage would also likely occur. There are also significant concerns about public health and safety, and the potential for loss of life, under the no action alternative. The no action alternative would leave mainline railroad tracks vulnerable and with a major flood event could halt or at least significantly impede the nationwide movement of goods by rail. Kemper Arena, the American Royal Building, and other CID businesses, including headquarters for a major national manufacturing company, would close during flooding causing potentially major impacts to the local and regional economy.

Induced damages within, or adjacent to the CID levee unit could occur as a result of any of the Argentine levee improvements proposed. These induced damages are discussed below in section 4.16.10. Upon completion of the levee improvements for the Kansas units, community cohesion may increase as levee improvements would provide a safer living environment.

The no action alternative would result in no improvements to the CID unit. In the absence of improving the flood damage reduction reliability of the Armourdale unit, impacts would occur to people irregardless of race or income, and community cohesion would be compromised. Property

damage and short, and long-term unemployment as a result of levee failure would depend upon the nature and extent of damages to residences and businesses. Levee failure could result in significant impacts to community cohesion as a result of potential fatalities and the displacement of residents and business closures.

Potential induced damages in the CID unit result from the rare flood events and flood stages that occur above the existing top of levee elevations in these units, and would be incurred beginning with about a 300 year, or more rare, event.

4.16.9 Proposed Borrow Area

No significant socioeconomic impacts, disproportionate impacts to minority or low-income residents, or significant impacts to the quality of life and cohesion of adjacent communities are expected from borrow activity as a result of the recommended plan.

4.16.10 Induced Damages

Implementation of the three Argentine raise alternatives, including the proposed nominal 500-year+3 preferred alternative, would temporarily increase the potential for induced physical flood damages in the Armourdale and Central Industrial District levee units and in low-lying unleveed areas just upstream of Argentine and just upstream and across from Armourdale if certain very rare flood events were to occur (Table 4-5). The potential damages in the Armourdale and CID units are deemed temporary in nature because they could occur only in the interim period between completion of the Argentine levee unit raise and before construction is completed for similar raises for the Armourdale and CID units. Evaluation of raise alternatives for the Armourdale and CID units will be completed for the Kansas Citys final report.

Table 4-5. *Argentine Raise Induced Damages

Alternative	Argentine Unit Annual Benefits	Annual Induced Physical Damages			Total
		Armourdale Unit (Temporary)	CID Unit (Temporary)	Upstream Areas	
Argentine Nominal 500+0 Raise	$15,653,000	$161,000	$25,000	$2,000	$187,000†
Argentine Nominal 500+3 Raise	$17,638,000	$172,000	$27,000	$3,000	$202,000
Argentine Nominal 500+5 Raise	$18,636,000	$175,000	$28,000	$3,000	$206,000
Argentine No Levee Raise, Just Pump Station Remedies and Earthwork	$13,443,000	$0	$0	$0	$0

*(October 2004 Prices, 5.375% Interest Rate, 50 year Period of Analysis)
† Any numeric discrepancies are due to rounding.

Potential induced damages in the Armourdale and CID Units result from the rare flood events and flood stages that occur above the existing top of levee elevations in these units, and would be incurred beginning with about a 300 year, or more rare, event. If a 300 year or greater flood event would occur in the interim time period before completion of any Armourdale and CID Unit raises, the Argentine Unit raise alternatives would increase profiles and flood depths by approximately 6 inches or less in the Armourdale and CID Units. With a 300 year event, structures in the Armourdale and CID Units would already be inundated with maximum flood depths (based on lowest structure elevation) of more than 21 feet and average flood depths (average for all structures) of about 15 feet in the Armourdale Unit and nearly 7 feet in the CID Unit. Induced flooding would add an additional 6 inches or less of flood depth on these structures.

The Argentine raise alternatives, during occurrence of rare flood events, would also induce six inches or less of additional flood depth in low-lying unleveed areas on both sides of the river just upstream of the Argentine and Armourdale Units and in another small unleveed area (approximately 4 residences impacted) near the 7th Street bridge, across from the Armourdale Unit. These areas are unprotected and would already be inundated with high flood depths before any induced flooding resulting from an Argentine Unit raise would begin to occur.

The high water events that cause induced damages upstream and downstream of the Argentine are not characterized as intermittent and frequent and are therefore, not considered a

"taking". However, they are included in the economic analysis of each raise alternative as a direct cost of implementation. No mitigation is proposed for induced damages.

The Argentine no action alternative does not induce any damages elsewhere and has no other direct costs of implementation. Implementation of the Argentine Unit raise alternatives does not impact the Missouri River Units (Fairfax-Jersey Creek, North Kansas City, East Bottoms and Birmingham), and residual damages in those Missouri River Units would remain the same as for the future without project condition in those units.

In regards to environmental justice and the potential for induced damages to potentially impact low income and/or minority residents, the area of potential affect for the Armourdale and CID units consists of the entire protected areas within these units and the unleveed areas previously mentioned. The composition of minorities and low-income residents, and sensitive populations are provided in section 4.15. The damages that could occur to individual residents are somewhat variable and depend in part on the degree of flooding and inundation timeframe.

The area of potential affect for the upstream, unleveed reach is located from approximate Kansas River miles 9.0 to 14.6, within zip code 66111. There are six mobile home parks, two churches, commercial businesses and private residences within the induced damage area of effect as determined by field surveys and available mapping. Near the 7th Street Bridge area, four houses would be subject to induced flooding within zip code 66103. Minority, low-income residents, and sensitive populations may occupy these areas.

4.17 Navigation

All of the alternatives proposed for the Kansas Citys' levee units under the recommended plan would benefit navigation. Of the rivers located within the project area, commercial navigation only occurs on the Missouri River. It is likely that navigation would be closed or safety zones established prior to the failure of any part of the Kansas Citys' line of protection. Navigation is generally affected by channel obstructions, drought and other variables. River closure or the recommendation of navigation safety zones depend on river stage (present and forescasted), levee conditions, boats in the reach, and other factors. Navigation would likely be closed or navigation safety zones established prior to the failure of any portion of the line of protection. Construction of the preferred alternatives for the levee units addressed in this study would primarily serve to keep navigation viable following a flood event.

4.18 Recreation

No significant impacts to recreation would be anticipated from the recommended plan formulated for the Kansas Citys' levee units. All of the preferred alternatives would protect river recreation and park facilities from overtopping and/or underseepage failure. The location of most of the proposed reliability improvements are in reaches of the rivers where recreation is generally low. The majority of parks within the units are located landward of the existing levees within the protected areas. Although no direct adverse impacts to recreation would be anticipated as levee improvements would improve the integrity of the line of protection, the generation of noise and dust could impact park use, especially if levee improvements were constructed in the spring to fall seasonal timeframe when rivers and parks are mostly utilized. The flood damage reduction reliability features of the Kansas Citys' levee units primarily protect an industrialized floodplain.

Industrial activities and associated noise including rail, aircraft, and truck traffic are common within the majority of the levee units. In many areas, industrial noise is buffered by riparian vegetation along the foreshore of the rivers located within the project area. Due to the relative proximity of Kaw Point Park to the Fairfax-Jersey Creek sheetpile wall, the preferred alternative for this location could adversely, indirectly impact recreation.

Kaw Point Park and associated walking trails are located approximately 0.1 miles from the proposed construction area. Adjacent businesses will be subject to short-term construction noise. Noise levels would return to their previous level following construction.

Impacts to recreation are variable depending on the seasonal timeframe of construction. Sheetpile installation during the spring and summer months would likely disrupt boating and fishing within the vicinity of construction. Visitors to Kaw Point Park, which includes a series of walking trails, would be disrupted by construction noise. Sheetpile installation during the fall and winter, when the level of outdoor activities decrease, would have less potential of disturbance to park visitors. According to the National Park Service Midwest Regional Office, Kaw Point Park is a Land and Water Conservation Fund project (J. Krejci, National Park Service Outdoor Recreation Planner, personal communication). No direct impacts to the park and associated trails are anticipated as a result of sheetpile wall installation. Short-term, temporary construction-related impacts would include noise and dust generation. It is not anticipated that a conversion of park use will occur as a result of sheetpile installation. Sheetpile installation is estimated to be completed in less than one year. However, the Kansas City District would seek to obtain a waiver from the National Park Service if it is later determined that the construction timeframe would be one year or greater. Upon completion of construction, there would be no further impacts to recreation. A new sheetpile wall would contribute to the protection of the park during high water events.

In accordance with CEQ Memorandum, August 10, 1980, adverse effects to the Kansas River were avoided. Upon completion of construction, the 57-mile reach of the lower Kansas River located between I-635 and the Delaware River listed on the Nationwide Rivers Inventory (NRI) in 1982 would not be anticipated to be removed from the Nationwide Rivers Inventory for potential inclusion into the National Wild and Scenic Rivers System as a result of the recommended plan.

5. Cumulative Impacts

5.1 General

The combined incremental effects of human activity are referred to as cumulative impacts. While these effects may be insignificant on their own, accumulated over time and from various sources they can result in serious degradation of the environment. The analysis must consider past, present and reasonably foreseeable actions in the project area and the consideration of actions outside of the Corps, to include other State and Federal agencies. As required by NEPA, the Corps has prepared the following assessment of cumulative impacts related to the alternatives considered in this DEIS. The potential impacts resulting from preferred and tentative preferred alternatives were discussed in Chapter 4 of this EIS. The analysis indicates that there are no substantial impacts resulting from the proposed reliability improvements that comprise the recommended plan.

The methodology used to determine the potential for significant cumulative impacts included the following:

1. Phase I and II Actions: Identify the location and extent of impacts resulting from the proposed actions for the Kansas Citys' flood damage reduction study during both the construction and operational phase. Identify all past, present and potential reasonable future public and private sector projects from existing reports and thru interviews with local planning agencies that may result in cumulative impacts.

2. Determine Cumulative Impact Zone: The boundary of the cumulative impact analysis zone varies according to the resource evaluation category considered. The potential cumulative impact zone considered extended along the river basin beyond the project area to determine upstream and downstream impacts. For many of the resource categories considered, the impacts of the recommended plan are not anticipated to extend beyond the footprint of the proposed project. Based on the impacts discussed in Chapter 4 of this DEIS, if impacts extend beyond the project footprint the impacts they are not anticipated to be substantial.

3. Determination of Significant Impact: The determination of a significant impact for the cumulative analysis will be the same as for the Chapter 4 Environmental Consequences section. The term significant impact as defined in Paragraph 1508.27 of the Regulations for Implementing the National Environmental Policy Act (NEPA) (40 CFR), requires consideration of both the context and intensity of the impact evaluated.

4. Past, Present and Foreseeable Future Actions: Past and present actions are defined as all actions occurring regionally or in the project boundary area including demographic trends, land use changes, Corps programs, other government agency actions and past and current private development in the area of the Kansas Citys' levees flood damage reduction reliability improvement projects. Foreseeable future actions include plans that have been identified and defined with respect to a future timeframe and general location for the proposed development or activity.

5.2 Past and Present Actions

Missouri River

The presettlement Missouri River was a diverse riverine ecosystem that meandered across the floodplain with braided channels, sloughs, chutes, islands, sandbars, backwaters, prairies, riparian woodland and other habitats. Significant modifications to this ecosystem followed European settlement. Snag removal and occasional bank protection was initiated on the Missouri River in the 1800s to aid commercial navigation. Since 1912, seven separate acts of Congress provided for the construction and maintenance of a navigation channel and bank stabilization works. The Missouri River Bank Stabilization and Navigation Project (BSNP) included placing revetments on the riverbanks, closing off sloughs and side channels and constructing pile dikes. Later work included dredging and rock dike construction.

Construction and long-term operation and maintenance of the BSNP created an inland navigation system and provided many benefits such as protecting utilities, transportation networks, bridges, and adjacent landowners and farms. However, the BSNP shortened the river by about 72 miles and decreased the acreages of riverine habitat (aquatic, island, and sandbar) and meander belt habitat (riparian timber, wetlands, sandbars, and other habitat types) (USFWS, 1980). The construction and operation of the BSNP also decreased channel width, shallow water habitats, river surface area, and suspended sediment transport. The Corps estimated that 522,000 acres of aquatic and terrestrial habitat would be lost from the natural channel and meander belt between 1912 and 2003 (Ferrel, 1996). Table 5-1 below provides a breakdown of this estimated acreage. The Water Resources Development Act of 1986 authorized a fish and wildlife mitigation program in Iowa, Nebraska, Kansas, and Missouri designed to restore, develop, and preserve some of the habitat lost due to the BSNP. The mitigation project is ongoing.

Table 5-1. BSNP Estimated Habitat Loss

Habitat Changes in Acres by State 1912-2003				
State	Natural Aquatic	Channel Terrestrial	Meander Belt Terrestrial	Total
Missouri	55,800	27,700	221,400	304,900
Iowa	17,100	18,700	29,600	65,400
Kansas	9,100	2,000	44,000	5,100
Nebraska	18,200	19,400	59,000	69,600
Totals	**100,200**	**67,800**	**354,000**	**522,000**

Source: Ferrell, 1996.

The BSNP and levee construction has also altered river hydrology. Stabilization has lowered the bed of the Missouri River. Bed degradation on the Missouri River is generally attributed to river training structures (dikes and revetments), commercial sand mining (dredging), major floods, and river cut-offs. The degree of bed degradation has not compensated for the reduction in channel width. Channel restriction may have resulted in a smaller capacity for flood

discharge. Higher flood stages may occur for an equal discharge as a result of a reduced discharge capacity at flood stages.

Kansas River

The Kansas River ecosystem was historically similar to that previously described for the Missouri River, though on a smaller scale (USFWS, 1980). Meandering caused erosion and deposition, creating unvegetated sandbars and islands. Compared to the Missouri River, the Kansas was relatively stable within its floodplain boundaries. European settlement also significantly altered the Kansas River ecosystem. Overbank flows and lateral channel migration have decreased since the impoundment of tributary reservoirs (Corps, 1988 and USFWS, 2000-BiOp). Similar to the Missouri, Kansas reservoirs trap sediment and bed degradation has occurred. Kansas River bed degradation is primarily attributed to commercial sand and gravel mining (dredging). Riverbed degradation has been addressed by numerous authors, including Simons et al. (1984), the Kansas Geological Survey (1998), and others. In 1990, the Kansas City District implemented a regulatory program for commercial dredging activities on the Kansas River, which consisted of dredging restrictions to minimize impacts and a monitoring program to assess the impacts of permitted dredging activities on the Kansas River. A restricted floodplain, bank erosion and floodplain encroachment have altered both channel, and off-channel vegetation composition. Although accurate data are not available, the acreage of off-channel wetland habitats have likely declined along the Kansas River (USFWS, 2000).

Missouri and Kansas Rivers

Flora and fauna have been substantially impacted by channelization of the Missouri River and reservoir construction and operation on the Missouri and Kansas Rivers as acreages of wetlands, grassland, bottomland timber, sandbar, and free-flowing river were flooded or eliminated (USFWS, 2000). Reservoir construction and operation has also decreased sediment transport and turbidity in the river, river meandering, the natural flood pulse, substrate diversity, affected the temperature regime, and impeded fish migration. Flow modifications have also impacted sensitive species, populations, communities, and ecosystems. Nebraska, Iowa, Kansas and Missouri have classified numerous organisms as rare, threatened or endangered as a direct or indirect result of river and floodplain modifications and operation. These include the pallid sturgeon, piping plover, and others. Substantial direct and indirect impacts to both state- and Federal threatened species have occurred from a variety of sources including overharvest, pesticide use, and the construction and operation of channel training structures and reservoirs. In accordance with the USFWS 2003 Amendment to the 2000 Biological Opinion on the Operation of the Missouri Mainstem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System, the Kansas City District and Omaha District are currently working on the restoration of shallow water habitat for the federally endangered pallid sturgeon along the Missouri River. Restoration work conducted by the Corps in 2004-2005 consisted of excavating dike notches and development of pilot channels and chutes.

No substantial impacts to threatened and endangered species are anticipated from increasing the reliability of the Kansas Citys' existing flood damage reduction system as a result of the recommended plan. Although the Kansas City reach likely contained numerous species that are presently listed as threatened or endangered, the project area for some time has been heavily industrialized and dominated by urban tolerant, common species. With the exception of the impacts

that have occurred from Kansas and Missouri river modifications, a relatively small amount of riparian and wetland acreage would be directly or indirectly impacted by the recommended plan. The habitat impacted by the recommended plan primarily consists of areas planted with grasses (brome, fescue, and rye) that are maintained and inspected for levee integrity. The USFWS does not consider these habitat types or their locations as those that used by the threatened and endangered species reported to occur within or adjacent to the project area, including the 3 relatively small wetlands impacted by the recommended plan. The anticipated impacts to wetland and riparian habitat from the recommended plan are additive to those that have occurred in the past. However, these impacts are relatively minor and are not considered substantial. Riparian impacts if unavoidable will be minor and incidental to the construction activities associated with the project. These impacts would not substantially alter the habitat quality of the existing environment.

In addition to impacting fish and wildlife habitat to protect the economic benefits provided by agriculture and various industries, the construction and operation of manmade river structures, including levees and floodwalls, have a history of altering riverscape aesthetics. Due to the request of local interests, the construction of the existing protective works was initiated along the Kansas River by the City of Kansas City, Missouri and the Kaw Valley Drainage District in the early 1900's. Federal flood protection involvement within the Kansas River levee units was initiated between the 1940's and the early 1950's prior to, and after the 1951 flood. Additional improvements to the Kansas line of protection were completed in the late 1970s.

The height of the existing levees and floodwalls are generally between twelve and fifteen feet. The levee raises and floodwall construction proposed along the Kansas River are considered a minor additive impact compared to the existing protection and a moderate impact compared to the raises proposed for this project. This construction would be additive to the visual quality impact of the existing line of protection. None of the proposed height increases would obstruct the view of the wetlands impacted by the proposed recommended plan. Wetlands impacted by the recommended plan are located landward and downgradient of the existing line of protection. The proposed raise would further obstruct the view of industry from the Kansas River. The view of the farmed wetland within the proposed borrow area would be impacted as it would likely be excavated, or otherwise hydraulically altered by the recommended plan. No increased substantial visual quality impacts are anticipated from the construction of underseepage improvements as these improvements are generally constructed landside and downgradient of the existing levee and are not readily viewed from the Missouri, Kansas, and Blue Rivers.

Reservoir construction on the Missouri and Kansas Rivers and the protection offered by Federal levees on the Missouri River provide numerous recreational opportunities for the public. Boating, fishing, camping, and other activities continually provide millions of dollars in economic benefits. In addition to Federal recreation facilities, many state, county, city, and private recreation areas exist that provide numerous economic and health benefits. Some private and Federally-owned levees provide recreation benefits as they are used for hike and bike trails. It is unlikely that any of the levee improvements would result in a long-term decrease in the number of visitors to a particular park. Although no direct impacts to recreation and parks are anticipated, minor indirect impacts from the noise or dust generated by construction within the vicinity of parks may temporarily disrupt park visitors. Sheetpile wall installation within the Fairfax-Jersey Creek levee unit could result in a temporary conversion of use of Kaw Point Park depending on the construction

timeframe. The viability of the existing parks and recreation areas within the levee units is protected by the existing line of protection and reliability improvements would increase the protection of these resources and the benefits they provide.

Development behind levees has resulted in heavily urbanized and industrialized floodplains. Completion of the BSNP and dam construction along the Missouri and on Kansas River tributaries preceded much of the development on the Missouri and Lower Kansas River floodplains and resulted in extensive agriculture use of the floodplain. Noise and air quality impacts greatly increased as urban and industrial development increased. The recommended plan would cause a temporary noise increase and air quality impact in the project area from construction. The increased emissions from construction are additive to the existing air pollution but would not substantially impact air quality. With the exception of sheetpile driving, construction noise would blend with the existing variety of noise that currently occurs within the project area. This noise increase is additive but would cause a temporary increase that is not anticipated to be significant. In addition to increased noise, the additional traffic from transporting soil from the proposed borrow area would have a temporary additive impact to the existing heavy truck traffic that occurs along the proposed haul route. This temporary increase is anticipated to be adverse but is not anticipated to be significant.

Floodplain development has also resulted in substantial prime farmland impacts. The majority of the floodplain soils mapped within the project area are classified as prime farmland by the NRCS. The majority of the work proposed for the Kansas Citys' levees project would occur from the crown of the existing levee or landside of the existing levee. Prime farmland soils would be removed from a portion of the proposed borrow area and placed on or adjacent to the existing levee within the floodplain on mapped prime farmland soils or other soils. In the absence of the proposed project, these soils would be only locally disturbed in the short-term. Due to the periodic demand for borrow soil it is anticipated that this land would be sought for borrow by some entity in the future. Soil borrowing from foreshore areas within the project area as observed from aerial photography would continue as it is more cost effective to haul borrow required for a local project from a local source. The relocation of prime farmland within the floodplain is additive to the borrow activity that occurred from construction of the existing levees and other governmental and private projects. Although the impacts to prime farmland soils from the recommended plan are adverse, prime farmland soils are relatively abundant within the project area counties and the recommended plan would result in a relocation of additional prime farmland soil within the floodplain.

Over the years, agricultural land has been replaced by urban development, particularly near metropolitan areas such as Kansas City and St. Louis (MRBO 2000). The Federal Emergency Management Agency's (FEMA) National Flood Insurance Program currently regulates development on the floodplain. Although minimizing development within the mapped 100-year flood plain, this program does not prevent development on the natural floodplain outside of the 100-year floodplain boundary. The Flood of 1993 demonstrated that during extreme events there still remains the potential for out-of-bank flows and associated damages on the Kansas River. After the Flood of 1993, FEMA sponsored buyouts of properties that were highly susceptible to flooding on the Kansas River floodplain. Per FEMA mapping, the areas currently protected by the Kansas Citys Levees are outside of the 100-year floodplain. Development that occurs within the floodplain

would not be in violation of Executive Order 11988. These protected areas are heavily urbanized and intense development has been in place for many years. Significant development is not anticipated to be induced by the proposed levee project because very little open space remains and any recent development has primarily consisted of improving old structures, or razing old structures and replacing with new structures. Although no reliability improvements are proposed for the Birmingham levee unit, it is anticipated that this unit will become slowly developed. Within the Kansas City area and other areas of the Midwest, the eventual development of agricultural land is commonplace and would be anticipated to occur without construction of the recommended plan.

Water quality degradation has occurred and will continue to occur from agricultural practices and urban development. The water quality of the Kansas and Missouri River and the majority of their tributaries, including the Blue River, has been significantly degraded by both point- and nonpoint source pollution. The Natural Resources Conservation Service working with farmers in the basin has implemented soil and water conservation practices on much of the remaining agricultural land in the basin. While these practices have minimized the adverse affects from chemical pesticides, herbicides, and fertilizer in agricultural production, they continue to contribute to decreased surface water quality. The development of industry along the floodplain has resulted in soil and groundwater contamination and the runoff from existing agricultural practices contribute a variety of pesticides and herbicides to adjacent waterways. The Clean Water Act, as amended, is the principle law governing pollution control and water quality of the Nation's waterways. Most water quality impairments in the Missouri River basin are indirect impacts as they result form a combination of pollutant sources and hydrologic conditions throughout the watersheds (Corps, 2004). Water quality in the Kansas River is affected primarily by nonpoint sources during storm runoff (USGS, (http://ks.water.usgs.gov/Kansas/pubs/press/KSriver.kdhe.9-05.pr.html).

Due to the excavation and soil placement that will occur to improve the existing levee system, there is a potential for a small amount of soil to inadvertently enter the rivers within the project area and cause a short-term, localized increase in turbidity. However, the recommended plan is not anticipated to significantly degrade waters of the United States, or significantly adversely affect aquatic life. The proposed levee improvements have been evaluated for compliance with section 404 of the Clean Water Act. A draft 404(b)(1) evaluation is included as appendix H of this DEIS.

5.3 Future Foreseeable Actions

Missouri River

The Missouri River has been subject to factors that may have affected river stages. Natural and man-made dikes that force energies of the river away from the main channel border have caused the main channel to convey more flow during low flows and increasing stages are observed under high flow conditions. Both man-made features and natural processes may affect Missouri River future conditions. The construction of Missouri River Levee System (MRLS) L385 was completed in 2005. This levee extends from River Mile 371.4 to 376.5 on the left bank of the Missouri River. The planning of this levee evaluated the hydrologic and hydraulic effects of the new levee on existing flood protection projects, including the Kansas Citys' local protection.

Natural processes include land accretion and erosion within the floodplain. Land accretion behind dikes placed for navigation channel alignment affect flood flow stage changes along the Missouri River. Flows deposit sediment in the quiescent area downstream of the navigation dike structures. This sediment builds over time and encroaches further into the channel. As time passes, vegetation grows and stabilizes this accreted land from future erosion and allows the cycle to continue further into the channel. This cycle produces the stands of timber behind dikes along the riverward side of some levees. Substantial accretion and tree growth within the project area is located along the left bank of the Missouri River in the reach between the North Kansas City Downtown Airport levee segment downstream to about the I-435 crossing near the downstream end of the East Bottoms levee unit. Land accretion and tree growth, and other variables affect river stages. This cycle may contribute to the upward stage trends of high flows observed for the Missouri River. The existing and future creation of shallow water habitat may negate some of these affects as accreted land erodes and is replaced with shallow slack water areas that benefit fisheries and wildlife. However, the effects of this cycle on river hydraulics have not yet been studied by the Kansas City or Omaha Districts.

Future foreseeable actions within the project area are primarily anticipated to occur within North Kansas City. The proposed Downtown Airport runway extension, if constructed, could require fill in the floodway at river mile 369.2. The responsibility for addressing fill impacts to the flood protection works lies with the runway extension proponent. Coordination and assuring compliance is through the non-Federal flood protection work's sponsors. This project is currently under review by KCD through the Inspection of Completed Works Program, which provides technical review of proposed work analysis and design. It is currently undetermined if this project will affect water surface elevations. Proposed projects may be approved if there are no adverse impacts to the flood protection works.

The North Kansas City Hillside Ditch parallels the northern extent of the North Kansas City Levee Unit (Figure 5-1). The ditch drains west-to-east and is bounded by bluffs to the north and a levee tieback to the south. There are two functions of the Hillside Ditch. The primary function of the ditch and levee tieback is to protect North Kansas from a Missouri River flood. When high water events occur, water backs up into the Hillside Ditch via Rock Creek. The ditch also intercepts stormwater runoff from the adjacent bluff, which is conveyed into Rock Creek, a tributary of the Missouri River, within the confines of a culvert beneath Highway 210. The AE firm Burns & McDonnell is currently investigating the capacity of the Hillside Ditch and the level of service

provided by the levee. A local community housing development is underway in North Kansas City within the vicinity of the Hillside Drainage ditch area. Although it is presently undetermined, overtopping reliability improvements may be recommended.

Repairs to the Broadway Extension in North Kansas City will likely be completed in the next two to three years. Construction may include a landside wall replacement.

The Missouri Department of Transportation (MODOT) has proposed improvements to the interstate system between Missouri 210 and downtown Kansas City, Missouri, including the Paseo Bridge crossing over the Missouri River. A DEIS for the Interstate 29/35 Corridor Improvement Project was issued and public hearings were held May 9 and May 11, 2006. Although a preferred alternative was preliminarily identified by MODOT within the DEIS, the final selection of a preferred alternative will not be made until all agency and public comments, and associated impacts have been considered (MoDOT, 2006). This project is currently being reviewed by KCD in regards to its effects on river hydraulics. Impacts to river hydraulics and navigation are currently unknown.

Project sponsors have requested that the Corps review the possibility of making a permanent tieback improvement at the extreme lower end of the Fairfax-Jersey Creek unit (Figure 5-2). Original project tieback measures have been compromised over the past decades. Tieback improvements may involve a short segment of 3 ft high floodwall or embankment under the Lewis & Clark viaduct area. No analysis has been conducted regarding this project feature. The analyses conducted for this feature and resulting recommendation will be included in the Final Interim Feasibility Report and the Final Environmental Impact Statement.

Kansas River

The proposed preferred and tentative preferred alternatives for the Kansas River levee units discussed in this DEIS are the only known projects in the foreseeable future that would affect water surface elevations. Since the upper reach is currently heavily vegetated with mature tree growth, it is not anticipated that future hydraulic conditions will substantially change from the further maturity of this vegetation. It is also anticipated that since the lower reach has not had significant vegetation growth from 1955 to the present, minimal to no growth would occur in the future. Bed degradation, which is caused in part by river mining operations, is anticipated to continue.

5.4 Other Regional and Site Specific Actions

The Mid America Regional Council (MARC), Bistate interest, and regional economic development agencies will continuing to develop a growth management plan and program focused on a variety of objectives including, but not limited to:

Developing a consistent set of planning and development policies, and zoning and building code regulations to be applied equally to the cities and surrounding areas. This includes coordinating planning activities in a manner designed to reduce potential conflicts between incompatible uses through the use of management tools and zoning programs.

Working with federal, state and local agencies to coordinate expansion and augmentation of public streets, utilities, water and sewerage systems, commercial services, quality of life programs, and job opportunities for residents. The routine, ongoing maintenance of federal, state, county, and

local highways, roads, and bridges is a priority requiring extensive agency coordination. Contacts with the State of Missouri Department of Transportation and the State of Kansas Highway Department, county and local officials confirmed that emphasis is being placed on maintenance and repair of existing transportation systems. MARC emphasizes the use of Best Management Practices and other environmental controls during construction activities, which have reduced the potential impact of such activities on surface waters.

One of MARC's highest priorities is the increased construction of greenways and trails for health and economic benefits. This may include the application of funds from the Federal Recreational Trails Program, which provides for trail-related construction and maintenance. Grant recipients are selected based on recommendations from the Missouri Trails Advisory Board (MDNR, 2006).

5.5 Cumulative Impacts Conclusion

Based on the analysis of past and foreseeable activity along the river systems, the changes of the existing line of protection within the Kansas City reach under the recommended plan cause minor changes within existing project boundaries. Those changes involve small raises of existing levees, the structural improvement or replacement of floodwalls and a sheetpile wall, and underseepage control improvements. Reliability improvements would provide an approximate 500-year level of protection without creating substantive changes in river morphology or hydrology, habitat changes along the river, or impacts to terrestrial or aquatic wildlife.

Hydraulic changes along the Kansas and Missouri Rivers analyzed using the HEC-RAS model showed no or minor changes to flood stage height under extreme flooding conditions. The limits of stage height increase were generally within and just upstream of the lower Kansas River units. Stage heights upstream and downstream of Kansas City were not impacted by the recommended plan. Impacts to wetlands would occur and potentially a small number of trees within the construction footprint could be impacted. However, these impacts along with mitigation of these impacts would not result in substantial changes to local or regional habitat or a loss of natural resources to the river and the public using those resources.

Based on the analysis provided in this DEIS, the recommended plan of constructing flood damage reduction reliability improvements within the Kansas City reach of the Missouri and Kansas Rivers will not result in substantial impacts to river reaches upstream or downstream of the project area. As such, cumulative impacts of the recommended plan are not considered significant.

6. List Of Preparers

The following is a table showing the preparers of the DEIS, their area of expertise, and the sections of the DEIS to which they contributed.

NAME	TITLE	AREA OF EXPERTISE
John Atkinson	GIS Specialist, Corps of Engineers, Kansas City District	Geographic Information Systems, Mapping and Graphical Exhibits
Debbie Bishop	Environmental Protection Specialist, USEPA	Environmental Justice
Bill Bolte, P.E.	Structural Engineer, Corps of Engineers, Kansas City District	Structural Analysis and Design
Ron Jansen, P.E.	Civil Engineer, Corps of Engineers, Kansas City District	Civil and Pump Station Analysis and Design,
Kimberly O. Johnson	Environmental Engineer, USEPA	NEPA Compliance, Air Quality, HTRW
Gordon Lance, P.E.	Senior Hydrologist, Corps of Engineers, Kansas City District	Hydrologic and Hydraulic Modeling
Scott Loehr, P.E.	Geotechnical Engineer, Corps of Engineers, Kansas City District	Geotechnical Analysis and Design
Lamar McKissack	Planner & Project Manager, Corps of Engineers, Kansas City District	Project Planning and Study Manager
Timothy Meade	Archeologist, Corps of Engineers, Kansas City District	Cultural Resource Investigation and Analysis
Hank Mildenberger, P.E.	Civil Engineer, Corps of Engineers, Kansas City District	Surveying, Civil, Site Work Analysis and Design
Patrick Miramontez	Cost Engineer, Corps of Engineers, Kansas City District	Cost Estimates and Construction Sequencing
Jeanne Musgrave	Economist, Corps of Engineers, Kansas City District	Civil Works Economics and associated modeling

Phil Rosewicz	HTRW Engineering, Corps of Engineers, Kansas City District	Hazardous and Toxic Waste Specialist
Eric Shumate, P.E.	Hydrologist, Corps of Engineers, Kansas City District	Hydrologic and Hydraulic Modeling
Richard Skinker	Environmental Resources Specialist, Corps of Engineers, Kansas City	NEPA Compliance and EIS Development
Lora Vacca	Real Estate Specialist, Corps of Engineers, Kansas City District	Real Estate Planning and Associated Actions
Lori Vollink	HTRW Engineering, Corps of Engineers, Kansas City District	Hazardous and Toxic Waste Specialist
Matthew Walker, P.E.	Hydrologist, Corps of Engineers, Kansas City District	Hydrologic and Hydraulic Modeling
Thomas Wright, P.E.	Senior Structural Engineer, Corps of Engineers, Kansas City District	Structural Analysis and Design

7. EIS Mailing List

The following mailing list has been maintained and updated through the duration of the project. The list of individuals and entities who were mailed the notice of availability for the DEIS was included in section 7 of the DEIS. Individuals and entities whose correspondence was returned as a result of a residence change, business closure, or other circumstances and no forwarding address was provided were removed from the mailing list. This is an updated list of individuals and entities that were mailed the DEIS notice of availability.

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Water Services Department

Mr. Leon Staab
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Mr. Larry Brennan
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Honorable Emanuel Cleaver II,
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Governor Matt Blunt
Missouri Capitol Building

Honorable Gene Bruns, Mayor
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Honorable Stan Salva, Mayor
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Burdette Peter Fullerton, Executive Dir.
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Carol McCaslin
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Honorable Sam Brownback,
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Honorable Jim Talent,
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Honorable Sam Graves,
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Honorable Joe Reardon, Mayor

Honorable Kathleen Rose, Mayor
Riverside City, Missouri

Honorable Harlan Shaver, Mayor
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Tina Uridge, Executive Director
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Honorable Pat Roberts,
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Honorable Dennis Moore,
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Governor Kathleen Sebelius

Honorable Kay Barnes, Mayor

Honorable Kathryn Dusenbery, Mayor
Parkville City, Missouri

Honorable Ron Stewart, Mayor
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Honorable Katheryn Shields
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Jim Gray, Principal Chief
Osage Tribe

Zach Pahmahmie, Chairman
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Cecelia Fire Thunder, President
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Roger Trundell, Chairman
Santee Sioux Tribe

E. Bernadette Huber, Tribal Chairman
Iowa Tribe of Oklahoma

Eugene Little Coyote, President
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Madonna Archambeau, Chairperson
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Winnebago Tribe of Nebraska

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Kickapoo Tribe in Kansas

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Sandra Keo, Chairperson
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Duane Big Eagle, Chairman
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Tex Hall, Chairman
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Kickapoo Tribe of Oklahoma

Eleanor Baxter, Chairman
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Mr. Homer Bear, Chairman
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Kay Rhoads, Principal Chief
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Valentino White, Sr., Chairman
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Juan Garza, Chairman
Kickapoo Traditional Tribe of Texas

Chief Leaford Bearskin
Wyandotte Nation – Oklahoma

Floyd E. Leonard – Tribal Chair
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Ron Sparkman, Chairman
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Division Administrator
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Sierra Club
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Ms. Vickie Richmond
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Mr. Tyler Harris
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Blue River Stream Team Committee

Citizens Environmental Council of Kansas City

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Friends of the KAW

Ms. Carla Bascom
Friends of Lakeside Nature Center

Kansas Canoe Association

INTERESTED BUSINESSES

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Sun Transportation Company

McKinney Associates

Big River Construction Company

Midwest Construction Company

Kansas Corporation Commission

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Engineering Specialist
FM Global St. Louis Operations

Mark Lathrom
Wausau Insurance Companies

F.W. Dodge Company

Division of Budget
ATTN: Martin Kennedy
Statehouse

Maczuk Industries, Inc.

Central State Underwater Contracting, Inc.

Dredge America

Kansas State University
Division of Biology

Ralph J. Kieffer, Attorney at Law

Thompson & Mitchell

KAW Valley Engineering

AmerenUE

Purdy & Associates, Inc.

American Commercial Marine Fleeting
American Commercial Barge Lines

PLATS WITHIN OR POTENTIALLY AFFECTED BY PROPOSED PROJECT

Bayer Chemical Corporation (MoBAY)

Missouri Valley Enterprises, Inc.

Marlin S. Gross

Eugene M. Arnott

Atchison, Topeka and Santa Fe Railway Company
General Offices

Ashland Chemical Co.

MOKAN Regional Council

National Starch Corporation

Thompson Bros., Inc.

Schnegelberger Properties

B & H Auto Salvage, Inc.

P & D Development Corp

Frank Perry

Unified Government of Wyandotte County

APAC-Kansas, Inc.

Roadway Express, Inc.

Overnite Transportation Co.

Blance Rangel

Burlington Northern & Santa Fe Railway

BGK Developers LLC

T.O.A.N., Inc.

Harcros Chemicals, Inc.

Arnold Clyd Knight

John M. & Susan P. Owens

Automotive Rental, Inc.

Allen J. Weaver

INTERESTED INDIVIDUALS

Larry O'Donnell

Dean Wilson

J. Ferrell

Mike Farley

Allen Cessna

NEWS MEDIA

Kansas City Kansan

WSAF – FOXTV – Kansas City

The Independence Examiner

The Dispatch Tribune

The Kansas City Call

Vernon Schroeder

United States Postal Service

Holiday Apartments, LLC
c/o Susan Rose

Harlem Baptist Church

CCH Enterprises, LLC

Mona Avery

Helene Miller

Joe Hyde

Wyatt Phillips

Troy Gordon

Alan S. Caldwell

Jackson County Advocate

KMBC – ABCTV – Kansas City

KMCI – NBCTV – Kansas City

The Kansas City Kansan

Dos Mundos Newspaper

Kansas City Hispanic News

John F. & JoAnn Ball

ConAgra

Jones Iron and Metal, Inc.
Floyd E. Jones

Brad Robertson

Leonard H. Jones, ETAL

Randy Niere
Missouri Bike Federation

A.P. Wildgrube

Ms. Andrea Weiss

Scott D. Dye

Edward J. Heisel

The Kansas City Star
David Goldstein
Missouri Correspondent

KCTV – CBSTV – Kansas City

The Liberty Sun-News

The Daily Record

Kansas City Business Journal

The Record

The Northeast News

Sun News of the Northland

The Liberty Tribune

The Raytown Tribune

Wednesday Magazine

LIBRARIES

Kansas City Public Library

Mid-Continent Public Library – Riverside Branch

Mid-Continent Public Library – Parkville Branch

Mid-Continent Public Library – North Oak Branch

Kansas City Missouri Public Library – Main

Kansas City Missouri Public Library - Northeast

Kansas City Missouri Public Library –Irene H. Ruiz Billoteca de las Americas

Kansas City Missouri Public Library – Southeast Branch

Library – Room 747
Richard Bolling Federal Building
USACE, Kansas City District

Kansas City Library
North East Branch
Claudia Visnich

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Raymond Smalling
Holmes Park Area

Elizabeth Ossorio
Elders Volunteer For Elders

John Loss
Center Planning and Development Council

Larry Hamel
Legal Aid of Western Missouri

Director
Housing and Economic Development Financial Corp.

Pat Cundiff
Mir Roundtable Conference

Cris Medina
Guadalupe Center

Richard Herrera
Southwest Blvd Merchants Association

Sylvester Holmes
Black Economic Union

Gerald Shechter
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Marty Kraft
Heartland All Species Project

Brent Schondelmeyer
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Michael Conley
Bethel Connection 2000

Paul Rojas
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Harold Tivol
Country Club Plaza Association

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Westside Resident Planning

KANSAS NEIGHBORHOODS

45th Street Brigade
Tabernacle Church

Active Citizens Task Force
United Methodist Church

Argentine Neighborhood Watch
Emerson Park Christian Church

Armourdale Renewal Association
Armourdale Recreation Center

Neighbors Against Drugs and Crime

Northeast Chelsea
Neighborhood Group

Prescott Group
Prescott Center

Quindaro Urban Improvement
First Baptist Church

Rosedale Community Improvement
Mt. Carmel Church

Rosedale Development Association

Struggler's Hill
JFK Elementary School

Waterway Group
Pentecostal Church

Historic Westheight
Neighborhood Association
St. Paul Episcopal Church

East Argentine/Rosedale
Neighborhood Group
Franklin Center

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Natural Resources
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Olathe Daily News

Lance W. Burr
Attorney and Counselor at Law

The Kansas River
Water Assurance District #1

INDIVIDUALS OR ENTITIES REQUESTING 404 NOTIFICATION FOR PROJECTS WITHIN: PLATTE COUNTY, MO

Platte County Commission

INDIVIDUALS OR ENTITIES REQUESTING 404 NOTIFICATION FOR PROJECTS WITHIN: CLAY COUNTY, MO

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INDIVIDUALS OR ENTITIES REQUESTING 404 NOTIFICATION FOR PROJECTS WITHIN: JACKSON COUNTY, MO

Jackson County Advocate

Natural Resources
Conservation Service

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Ozark Chapter Sierra Club

Blaske Marine Service

Sun Transportation Company

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U.S. Coast Guard
CWO Paul Putkey

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Dixie Carriers, Inc.

Troy Gordon

Janice Lorrain
ORC

American Commercial Lines, Inc.

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Wyandotte County Health Department

Kansas City Kansas Public Library

Director
Youth Friends

Director
US Commission on Civil Rights

Wyandotte County Department of Air Quality

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Oak Grove Neighborhood Assn.
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Central Avenue Betterment Assn.

Leadbusters, Inc.

Chelsea Neighborhood
Nedra Bonds

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UMKC – Dept. of Geosciences
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Missouri Parks Association
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8. Glossary

Base Flood Elevation (BFE) - the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum of 1929, the North American Vertical Datum of 1988, or other datum referenced in the Flood Insurance Study report, or average depth of the base flood, usually in feet, above the ground surface.

Emergency Action Plan - a predetermined plan of action to be taken to reduce the potential for property damage and loss of life in an area affected by a dam break.

et seq (et sequens) - and the following one or ones.

Failure - the uncontrolled release of water from a dam.

Floodplain - an area adjoining a body of water or natural stream that has been or may be covered by flood water.

Flood routing - the determination of the attenuating effect of storage on a flood passing through a valley, channel, or reservoir.

Foundation of levee - the natural material on which the dam structure is placed.

Freeboard - the vertical distance between a stated water level and the top of the levee/floodwall.

Grout cutoff - a barrier produced by injecting grout into a vertical zone, usually narrow horizontally, in the foundation to reduce seepage under a dam.

Hydrograph - a graphic representation of discharge, stage, or other hydraulic property with respect to time for a particular point on a stream.

Peak flow - the maximum instantaneous discharge that occurs during a flood. It is coincident with the peak of a flood hydrograph.

Piping - the movement of fine soil particles caused by excessive foundation water pressure generated from high river stages. The water seepage associated with piping can lead to the progressive development of soil erosion.

PMF (Probable Maximum Flood) - a flood that would result from the most severe combination of critical meteorologic and hydrologic conditions possible in the region.

Pressure relief well and collector system - the pressure relief well is a vertical well or borehole, usually downstream of impervious cores and/or cutoffs, designed to collect and direct seepage through or under a levee to reduce uplift pressure under or within a levee. The well is designed to prevent piping of the foundation soil. A line of such wells forms a drainage curtain that generally discharges the collected water into a collector ditch.

Reach Index Point – A river mile location in a reach that is used to aggregate the stage damage relationships for the different categories of investment within a reach at a common location.

Riprap - a layer of large uncoursed stones, broken rock, or precast blocks placed in random fashion on the upstream slope of an embankment dam as a protection against wave and ice action.

Rock Toe – An area of a levee near the bottom of the slope above the existing ground surface that needs to have existing soils, such as clays, sands, and silts, removed and replaced with rock to provide stability.

Seepage - the interstitial movement of water that may take place through a dam, its foundation, or its abutments.

Tieback - A landward extension of the main stem levee that protects interior areas from backwater and/or tributary headwater flooding.

Underseepage - the interstitial movement of water through a foundation.

9. Acronyms

AIRS – Aerometric Information Retrieval System
AOC – Areas of Concern
ASLA – American Society of Landscape Architects
BMP – Best Management Practices
BPU – Board of Public Utilities
DCAR – Draft Coordination Act Report
cfs – cubic feet per second
COE – Corps of Engineers
CRPM – Cultural Resource Project Manager
CWA – Clean Water Act
DEIS – Draft Environmental Impact Statement
DFR – Draft Feasibility Report
EIS – Environmental Impact Statement
EPA –Environmental Protection Agency
EvR – Evaluation Report
ER – Engineering Regulation
ESA – Endangered Species Act
FCAR – Final Coordination Act Report
FEIS – Final Environmental Impact Statement
FFR – Final Feasibility Report
HTRW – Hazardous, Toxic, and Radioactive Waste
KCD – Kansas City District (Corps)
KDA – Kansas Department of Agriculture
KDHE – Kansas Department of Health and Environment
KDWP – Kansas Department of Wildlife and Parks
KGS – Kansas Geological Survey
KSR – Kansas River
KWO – Kansas Water Office
LUST – Leaking Underground Storage Tank
MoDOT – Missouri Department of Transportation
NAAQS-National Ambient Air Quality Standards
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NOA – Notice of Availability
NOI – Notice of Intent
NOx – Nitrogen Oxides
NPDES – National Pollution Discharge Elimination System
NRCS – Natural Resources Conservation Service
NWI – National Wetlands Inventory
OHWM – Ordinary High Water Mark
PAL – Planning Aid Letter
PAR – Population at Risk
PMF – Probable Maximum Flood
RCRA – Resource Conservation and Recovery Act

ROD – Record of Decision
SHPO – State Historic Preservation Office
SIP– State Implementation Plan
SVOC – Semi-Volatile Organic Compounds
TRIS – Toxic Release Inventory System
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
USEPA – United States Environmental Protection Agency
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
UST – Underground Storage Tank
VOCs – Volatile Organic Compounds

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U.S. Army Corps of Engineers, Kansas City District

Appendices

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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U.S. Army Corps of Engineers, Kansas City District

Appendix A

Kansas Citys Levees Feasibility Study Website

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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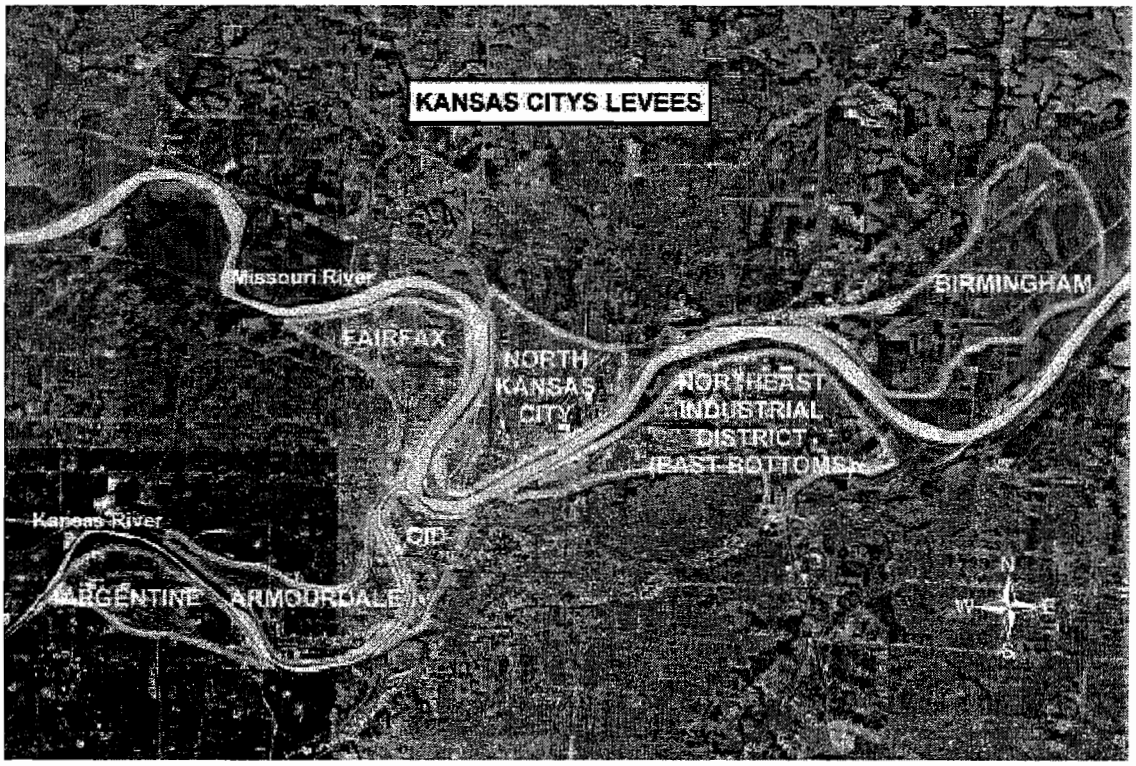
Welcome. You are visitor number: 3836



Aerial Photograph of the Kansas Citys Levees
(Click on the picture for more information about the levees)

NEWS

Release of Draft Interim Feasibility Report and Draft Environmental Impact Statement
June 02, 2006

Briefing Slides from the July 13, 2006 Public Meeting

Welcome to the web site for the Kansas Citys Levees feasibility study. This feasibility study will review the performance of the existing levee system and examine various alternatives for increasing the level of performance. This web site contains both general background and updates regarding the progress of the study.

If you are interested in current levee operations, please visit the Kansas City District Local Protection web pages:

http://www.nwk.usace.army.mil/local_protection/levees.html

Download Draft EIS and Draft Interim Feasibility Report

WARNING – Some file sizes are large. The download of the following files may not be possible from some computers. Others may experience that it will take a considerable amount of time to download and view the attached files.

Adobe Acrobat Reader Required

1 -- Draft Feasibility Report & DEIS

File Size (MB)	**DEIS**
0.65	**DRAFT EIS May 2006**
11.69	**Complete DEIS Appendices May06**
0.85	**Figure 4-1 USEPA Environmental Justice Figure**
56.92	**zPlus3EnvironmentalMaps11x17**

File Size (MB)	**Draft Feasibility Report**
0.57	**Draft Feasibility Report May 2006**
0.04	**Draft Feas Report TofC & Syllabus May2006**
File Size (MB)	**Draft Feasibility Report -- Feas Report Exhibits May2006**
0.02	**DFR EXHIBIT #10 System of AccountsTable**
0.03	**DFR EXHIBIT #11 FCWith Eng Perf**
0.01	**DFR EXHIBIT #12a Arg Pump Stations Listing**
0.02	**DFR EXHIBIT #12b Arg Storm Outlets Listing**
0.01	**DFR EXHIBIT #13 OVERALL PLAN AnnualDmgBenCosts**
0.01	**DFR EXHIBIT #14 OVERALL PLAN Long Term Risk**
0.27	**DFR EXHIBIT #15 Induced Damages Memo**
0.03	**DFR EXHIBIT #16 Construction Considerations**
0.05	**DFR EXHIBIT #17 Perspectives on Levee Analysis**
0.07	**DFR EXHIBIT #18 Project Schedule**
0.31	**DFR EXHIBIT #3 Project Overview Map May2006**
0.22	**DFR EXHIBIT #3a Argentine Levee Unit Map**
0.19	**DFR EXHIBIT #3b Fairfax-JC Levee Unit Map**
0.26	**DFR EXHIBIT #3c NKC Levee Unit Map**
0.23	**DFR EXHIBIT #3d East Bottoms Levee Unit Map**
0.02	**DFR EXHIBIT #4 EC Ovrtop Eng Perf**
0.01	**DFR EXHIBIT #5 EC Overall Reliab**
0.01	**DFR EXHIBIT #6 EC Annual Damage**
0.01	**DFR EXHIBIT #7 FC WO Proj Annual Damage**
0.03	**DFR EXHIBIT #8 screening table**
0.02	**DFR EXHIBIT #9 Alt Screen Summ**
0.03	**DFR EXHIBIT#1 93Hydrograph**
0.26	**DFR EXHIBIT#2 51Flood Photo**
File Size (MB)	**Draft Feasibility Report -- Feas Report Plates May2006**
1.67	**Plate #10 FairfaxJerseyCr11x17NedApr06**
2.97	**Plate #6 E Bottoms MO & Blue Confluence Area11x17NedApr06**
2.82	**Plate #7 NKC HarlemArea11x17NedApr06**

2.85	Plate #8_NKC NatStarch11x17NedApr06
1.69	Plate #9_FairfaxBPU11x17NedApr06

Draft Feasibility Report -- Feas Report Plates May2006 -- Argentine_500+0 Plates 11 - 15

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3.23	Plate #12_Arg_60-125_0_11x17NedApr06
3.24	Plate #13_Arg_120-180_0_11x17NedApr06
3.23	Plate #14_Arg_180-240_0_11x17NedApr06
3.58	Plate #15_Arg_240-289_0_11x17NedApr06

Draft Feasibility Report -- Feas Report Plates May2006 -- Argentine_500+3 Plates 1 - 5

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Draft Feasibility Report -- Feas Report Plates May2006 -- Argentine_500+5 Plates 16 - 20

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3.24	Plate #19_Arg_180-240_5_11x17NedApr06
3.60	Plate #20_Arg_240-289_5_11x17NedApr06

2 -- Engineering Appendices

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4.69	Final_KCL_EA_A18_Access
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18.70	Final_KCL_EA_A6_GeoEB
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0.08	Final_KCL_EA_Readme
0.50	Final_KCL_EA_TOC&Index

3 -- Real Estate, Economics, & HTRW Appendices

File Size (MB) **Econ Appendix C**

0.47	**Econ Appendix Attachments Binder May2006**
7.92	**Econ Appendix May2006**

File Size (MB) **HTRW Appendix D**

122.64	**HTRW Appendix May2006**

File Size (MB) **Real Estate Appendix B**

0.01	**Attach 3 LERRD Description**
0.05	**REP Final May06**
0.01	**REP Table of Contents**

File Size (MB) **Real Estate Appendix B -- 500+3 RE Mapping**

2.95	**E Bottoms MO-Blue Area11x17NedApr06**
1.67	**FairfaxBPU11x17NedApr06**
1.64	**FairfaxJerseyCr11x17NedApr06**
2.79	**NKC HarlemArea11x17NedApr06**
2.82	**NKC NatStarch11x17NedApr06**
3.71	**REP Mapping 1a Arg_0-60_3_11x17NedApr06**
3.17	**REP Mapping 1b Arg_60-125_3_11x17NedApr06**
3.23	**REP Mapping 1c Arg_120-180_3_11x17NedApr06**
3.21	**REP Mapping 1d_Arg_180-240_3_11x17NedApr06**
3.56	**REP Mapping 1e_Arg_240-289_3_11x17NedApr06**
9.72	**REP Mapping Argentine borrow Area**

U.S. Army Corps of Engineers, Kansas City District

Appendix B

SCOPING COMMENTS

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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SCOPING COMMENTS AND RESPONSES

FEASIBILILTY STUDY/ENVIRONMENTAL IMPACT STATEMENT
FLOOD DAMAGE REDUCTION
IN THE KANSAS CITYS, MISSOURI AND KANSAS METROPOLITAN AREA
January 30, 2004

1. Hike/bike trails on levees and increased riverfront access

Because there were a number of comments regarding trails on levees, all the comments have been listed below followed by a general response to this issue.

Comments:

1.1 Comment: I want everybody to know there is a high level of interest in Clay County to incorporate trails in the County and one of the areas we recognize in the Northland Trails Plan, and I have copies of that here, were the levees along the Missouri River. ... We think that possibly the levee may be another source of land where we do not need to go to numerous owners for acquisition. ... I am here tonight representing the Commission to see if there is a level of interest and if there is with the Clay County Levee Districts we would like to pursue this and if there isn't just tell us and we will look someplace else. ... We think it might help increase security around the levee, it might help increase public support for the levees, increase political support for the levees and also help improve the quality of life for Clay County Citizens. So if you are interested in taking any of this information I will be glad to leave it for you and I would also be glad to discuss this with you after the meeting. Craig Porter, Clay County Commissioner, Clay County Missouri, verbal at August 20, 2003 Public Scoping Meeting

1.2 Comment: I think that primarily I need to address the Riverfront Heritage Trail and its relationship to the CID (Central Industrial District) and more specifically the Kaw Valley Drainage District. I brought with me several copies of the maps of the Riverfront Heritage Trail. I don't know if any of you are familiar or at this point unfamiliar with the Heritage Trail but it's a multiuse trail that will unify the riverfront with the city market area and eventually extend as far south as the Kemper Arena Area. There are some segments of the trail as outlined in this map that of course run along the levees of the Kaw Valley Drainage District ... The perception is that the riverfront has been sequestered and it is no longer really accessible to the public. I personally feel and I believe I can speak with a certain amount of confidence for the Missouri Bicycle Federation that allowing the public to buy-in to those districts, to allow the public to buy-in to those areas in the form of recreation puts the public commitment back into the preservation of those areas. ... I submit and simply put that the best way to ensure the success of flood districts in the future is to make sure that the public buys-in and that can be most efficiently done with recreation. ... I have some copies of the Riverfront Heritage Trail map if you would like them and I thank you for your time. Randy Niere, Unofficial representative of the Missouri Bicycle Federation and the Riverfront Heritage Trail organization, verbal at August 20, 2003 Public Scoping Meeting.

1.3 Comment: We are here to express our support for the concept of recreation on top of the levees and we offer to provide technical assistance or be a resource of information to the Corps, local agencies or levee districts for that purpose. We have a great interest in connecting the public back to our region's important resource which is the river. Steve Rhoades, MidAmerica Regional Council, verbal at August 20, 2003 Public Scoping Meeting

1.4 Comment: I think the levee systems should be open to non-motorized use and trail development. The levees have cut the people off from the rivers. Opening them will help restore that use. I know levees elsewhere are

used for public roads (Mo Bootheel – Memphis Corps District). Bikes and walkers are much less damaging (if they cause any damage) then that. People out there also help watch for and report problems. The levees will make vital links for proposed trail systems, help with bicycle transportation corridors and help get a healthier population by getting exercise. There will also be an effect on tourism dollars. The people need to be reconnected to the river. The use at English Landing Park – one of the few places you can actually get to the river – is an indication of this need. Helene Miller, Liberty Missouri, comment card August 20, 2003 Public Scoping Meeting.

1.5 Comment: A trail system built on the levees and riverfront ways of this system would be a gem of considerable economic and cultural benefit to the Kansas City region. This economic benefit should be considered as an integral part of the project and the economic value of the trails/greenway system should be included in the economic analysis created for the project. Public access to the levee system and the creation of walking/bike trails throughout the system should be an important part of this project. Brent Hugh, Email comment received August 21, 2003.

1.6 Comment: I would like to endorse the idea of using the levy system for trails in the Kansas City area. The Kansas City area has fewer trails than most cities in the USA, and the use of levees could be a big boost to our trail system. Steve Fuller, Email comment received August 29, 2003.

1.7 Comment: Recreational trails on levees. The Mid-America Regional Council (MARC), in association with local governments and civic partners throughout the region, developed a metrowide greenways trails plan for the Kansas City region called MetroGreen. This plan calls for the development of over 1,100 miles of trails throughout the region in the coming generation. Key elements of this plan call for the creation of 240 miles of recreational trail atop the levee systems along the Kansas and Missouri Rivers. MARC encourages the Corps to include consideration of public access of levees and use maintenance roads as trails. We would request your agency be supportive of considering this concept when discussing it with local levee districts in our region. Tom Jacobs, Manager Environmental Programs, MidAmerica Regional Council by letter September 17, 2003.

Response: Several comments were received in relation to the development of recreational hike/bike trails on the existing levee system. These comments ranged from stating that the Corps should encourage or facilitate the development of a recreational hike/bike trail system on the existing levees, to the Corps should itself fund trails on the existing levee system or even require that levee districts construct or allow trails on the existing levee system. In support of trails on the existing levee system several commenters provided examples where hike/bike trails were located on Federal levees. Some commenters noted that locating hike/bike trails on the levees would emphasize Kansas City's tie with the two river systems that have played such a major role in the development of our community. They have also noted that the recreational trail system could actually increase support for, and awareness of, the benefits provided by the existing levee system. Commenters also noted the aesthetic benefits associated with the river and adjacent riparian timber. The following provides further information and clarification on how recreational hike/bike trails will be considered during this study:

1. The Corps is neither a proponent of, nor an opponent to, the incorporation of a recreational trail system into any given levee unit. In addition, the Corps has no authority to require that levee districts construct or allow recreational hike/bike trails on the existing levee system. In Kansas City District, the local sponsors own and operate the Federal levees that the Corps of Engineers constructed. The local sponsors (in some cases drainage districts, in some cases municipalities) pay for the maintenance of those systems. In other parts of the nation, this is not always the case. So, the circumstances of other Federal levee systems are not necessarily analogous to the circumstances in the Kansas City District.

2. The Corps of Engineers does not own the levee units but monitors for compliance the operation and maintenance of the levee system in cooperation with the local levee districts. This oversight is primarily to ensure that the existing levee system will perform as designed during a flood event. The Corps makes annual

inspections of each levee unit and reviews plans submitted by the levee districts for work on or adjacent to the levees. The standards used as basis for this oversight and inspections are contained in the following referenced citations: TITLE 33- NAVIGATION AND NAVIGABLE WATERS, Chapter II – Corps of Engineers, Department of the Army, Part 208 – Flood Control Regulations, MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS. In summary, Part 208 emphasizes efficient operation and maintenance of levees, floodwalls, drainage structures, gates, valves, floodways, channels, pumping plants, and other flood control facilities. Failure of a levee district to maintain the levee unit in a manner consistent with the operation and maintenance manual or allow modification on or adjacent to the levee without the required engineering review and approval from the Corps could result in that levee unit not being eligible for Federal funds for repairs should it be damaged during a major flood.

3. Currently, within the Kansas City District there are recreational hike/bike trails at the Federal levee units at both Lawrence and Manhattan, Kansas. These trails provide numerous recreational opportunities and both receive fairly high usage and are popular in their communities. However, the levee systems in the Kansas City metropolitan area are in many cases immediately adjacent to intense industrial development, utilities, and transportation infrastructure. In view of heightened security concerns of recent times, there are industrial complexes, key utilities, and transportation lines adjacent to the levee systems that would be sensitive to increased public access. Concerns have been raised by the levee districts regarding the following: liability issues, litter/dumping, trespassing on adjacent landowners, security of businesses, damage or vandalism to levee structures, erosion of the levee embankment, sources of funding for operation and maintenance of the trail, and also conflicts between recreational users and relatively frequent operation and maintenance work on the levees. Also, there is a concern raised by the levee districts that the primary purpose of the levee system would be subordinated by adding another purpose. The Kansas Citys levee system provided significant protection to the economic investment in our community during the Great Flood of 1993. The Kansas City levee system has saved lives, prevented hundreds of millions of dollars in physical damages, and maintained economic and employment opportunities for a large vital portion of the metropolitan area. The levee owners and the constituents they serve remain adamant that the primary reason for the existence of this critical infrastructure must remain a central focus.

4. Funding for the development and long-term viability of a recreational hike/bike trail on a levee unit is a critical consideration. Local trail proponents may decide to fund all such costs locally. Or the possibility of Federal funding can be considered. In a study authorized under Section 216 (this study) a dollar amount up to 10% of the total project cost can be utilized for recreational development. This would include, study, design and construction costs. The costs of this recreational development are shared with the local sponsor on a 50% local and 50% Federal basis. There is currently no authority for the Corps to fund recreational trails on this levee system at 100% Federal costs.

In the current ongoing study, no specific funding for the study of recreational development was identified by the study sponsors. Thus the study budget does not address levee trail implementation directly. Furthermore, the long-term operation and maintenance cost of recreational development are fully the responsibility of the levee district (or the local sponsor for that recreational feature). It is our understanding that funding arrangements for the operation and maintenance costs associated with the implementation of a levee trail system have not been clearly identified by trail proponents in consultation with all the levee districts involved with this study. The development of a bona-fide local financing plan (addressing study, design, construction, operation and maintenance) is a necessary prerequisite for Federal involvement in any proposed trail action.

5. The first step in realistically addressing the development of a recreational hike/bike trail on a levee unit would be for the trail proponent to meet with the officials of the local levee district and discuss in some detail the operation and maintenance requirements of the levee unit. To be successful, this discussion must lead to agreement on the financial responsibility for the operation and maintenance costs associated with trail

implementation. Such discussions should recognize the range and numbers of flood control facilities and access requirements for the specific levee unit. .

Following the initial meetings and subsequent agreements between trail proponents and the levee districts, the individual levee districts must then formally submit to the Corps:

A. A request for technical review of any locally-developed trail plan. The Corps technical oversight review would identify any components of the proposed plan that would not be compatible with operation or maintenance of the levee system in accordance with its primary function to provide protection during major floods, or

B. If the trail implementation plan were to propose Corps funding or Corps involvement in the study, design, or construction of the trails, then the aforementioned local financial responsibility plan must be provided to the Corps for review. The Corps would then determine if the proposed trail implementation could be considered within the authority of the ongoing feasibility study.

6. As part of this Kansas Cities Levees Study, the Corps will consider requests from the levee districts along with any local plans, such as Metrogreen, to ensure that if practicable, any alternative selected to increase the reliability of the existing flood damage reduction system, does not preclude future development of recreation opportunities. The Corps of Engineers is supportive of beneficial and compatible recreation development in the Metropolitan area, including trail systems that interconnect the region. The Corps will continue to work with recreation interests and the levee districts to facilitate better mutual understanding and cooperation where possible.

2. Hydrologic and engineering

2.1 Comment: Will increased flood protection measures within the study area result in increased floodwater elevations immediately downstream of the study area? If so, how are those impacts handled? Jim Shipley, Project Manager MoDOT, comment card August 7, 2003 Scoping Meeting

Response: Hydraulic impacts (effects) upstream, downstream, and through the project reach for the selected alternative will be included in the final report. At this time, effects have not been quantified.

2.2 Comment: The impression I got was that the Kaw was doubtful in any event in the 1951 order of flow. First, what was the estimated peak flow from the Kaw from the flood of 1951 vs what the river is estimated to be able to bear currently? Randy Niere, Email comment received August 22, 2003

Response: The estimated peak discharge on the Kansas River during the 1951 event is 510,000 cubic feet per second (cfs) coincident with 63,000 cfs on the Missouri River above the Kansas River. Therefore, the total flow immediately downstream of the confluence at the Hannibal Bridge was estimated at 573,000 cfs. The capacity of the Kansas River in the study reach is dependent on the assumed discharge on the Missouri River. Results of this analysis will be included in the final report.

2.3 Comment: How likely is the secondary berming, wells and pumping to actually prevent sand boils or physical denigration or migration of the levee itself? Randy Niere, Email comment received August 22, 2003

Response: Under seepage berms on the landside of the levee add weight at the toe to prevent soil particles from piping under the levee from sand-boil activity acting at the landside that could result in failure of the levee. Wells work as pumping, to draw down the excess pressure head. They reduce the pressure head down landward of the toe so risk of failure due to uplift or piping is minimized

2.4 Comment: Has the subsidence effect of scouring and undermining of the sand layer at points like Turkey creek been estimated in this model? Randy Niere, Email comment received August 22, 2003

Response: No.

2.5 Comment: Do the numbers for the Kaw change if the Missouri is concomitantly high, near flood stage? Randy Niere, Email comment received August 22, 2003

Response: See response to comment 2.2 above.

2.6 Comment: At what depth is the sand layer? The bedrock layer at the riverbank? I have physically been down in the banks around James St., and it is a fine sand down there. Is this contiguous with the sand layer in the geodynamics slide? Randy Niere, Email comment received August 22, 2003

Response: This will depend on the slide area you are referring to.

2.7 Comment: Are there any similar models for this kind of flood prevention situation in another urban environment? Randy Niere, Email comment received August 22, 2003.

Response: The Corps of Engineers Hydrologic Engineering Center has developed a state-of-the-art analysis model for formulating and evaluating flood damage reduction plans for both urban and rural areas. The current model is the Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) computer program model that uses a risk-based analysis. The model includes both economic flood damage and hydrologic engineering analyses using a consistent study configuration for streams, damage reaches, plans, and analysis years.

3. Channelization and environmental impact issues

3.1 Comment: Information provided at the August 7, 2003 meeting indicates a new alternative (not previously addressed in 1999) will be explored for possible implementation. The new alternative will explore increasing the channel capacity of the lower Kansa River which will entail channel and bank line modifications.... Channelization of the lower Kansas River would have significant adverse impacts on fish and wildlife resources. Channelization will result in a quantitative reduction in aquatic habitat, decrease aquatic habitat diversity, and increase sediment loading in the area channelized. Major impacts will occur from loss of substrate, removal of snags, detritis, loss of instream vegetation, loss of streamside vegetation, disruption of the run-pool sequence, and potential dewatering of adjacent areas. It is also expected that these adverse impacts will affect downstream Missouri River areas. ... Overall, this alternative would significantly damage fish and wildlife resources and their habitat. ... The adverse affects to fish and wildlife and recreation from implementation of this alternative should be avoided by discarding it from further evaluation. Increasing the height of existing levees along the lower Kansas River will eliminate the need for removing large amounts of vegetation from stream banks and avoid the expense of maintenance required on channels dredged through noncohesive (sand substrate) materials. William H. Gill Field Supervisor U.S. Fish and Wildlife Service, Kansas Field Office by letter September 11, 2003.

Response: In preparation for the scoping process, removal of riparian vegetation was identified by the Corps as one potential measure that could potentially increase the discharge capacity on the lower part of the Kansas River. Historic photographs taken during the 1950s show a Kansas River channel with little or no riparian vegetation. While this condition would not be considered optimal for fish and wildlife resources, this condition did provide optimal conveyance of floodwaters by maintaining a maximum cross sectional area for flood flows. Since the 1950s a woody riparian corridor has developed and as out of bank flows occurred additional material was deposited on the high bank further reducing the cross sectional area and conveyance capacity of the Kansas River channel. The Corps fully acknowledges the FWS position that the wholesale clearing of all riparian

vegetation on the lower Kansas River would have adverse effects on fish and wildlife resources, water quality and recreational use of the river, but does not want to remove from consideration this early in the scoping process what, if any, mutually compatible conveyance and environmental benefits could be realized by converting and maintaining a portion of the woody riparian corridor to shallow water habitat.

3.2 Comment: Restoring some vegetation (trees probably) along the river will not only hide the ugly channels in the metro area but also provide some wildlife habitat. The river is a great place for canoeing, fishing, etc. Helene Miller, Liberty Missouri, comment card August 20, 2003 Public Scoping Meeting.

Response: The Corps' Environmental Operating Principles presented on March 26, 2002 and other regulations provide guidance to the Corps to actively seek design solutions for flood damage reduction projects that will also achieve environmental sustainability. Alternatives developed for this project will evaluate the potential for environmental enhancement and ecosystem restoration where opportunities exist.

3.3 Comment: Environmental Sustainability & Corps Environmental Operating Principles. As you know, in March 2002, Lt. General Robert Flowers announced the U.S. Army Corps Engineers Environmental Operating Principles to guide the Corps in all of its work. These principles articulate strong support for designing and constructing environmentally sustainable projects. Use of these principles to define the scope of this project might have several interesting implications. The broadest, however, would suggest that the project scope itself seek opportunities to enhance and restore environmental conditions wherever possible, rather than restricting the scope to mitigating negative impacts. Tom Jacobs, Manager Environmental Programs, MidAmerica Regional Council by letter September 17, 2003.

Response: As alternatives are developed thru the EIS process for the seven levee project area, the study team will analyze potential opportunities for ecosystem restoration and recreation development options that can be combined with the primary purpose of flood damage reduction. These opportunities will need to be evaluated in terms of the study authority, the availability of funding, and based upon the approval of the levee district sponsors.

3.4 Comment: Restoration sites and regional planning. MARC, in association with a broad range of federal, state and local partners (including the Corps) is working to develop a regional natural resources inventory. This GIS-based initiative will seek to identify critical natural areas, natural resource conservation needs and environmental restoration opportunities. Opportunities to restore environmental conditions on some of these sites identified through this initiative should be seriously evaluated as project alternatives are developed. Tom Jacobs, Manager Environmental Programs, MidAmerica Regional Council by letter September 17,2003.

Response: The team will use the regional natural resources inventory to identify environmental restoration opportunities in the study area. As flood reduction alternatives are developed for the study area the opportunities for wetland and ecosystem restoration will be evaluated in more detail for specific sites. The Corps has extensive experience in designing and implementing ecosystem restoration projects along the Missouri and Kansas River systems and can bring this knowledge to the Kansas Citys Seven Levee Flood Damage Reduction Project.

4. Cultural and historic issues

4.1 Comment: At this time, we have no particular areas of concern although a number of historic trail routes and farmstead locations are recorded within these areas on historical maps. Although we have not identified any known archeological sites or historic structures within the areas identified, we would like the opportunity to review any future construction projects propose as a result of the study. Mary R. Allman, Kansas State Historical Society by letter August 18, 2003.

Response: Comment noted. The Kansas State Historical Society will be consulted regarding any cultural resources that may be impacted by alternatives developed for this project.

4.2 Comment: We would like to be up dated on all issues pertaining to the Kansas City levees for historical, cultural, and environmental issues. Sherri Clemons, NAGPRA Wyandotte-Nation, Email comment received August 14, 2003

Response: Comment noted.

5. Other comments

5.1 Comment: You should seriously consider buying development rights on ag lands upstream (and perhaps downstream) where the floodwaters will be allowed to go and spread out. It makes no sense to continually narrow the river channel pushing water levels higher, to allow levee development in floodplains. Buy the land or at least the development rights in places. Some could be used for wetland creation. The rest could be farmed. Helene Miller, Liberty Missouri, comment card August 20, 2003 Public Scoping Meeting.

Response: Comment noted. A program similar to what you have suggested is currently being implemented by the Corps of Engineers through the Missouri River Fish and Wildlife Mitigation Project. This project has authorized the purchase of 166,750 acres from willing sellers in the Missouri River floodplain from Sioux City, Iowa to the mouth of the river at St Louis, Missouri. The primary purpose of this project is to mitigate the habitat lost as a result of bank stabilization and navigation projects implemented over several decades in the floodplain area. Additional information can be obtained by calling the Corps of Engineers at (816) 983-3324 or on the project website: http://www.nwk.usace.army.mil/projects/mitigation/.

5.2 Comment: Please advise FEMA to attend Agency Scoping Meetings. Region VII contact: Phil Kirk, phil.kirk@dhs.gov (816-283-7076) Roger Benson, FEMA R-VII Kansas City, Missouri, comment card August 20, 2003 Scoping Meeting.

Response: Mr. Kirk will be added to our agency contact list.

5.3 Comment: How would the development/redevelopments at KCMO Riverfront impact your evaluation of potential improvements to the levee systems adjacent to the Missouri River. Gabriel Okafor, Division Manager, Economic Development and Business Assistance Kansas City, Missouri, comment card August 7, 2003 Scoping Meeting.

Response: Development and redevelopment of the KCMO Riverfront will be evaluated in the economic impact analysis section. The economic analysis will note any increase in the level of real estate and other assets in the study area resulting from recent and proposed economic development plans.

5.4 Comment: Will reports include any impact on maritime commerce? Update your agency list: Change US Coast Guard Second District to US Coast Guard Marine Safety Office St. Louis. LTJG Tom Morgan, Planning Division Chief, US Coast Guard Marine Safety Office, St. Louis, Missouri, comment card August 7, 2003 Scoping Meeting.

Response: The Transportation Section in the Draft EIS will address the potential impacts of alternatives being analyzed on Maritime and other transportation resources in the study area.

5.5: Comment: Good information on general direction that the Corp is taking toward this task. Abe Shirazi, Parks and Recreation Department, Kansas City, Missouri, comment card August 7, 2003 Scoping Meeting.

Response: Comment noted.

5.6 Comment: Keep MoDOT informed related to proposed work adjacent to all Mo. River Bridges and highways, (indicated work near Rte. 169). Keep Kansas City District of MoDOT notified. Michael Stelzleni, Technical Support Engineer, MoDOT, comment card August 7, 2003 Scoping Meeting.

Response: Comment noted. The Kansas City District of MoDOT will be included on the mailing list and kept informed through the NEPA process with the preparation of a Draft EIS and public meetings. If specific transportation related issues are identified as related to flood protection alternatives, MoDOT will be contacted to review transportation issues and impacts.

5.7 Comment: Clay County's concerns center around (1) Bridge safety, Broadway to 291, (2) Natural habitat, (3) Recreational opportunities, and (4) Navigation of Missouri River. Not interested in commercial (business) development along the river as it's all in the floodplain. Would like to help NKC and Birmingham Levee Districts with discussions of solutions, ideas. Carole Bloom, Planning and Zoning Director, Clay County, Missouri, comment card August 7, 2003 Scoping Meeting

Response: The impacts of any proposed alternatives developed for this project will be analyzed for bridge safety, natural resource, recreational opportunities and navigation in the Draft EIS. The Corps is open to discuss with government officials and community stakeholders any alternatives or solutions that they want to propose for the flood reduction project.

5.8 Comment: I believe that the river needs to be accessible and enjoyed for people to support adequate flood protection. I suspect adequate will prove to be extensive and costly, based on reducing the threat of failure in the underlying geologic structure of the Kaw and Missouri river valleys in the metro area. But it needs to be done, obviously, even if that means pouring footings or jacking pilings for the levee all the way down to bedrock. This is about human and economic security for the metro region, after all. Randy Niere, Email comment received August 22, 2003

Response: Comment noted.

U.S. Army Corps of Engineers, Kansas City District

Appendix C

U.S. Fish & Wildlife Service
Draft Coordination Act Report
Final Coordination Act Report

Agency Correspondence

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Field Office
315 Houston Street, Suite E
Manhattan, Kansas 66502-6172

September 28, 2005

Colonel Michael Rossi
District Engineer
Kansas City District, Corps of Engineers
700 Federal Building
601 East 12th Street
Kansas City, Missouri 64106-2896

Attn: CEMRK-EP-PR
Richard A. Skinker

Dear Colonel Rossi:

Enclosed is a copy of our draft Fish and Wildlife Coordination Act Report for the Kansas Cities, Missouri and Kansas flood damage reduction project located in Kansas City, Kansas and Kansas City, Missouri.

This report is intended to accompany the U.S. Army, Corps of Engineers feasibility report on the proposed project and in its final form will be attached to and incorporated into the body of the report to Congress.

We would appreciate your review and comments on our draft report. We are also transmitting copies of this draft report to the Kansas Department of Wildlife and Parks, the Missouri Department of Conservation, and to our Regional Office in Denver, Colorado for concurrent review.

If you have any questions concerning this report, please contact Dewey Caster or me at 785 539-3474. We would appreciate receiving any comments you may have by October 21, 2005.

Sincerely,

Michael J. LeValley
Field Supervisor

Enclosure

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DRAFT
FISH AND WILDLIFE COORDINATION ACT REPORT
FOR THE
KANSAS CITIES, MISSOURI AND KANSAS FLOOD DAMAGE REDUCTION PROJECT
KANSAS CITY, MISSOURI AND KANSAS CITY, KANSAS

PREPARED FOR THE
UNITED STATES ARMY, CORPS OF ENGINEERS,
KANSAS CITY DISTRICT, KANSAS CITY, MISSOURI

BY THE
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
KANSAS FIELD OFFICE
MANHATTAN, KANSAS

September, 2005

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EXECUTIVE SUMMARY

The Kansas City District, Corps of Engineers, is in the process of developing a feasibility study for flood damage reduction measures for the cities of Kansas City, Kansas and Kansas City, Missouri. This Draft Fish and Wildlife Coordination Act Report describes the study area, identifies important aquatic and terrestrial resources, evaluates impacts of flood damage reduction measures, and describes mitigation measures.

The project area is highly urbanized inside the existing levee system. The primary impact from a fish and wildlife perspective will be the loss of terrestrial habitat from levee and floodwall construction, permanent loss of wetlands from levee construction, and temporary loss of terrestrial habitat due to construction activities and borrow construction. Therefore, the Fish and Wildlife Service recommends the following:

RECOMMENDATIONS

1. Riparian and wetland habitats should be avoided to the maximum extent practicable when selecting borrow sites for the proposed levee raises and compensatory mitigation should be undertaken for unavoidable impacts.

2. Levees should be seeded with warm season grasses such as switch grass.

3. Removal of mature cottonwoods, and other native vegetation should be avoided where possible, and if they are removed, replace woody vegetation by establishing two acres of native vegetation for every acre impacted.

4. The Corps should create wetland mitigation habitat to compensate for the loss of wetland acreage from construction of the project. Because an, as yet, unknown number of acres of farmed wetland may be directly impacted by borrow activities it may be necessary to restore non-wetland habitat to wetland habitat. Farmed wetlands should be mitigated at a 1.0 to 1.0 ratio.

5. Since channelization, levee construction and floodplain development have already resulted in a dramatic loss of riparian and wetland habitats in the Missouri and Kansas River basins, the alternative to remove riparian vegetation to increase discharge capacity of the lower Kansas River should be dropped from further consideration.

The following recommendations describe opportunities to provide fish and wildlife enhancement through the project.

6. Encourage wetland development and hydrological reconnection to the river at existing borrow areas landward of the levee units.

7. Provide river access at the Argentine Levee segment.

8. Establish native vegetation (trees and shrubs) riverward of levee segments where riparian woodlands are sparse or nonexistent.

9. Potential for aquatic and wetland restoration at Liberty Bend Cut-off just downstream of Kansas City should be explored.

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Figure 1-1	Kansas Cities study area
Figure 2-2	Kansas Cities Project Features
Figure 3-3 thru 3-7	National Wetland Inventory Maps

INTRODUCTION

This Draft Fish and Wildlife Coordination Act Report (Report) is submitted pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), and the fiscal year 2004 Scope-of-Work Agreement between the U.S. Fish and Wildlife Service (Service) and the U.S. Army Corps of Engineers, Kansas City District (Corps) for the Section 216, Local Flood Protection Feasibility Study. This report is designed to accompany and is to be incorporated into the Corps' feasibility report on the proposed project. The purpose of the feasibility study is to determine if there is a practicable alternative for reducing flood damages along the Kansas and Missouri rivers in the vicinity of the two Kansas Cities, Kansas and Missouri.

This study was authorized under authority of Section 216 of the Flood Control Act of 1970, as amended.

The Service provided a Planning Aid Letter dated July 12, 1999 to Mr. Michael G. Trail, Deputy for Project Management regarding this project. Our letter focused on fish and wildlife resource needs, opportunities and impacts associated with alternatives for the Kansas Cities, Flood Protection Project, as envisioned in 1999.

DESCRIPTION OF THE STUDY AREA

The Missouri River originates in southwestern Montana and flows about 2,315 miles to join the Mississippi River near St. Louis Missouri. The Kansas River originates on the plains of northeastern Colorado and flows 1,242 miles eastward draining northern Kansas, southern Nebraska and northeastern Colorado and joins the Missouri River at Kansas City. The River Mile (RM) references used in this report are measured upstream from the confluence of the Missouri River with the Mississippi River or upstream of the confluence of the Kansas River with the Missouri River. The project area is located between RM 358 and 374 on the Missouri River and between RM 0 and 10 on the Kansas River, Figure 1-1. This local protection project consists of improvements to six levee units along both banks of the Missouri and Kansas Rivers in the Kansas City Metropolitan area, Figure 2-2.

Most of the study area is heavily urbanized floodplain occupied by traffic arteries, rail lines and rail yards, and commercial-industrial development. Above the floodplain, the Kansas and Missouri hillside areas are occupied by residential and commercial/ industrial development.

The study area is part of the Osage Plains physiographic section of eastern Kansas and western Missouri, a maturely dissected and gently rolling region with relatively wide stream valleys. The topography is developed on Pennsylvania age shales with interbedded limestone, sandstone and coal. The natural, alluvial soils are silt and silty clay loams of the Onawa-Haynie association. Hillside soils are derived from loess and limestone/shale deposits and can be described as silty loams of the Knox-Ladoga association.

The main topographic features of the area are the valleys of the Missouri and Kansas Rivers and their tributaries. The Missouri River valley is generally two to 3 miles wide, and the Kansas River valley is slightly more than 1 mile wide. The uplands along the Missouri River valley are deeply dissected loess hills with limestone outcrops. Steep slopes and breaks formed by differential erosion of limestone shale and sandstone are along the Kansas River and its tributaries. The divide between the rivers and their tributaries are rolling to hilly loess and till uplands.

As indicated previously, the floodplains of the Kansas and Missouri Rivers at the Kansas Cities have filled with major industrial, transportation, and municipal, residential developments. Those sites, subject to annual flood events, were incorporated in the Kansas Cities flood control project beginning in the mid 1930's.

The original local flood protection project was authorized by the Flood Control Act of 1936 and construction was started in 1940. Amended plans on which the present project is based were authorized by the Flood Control Acts of 1944, 1946 and 1954.

To facilitate construction, management, and operation, the overall project was set up in seven units. The geographical units are: the Fairfax-Jersey Creek Unit on the Missouri River in Kansas; the Argentine and Armourdale Units on the Kansas River in Kansas; the Central Industrial District Unit, which lies in both States and is bounded on the west by the Kansas River and on the north by the Missouri River; and three other Units: the North Kansas City, East Bottoms, and Birmingham Units, all in Missouri. The design and construction of each of these units were coordinated with the others, yet each became effective as it was completed, and each is operationally independent. Complete effectiveness of the overall project is contingent upon adequate reservoir control in the upper Missouri and Kansas River Basins. Levees, flood walls, relief wells, gravity drain structures, and pumping plants comprise the main protective structures. Other major elements include channel and flood way improvements in both rivers, bridge and approach alterations, and the Liberty Bend cutoff in the Missouri River immediately downstream from Kansas City.

The Flood Control Act of 1962 authorized and provided for modification of the portion of the Kansas City project along the Kansas River involving the Argentine, Armourdale, and Central Industrial Districts and alterations to bridges and approaches to provide a higher degree of protection.

The cost of the Kansas Cities project as authorized in 1944 is $42,668,213 Federal and $5,120,000 non-Federal. The cost of the 1962 authorized modification on the Kansas River was $28,300,000 Federal and $7,090,000 non-Federal. (COE ,1981).

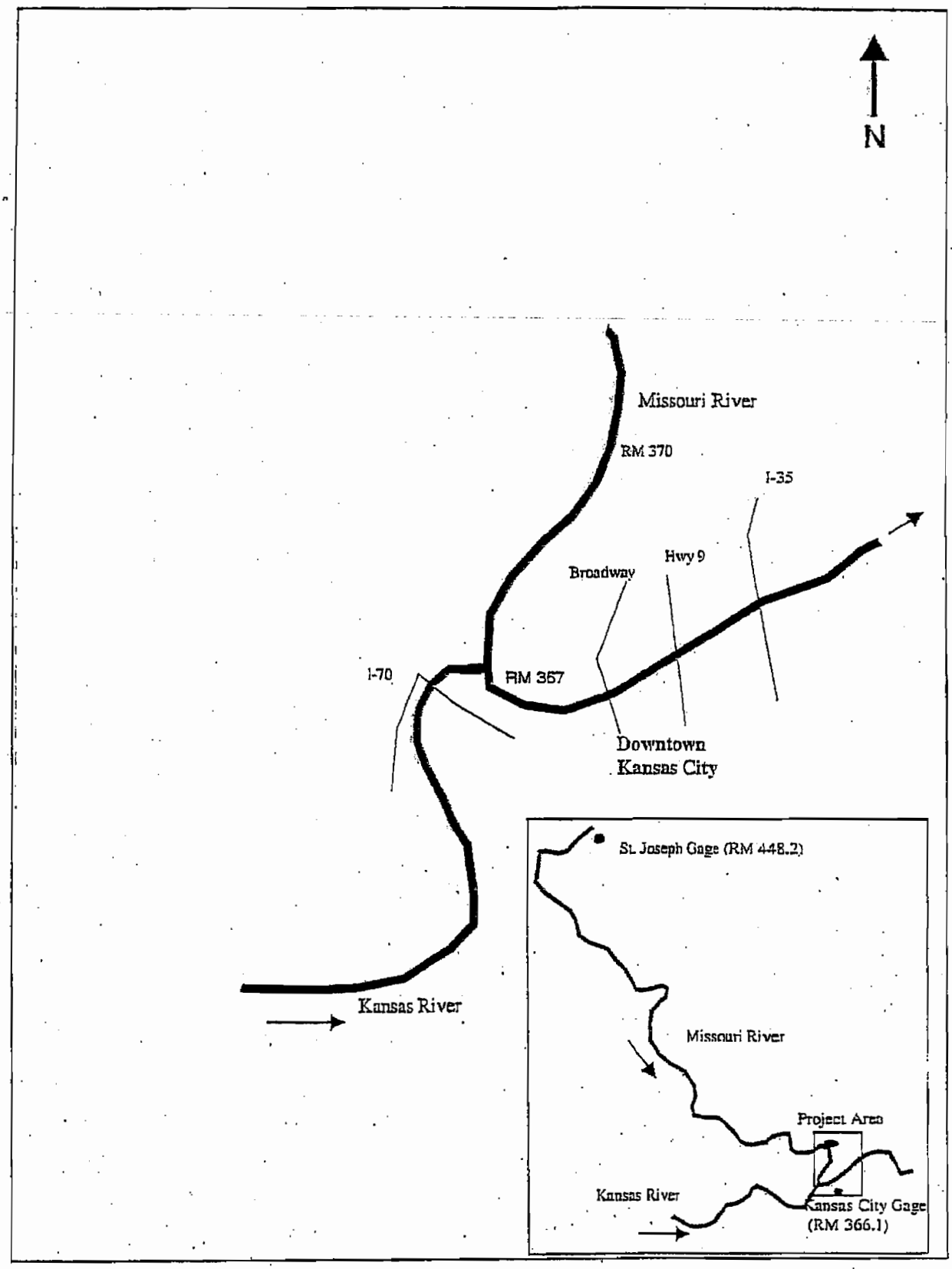

Figure 1-1: Schematic of the project area.

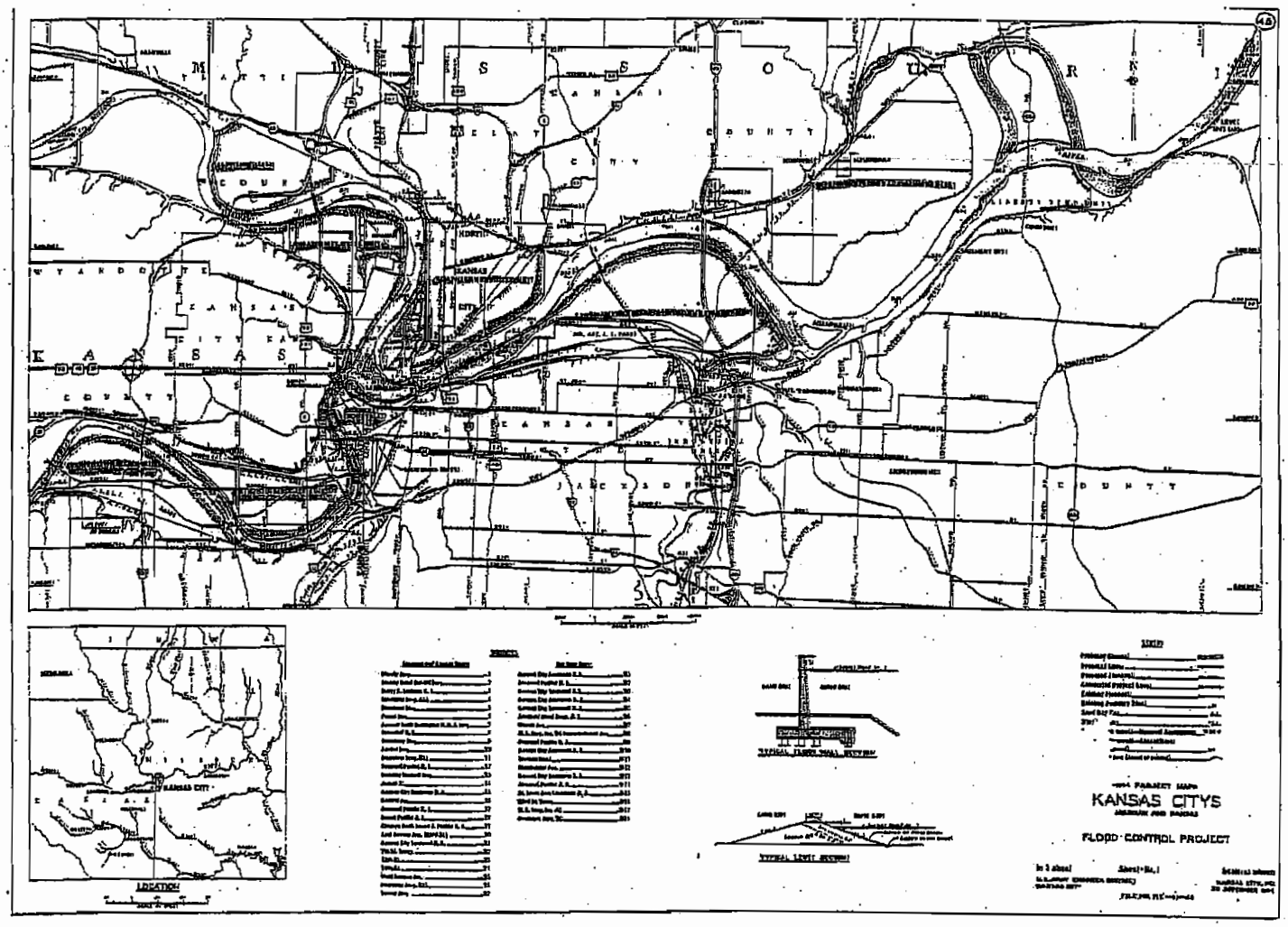

Figure 2-2: Kansas Citys Project Features

Terrestrial Resources

A review of historical conditions on the Missouri River can facilitate an understanding of how the river formerly functioned, and suggest the ecological functions and processes that were essential to development of such an abundant and rich array of fish and wildlife resources. However, clearly defining historical conditions is somewhat problematic, since most of the more detailed quantitative and qualitative descriptions of the Missouri River occurred during or after major episodes of human impact. Nevertheless, we can broadly surmise how the presettlement Missouri River appeared.

The river at this time was free-flowing, without the restrictions of dams and diversions. Flows varied dramatically. Late summer flows at Kansas City were low in contrast to today's summer flows, probably averaging about 29,500 cubic feet per second (cfs), with dry year flows dropping to perhaps about 4,700 cfs.(Galat, 1999). Flows fluctuated widely in response to winter rains, and sustained high flows occurred in the spring and early summer in response to snow melt.

The higher flow events resulted in over bank flooding, often over extensive reaches of the valley floor. Overflow areas were covered by dense forests of riparian vegetation. Some accounts place the riparian band as extending up to 14-15 miles along each side of the river and encompassing at least one-half million acres. Extensive swamps, marshes, and other diverse and expansive wetlands were also nourished by the regular flooding events.

Bank erosion and river meander, the basic forces for most riverine ecological processes and functions, were unimpeded. Erosion was most active on the outsides of the numerous meander bends, where the highest velocities impinged directly on the earthen substrates. As one bank was eroded, the opposite bank experienced sediment accretion. Some of the meanders became cut off from the river, forming oxbow lakes and other broad, highly diverse channel overflow areas. Erosion also resulted in the input of large volumes of woody debris of a broad range of sizes, types, and complexities into the river. The fish, wildlife, and riparian vegetation of the river were in a dynamic equilibrium, adjusted to, and dependent upon the cycle of erosion, deposition, and changing channel pattern as the river slowly swung back and forth across its meander belt. The ecological health and productivity of the river at any point in time were dependent on periodic rejuvenation associated with these natural processes and changes.

From this pristine, presettlement picture of the river, jump forward 150 years to the present era. The most significant environmental changes and impacts have now occurred. The extensive riparian forests and wetlands have been largely removed through urbanization and land clearing for agricultural purposes. The river is now controlled by dozens of dams on the main stem and tributaries. The lower river is channelized and largely confined by levees and bank stabilization, and overall, a mere remnant of the ecologically dynamic and complex system of the past.

The confluence of the Kansas with the Missouri river contains only remnants of the pre-settlement vegetative community, which was likely, a wet-mesic bottomland forest along the floodplain with slopes taking on characteristics of the mesic limestone dolomite forest. Tallgrass prairie vegetation was also likely present as the region was somewhat park-like, with prairies being interspersed with oak-hickory-maple forests. (Nelson, 1987) Only remnants of these dynamic ecosystems remain. The area was likely initially cleared for farms and homes, later for commerce and industry. The forested slopes of the hills of Kansas City, Kansas and Missouri remain relatively undeveloped, chiefly due to slope. Urban type amenities and infrastructure are present above and below this band of woodland.

The floodplains of the Kansas and Missouri Rivers at Kansas City are largely developed, but has bands of a riparian vegetation river ward of some levee units. The dominant trees in these riparian bands are cottonwood, willows, green ash, silver maple, boxelder and sycamore. The upland hillsides are occupied by grasses and oak-hickory forest associations as stated previously. Because of the urban nature of the Kansas Cities, which has resulted in extensive development within the floodplain, the value of the remaining areas of native vegetation riverward of the levees is greatly enhanced. They appear as a string of habitat beads or pearls strung along the length of the river with an urban backdrop. The largest areas of native vegetation are riverward of the East Bottoms units in Missouri, and the Argentine and Fairfax-Jersey Creek Units in Kansas.

Areas of special note are east of the East Bottoms unit at the mouth of the Blue River and the area of Big Shoal Creek as it emerges from the bluff, passes around the northern end of the Birmingham Unit and enters the Liberty Bend Cut-off. Although small, the areas incorporate side channels, wetlands, and bottomland hardwoods. The areas retain some natural hydrology and some semblance of natural floodplain.

Mammals associated with these remaining habitats include white-tailed deer, red and gray squirrels, eastern cottontail rabbits, racoons, coyotes, gray and red fox, skunks, opossums, mink, beaver and muskrat. Small mammals such as mice, rats, voles, and bats account for the majority of species present. White-tailed deer is the only naturally occurring large mammal still common within this area of urban development.

Riparian and associated upland woodlands provide a year-around habitat for approximately thirty-one species of birds. Approximately sixty-seven species nests here in addition to the year around residents, while fourteen additional species are winter residents only. More than 110 species use the corridor regularly during fall migrations. The most spectacular migration is that of the snow goose. The fall migration is impressive, with Squaw Creek National Wildlife Refuge north of Kansas City playing host to two hundred thousand snow geese during the fall migration. But the fall concentrations pale in comparison to the spring flocks moving north to Canada in the spring. The spring migration is more urgent than the trip south, and it is often stopped by bad weather. When that happens, the number of geese along the river may reach a million birds north and east of Kansas City.

Wetlands

The wet-mesic bottomland forest, found riverward of the current levee systems, is typical of the Missouri and the Kansas river floodplain. Historically, wet mesic bottomland forest was the most extensive bottomland forest natural community in Missouri (Nelson, 1987). It has a diversity of tree species such as pin oak, cottonwood, river birch, green ash, and hackberry, cherry, sweetgum, hawthorn, dogwood, hickories, wildplum, persimmon, the maples, elm, and sassafras. A well-developed understory is often present, containing poison ivy, elm, nettle, and honeysuckle. These communities provide habitat for a wide variety of resident and migratory wildlife. Forested wetlands have been found to support significantly higher abundance and diversity of bird species compared to upland forests (Brinton, 1981).

Wetland types listed on the National Wetland Inventory (NWI) maps for the area include, temporarily flooded palustrine emergent wetlands (PEMA), seasonally flooded emergent wetlands (PEMC), seasonally flooded broad-leaved deciduous scrub-shrub wetlands (PSSI), temporarily flooded broad-leaved deciduous palustrine forested wetlands (PFO1A). The R2UBA listed wetland is the main channel of the Missouri and Kansas Rivers. Most of these wetlands are located riverward of the levee system and should not be affected by levee heightening. Figures 3- 7.

A jurisdictional wetland determination will be necessary if levee alignments or borrow areas directly impact wetlands within agricultural lands or other areas landward of the existing levee alignments. The quantity and quality of existing wetland will determine the amount of compensation necessary to offset project losses. A wetland mitigation plan would be developed in coordination with at least the Corps, Service, EPA, and the Kansas Department of Wildlife and Parks or the Missouri Department of Conservation. This plan would include site locations, time frames, construction plans, a monitoring plan, progress reports, and standards of success. This plan would be a condition of any Section 404 permit issued for the project. The plan should be implemented regardless of the regulatory nature of the wetland.

Compensatory Mitigation

Advance creation	1.5:1	Forested
	1:1	Emergent wetland
Concurrent creation	2:1	Forested
	1.5:1	Emergent wetland
Advanced restoration	1.5:1	Forested
	1:1	Emergent wetland
Concurrent restoration	2:1	Forested
	1.5:1	Emergent wetland
Advanced enhancement	3:1	Forested

U.S. Fish & Wildlife Service

Wetlands Mapper

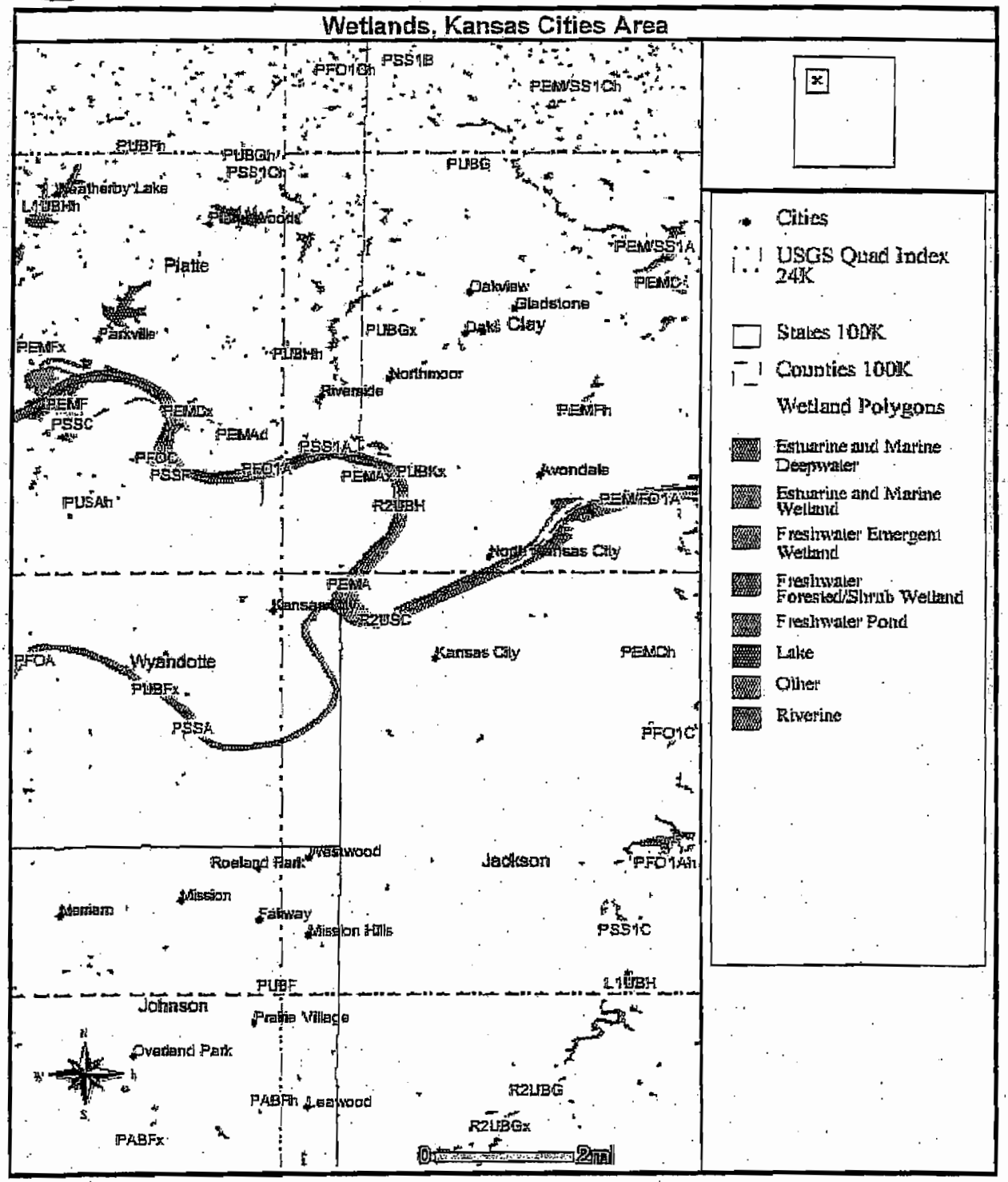

Figure 3-3

U.S. Fish & Wildlife Service

Wetlands Mapper

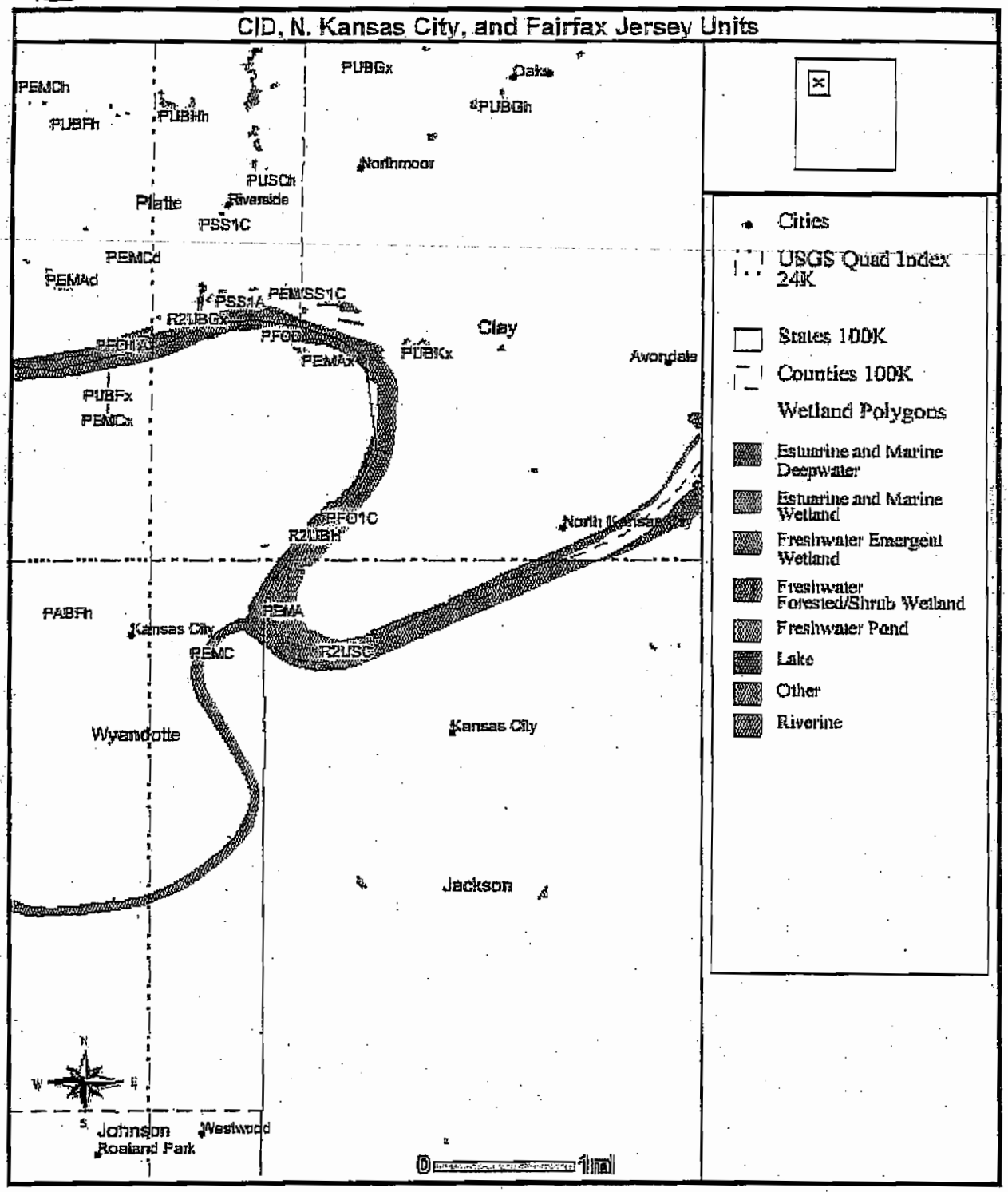

Figure 5-5

U.S. Fish & Wildlife Service

Wetlands Mapper

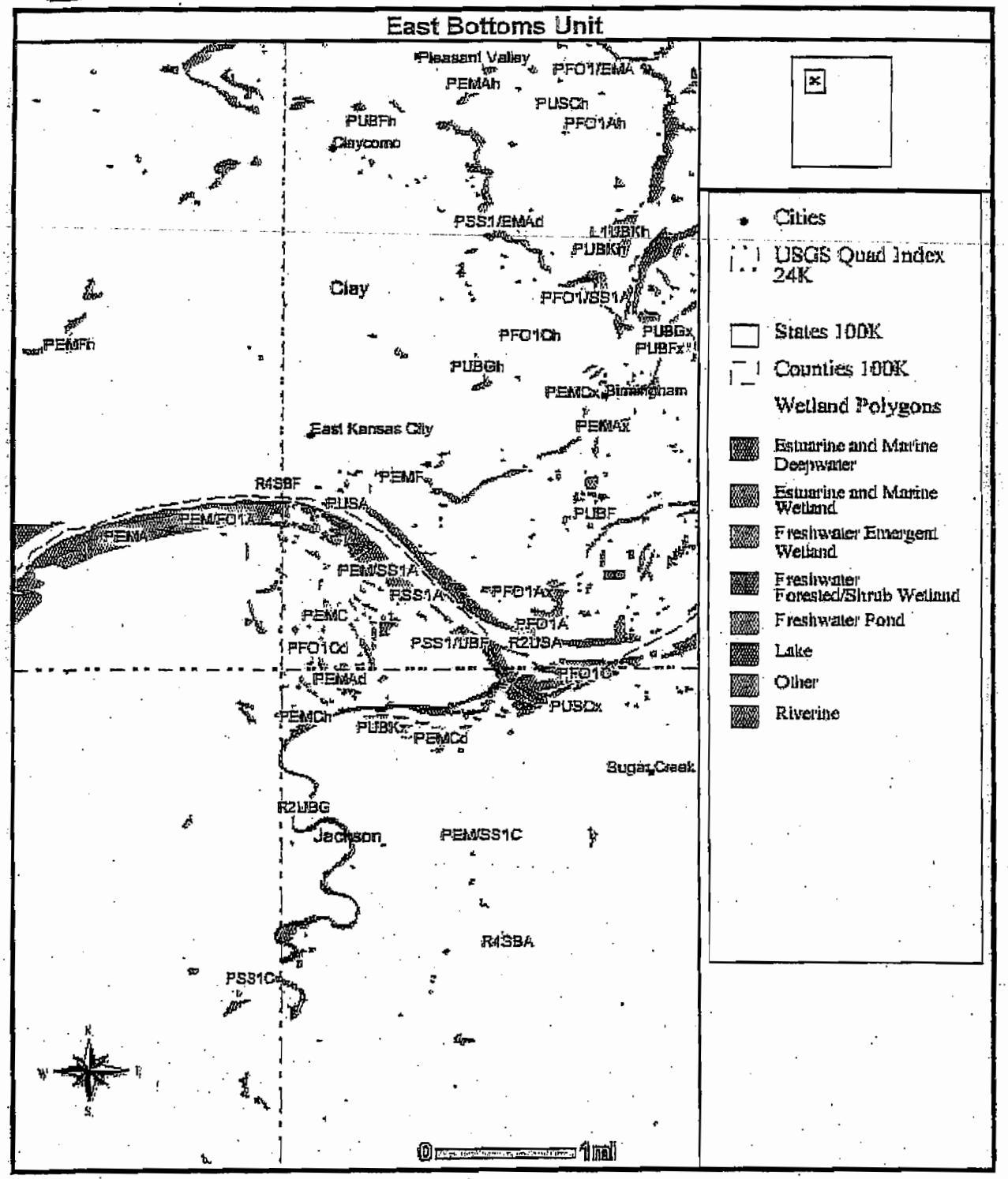

Figure 4-4

U.S. Fish & Wildlife Service

Wetlands Mapper

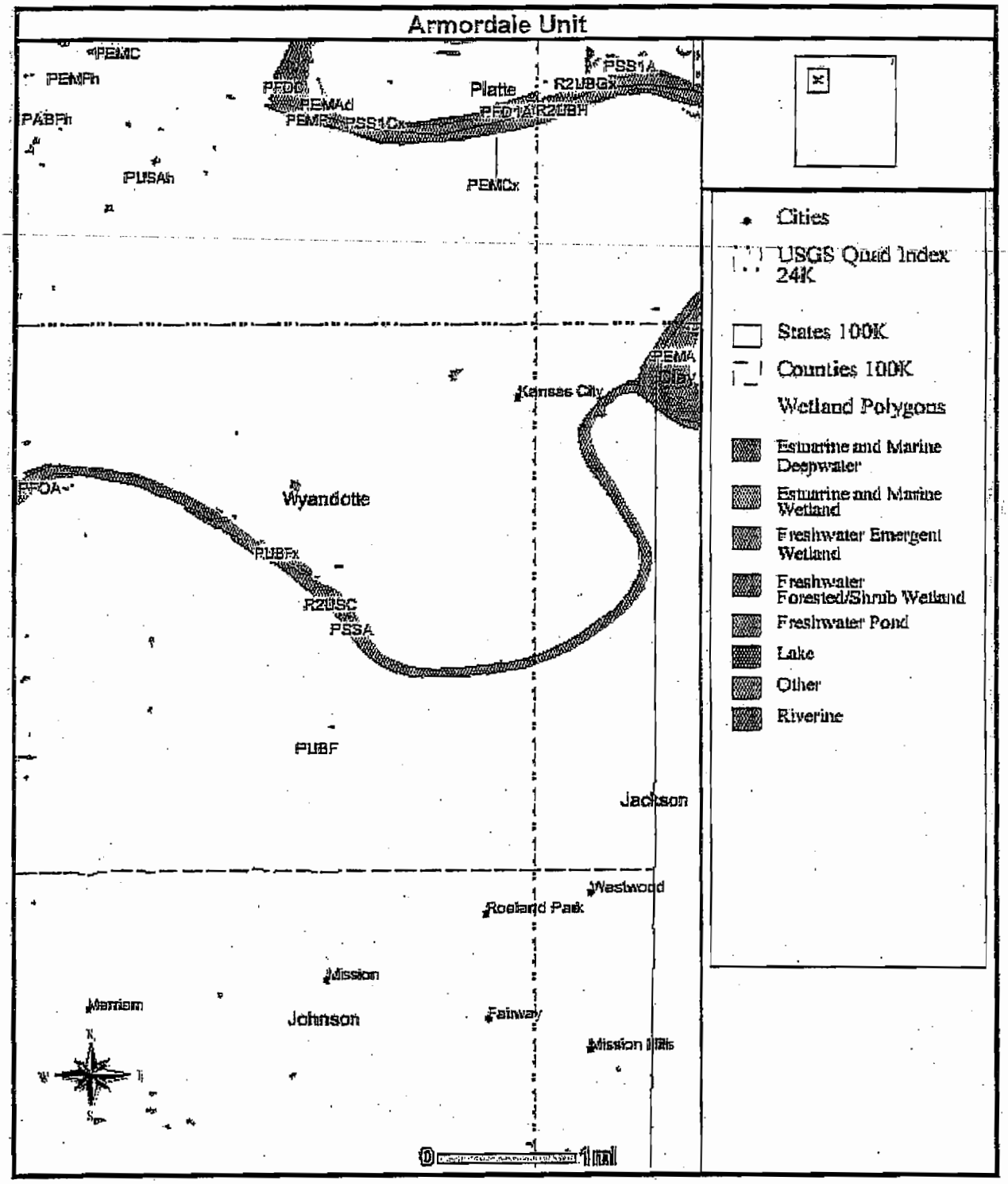

Figure 6-6

U.S. Fish & Wildlife Service

Wetlands Mapper

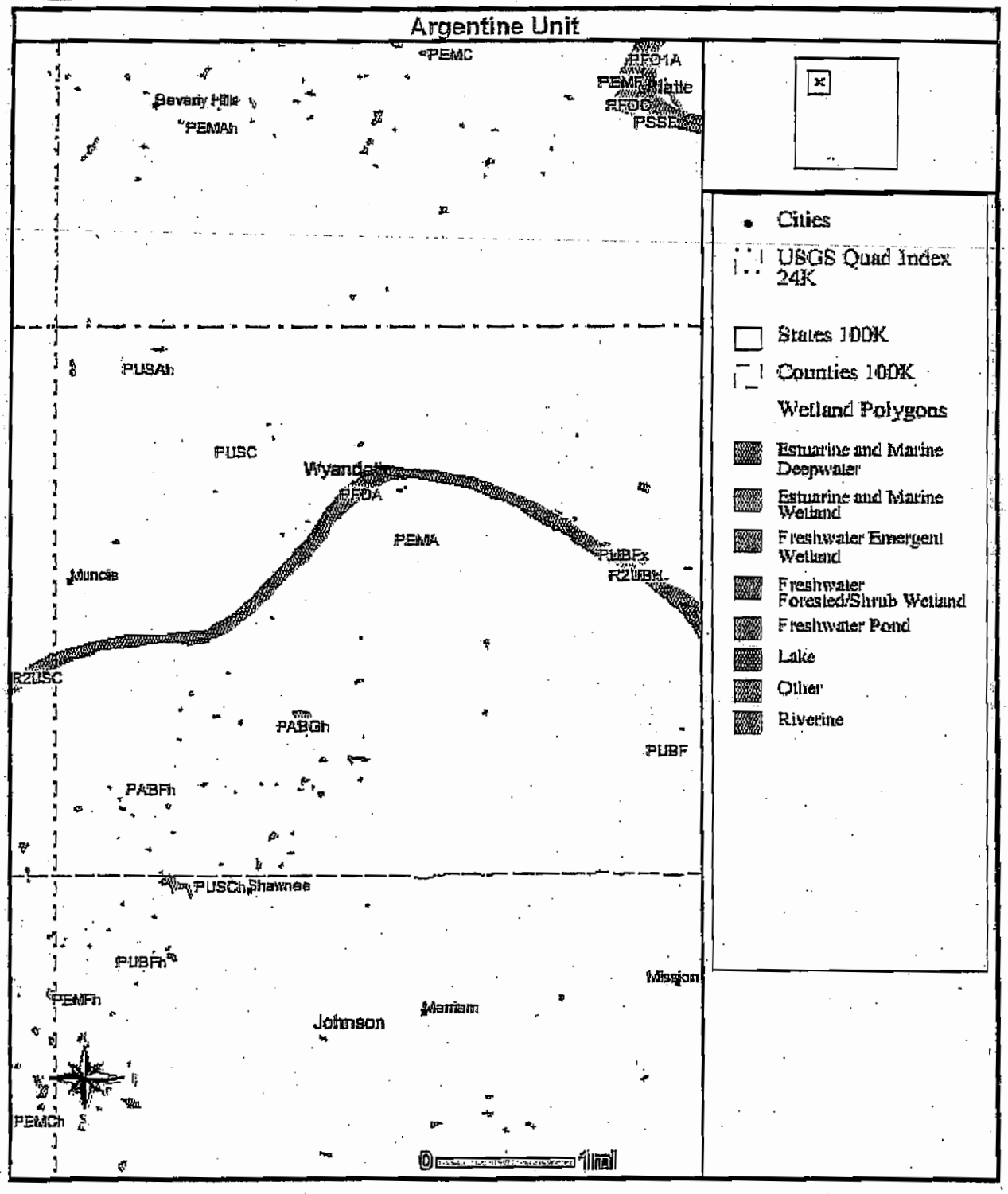

Figure 7-7

	2:1	Emergent wetland
Concurrent enhancement	4:1	Forested
	3:1	Emergent wetland
Preservation	5:1	Forested

Aquatic Resources

The Missouri and the Kansas rivers have undergone considerable change since the Louisiana Purchase in 1803 and Louis and Clark's subsequent exploration of the Kansas River confluence on June 26, 1804. Modifications to the natural Missouri River floodplain ecosystem have been immense and ongoing for more than 150 years. Presently, 35 percent of the river's length is impounded, 32 percent is channelized or stabilized, and the remaining 33 percent is freeflowing. (Schmulbach and others, 1992). Major civil works projects involved channelization, channel maintenance, and impoundment and reservoir operation. Total cost for construction, operation, and maintenance of civil works projects through 1984 was nearly $6.2 billion. (Hesse, 1987). Agricultural, industrial, and urban development within the basin also significantly modified the Missouri River and its adjoining floodplain.

Presently all of the Missouri River from Sioux City, Iowa, to its mouth at Saint Louis, Missouri, is channelized. Even during flooding only about 10 percent of the original flood plain is inundated, as high agricultural and urban levees confine the river to a width of approximately 500 feet from Kansas City north (U.S.F.W.S, 1980). The impacts of channelization have been numerous and severe on the physical, chemical, and biological structure and function of the Missouri River and its flood plain. The most damaging of these alterations to aquatic communities has been the nearly complete isolation of the river from its flood plain, subsequent loss of flood plain habitat , drastic reduction in area and diversity of river channel habitats, and increased velocity of the main channel.

The Kansas River has fared better than the Missouri. There is evidence that the Lower Kansas River was generally wide and shallow, both before and since the 19th-century period of westward exploration and settlement. The indigenous fish fauna is mainly indicative of shallow, turbid streams. Most early traffic across the prairies was overland, rather than by river as in the eastern regions. Despite some successful ventures by steamboats there seems little reason to doubt that the Kansas was sand-filled nearly to its mouth as was the channel of the Missouri River which receives its flow. Although the river was and remains navigable for administrative purposes, "the government...considers the river for purposes of practical navigation as a whole unworthy of improvement." (Schoewe, 1951)

Although the river itself has not been channelized or "improved" for navigation, the flood plain is often farmed to the high bank of the river with extensive clearing of the riparian areas in the process. The cities of Junction City, Manhattan, Topeka, Lawrence and Kansas City and numerous smaller municipalities are located on or near the Kansas River. Each city is protected by a levee system with agricultural levees that protect the more fertile soils in between urban centers. Thirteen large Federal impoundments have been constructed which have a pronounced effect on the stream flows of the Kansas River Basin. The lower segment of the river is subject to intensive instream sand and gravel dredging that changes the course, depth, and substrate of the river. Dredging is responsible for significant changes in the benthic macroinvertebrate populations and fish populations in the immediate area of the activity.

Although major changes have altered the free-flowing Missouri and Kansas Rivers and many fish species native to the rivers have had serious population declines, most of the indigenous fish species still remain. Empirical data from certain river reaches verifies long term declines in commercial fisheries and certain sport fisheries and at least six big river fishes are of special concern. Table 1 lists the principal fish species occurring in the reach of these rivers in the immediate vicinity of the Kansas Cities.

Table 1- Principal Fish Species of the Lower Kansas and Missouri Rivers at Kansas City

Channel catfish*	Fathead minnow
Blue catfish	Bigmouth buffalo
Black bullhead	Smallmouth buffalo*
Flathead catfish	Quilback
Shortnose gar*	River carpsucker*
Longnose gar	Shorthead redhorse
Shovelnose sturgeon	Green sunfish
Gizzard shad*	Bluegill
Goldeye	White crappie
Carp*	Freshwater drum
Sand shiner	Walleye

*Dominant species

Threatened and Endangered Species

As a result of habitat losses and flow regime changes, four species dependent on the rivers are federally-listed as endangered or threatened and two species are candidates for listing. The bald eagle (Haliaeetus leucocephalis), federally listed as a threatened species, frequents reservoirs and large rivers in Kansas and Missouri during the winter months. The Kansas River has nesting pairs of bald eagles, with parents and young remaining in the area through the spring and summer months. Eagles use large trees and snags in close proximity to water for perches where they feed

on fish and waterfowl. We recommend that any large trees or snags be avoided during project implementation. The piping plover (Charadius melodus), federally listed as a threatened species, is a seasonal spring and fall migrant through portions of Kansas and Missouri along the Kansas and Missouri Rivers, with nesting on the Kansas river. Plovers are associated with unvegetated shorelines, sandbars, and mudflats, utilizing aquatic invertebrates for food. The least tern (Sterna antillarum) utilizes similar unvegetated wetland habitat as do piping plovers, in the same geographic regions of Kansas and Missouri, feeding primarily on small fish. It occurs as a spring and fall migrant through this area and nests on the Kansas River upstream of Kansas City. This species is endangered. The pallid sturgeon (Scaphirhynchus albus) is a moderately large bottom-dwelling fish which occurs in low numbers in portions of the Missouri River and may occur in the lower Kansas River, below Lawrence during high flow events. It is believed to require sandbars, chutes, and backwater areas for feeding and loafing. It requires gravel bars and properly timed flows and water temperatures for reproduction and is federally listed as endangered.

Sturgeon chub (Macrhybopsis gelida) historically occurred along most of the Missouri River and large western tributaries including the Kansas River (Cross, 1975). It has experienced serious decline within its range and is a candidate for Endangered Species Act (ESA) listing.

Sicklefin chub (Macrhybopsis meeki) historically occurred in the Missouri River, lower Kansas River and lower Mississippi River (Cross, 1975, Lee, 1980). This species is declining markedly and is now a candidate for ESA listing.

Section 7 of the Endangered Species Act, 87 Stat. 884, as amended, requires an agency to ask the Secretary of the Interior, acting through the U.S. Fish and Wildlife Service, whether any listed or proposed endangered species may be present in the area of each Federal construction project. If the project may affect listed species, the Corps of Engineers should initiate formal Section 7 consultation with this office. If there will be no effect, or if the Fish and Wildlife Service concurs in writing there will be beneficial effects, further consultation is not necessary.

Kansas State Law (K.S.A. 32-504, 32-507: effective May 1, 1981) requires persons undertaking or sponsoring publicly funded or State or Federally Assisted action which is likely to impact endangered or threatened wildlife habitats where they are likely to occur, to obtain a project action permit from the Secretary of the Kansas Department of Wildlife and Parks prior to initiation of such action. In addition to the Federally listed threatened and endangered species, the State lists additional species that may be of concern within the project area. This list should be requested from the Environmental Services Section, Kansas Department of Wildlife and Parks, 512 SE 25th Ave., Pratt, KS 67124-8174.

According to the Missouri Department of Conservation's Natural History Data Base (1999) there are occurrences of state listed species or communities (aside from those previously mentioned) in the project area. Species and concerns should be requested from the Missouri Department of Conservation, P.O. Box 180, Jefferson City, MO 65102.

Wild and Scenic River Designation

The Kansas River is listed on the Nationwide Rivers Inventory (NRI). The NRI includes rivers selected on the basis of the degree to which they are free-flowing, the degree to which the rivers and their corridors are undeveloped, and the outstanding natural and cultural characteristics of the rivers and their immediate environments. The purposes of the inventory are several, including the identification of rivers which have potential to qualify for inclusion in the National Wild and Scenic Rivers System. The Kansas River was included in the inventory because of its outstanding scenic, recreational, fish, wildlife, and cultural values. Section 5(d) of the Wild and Scenic Rivers Act (Public Law 90-542) requires that "In all planning for the use and development of water and related land resources, consideration shall be given by all federal agencies involved to potential national wild, scenic, and recreational river areas." A presidential directive and subsequent instruction issued by the Council on Environmental Quality and codified in agency manuals require that each Federal agency, as part of its normal planning and environmental review process, take care to avoid or mitigate adverse effects on rivers identified in the NRI.

In 1980 potential recreation sites adjacent to the Kansas River were identified by the Heritage Conservation and Recreation Service (now the Park Service) as an element of the Kansas River Bank Stabilization Study. The plan proposes that the reach of the Kansas River beginning at its confluence with the Delaware River downstream to Interstate Highway 635 Bridge Crossing, a distance of 57 miles, be designated as a component of the National Wild and Scenic River System. The Plan proposed fee acquisition of 18 acres and easements on between 14 and 98 acres of land on the right bank of the river between the 635 bridge and Turner Bridge. This site was to become the downstream terminus or take out point for the recreational river segment. The western half of the Argentine Unit on the Kansas River encompasses this site.

DESCRIPTION OF THE PROJECT

The units being considered for levee improvements are: the Argentine and Armourdale Units on the Kansas River in Kansas, the Fairfax-Jersey Creek Unit on the Missouri River in Kansas; the Central Industrial District Unit, which lies in Kansas and Missouri and is bounded on the west by the Kansas River and on the North by the Missouri River; and two other Units: North Kansas City and East Bottoms, both in Missouri. The Birmingham Unit is not being considered for improvements.

The Kansas Cities feasibility study is currently being conducted using a two-phased approach.

PHASE I

Levee unit improvement locations include Argentine, East Bottoms, North Kansas City-Harlem Segment, North Kansas City-National Starch Site, Fairfax-Jersey Creek-Board of Public Utilities (BPU) Floodwall, and the Fairfax-Jersey Creek Sheetpile Wall. The preferred alternatives for the levee units are as follows:

Argentine Unit

The preferred alternative for the Argentine unit is the nominal 500+0 levee raise with pump station and levee modifications. This raise equates to roughly a 1.5- foot to 2.5- foot raise along the entire length of the Argentine levee. Pump station replacement or modification would involve three existing pump stations. Levee raise modifications would include raises on existing floodwalls, new I-walls located on top of the existing levee, stop log gap raises, top cap raise, landside levee raise with berm, and landside levee raise with no berm. A rock toe would be constructed in areas of railbed congestion to allow steeper slope for the levee raise.

Estimated Borrow Requirement: 101,258 cubic yards

East Bottoms Unit

Pressure relief wells and a header collector pipe would be installed along the toe of the levee. This alternative is an augmentation to an existing collector system. Relief wells provide a reliable solution to control underseepage can be completed within the existing right-of-way. The small amount of soil required for the East Bottoms levee unit improvement will be acquired from commercial borrow sources.

Estimated Borrow Requirement: 400 cubic yards

North Kansas City Unit-Harlem Segment

An underground water collection system using of perforated pipe will be installed the full length of the levee along the landside toe to intercept seepage. Six manholes will be placed along the system to collect the seepwater and allow portable pumping units to be placed during flooding to pump collected water over the levee.

Estimated Borrow Requirement: none

North Kansas City Unit-National Starch

Pressure relief wells and a pump station will be installed into the existing stability berm along the landside toe of the levee. Installing relief wells at this site will provide a highly effective mechanism to control underseepage.

The small soil requirement for the East Bottoms levee unit improvement will be acquired from a commercial borrow sources.

Estimated Borrow Requirement: 400 cubic yards.

Fairfax-Jersey Creek Unit BPU Floodwall

An additional row of auger cast piles would be installed on the landward side of the pile cap. A foundation slab extension would be connected to the new row of piles. Additional piles and the slab extension will be installed the entire length of the existing floodwall.

Estimated Borrow Requirement: None

Fairfax-Jersey Creek Unit Sheetpile Wall

An open cell sheetpile wall will be "driven" into the existing foreshore/stability berm along the length of the existing wall utilizing a crane deployed on a floating barge.

Estimated Borrow Requirement: 1,675 cubic yards.

Proposed Borrow Area

The proposed borrow area is located on private land adjacent to the right descending bank of the Kansas River at river mile +/- 11.5, Sections 22, 27 & 28, Township 11 South, Range 24 East, Wyandotte County, Kansas. The primary uses of the land are mono fill lime storage and active row-cropping. Portions of the property are excavated to a depth of 20 feet for temporary lime storage, and subsequently filled, capped and graded to the surrounding elevation. A portion of the property is currently row-cropped under a lease agreement. The excavation borrow will be coordinated with the landowners to ensure that only clean borrow is obtained for the Argentine levee.

PHASE II

Phase II remains subject to negotiations with various sponsors.

Armourdale and CID Levee Units

Findings for overtopping risk and geotechnical/structural risk indicate the need to pursue potential reliability improvements in these units. Such improvements may involve earthen levee raises, floodwall raises, and underseepage improvement measures. This will involve a large amount of analysis and feasibility design work, and is expected to compromise the bulk of Phase 2 efforts.

The performance of the Birmingham Unit in Missouri currently meets the planning objectives of this study. Therefore, no reliability improvements are recommended under the proposed study.

OTHER PROJECT ALTERNATIVES

No Action Alternative

Under the No Action Alternative the levee improvement projects would not be implemented. The No Action Alternative would not change the existing fish and wildlife habitat in the Kansas Cities area.

Removal of Riparian Vegetation as a Measure to Increase Discharge Capacity of the Lower Kansas River

During the scoping process for this project the Corps and the levee districts adjacent to the Kansas River identified removal of riparian vegetation landward of the existing levee system as a measure to increase discharge capacity on the lower Kansas River.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

In general, the project area is characterized as urban consisting of industrial, commercial development with rail yards, major roads and bridges, secondary roads, and housing developments on and above the floodplain. The existing wildlife habitat is scarce, and of generally low quality due to habitat fragmentation and loss of habitat from the development that has been ongoing for more than a hundred and fifty years. Without the levee improvement project the few undeveloped or underdeveloped areas within the levee districts will continue to be converted to commercial and industrial use. Wildlife and their habitat will continue to decline.

FISH AND WILDLIFE WITH THE PROJECT

PHASE 1 IMPLEMENTATION

Construction of Phase 1 of the Kansas Cities Project primarily involves pump station replacement or modification, installation of new piles or slab extensions or adding concrete or fill to the crown and landward sides of the existing levee systems.

A large portion of the area protected by the current levee alignments is either industrial, commercial or urban in nature. The commercial/industrial areas are vegetated (if at all) by cultivated lawn grasses, shrubs and trees. Urban tolerant species such as squirrels, rabbits, moles, starlings, robin, house sparrow, Canada geese and white-tailed deer are common.

The loss of levee brome grasses during heightening of the existing levee system will be a short term loss. Re-seeding the levee to warm season grasses such as switch grass to reduce erosion and to insure the integrity of the levee system should be a priority of project implementation.

Previous development within the Missouri River Basin and the Lower Kansas River has had an adverse effect on fish and wildlife habitat. The Missouri River surface area has declined more than 50 percent. The river channel is now deep and has currents too swift to provide suitable habitat for many fish and wildlife species. River backwaters, chutes, sandbars, and oxbow lakes have been lost to flood plain development. The present project will not involve additional channel work or encroach on areas riverward of the levee units.

During project construction, Phase 1 of the Kansas Cities Project would cause temporary, short-term impacts to fish and wildlife from noise, dust, and the presence of workers and machinery. Runoff from construction areas, access roads, staging areas and unprotected fills could degrade water quality inside the levee system. Accidental spills of fuels, lubricants, hydraulic fluids and other petrochemicals would be harmful to aquatic life.

Construction would require approximately 102,933 cubic yards of fill from cropland located upstream of the Argentine Levee Unit on the Kansas River. Removal of fill material from within the cropland area has the potential to cause the loss of farmed wetland. Farmed wetland should be delineated within the borrow site and should be avoided if possible. If an unavoidable loss is incurred, the quantity and quality of the farmed wetland will determine the amount of compensation necessary to offset project losses. The wetland mitigation plan would be developed in coordination with the Corps, EPA, and the Kansas Department of Wildlife and Parks. This plan would include site locations, time frames, construction plans, a monitoring plan, progress reports, and standards of success. This plan would be a condition of any permit issued for the project. The plan should be implemented regardless of whether impacted wetlands are classified as jurisdictional for purposes of the Clean Water Act.

Although the floodway cross section will remain essentially unchanged, the heightened levees will increase flood stages downstream and upstream at very high flood stages. Flood crests may increase in height (the water has no place to go but up) and floodwaters will be impounded upstream. In 1993, the constricted Missouri River floodplain prevented the Kansas River from draining. This caused water to back up in the Kansas River, flooding far into the state of Kansas. (White House Interagency Flood plain Management Review Committee, 1994) We are concerned that if Kansas City increases the height of its levees, other levee districts upstream and downstream will face the need to build their own levees even higher to avoid increased flood damages. Such cumulative effects should be addressed during the feasibility phase and NEPA documents.

Alternative to remove Riparian Vegetation from the Lower Kansas River to increase channel capacity.

The purpose of this alternative is to increase the capacity of the lower Kansas River to carry off flood water by enlarging the cross-sectional area (deepening) and smoothing the channel. Clearing all woodland riverward of the levees is designed to increase flow velocity.

The initial and secondary impacts of the removal of riparian vegetation associated with this alternative will be devastating to wildlife populations which will be eliminated. Major impacts to reptiles, amphibians, mammals, and birds include loss of cover (for reproduction or escape) loss of food, species composition changes, decreased diversity, decreased density and numbers, and increased susceptibility to predators. Overall, this alternative would significantly damage fish and wildlife resources and their habitat.

We assume this alternative would eliminate the island, and vegetation on the island, located mid-channel near the eastern end of the Argentine levee. Please be aware that all islands on the Kansas River are the property of the State of Kansas and are held in thrust for the people by the Kansas Department of Wildlife and Parks (Department). Any alternative that would adversely affect the island or the variety of shallow water habitats associated with the island would have to be closely coordinated with the Department.

The shallow sand substrate of the Kansas River is much more conducive to some native fish than the fast, deep Missouri. Missouri River fishes use the lower Kansas River as a backwater providing refuge from high swift turbid flows of the channelized navigation channel of the mainstem. Shovel nose sturgeon are known to seek out these calmer waters, particularly during winter. The pallid sturgeon (Scaphirhynchus albus) is a moderately large bottom-dwelling fish which occurs in low numbers in portions of the Missouri River and may occur in the lower Kansas River, below Lawrence during high Kansas flow. Enlarging the cross-sectional area the lower Kansas River will likely result in a "may affect" determination for the pallid sturgeon, thereby requiring formal consultation pursuant to section 7 of the Endangered Species Act.

In compliance with the requirements of Section 7 (c) of the Act, a Biological Opinion on the Operation of the Missouri River Mainstem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project and the Operation of the Kansas River Reservoir System was issued by the Service in November of 2000. It is the Service's biological opinion that the Corp's proposed continued operation of the system and the cumulative effects, are likely to jeopardize the continued existence of the least tern, piping plover, and the pallid sturgeon, but not likely to jeopardize the continued existence of the bald eagle. The jeopardy opinion is still in effect for the Kansas River System. Additional adverse impacts to pallid sturgeon habitat at the mouth of the Kansas River would be problematic.

In 1980, potential recreation sites adjacent to the Kansas River were identified by the Heritage Conservation and Recreation Service (now the Park Service) as an element of the Kansas River Bank Stabilization Study. The plan proposes that the reach of the Kansas River beginning at its confluence with the Deleware River downstream to Interstate Highway 635 Bridge Crossing, a distance of 57 miles, be designated as a component of the National Wild and Scenic River System. The Plan proposed fee acquisition of 18 acres and easements on between 14 and 98 acres of land on the right bank of the river between the 635 bridge and Turner Bridge. This site was to become the downstream terminus or take out point for the recreational river segment. The western half of the Argentine Unit on the Kansas River encompasses this site. Any effort to modify or deepen the river in this area must be closely coordinated with the National Park Service.

The adverse effects to fish and wildlife and recreation from implementation of this alterative should be avoided by eliminating it from further consideration. Increasing the height of existing levees along the lower Kansas River will eliminate the need for removing large amounts of vegetation from stream banks and avoid the expense of maintenance required on channels dredged through noncohesive (sand substrate) materials. In addition, removal of riparian vegetation riverward of levees increases their risk of failure through breeching during floods based on a study of levee failures during the 1993 flood conducted by the University of Missouri.

MITIGATION DISCUSSION

To date, a formal habitat evaluation has not been conducted on habitats within the project area and none is deemed necessary.

The Service has established a mitigation policy used as guidance in determining resource categories and recommending mitigation (46 FR: 7644-7663). We have determined that most of the wildlife habitat that would be affected by the raising of existing levees and flood walls is in Resource Category No. 4" (habitats of medium to low value). For this category, loss of habitat value should be minimized.

Forested wetland and riparian woodland are consistent with Resource category No.2 that is, habitats are of high value that are relatively scarce or becoming scarce on a national or regional basis. Losses attributed to the project would require in-kind mitigation (replacement of habitat

value lost with equal habitat values of the same kind of habitat as those eliminated). The cost of mitigating habitat losses should be included as a project cost. The only area of potential impact is the borrow site where farmed wetlands may be present.

Whenever possible, we recommend upland trees within the construction right-of-way remain undisturbed. While trees are young now, they are closer to a mature and more valuable stage than newly established trees.

To minimize impacts to birds protected under the Migratory Bird Treaty Act, trees or other vegetated areas slated for grubbing or clearing should be surveyed for the presence of nesting birds during the general migratory bird nesting season of March through August. Disturbance of nesting areas should be avoided until nesting is completed. Vegetation clearing and construction related soil disturbances can cause sediment-laden runoff to enter waterways. To minimize impacts associated with erosion, contractors should employ silt curtains, coffer dams, dikes, straw bales or other suitable erosion control measures. Construction related petrochemical spills can also negatively impact fish and wildlife resources. Therefore, measures should be implemented prior to construction to minimize the likelihood of petrochemical spills.

Section 2 of the Fish and Wildlife Coordination Act requires the Service to identify project related opportunities to enhance fish and wildlife. The enhancement recommendations discussed below refer to project related creation of wildlife habitat, over and above that required to mitigate losses attributable to project construction.

The Corps should coordinate with the National Park Service and the Kansas Department of Wildlife and Parks to determine the need or desirability of an access road over Argentine Levee Unit in the vicinity of the 635 Bridge, the downstream terminus of the NRI segment of the Kansas River. Every effort should be made to preserve the native vegetation riverward of this levee unit.

Native trees, grasses and forbs, noted for their high wildlife value, could be established along the landward (where feasible) and stream side base of the existing levee system. This might help offset future losses due to increased encroachment along the rivers once flood protection is increased once again. Switch grass often takes longer to become fully established; however, when established, stand of native vegetation provide excellent soil binding characteristics, a valuable wildlife habitat and require fewer maintenance costs. The Service, Missouri Department of Conservation, the Kansas Department of Wildlife and Parks, and the Natural Resources Conservation Service offer assistance programs and could work with the cities of Kansas City to develop vegetation management plans.

The potential for aquatic and wetland restoration at Liberty Bend Cut-off should be explored in an effort to replenish this backwater area or restore (create) disconnected oxbow habitat.

RECOMMENDATIONS

In the interest of protecting fish and wildlife resources in the vicinity of the Kansas Cities local flood protection project area the following recommendations are provided.

1. Riparian and wetland habitats should be avoided to the maximum extent practicable when selecting borrow sites for the proposed levee raises and compensatory mitigation should be undertaken for unavoidable impacts.

2. Levees should be seeded with warm season grasses such as switch grass.

3. Removal of mature cottonwoods, and other native vegetation should be avoided where possible, and if they are removed, replace woody vegetation by establishing 2 acres of native vegetation for every acre impacted.

4. The Corps should create wetland mitigation habitat to compensate for the loss of wetland acreage from construction of the project. Because an, as yet, unknown number of acres of farmed wetland may be directly impacted, it may be necessary to restore non-wetland habitat to wetland habitat. Farmed wetlands should be mitigated at a 1.0 to 1.0 ratio.

5. Since channelization and levee construction have already resulted in dramatic loss of riparian and wetland habitats in the Missouri and Kansas River basins, the alternative to remove riparian vegetation to increase discharge capacity of the lower Kansas River should be dropped from further consideration.

The following recommendations describe opportunities to provide fish and wildlife enhancement through the project.

6. Encourage wetland development and hydrological re-connection to the river at existing borrow areas landward of the levee units.

7. Provide river access at the Argentine Levee segment.

8. Establish native vegetation (trees and shrubs) riverward of levee segments where riparian woodlands are sparse or nonexistent.

9. Potential for aquatic and wetland restoration at Liberty Bend Cot-off just downstream of Kansas City should be explored.

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January 4, 2006

Environmental Resources Section
Planning Branch

Mr. Michael LeValley
Field Supervisor, Kansas Field Office
U.S. Fish and Wildlife Service
315 Houston, Suite E
Manhattan, Kansas 66502

Dear Mr. LeValley:

The Corps of Engineers, Kansas City District (CENWK) received your draft Fish and Wildlife Coordination Act Report dated September 28, 2005, for the Kansas Citys, Missouri and Kansas, Flood Damage Reduction Feasibility Study and Environmental Impact Statement. Here are our comments in regards to the recommendations that your office provided:

1) Comment Noted. Impacts to natural resources including wetlands, islands, snags, riparian and upland trees will be avoided to the extent practicable. Compensatory mitigation will be undertaken for significant unavoidable resource impacts as needed.

2) Comment Noted. Levee seeding is conducted in accordance with the information provided in the operation and maintenance section within the "*Guidance For The Design And Construction Within The Critical Area Of Constructed Flood Control Projects*" (http://www.nwk.usace.army.mil/local_protection/guidance.html), MAINTENANCE Chapter, paragraph 2.2 to 2.2.10. The seeding requirements meet 33CFR 208.10 Part B section, Levee Maintenance. This requirement assures that levee slopes are mowed on a regular basis for close inspection of the slopes. Close inspection is required to detect settlement, sloughing, slope instability, erosion, the presence of burrowing animals, the presence of debris, encroachments that tend to weaken levees, rutting, depressions or other effects. Regular mowing also assures that deep-rooted vegetation will not become established on levee slopes. The use of switchgrass is not amenable for use on levee slopes meeting the above requirements.

3) Comment Noted. CENWK will mitigate unavoidable impacts to natural resources as appropriate.

4) Comment Noted. Mitigation for impacted wetlands will be conducted in accordance with the Corps requirements contained in Regulatory Guidance Letter No. 02-2, dated December 24, 2002.

5) Comment Noted. Kansas River tree removal has been removed from further consideration for Phase I alternatives. A levee raise is the current, preferred alternative for the Argentine levee unit to achieve flood damage reduction and to avoid and minimize impacts to riparian vegetation. Phase II alternatives are currently in the early stages of the alternatives formulation process.

6) Comment Noted. Opportunities for environmental measures will be considered in combination with any potential mitigation requirements.

7) Comment Noted. Providing river access at the Argentine levee segment or the construction of an access road over the Argentine unit is not anticipated to be a component of this project.

8) Comment Noted. No concentrated areas of tree clearing are anticipated as a result of project requirements. The feasibility of woody vegetation establishment will be determined with the consideration of flow conveyance requirements.

9) Comment Noted. Potential sites for fish and wildlife measures as part of mitigation requirements will include the Liberty Bend cut-off.

Additional, non-enumerated comments were noted within your draft Fish and Wildlife Coordination Act Report. In regards to state-listed species that may occur within the project area, county species lists have been obtained from the Kansas Department of Wildlife and Parks, and the Missouri Department of Conservation. Impacts to state-listed threatened and endangered species will be avoided to the extent practicable.

Areas slated for clearing and grubbing as a result of project requirements will be surveyed for the presence of nesting birds during the specified March through August timeframe.

Based upon our existing analysis, levee improvements to be conducted within the Argentine levee unit, which includes the segment of the Kansas River listed on the National Rivers Inventory, are not anticipated to compromise the potential for future designation of the Kansas River as a Wild and Scenic river.

Best Management Practices would be included within the project specifications to avoid and minimize erosion and petrochemical spills within construction areas. Erosion control measures may include silt fences, straw bales, and other suitable mechanisms. Measures utilized to prevent the loss of petrochemicals into waters of the U.S. would include the designation of staging areas for chemical storage away from streams, fueling heavy equipment away from streams, and the proper disposal of contractor generated waste.

Contractors would be required to submit an environmental protection plan prior to initiating construction activities.

In regards to the potential need of levee districts upstream and downstream of the Kansas City's project needing to conduct levee raises in response to a levee raise proposed for this project, recent detailed studies of the 1993 flood as it occurred in the Kansas City metropolitan area have established that the arrival of the peak flows from both the Kansas River and the upper Missouri River were almost coincidental.

A small increase in flood stage will not adversely affect the urban levees on the Missouri River in Kansas City, as these levees now provide a greater level of protection. The Missouri River agricultural levees downstream of Kansas City will be long overtopped before these extremely rare flood stages are realized, and the slight increase in stage occurs. The same is true for any agricultural levees along the lower Kansas River (Kansas Citys Review of Completed Works, in progress).

Another factor to consider is the fact that two of the lower Kansas River levees provide protection for a considerable urban population, mostly low income. People live behind these levees. Levee failure, particularly at the upstream end of the levees, could result in a significant loss of life.

Sincerely,

Christopher M. White, Ph. D.
Chief, Environmental Resources Section
Planning Branch

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502-6172

May 3, 2006

Dr. Christopher M. White, Chief, Environmental Resources
Room 843
CENWK-PM-PR
U.S. Army Corps of Engineers
700 Federal Building
601 East 12th Street
Kansas City, MO 64106-2896

Dear Dr. White:

The U.S. Fish and Wildlife Service submits this supplemental letter to the Draft Fish and Wildlife Coordination Act Report (DCAR) dated September 2005 for the Kansas Cities, Missouri and Kansas Flood Damage Reduction Project - Kansas City, Missouri and Kansas City, Kansas project pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), and the fiscal year 2004 Scope-of-Work Agreement between the U.S. Fish and Wildlife Service (Service) and the U.S. Army Corps of Engineers, Kansas City District (Corps) for the Section 216, Local Flood Protection Feasibility Study, as requested by your office. The requests for the evaluations of additional alternatives were received on February 14, 2006 for the Argentine 500 +3 alternative, on February 16, 2006 for the Central Industrial District Levee and Armourdale Levee modifications, and on March 8, 2006 for the Argentine 500 +5 alternative. We received draft delineation maps dated 2003 for the CID and Armourdale levee modifications and a series of Proposed Area Footprint Mapping documents dated 27 April 2005 for the two Argentine alternatives.

The CID and Armourdale levee modifications are considered to be Phase 2 of the project and appear to involve earthen levee raises, floodwall raises, and underseepage improvement measures. However these units were not included in the Scope of Work (SOW) for this project. The FY 2004/2005 Scope of Work Impact Analysis for a Feasibility Study and Environmental Impact Statement, Kansas Citys, Missouri and Kansas, Flodd Damage Reduction Study, Missouri and Kansas Rivers Between the Kansas City District, Corps of Engineers and the U.S. Fish and Wildlife Service, Manhattan, KS states that the SOW for the "Armourdale and the Central Industrial Districts (CIDs) of Missouri and Kansas, is to be determined upon further evaluation." Due to this technicality and the limited information provided by the Corps concerning these modifications we feel that an evaluation at this time would be inappropriate and incomplete for inclusion in the Draft or Final Fish and Wildlife Coordination Act Report for this project. When

more definitive plans are developed, we will study the proposal and any alternatives and prepare more detailed comments and recommendations based upon the SOW prepared for this work.

This letter has been developed in cooperation with the Kansas Department of Wildlife and Parks and is submitted in accordance with the Fish and Wildlife coordination act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Missouri Department of Conservation has declined to review the supplemental letter to the Draft Fish and Wildlife Coordination Act Report. The Fish and Wildlife Service will provide a final Fish and Wildlife Coordination Act Report when a recommended plan has been selected.

GENERAL DESCRIPTION OF THE PROJECT AREA

To facilitate construction, management, and operation, the overall project was set up in seven units. The geographical units are: the Fairfax-Jersey Creek unit on the Missouri River in Kansas; the Argentine and Armourdale units on the Kansas River in Kansas; the Central Industrial District unit, which lies in both States and is bounded on the west by the Kansas River and on the north by the Missouri River; and three other units the North Kansas City, East Bottoms, and Birmingham units, all in Missouri. The design and construction of each of these units was coordinated with the others, yet each became effective as it was completed, and each is operationally independent. Complete effectiveness of the overall project is contingent upon adequate reservoir control in the upper Missouri and Kansas River Basins. Levees, floodwalls, relief wells, gravity drain structures, and pumping plants comprise the main protective structures. Other major elements include channel and floodway improvements in both rivers, bridge and approach alterations, and the Liberty Bend cutoff in the Missouri River immediately downstream from Kansas City.

The floodplains of the Kansas and Missouri Rivers at Kansas City are largely developed, but have bands of a riparian vegetation riverward of some levee units. The dominant trees in these riparian bands are cottonwood, willows, green ash, silver maple, boxelder and sycamore. The upland hillsides are occupied by grasses and oak-hickory forest associations. Because of the urban nature of the Kansas Cities, which has resulted in extensive development within the floodplain, the value of the remaining areas of native vegetation riverward of the levees is greatly enhanced. They appear as a string of habitat beads or pearls strung along the length of the river with an urban backdrop. The largest areas of native vegetation are riverward of the East Bottoms units in Missouri, and the Argentine and Fairfax-Jersey Creek Units in Kansas.

Areas of special note are east of the East Bottoms unit at the mouth of the Blue River and the area of Big Shoal Creek as it emerges from the bluff, passes around the northern end of the Birmingham Unit and enters the Liberty Bend Cut-off. Although small, the areas incorporate side channels, wetlands, and bottomland hardwoods. The areas retain some natural hydrology and some semblance of natural floodplain.

Aquatic and terrestrial resources and threatened and endangered species remain as described in the DCAR.

Evaluation of Alternatives Considered

Two additional alternatives were evaluated for the Argentine Unit. The Argentine 500 +3 and Argentine 500 +5 would consist primarily of landside raise along the majority of the levee. Information provided for the Argentine 500 +0, the original preferred alternative, stated that a two-foot increase would widen the base by 12 feet. For every mile of two-foot levee improvement, approximately, 1.5 acres of land on the landward side of the levee would be incorporated into the levee system. We assume that these proportions would remain the same for the two new alternatives. However, some areas of the levees would receive I-walls which would allow the levee to be heightened vertically without the corresponding horizontal increase in the base width. The 500 +3 alternative would increase the height of the levee approximately 2 - 6 feet, while the 500 +5 alternative would increase the height of the levee approximately 4 - 9 feet.

These increases in levee height will result in an increase in the amount of fill needed. To meet the need for additional fill, new borrow areas may be procured or borrow areas already identified may be expanded. The Corps has identified three wetlands that may be affected by the Argentine 500 +3 and 500 +5 alternatives. Two would be impacted from increases in the levee base width and the third is a farmed wetland present in a proposed borrow area. The increase in borrow areas may result in the discovery of additional impacts to wetlands. All wetland impacts should be mitigated in accordance with the mitigation recommendations contained in the DCAR.

Although the floodway cross section will remain essentially unchanged the heightened levees will force flood water to pass through the narrow funnel-like opening left by higher levees and floodwalls which line both sides of the river. This will cause flood crests to increase in height (the water has no place to go but up) and floodwaters will be impounded upstream. In 1993, the constricted Missouri River floodplain prevented the Kansas River from draining. This caused water to back up in the Kansas River, flooding far into the state of Kansas (White House Interagency Floodplain Management Review Committee, 1994). If Kansas City increases the height of its levees, upstream levees may need to be raise even higher with possible impacts to other river and floodplain habitat.

Riparian woodland (in various serial stages) is the only significant resource anticipated to be impacted by proposed flood control work in the Kansas City area. The Argentine 500 +3 and Argentine 500 +5 alternatives will likely result in an increase in water depth riverward of the levees and an increase in the length of time these areas are inundated during flood stages. This will likely cause changes in species composition and canopy cover in riparian areas. We expect that riparian species composition will decrease in diversity becoming ever more dominated by flood tolerant species and that the understory will also decrease. Canopy cover would be expected to decrease as the less water tolerant species die out, then increase and stabilize as the water tolerant species fill the void. The understory would likely be dominated by annual species.

Project construction of the Argentine Units would cause temporary, short-term impacts to fish and wildlife from noise, dust, and the presence of workers and machinery. Runoff from construction areas, access roads, staging areas and unprotected fills could degrade water quality

inside the levee system. Accidental spills of fuels, lubricants, hydraulic fluids and other petrochemicals would be harmful to aquatic life.

RECOMMENDATIONS

Since impacts to terrestrial and aquatic resources are presumed to remain essentially the same as the Argentine 500 +0 alternative we evaluated in the DCAR, our recommendations for fish and wildlife enhancement also remain essentially the same as in the DCAR.

1. Riparian and wetland habitats should be avoided to the maximum extent practicable when selecting borrow sites for the proposed levee raises and compensatory mitigation should be undertaken for unavoidable impacts.

2. Levees should be seeded with warm season grasses such as switch grass.

3. Removal of mature cottonwoods, and other native vegetation should be avoided where possible, and if they are removed, replace woody vegetation by establishing two acres of native vegetation for every acre impacted.

4. The Corps should create wetland mitigation habitat to compensate for the loss of wetland acreage from construction of the project. Removal of fill material from within the cropland area has the potential to cause the loss of farmed wetland. Farmed wetland should be delineated within borrow sites and should be avoided if possible. If an unavoidable loss is incurred, the quantity and quality of the farmed wetland will determine the amount of compensation necessary to offset project losses. The wetland mitigation plan would be developed in coordination with the Corps, EPA, and the Kansas Department of Wildlife and Parks. This plan would include site locations, time frames, construction plans, a monitoring plan, progress reports, and standards of success. This plan would be a condition of any permit issued for the project. The plan should be implemented regardless of whether impacted wetlands are classified as jurisdictional for purposes of the Clean Water Act..

The following recommendations describe opportunities to provide fish and wildlife enhancement through the project.

5. Encourage wetland development and hydrological reconnection to the river at existing borrow areas landward of the levee units.

6. The Corps should coordinate with the National Park Service and the Kansas Department of Wildlife and Parks to determine the need or desirability of an access road over the Argentine Levee Unit in the vicinity of the I-635 Bridge, the downstream terminus of the NRI segment of the Kansas River. Every effort should be made to preserve the native vegetation riverward of this levee unit.

7. Establish native vegetation (trees and shrubs) riverward of levee segments where riparian woodlands are sparse or nonexistent.

8. The potential for aquatic and wetland restoration at Liberty Bend Cut-off should be explored in an effort to replenish this backwater area or restore (create) disconnected oxbow habitat.

9. Native trees, grasses and forbs, noted for their high wildlife value, could be established along the landward (where feasible) and stream side base of the existing levee system. This might help offset future losses due to increased encroachment along the rivers once flood protection is increased once again. Switch grass often takes longer to become fully established; however, when established, stands of native vegetation provide excellent soil binding characteristics, a valuable wildlife habitat and require fewer maintenance costs. The Service, Missouri Department of Conservation, the Kansas Department of Wildlife and Parks, and the Natural Resources Conservation Service offer assistance programs and could work with the cities of Kansas City to develop vegetation management plans.

To minimize impacts to birds protected under the Migratory Bird Treaty Act, trees or other vegetated areas slated for grubbing or clearing should be surveyed for the presence of nesting birds during the general migratory bird nesting season of March through August. Disturbance of nesting areas should be avoided until nesting is completed. Vegetation clearing and construction related soil disturbances can cause sediment-laden runoff to enter waterways. To minimize impacts associated with erosion, contractors should employ silt curtains, coffer dams, dikes, straw bales or other suitable erosion control measures. Construction related petrochemical spills can also negatively impact fish and wildlife resources. Therefore, measures should be implemented prior to construction to minimize the likelihood of petrochemical spills.

Invasive species have been identified as a major factor in the decline of native flora and fauna and their ecosystems. Nearly half of the species currently listed as Threatened or Endangered under the U.S. Federal Endangered Species Act are considered to be at risk primarily because of competition with and predation by non-indigenous species (Nature Conservancy 1996; Wilcove et al. 1998). Human actions are the primary means of invasive species introductions. Prevention of introductions is the first and most cost-effective option for dealing with invasive species (Global Invasive Species Programme Toolkit). Executive order 13112 Section 2 (3) directs Federal agencies to not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere and to ensure that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. Therefore, we recommend that the following Best Management Practice (BMP) be implemented during construction of the levees.

> All equipment brought on site will be throughly washed to remove dirt, seeds and plant parts. Any equipment that has been in any body of water within the past 30 days will be thoroughly cleaned with hot water (hotter than 40° C or 104° F) and dried for a minimum of five days before being used at this project site. In addition, before transporting equipment from the project site all visible mud, plants, and fish/animals will be removed, all water will be eliminated, and the equipment will be throughly cleaned. Anything that came in contact with the water will be cleaned and dried following the above procedure.

Please feel free to call me at 785 539-3474 ext. 105 or Susan Blackford ext. 102, if you have any questions or if we can be of any further assistance with this project.

Sincerely,

Michael J. LeValley
Field Supervisor

cc: Kansas Department of Wildlife & Parks Environmental Services Section, Pratt, KS Attn: Jim Hays
U.S.F.W.S., Columbia Field Office, Ecological Services.
U.S.F.W.S., Federal Activities, Denver, CO Attn: Bob Dach
Missouri Department of Conservation, Jefferson, City, MO. Attn: Stuart Miller and Jane Epperson

MJL/shb

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, KANSAS CITY DISTRICT
700 FEDERAL BUILDING
601 E 12TH STREET
KANSAS CITY MO 64106-2896

REPLY TO
ATTENTION OF

May 23, 2006

Environmental Resources Section
Planning Branch

Mr. Michael LeValley
Field Supervisor, Kansas Field Office
U.S. Fish and Wildlife Service
315 Houston, Suite E
Manhattan, Kansas 66502

Dear Mr. LeValley:

The Corps of Engineers, Kansas City District (CENWK) received your supplemental letter to the Draft Fish and Wildlife Coordination Act Report dated September 28, 2005, for the Kansas Citys, Missouri and Kansas, Flood Damage Reduction Feasibility Study and Environmental Impact Statement. Here are our comments in regards to the recommendations that your office provided:

1) Comment Noted. Impacts to natural resources including wetlands, islands, snags, riparian and upland trees will be avoided to the extent practicable. Compensatory mitigation will be undertaken for significant unavoidable resource impacts as needed.

2) Comment Noted. Levee seeding is conducted in accordance with the information provided in the operation and maintenance section within the "*Guidance For The Design And Construction Within The Critical Area Of Constructed Flood Control Projects*" (http://www.nwk.usace.army.mil/local_protection/guidance.html), MAINTENANCE Chapter, paragraph 2.2 to 2.2.10. The seeding requirements meet 33CFR 208.10 Part B section, Levee Maintenance that requires levee slopes to be mowed on a regular basis for close inspection. Close inspection is required to detect settlement, sloughing, slope instability, erosion, the presence of burrowing animals, the presence of debris, encroachments that tend to weaken levees, rutting, depressions or other effects. Regular mowing also insures that deep-rooted vegetation will not become established on levee slopes. The use of switchgrass is not amenable for use on levee slopes meeting the above requirements.

3) Comment Noted. CENWK will mitigate unavoidable impacts to natural resources as appropriate.

4) Comment Noted. Mitigation for impacted wetlands will be conducted in accordance with the Corps requirements contained in Regulatory Guidance Letter No. 02-2, dated December 24, 2002.

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5) Comment Noted. Opportunities for environmental measures will be considered in combination with any potential mitigation requirements.

6) Comment Noted. Providing river access at the Argentine levee segment or the construction of an access road over the Argentine unit is not anticipated to be a component of this project.

7) Comment Noted. The feasibility of woody vegetation establishment riverward of levee segments will be determined with the consideration of flow conveyance and levee maintenance requirements.

8) Comment Noted. Potential sites for fish and wildlife measures as part of mitigation requirements will include the Liberty Bend cut-off.

9) Comment Noted. Levees are seeded with vegetation that can be maintained through mowing for inspection of levee integrity. Trees are not generally desirable at the base of levees as woody vegetation may compromise levee integrity. The feasibility of woody vegetation establishment riverward of levee segments will be determined with the consideration of flow conveyance requirements.

Additional, non-enumerated comments were noted within your report. Areas slated for clearing and grubbing as a result of project requirements will be surveyed for the presence of nesting birds during the specified March through August timeframe. Best Management Practices would be included within the project specifications to avoid and minimize erosion and petrochemical spills within construction areas, and prevent the introduction of invasive species. Erosion control measures may include silt fences, straw bales, and other suitable mechanisms. Measures utilized to prevent the loss of petrochemicals into waters of the U.S. would include the designation of staging areas for chemical storage away from streams, fueling heavy equipment away from streams, and the proper disposal of contractor generated waste. Contractors will be required to submit an environmental protection plan prior to initiating construction activities.

Sincerely,

Christopher M. White, Ph. D.
Chief, Environmental Resources Section

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Office
2609 Anderson Avenue
Manhattan, Kansas 66503-6172

August 4, 2006

Dr. Christopher M. White, Chief, Environmental Resources
Room 843
CENWK-PM-PR
U.S. Army Corps of Engineers
700 Federal Building
601 East 12th Street
Kansas City, MO 64106-2896

Dear Dr. White:

The U.S. Fish and Wildlife Service submits this Final Fish and Wildlife Coordination Act Report (FCAR) dated August 2006 for the Kansas Cities, Missouri and Kansas Flood Damage Reduction Project - Kansas City, Missouri and Kansas City, Kansas project pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), and the fiscal year 2004 Scope-of-Work Agreement between the U.S. Fish and Wildlife Service (Service) and the U.S. Army Corps of Engineers, Kansas City District (Corps) for the Section 216, Local Flood Protection Feasibility Study, as requested by your office.

Cooperation and information utilized in the preparation of this report was obtained from the Kansas Department of Wildlife and Parks (KDWP) and the Corps.

We appreciate the opportunity to discuss impacts to fish and wildlife anticipated by the implementation of this project. If we can be of any assistance please call Ms. Susan Blackford, of my staff, at 785-539-3434 ext. 102.

Sincerely

Michael J. LeValley
Field Supervisor

MJL/shb

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FINAL
FISH AND WILDLIFE
COORDINATION ACT REPORT
FOR THE
KANSAS CITIES, MISSOURI AND KANSAS FLOOD DAMAGE REDUCTION PROJECT
KANSAS CITY, MISSOURI AND KANSAS CITY, KANSAS

PREPARED FOR THE

UNITED STATES ARMY,
KANSAS CITY DISTRICT,

CORPS OF ENGINEERS,
KANSAS CITY, MISSOURI

BY THE
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
KANSAS FIELD OFFICE
MANHATTAN, KANSAS

August, 2006

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EXECUTIVE SUMMARY

The Kansas City District, Corps of Engineers, is in the process of developing a feasibility study for flood damage reduction measures for the cities of Kansas City, Kansas and Kansas City, Missouri. This Final Fish and Wildlife Coordination Act Report describes the study area, identifies important aquatic and terrestrial resources, evaluates impacts of flood damage reduction measures, and describes mitigation measures.

The project area is highly urbanized inside the existing levee system. The primary impact from a fish and wildlife perspective will be the loss of terrestrial habitat from levee and floodwall construction, permanent loss of wetlands from levee construction, and temporary loss of terrestrial habitat due to construction activities and borrow construction. Therefore, the Fish and Wildlife Service recommends the following:

RECOMMENDATIONS

1. Riparian and wetland habitats should be avoided to the maximum extent practicable when selecting borrow sites for the proposed levee raises and compensatory mitigation should be undertaken for unavoidable impacts.

2. Levees should be seeded with warm season grasses such as switch grass.

3. Removal of mature cottonwoods, and other native vegetation should be avoided where possible, and if they are removed, replace woody vegetation by establishing two acres of native vegetation for every acre impacted.

4. The Corps should create wetland mitigation habitat to compensate for the loss of wetland acreage from construction of the project. Because an, as yet, unknown number of acres of farmed wetland may be directly impacted by borrow activities it may be necessary to restore non-wetland habitat to wetland habitat. Farmed wetlands should be mitigated at a 1.0 to 1.0 ratio.

5. Since channelization, levee construction and floodplain development have already resulted in a dramatic loss of riparian and wetland habitats in the Missouri and Kansas River basins, the alternative to remove riparian vegetation to increase discharge capacity of the lower Kansas River should be dropped from further consideration.

The following recommendations describe opportunities to provide fish and wildlife enhancement through the project.

6. Encourage wetland development and hydrological reconnection to the river at existing borrow areas landward of the levee units.

7. Provide river access at the Argentine Levee segment.

8. Establish native vegetation (trees and shrubs) riverward of levee segments where riparian woodlands are sparse or nonexistent.

9. Potential for aquatic and wetland restoration at Liberty Bend Cut-off just downstream of Kansas City should be explored.

10. Utilize Best Management Practices to prevent invasive species from being transported to or from the project sites.

LIST OF FIGURES

Figure 1	Kansas Cities study area
Figure 2	Kansas Cities Project Features
Figure 3 thru 7	National Wetland Inventory Maps
Figure 8	Kansas Citys Levees Project Graphic

INTRODUCTION

This Fish and Wildlife Coordination Act Report (Report) is submitted pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), and the fiscal year 2004 Scope-of-Work Agreement between the U.S. Fish and Wildlife Service (Service) and the U.S. Army Corps of Engineers, Kansas City District (Corps) for the Section 216, Local Flood Protection Feasibility Study. This report is designed to accompany and is to be incorporated into the Corps' feasibility report on the proposed project. The purpose of the feasibility study is to determine if there is a practicable alternative for reducing flood damages along the Kansas and Missouri rivers in the vicinity of the two Kansas Cities, Kansas and Missouri.

This study was authorized under authority of Section 216 of the Flood Control Act of 1970, as amended.

The Service provided a Planning Aid Letter dated July 12, 1999 to Mr. Michael G. Trail, Deputy for Project Management regarding this project. Our letter focused on fish and wildlife resource needs, opportunities and impacts associated with alternatives for the Kansas Cities, Flood Protection Project, as envisioned in 1999.

The Service provided a Draft Coordination Act Report dated September 2005 and a supplemental letter to the Draft Fish and Wildlife Coordination Act Report (DCAR) dated May 3, 2006. The requests for the evaluations of additional alternatives were received on February 14, 2006 for the Argentine 500 +3 alternative, on February 16, 2006 for the Central Industrial District (CID) Levee and Armourdale Levee modifications, and on March 8, 2006 for the Argentine 500 +5 alternative. We declined to evaluate the CID and Armourdale Levee modifications as these units were not included in the Scope of Work for this project as only limited information was available which addresses project features and alternatives. The CID and Armourdale levee modifications are considered to be Phase 2 of the overall project.

DESCRIPTION OF THE STUDY AREA

The Missouri River originates in southwestern Montana and flows about 2,315 miles to join the Mississippi River near St. Louis Missouri. The Kansas River originates on the plains of northeastern Colorado and flows 1,242 miles eastward draining northern Kansas, southern Nebraska and northeastern Colorado and joins the Missouri River at Kansas City. The River Mile (RM) references used in this report are measured upstream from the confluence of the Missouri River with the Mississippi River or upstream of the confluence of the Kansas River with the Missouri River. The project area is located between RM 358 and 374 on the Missouri River and between RM 0 and 10 on the Kansas River, Figure 1. This local protection project consists of improvements to six levee units along both banks of the Missouri and Kansas Rivers in the Kansas City Metropolitan area, Figure 2.

Most of the study area is heavily urbanized floodplain occupied by traffic arteries, rail lines and rail yards, and commercial-industrial development. Above the floodplain, the Kansas and Missouri hillside areas are occupied by residential and commercial/ industrial development.

The study area is part of the Osage Plains physiographic section of eastern Kansas and western Missouri, a maturely dissected and gently rolling region with relatively wide stream valleys. The topography is developed on Pennsylvania age shales with interbedded limestone, sandstone and coal. The natural, alluvial soils are silt and silty clay loams of the Onawa-Haynie association. Hillside soils are derived from loess and limestone/shale deposits and can be described as silty loams of the Knox-Ladoga association.

The main topographic features of the area are the valleys of the Missouri and Kansas Rivers and their tributaries. The Missouri River valley is generally two to 3 miles wide, and the Kansas River valley is slightly more than 1 mile wide. The uplands along the Missouri River valley are deeply dissected loess hills with limestone outcrops. Steep slopes and breaks formed by differential erosion of limestone shale and sandstone are along the Kansas River and its tributaries. The divide between the rivers and their tributaries are rolling to hilly loess and till uplands.

As indicated previously, the floodplains of the Kansas and Missouri Rivers at the Kansas Cities have filled with major industrial, transportation, and municipal, residential developments. Those sites, subject to annual flood events, were incorporated in the Kansas Cities flood control project beginning in the mid 1930's.

The original local flood protection project was authorized by the Flood Control Act of 1936 and construction was started in 1940. Amended plans on which the present project is based were authorized by the Flood Control Acts of 1944, 1946 and 1954.

To facilitate construction, management, and operation, the overall project was set up in seven units. The geographical units are: the Fairfax-Jersey Creek Unit on the Missouri River in Kansas; the Argentine and Armourdale Units on the Kansas River in Kansas; the Central Industrial District Unit, which lies in both States and is bounded on the west by the Kansas River and on the north by the Missouri River; and three other Units: the North Kansas City, East Bottoms, and Birmingham Units, all in Missouri. The design and construction of each of these units were coordinated with the others, yet each became effective as it was completed, and each is operationally independent. Complete effectiveness of the overall project is contingent upon adequate reservoir control in the upper Missouri and Kansas River Basins. Levees, flood walls, relief wells, gravity drain structures, and pumping plants comprise the main protective structures. Other major elements include channel and flood way improvements in both rivers, bridge and approach alterations, and the Liberty Bend cutoff in the Missouri River immediately downstream from Kansas City.

The Flood Control Act of 1962 authorized and provided for modification of the portion of the Kansas City project along the Kansas River involving the Argentine, Armourdale, and Central Industrial Districts and alterations to bridges and approaches to provide a higher degree of protection.

The cost of the Kansas Cities project as authorized in 1944 is $42,668,213 Federal and $5,120,000 non-Federal. The cost of the 1962 authorized modification on the Kansas River was $28,300,000 Federal and $7,090,000 non-Federal. (COE ,1981).

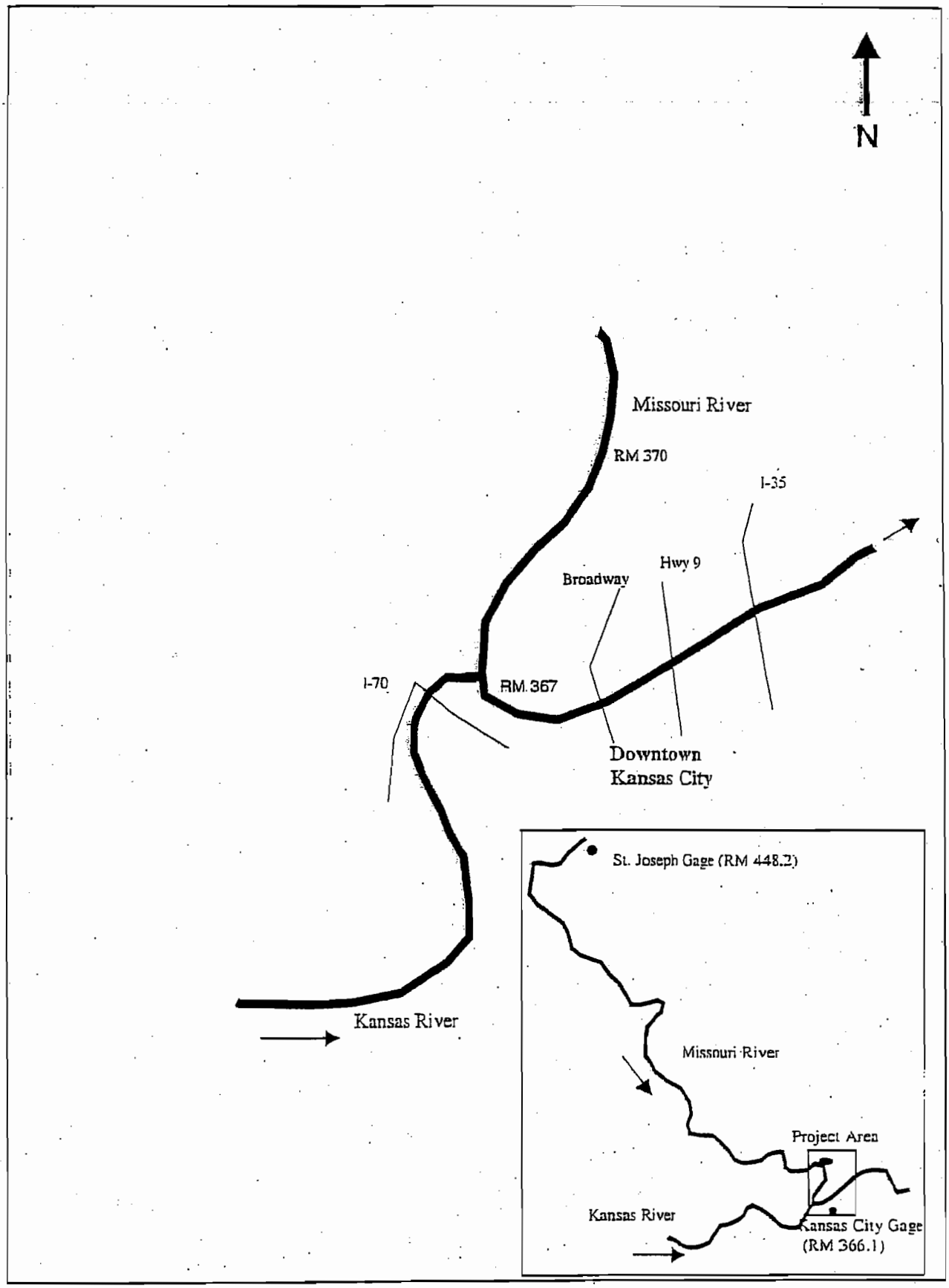


Figure 1 Schematic of the project area.

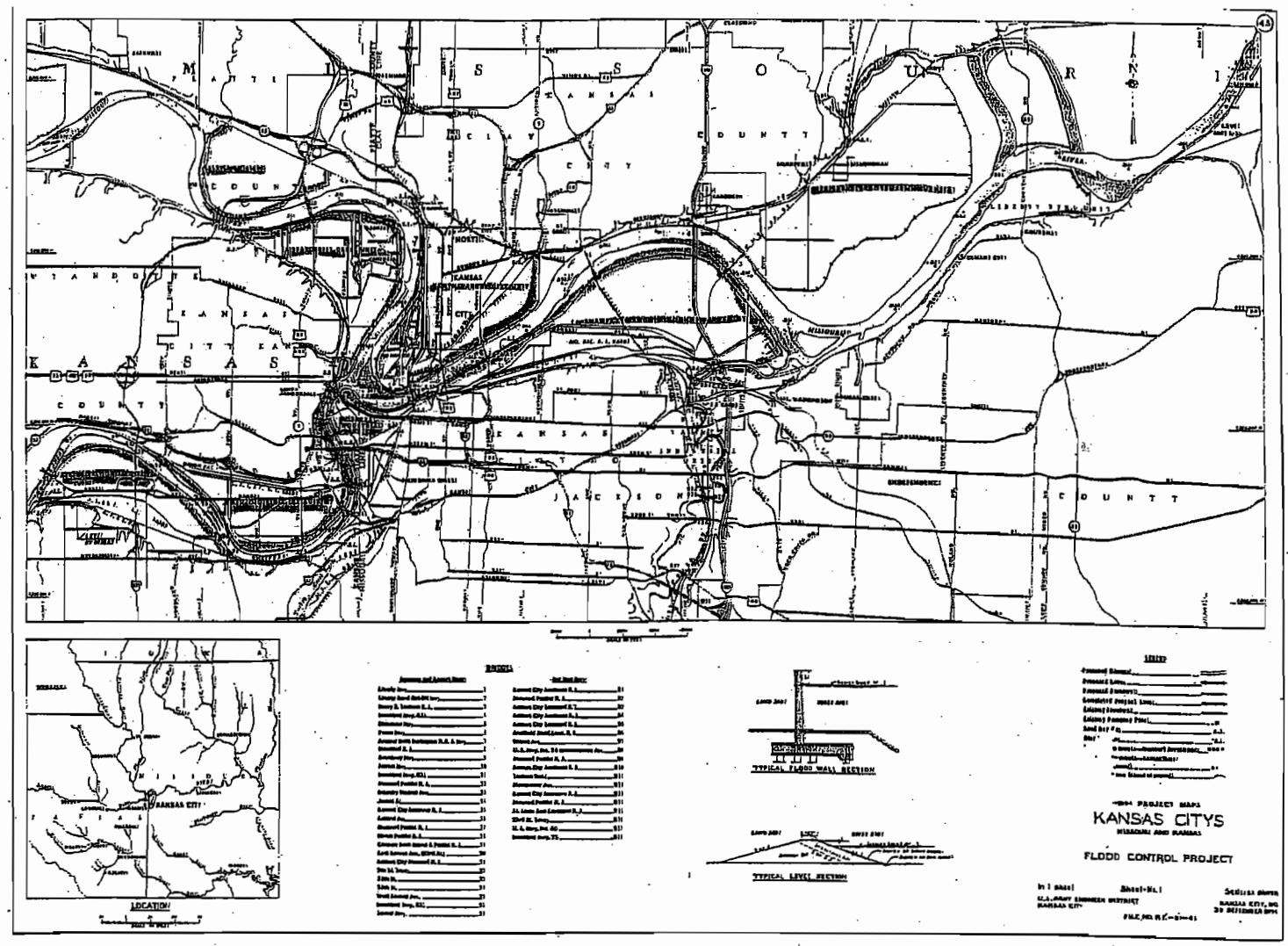


Figure 2. Kansas Citys Project Features

Terrestrial Resources

A review of historical conditions on the Missouri River can facilitate an understanding of how the river formerly functioned, and suggest the ecological functions and processes that were essential to development of such an abundant and rich array of fish and wildlife resources. However, clearly defining historical conditions is somewhat problematic, since most of the more detailed quantitative and qualitative descriptions of the Missouri River occurred during or after major episodes of human impact. Nevertheless, we can broadly surmise how the presettlement Missouri River appeared.

The river at this time was free-flowing, without the restrictions of dams and diversions. Flows varied dramatically. Late summer flows at Kansas City were low in contrast to today's summer flows, probably averaging about 29,500 cubic feet per second (cfs), with dry year flows dropping to perhaps about 4,700 cfs. (Gala, 1999). Flows fluctuated widely in response to winter rains, and sustained high flows occurred in the spring and early summer in response to snow melts.

The higher flow events resulted in over bank flooding, often over extensive reaches of the valley floor. Overflow areas were covered by dense forests of riparian vegetation. Some accounts place the riparian band as extending up to 14-15 miles along each side of the river and encompassing at least one-half million acres. Extensive swamps, marshes, and other diverse and expansive wetlands were also nourished by the regular flooding events.

Bank erosion and river meander, the basic forces for most riverine ecological processes and functions, were unimpeded. Erosion was most active on the outsides of the numerous meander bends, where the highest velocities impinged directly on the earthen substrates. As one bank was eroded, the opposite bank experienced sediment accretion. Some of the meanders became cut off from the river, forming oxbow lakes and other broad, highly diverse channel overflow areas. Erosion also resulted in the input of large volumes of woody debris of a broad range of sizes, types, and complexities into the river. The fish, wildlife, and riparian vegetation of the river were in a dynamic equilibrium, adjusted to, and dependent upon the cycle of erosion, deposition, and changing channel pattern as the river slowly swung back and forth across its meander belt. The ecological health and productivity of the river at any point in time were dependent on periodic rejuvenation associated with these natural processes and changes.

From this pristine, presettlement picture of the river, jump forward 150 years to the present era. The most significant environmental changes and impacts have now occurred. The extensive riparian forests and wetlands have been largely removed through urbanization and land clearing for agricultural purposes. The river is now controlled by dozens of dams on the main stem and tributaries. The lower river is channelized and largely confined by levees and bank stabilization, and overall, a mere remnant of the ecologically dynamic and complex system of the past.

The confluence of the Kansas with the Missouri river contains only remnants of the pre-settlement vegetative community, which was likely, a wet-mesic bottomland forest along the floodplain with slopes taking on characteristics of the mesic limestone dolomite forest. Tallgrass prairie vegetation was also likely present as the region was somewhat park-like, with prairies being interspersed with oak-hickory-maple forests. (Nelson, 1987) Only remnants of these dynamic ecosystems remain. The area was likely initially cleared for farms and homes, later for commerce and industry. The forested slopes of the hills of Kansas City, Kansas and Missouri remain relatively undeveloped, chiefly due to slope. Urban type amenities and infrastructure are present above and below this band of woodland.

The floodplains of the Kansas and Missouri Rivers at Kansas City are largely developed, but has bands of riparian vegetation riverward of some levee units. The dominant trees in these riparian bands are cottonwood, willows, green ash, silver maple, boxelder and sycamore. The upland hillsides are occupied by grasses and oak-hickory forest associations as stated previously. Because of the urban nature of the Kansas Cities, which has resulted in extensive development within the floodplain, the value of the remaining areas of native vegetation riverward of the levees is greatly enhanced. They appear as a string of habitat beads or pearls strung along the length of the river with an urban backdrop. The largest areas of native vegetation are riverward of the East Bottoms units in Missouri, and the Argentine and Fairfax-Jersey Creek Units in Kansas.

Areas of special note are east of the East Bottoms unit at the mouth of the Blue River and the area of Big Shoal Creek as it emerges from the bluff, passes around the northern end of the Birmingham Unit and enters the Liberty Bend Cut-off. Although small, the areas incorporate side channels, wetlands, and bottomland hardwoods. The areas retain some natural hydrology and some semblance of natural floodplain.

Mammals associated with these remaining habitats include white-tailed deer, red and gray squirrels, eastern cottontail rabbits, racoons, coyotes, gray and red fox, skunks, opossums, mink, beaver and muskrat. Small mammals such as mice, rats, voles, and bats account for the majority of species present. White-tailed deer is the only naturally occurring large mammal still common within this area of urban development.

Riparian and associated upland woodlands provide a year-around habitat for approximately thirty-one species of birds. Approximately sixty-seven species nests here in addition to the year around residents, while fourteen additional species are winter residents only. More than 110 species use the corridor regularly during fall migrations. The most spectacular migration is that of the snow goose. The fall migration is impressive, with Squaw Creek National Wildlife Refuge north of Kansas City playing host to two hundred thousand snow geese during the fall migration. But the fall concentrations pale in comparison to the spring flocks moving north to Canada in the spring. The spring migration is more urgent than the trip south, and it is often stopped by bad weather. When that happens, the number of geese along the river may reach a million birds north and east of Kansas City.

Wetlands

The wet-mesic bottomland forest, found riverward of the current levee systems, is typical of the Missouri and the Kansas river floodplain. Historically, wet mesic bottomland forest was the most extensive bottomland forest natural community in Missouri (Nelson, 1987). It has a diversity of tree species such as pin oak, cottonwood, river birch, green ash, and hackberry, cherry, sweetgum, hawthorn, dogwood, hickories, wildplum, persimmon, the maples, elm, and sassafras. A well-developed understory is often present, containing poison ivy, elm, nettle, and honeysuckle. These communities provide habitat for a wide variety of resident and migratory wildlife. Forested wetlands have been found to support significantly higher abundance and diversity of bird species compared to upland forests (Brinson, 1981).

Wetland types listed on the National Wetland Inventory (NWI) maps for the area include, temporarily flooded palustrine emergent wetlands (PEMA), seasonally flooded emergent wetlands (PEMC), seasonally flooded broad-leaved deciduous scrub-shrub wetlands (PSSI), temporarily flooded broad-leaved deciduous palustrine forested wetlands (PFO1A). The R2UBA listed wetland is the main channel of the Missouri and Kansas Rivers. Most of these wetlands are located riverward of the levee system and should not be affected by levee heightening. Figures 3 - 7.

A jurisdictional wetland determination will be necessary if levee alignments or borrow areas directly impact wetlands within agricultural lands or other areas landward of the existing levee alignments. The quantity and quality of existing wetland will determine the amount of compensation necessary to offset project losses. A wetland mitigation plan would be developed in coordination with at least the Corps, Service, EPA, and the Kansas Department of Wildlife and Parks or the Missouri Department of Conservation. This plan would include site locations, time frames, construction plans, a monitoring plan, progress reports, and standards of success. This plan would be a condition of any Section 404 permit issued for the project. The plan should be implemented regardless of the regulatory nature of the wetland.

Compensatory Mitigation

Advance creation	1.5:1	Forested
	1:1	Emergent wetland
Concurrent creation	2:1	Forested
	1.5:1	Emergent wetland
Advanced restoration	1.5:1	Forested
	1:1	Emergent wetland
Concurrent restoration	2:1	Forested
	1.5:1	Emergent wetland
Advanced enhancement	3:1	Forested

U.S. Fish & Wildlife Service

Wetlands Mapper

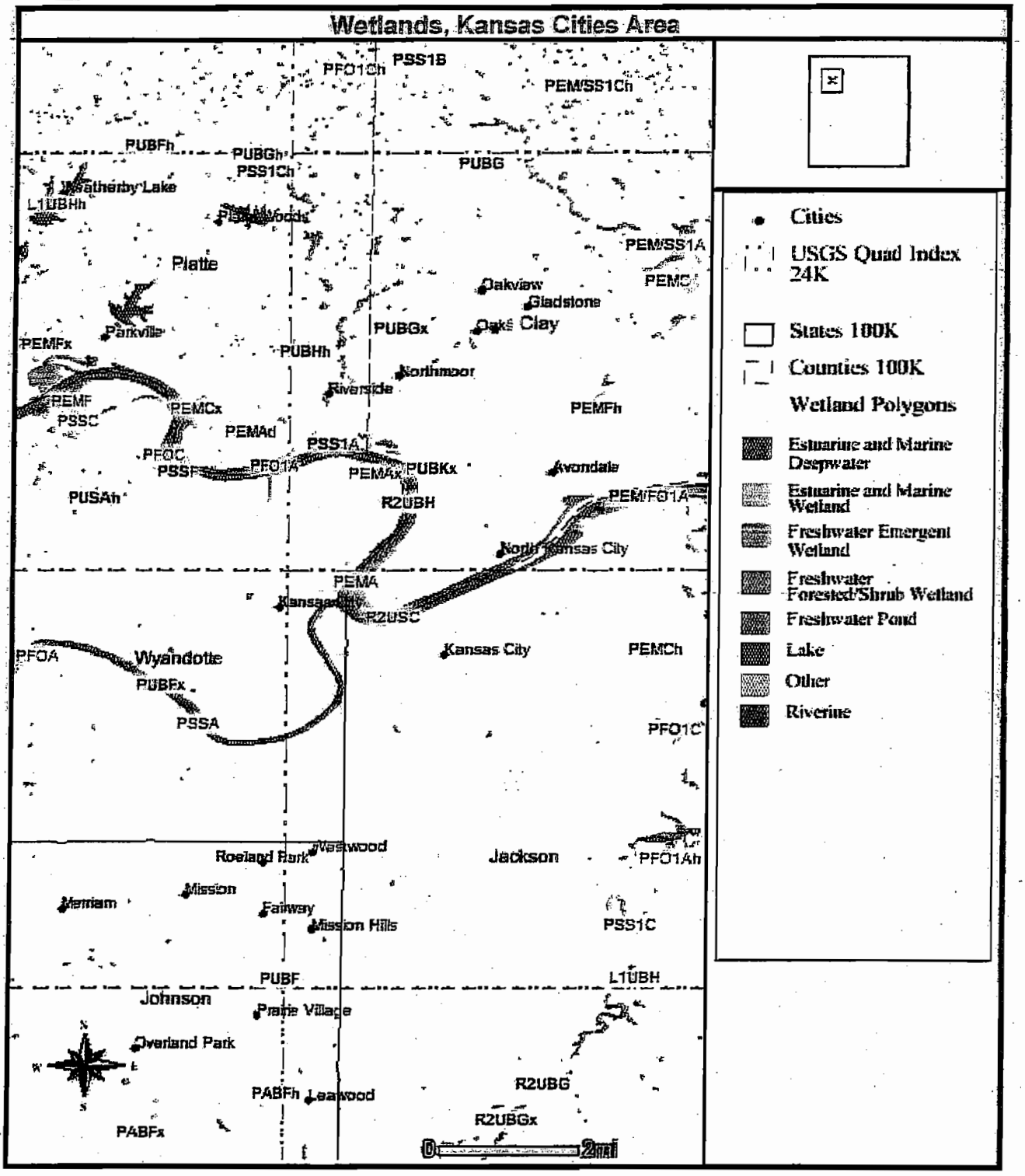


Figure 3.

U.S. Fish & Wildlife Service

Wetlands Mapper

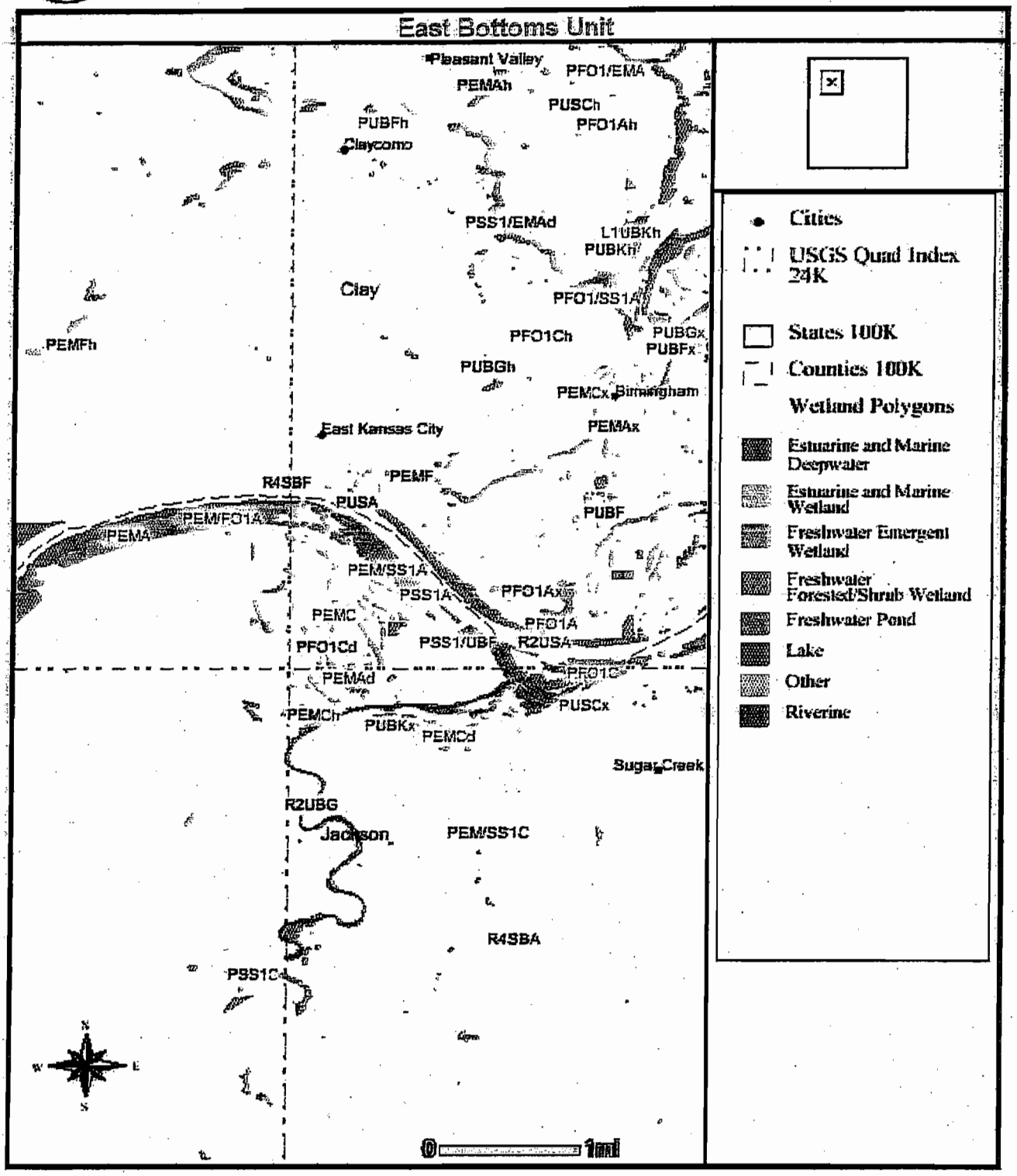


Figure 4

U.S. Fish & Wildlife Service

Wetlands Mapper

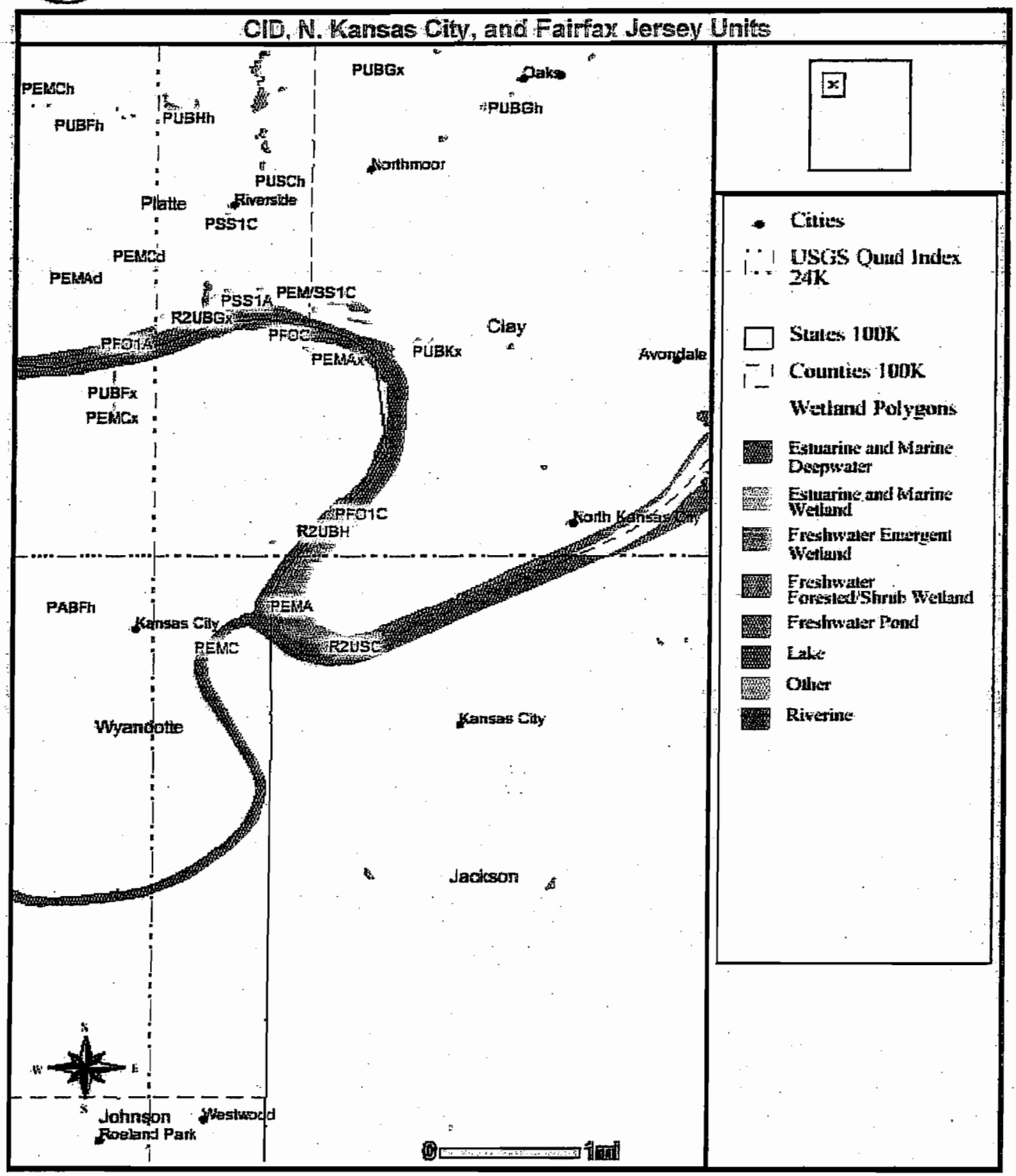


Figure 5

U.S. Fish & Wildlife Service

Wetlands Mapper

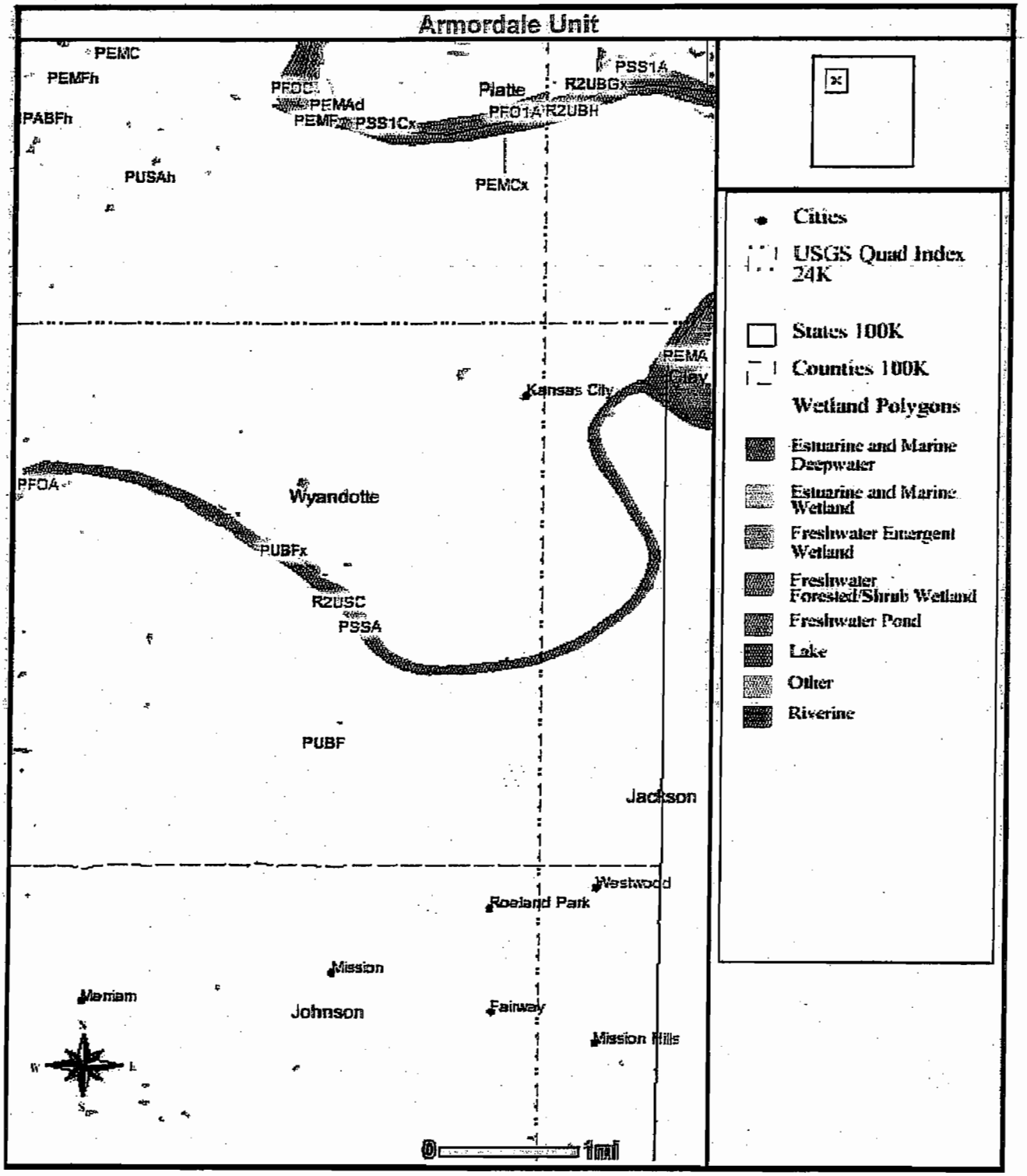


Figure 6.

U.S. Fish & Wildlife Service

Wetlands Mapper

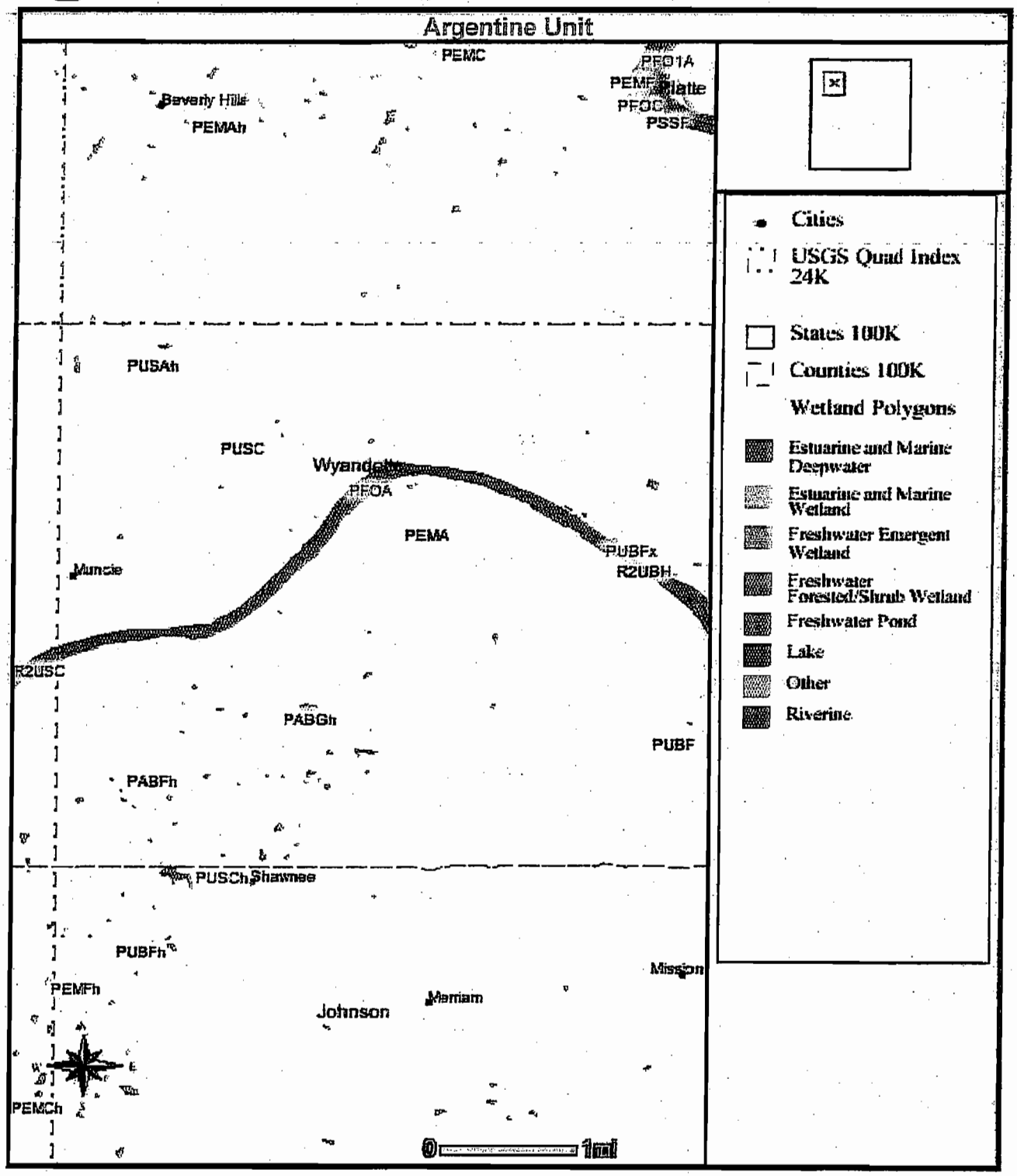


Figure 7

	2:1	Emergent wetland
Concurrent enhancement	4:1	Forested
	3:1	Emergent wetland
Preservation	5:1	Forested

Aquatic Resources

The Missouri and the Kansas rivers have undergone considerable change since the Louisiana Purchase in 1803 and Louis and Clark's subsequent exploration of the Kansas River confluence on June 26, 1804. Modifications to the natural Missouri River floodplain ecosystem have been immense and ongoing for more than 150 years. Presently, 35 percent of the river's length is impounded, 32 percent is channelized or stabilized, and the remaining 33 percent is freeflowing. (Schmulbach and others, 1992). Major civil works projects involved channelization, channel maintenance, and impoundment and reservoir operation. Total cost for construction, operation, and maintenance of civil works projects through 1984 was nearly $6.2 billion. (Hesse, 1987). Agricultural, industrial, and urban development within the basin also significantly modified the Missouri River and its adjoining floodplain.

Presently all of the Missouri River from Sioux City, Iowa, to its mouth at Saint Louis, Missouri, is channelized. Even during flooding only about 10 percent of the original flood plain is inundated, as high agricultural and urban levees confine the river to a width of approximately 500 feet from Kansas City north (U.S.F.W.S, 1980). The impacts of channelization have been numerous and severe on the physical, chemical, and biological structure and function of the Missouri River and its flood plain. The most damaging of these alterations to aquatic communities has been the nearly complete isolation of the river from its flood plain, subsequent loss of flood plain habitat , drastic reduction in area and diversity of river channel habitats, and increased velocity of the main channel.

The Kansas River has fared better than the Missouri. There is evidence that the Lower Kansas River was generally wide and shallow, both before and since the 19th-century period of westward exploration and settlement. The indigenous fish fauna is mainly indicative of shallow, turbid streams. Most early traffic across the prairies was overland, rather than by river as in the eastern regions. Despite some successful ventures by steamboats there seems little reason to doubt that the Kansas was sand-filled nearly to its mouth as was the channel of the Missouri River which receives its flow. Although the river was and remains navigable for administrative purposes, "the government...considers the river for purposes of practical navigation as a whole unworthy of improvement." (Schoewe, 1951)

Although the river itself has not been channelized or "improved" for navigation, the flood plain is often farmed to the high bank of the river with extensive clearing of the riparian areas in the process. The cities of Junction City, Manhattan, Topeka, Lawrence and Kansas City and numerous smaller municipalities are located on or near the Kansas River. Each city is protected by a levee system with agricultural levees that protect the more fertile soils in between urban centers. Thirteen large Federal impoundments have been constructed which have a pronounced effect on the stream flows of the Kansas River Basin. The lower segment of the river is subject to intensive instream sand and gravel dredging that changes the course, depth, and substrate of the river. Dredging is responsible for significant changes in the benthic macroinvertebrate populations and fish populations in the immediate area of the activity.

Although major changes have altered the free-flowing Missouri and Kansas Rivers and many fish species native to the rivers have had serious population declines, most of the indigenous fish species still remain. Empirical data from certain river reaches verifies long term declines in commercial fisheries and certain sport fisheries and at least six big river fishes are of special concern. Table 1 lists the principal fish species occurring in the reach of these rivers in the immediate vicinity of the Kansas Cities.

Table 1- Principal Fish Species of the Lower Kansas and Missouri Rivers at Kansas City

Channel catfish*	Fathead minnow
Blue catfish	Bigmouth buffalo
Black bullhead	Smallmouth buffalo*
Flathead catfish	Quilback
Shortnose gar*	River carpsucker*
Longnose gar	Shorthead redhorse
Shovelnose sturgeon	Green sunfish
Gizzard shad*	Bluegill
Goldeye	White crappie
Carp*	Freshwater drum
Sand shiner	Walleye
Paddlefish	Blue sucker

*Dominant species

Threatened and Endangered Species

As a result of habitat losses and flow regime changes, four species dependent on the rivers are federally-listed as endangered or threatened. Two additional species were formerly candidates for listing. The bald eagle (Haliaeetus leucoccephalis), federally listed as a threatened species, frequents reservoirs and large rivers in Kansas and Missouri during the winter months. The Kansas River has nesting pairs of bald eagles, with parents and young remaining in the area through the spring and summer months. Eagles use large trees and snags in close proximity to

water for perches where they feed on fish and waterfowl. We recommend that any large trees or snags be avoided during project implementation. The piping plover (Charadius melodus), federally listed as a threatened species, is a seasonal spring and fall migrant through portions of Kansas and Missouri along the Kansas and Missouri Rivers, with nesting on the Kansas river. Plovers are associated with unvegetated shorelines, sandbars, and mudflats, utilizing aquatic invertebrates for food. The least tern (Sterna antillarum) utilizes similar unvegetated wetland habitat as do piping plovers, in the same geographic regions of Kansas and Missouri, feeding primarily on small fish. It occurs as a spring and fall migrant through this area and nests on the Kansas River upstream of Kansas City. This species is endangered. The pallid sturgeon (Scaphirhynchus albus) is a moderately large bottom-dwelling fish which occurs in low numbers in portions of the Missouri River and may occur in the lower Kansas River, below Lawrence during high flow events. It is believed to require sandbars, chutes, and backwater areas for feeding and loafing. It requires gravel bars and properly timed flows and water temperatures for reproduction and is federally listed as endangered.

Sturgeon chub (Macrhybopsis gelida) historically occurred along most of the Missouri River and large western tributaries including the Kansas River (Cross, 1975). It has experienced serious decline within its range and was formerly a candidate for Endangered Species Act (ESA) listing.

Sicklefin chub (Macrhybopsis meeki) historically occurred in the Missouri River, lower Kansas River and lower Mississippi River (Cross, 1975, Lee, 1980). This species is declining markedly and was formerly a candidate for ESA listing.

Section 7 of the Endangered Species Act, 87 Stat. 884, as amended, requires an agency to ask the Secretary of the Interior, acting through the U.S. Fish and Wildlife Service, whether any listed or proposed endangered species may be present in the area of each Federal construction project. If the project may affect listed species, the Corps of Engineers should initiate formal Section 7 consultation with this office. If there will be no effect, or if the Fish and Wildlife Service concurs in writing there will be beneficial effects, further consultation is not necessary.

Kansas State Law (K.S.A. 32-504, 32-507: effective May 1, 1981) requires persons undertaking or sponsoring publicly funded or State or Federally Assisted action which is likely to impact endangered or threatened wildlife habitats where they are likely to occur, to obtain a project action permit from the Secretary of the Kansas Department of Wildlife and Parks prior to initiation of such action. In addition to the Federally listed threatened and endangered species, the State lists additional species that may be of concern within the project area. This list should be requested from the Environmental Services Section, Kansas Department of Wildlife and Parks, 512 SE 25th Ave., Pratt, KS 67124-8174.

According to the Missouri Department of Conservation's Natural History Data Base (1999) there are occurrences of state listed species or communities (aside from those previously mentioned) in the project area. Species and concerns should be requested from the Missouri Department of Conservation, P.O. Box 180, Jefferson City, MO 65102.

Wild and Scenic River Designation

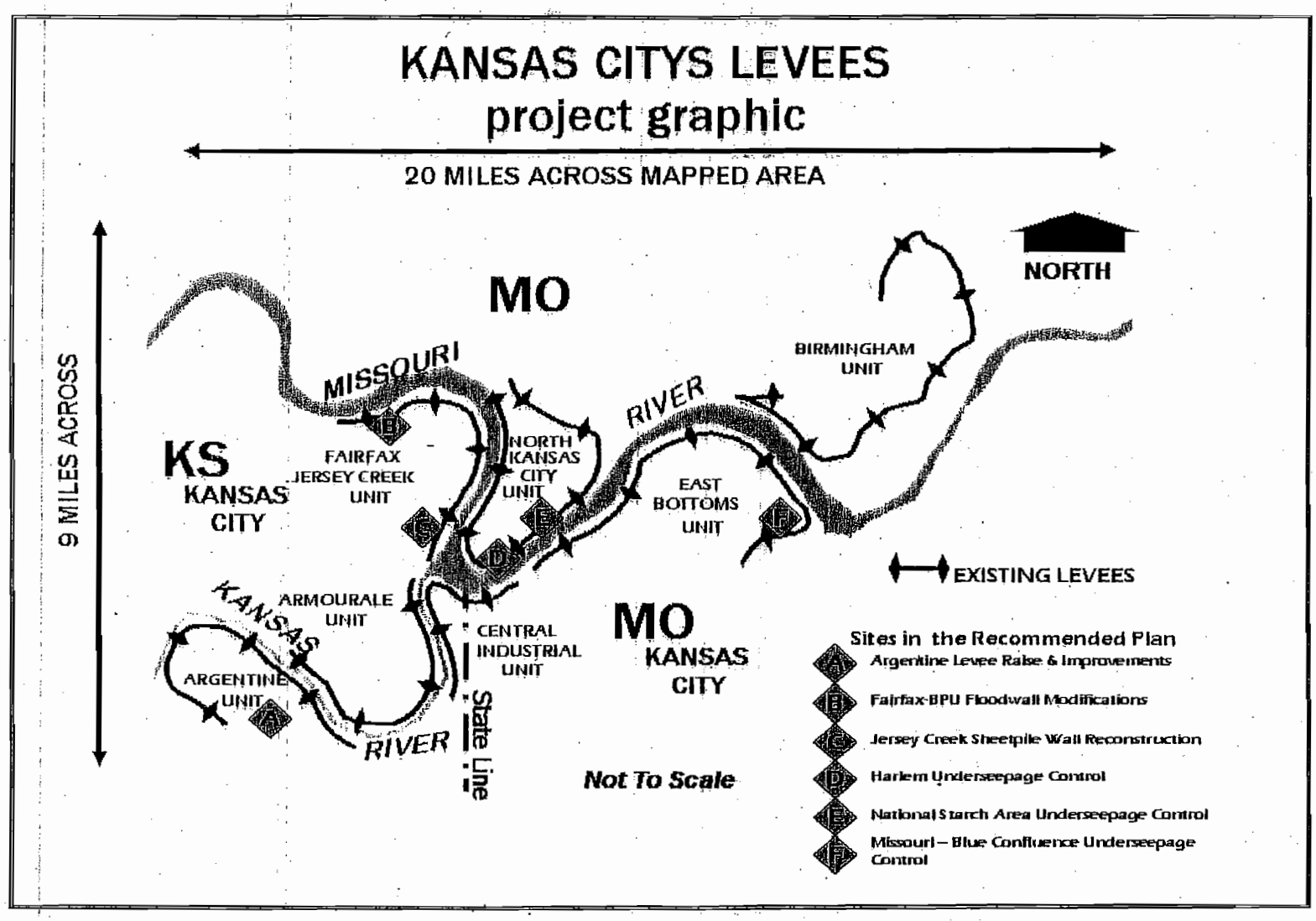
The Kansas River is listed on the Nationwide Rivers Inventory (NRI). The NRI includes rivers selected on the basis of the degree to which they are free-flowing, the degree to which the rivers and their corridors are undeveloped, and the outstanding natural and cultural characteristics of the rivers and their immediate environments. The purposes of the inventory are several, including the identification of rivers which have potential to qualify for inclusion in the National Wild and Scenic Rivers System. The Kansas River was included in the inventory because of its outstanding scenic, recreational, fish, wildlife, and cultural values. Section 5(d) of the Wild and Scenic Rivers Act (Public Law 90-542) requires that "In all planning for the use and development of water and related land resources, consideration shall be given by all federal agencies involved to potential national wild, scenic, and recreational river areas." A presidential directive and subsequent instruction issued by the Council on Environmental Quality and codified in agency manuals require that each Federal agency, as part of its normal planning and environmental review process, take care to avoid or mitigate adverse effects on rivers identified in the NRI.

In 1980 potential recreation sites adjacent to the Kansas River were identified by the Heritage Conservation and Recreation Service (now the Park Service) as an element of the Kansas River Bank Stabilization Study. The plan proposes that the reach of the Kansas River beginning at its confluence with the Delaware River downstream to Interstate Highway 635 Bridge Crossing, a distance of 57 miles, be designated as a component of the National Wild and Scenic River System. The Plan proposed fee acquisition of 18 acres and easements on between 14 and 98 acres of land on the right bank of the river between the 635 bridge and Turner Bridge. This site was to become the downstream terminus or take out point for the recreational river segment. The western half of the Argentine Unit on the Kansas River encompasses this site.

DESCRIPTION OF THE PROJECT

The units being considered for levee improvements are: the Argentine and Armourdale Units on the Kansas River in Kansas, the Fairfax-Jersey Creek Unit on the Missouri River in Kansas; the Central Industrial District Unit, which lies in Kansas and Missouri and is bounded on the west by the Kansas River and on the North by the Missouri River; and two other Units: North Kansas City and East Bottoms, both in Missouri. The Birmingham Unit is not being considered for improvements.

The Kansas Cities feasibility study is currently being conducted using a two-phased approach.


KANSAS CITYS LEVEES
project graphic
20 MILES ACROSS MAPPED AREA
9 MILES ACROSS
NORTH
MO
MISSOURI
RIVER
KS
KANSAS CITY
FAIRFAX
JERSEY CREEK
UNIT
NORTH KANSAS CITY UNIT
EAST BOTTOMS UNIT
BIRMINGHAM UNIT
EXISTING LEVEES
KANSAS
RIVER
ARMOURALE UNIT
CENTRAL INDUSTRIAL UNIT
ARGENTINE UNIT
State Line
MO
KANSAS CITY
Not To Scale
Sites in the Recommended Plan
A Argentine Levee Raise & Improvements
B Fairfax-BPU Floodwall Modifications
C Jersey Creek Sheetpile Wall Reconstruction
D Harlem Underseepage Control
E National Starch Area Underseepage Control
F Missouri – Blue Confluence Underseepage Control

PHASE I

Levee unit improvement locations include Argentine, East Bottoms, North Kansas City-Harlem Segment, North Kansas City-National Starch Site, Fairfax-Jersey Creek-Board of Public Utilities (BPU) Floodwall, and the Fairfax-Jersey Creek Sheetpile Wall. The preferred alternatives for the levee units are as follows:

Argentine Unit

The preferred alternative for the Argentine unit is the nominal 500-year +3 levee raise with pump station and levee improvements to increase stability and provide underseepage control. This raise equates to roughly a four to six foot raise along the entire length of the Argentine levee. The existing Kansas City's levees average approximately +/- 15 feet in height. Levee improvements consist of the modification or replacement of three pump stations and the construction of buried collectors at three locations. Levee raise modifications would include raises on existing floodwalls, new I-walls located on top of the existing levee, stop log gap raises, top cap raise, landside levee raise with berm, and landside levee raise with no berm. A rock toe would be constructed in areas of railbed congestion to allow steeper slope for the levee raise.

The recommended Argentine levee raise of 500-year + 3 will impact two additional wetlands within the construction footprint of the Argentine levee that would not have been impacted under the previous preferred alternative of 500-year +0. These two wetlands total approximately 0.027 acres in area. Both wetlands are small linear wetlands associated with fence line depressions or drainage depressions at the toe of the existing levee units. The Corps has stated that the wetlands are of poor quality, dominated by cattails, curly dock, and reed canary grass with no open water community. The Corps is proposing to mitigate the wetlands on-site at a 1.5:1 ratio.

East Bottoms Unit

Pressure relief wells and a header collector pipe would be installed along the landside toe of the levee. This alternative is an augmentation to an existing collector system. Relief wells provide a reliable solution to control underseepage can be completed within the existing right-of-way. The small amount of soil required for the East Bottoms levee unit improvement will be acquired from commercial borrow sources. Less than one-quarter acre of maintained grass (brome fescue, and rye) would be converted to relief wells and manholes.

North Kansas City Unit-Harlem Segment

An underground water collection system using of perforated pipe will be installed the full length of the levee along the landside toe to intercept seepage. Six manholes will be placed along the

system to collect the seepwater and allow portable pumping units to be placed during flooding to pump collected water over the levee.

North Kansas City Unit-National Starch

Pressure relief wells and a pump station will be installed into the existing stability berm along the landside toe of the levee. Installing relief wells at this site will provide a highly effective mechanism to control underseepage. An outlet structure may be constructed riverside at the toe of the levee and a conveyance path may be excavated and lined with rock to allow pumped seepwater to enter the river instead of eroding the land and headcutting up the riverside slope.

Fairfax-Jersey Creek Unit BPU Floodwall

An additional row of auger cast piles would be installed on the landward side of the pile cap. A foundation slab extension would be connected to the new row of piles. Additional piles and the slab extension will be installed landside along the entire length of the existing floodwall.

Fairfax-Jersey Creek Unit Sheetpile Wall

An open cell sheetpile wall will be "driven" into the existing foreshore/stability berm along the length of the existing wall utilizing a crane deployed on a floating barge. Areas disturbed by excavation would be graded and seeded when construction is compete.

Proposed Borrow Area

The proposed borrow area measures approximately 276 acres and is owned by Water District number One (WaterOne) of Johnson, County, Kansas. It is located adjacent to the right descending bank of the Kansas River between river mile 11 and 13, Sections 22, 27 & 28, Township 11 South, Range 24 East, Wyandotte County, Kansas. The primary uses of the land are mono fill lime storage and active row-cropping. Portions of the property are excavated to a depth of 20 feet for temporary lime storage, and subsequently filled, capped and graded to the surrounding elevation. A portion of the property is currently row-cropped under a lease agreement. The excavation borrow will be coordinated with the landowners to ensure that only clean borrow is obtained for the Argentine levee.

A farmed wetland 0.17 acre in size exists within the borrow area. The Corps is proposing to mitigate impacts to this wetland on-site at a 1:1 ratio.

PHASE II

Phase II remains subject to negotiations with various sponsors.

Armourdale and CID Levee Units

Findings for overtopping risk and geotechnical/structural risk indicate the need to pursue potential reliability improvements in these units. Such improvements may involve earthen levee raises, floodwall raises, and underseepage improvement measures. This will involve a large amount of analysis and feasibility design work, and is expected to compromise the bulk of Phase 2 efforts.

The tentative preferred alternative for the Armourdale Unit is the nominal 500-year + 3 height increase including underseepage controls. The raise would be accomplished by constructing earthen levee, floodwalls, and I-walls. This levee raise would result in an approximate four to six foot raise along the existing levee and floodwalls.

The tentative preferred alternative for the CID Unit is the nominal 500-year +3 levee raise including underseepage controls. The levee raise would be accomplished by constructing earthen levee and floodwalls. No I-walls would be constructed within the CID unit. Floodwalls would be constructed landside of existing floodwalls to allow a vertical raise while minimizing and avoiding real estate impacts landside of the existing levee. The nominal 500-year +3 levee raise alternative generally results in an approximate four to six foot raise along the existing levee and floodwalls.

The performance of the Birmingham Unit in Missouri currently meets the planning objectives of this study. Therefore, no reliability improvements are recommended under the proposed study.

OTHER PROJECT ALTERNATIVES

No Action Alternative

Under the No Action Alternative the levee improvement projects would not be implemented. The No Action Alternative would not change the existing fish and wildlife habitat in the Kansas Cities area.

Removal of Riparian Vegetation as a Measure to Increase Discharge Capacity of the Lower Kansas River

During the scoping process for this project the Corps and the levee districts adjacent to the Kansas River identified removal of riparian vegetation landward of the existing levee system as a measure to increase discharge capacity on the lower Kansas River.

Argentine 500-year +0 and 500-year +5

Two additional levee raises were considered for the Argentine Unit. The 500-year +0 was the original preferred alternative. The 500-year +5 was also evaluated. Impacts would be similar to the preferred alternative of 500-year +3. The 500-year +0 would require less borrow while the 500-year +5 would require more borrow than the preferred alternative.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

In general, the project area is characterized as urban consisting of industrial, commercial development with rail yards, major roads and bridges, secondary roads, and housing developments on and above the floodplain. The existing wildlife habitat is scarce, and of generally low quality due to habitat fragmentation and loss of habitat from the development that has been ongoing for more than a hundred and fifty years. Without the levee improvement project the few undeveloped or underdeveloped areas within the levee districts will continue to be converted to commercial and industrial use. Wildlife and their habitat will continue to decline.

FISH AND WILDLIFE WITH THE PROJECT

PHASE 1 IMPLEMENTATION

Construction of Phase 1 of the Kansas Cities Project primarily involves pump station replacement or modification, installation of new piles or slab extensions or adding concrete or fill to the crown and landward sides of the existing levee systems.

A large portion of the area protected by the current levee alignments is either industrial, commercial or urban in nature. The commercial/industrial areas are vegetated (if at all) by cultivated lawn grasses, shrubs and trees. Urban tolerant species such as squirrels, rabbits, moles, starlings, robin, house sparrow, Canada geese and white-tailed deer are common.

The loss of levee brome grasses during heightening of the existing levee system will be a short term loss. Re-seeding the levee to warm season grasses such as switch grass to reduce erosion and to insure the integrity of the levee system should be a priority of project implementation.

Previous development within the Missouri River Basin and the Lower Kansas River has had an adverse effect on fish and wildlife habitat. The Missouri River surface area has declined more than 50 percent. The river channel is now deep and has currents too swift to provide suitable habitat for many fish and wildlife species. River backwaters, chutes, sandbars, and oxbow lakes have been lost to flood plain development. The present project will not involve additional

channel work or encroach on areas riverward of the levee units.

During project construction, Phase 1 of the Kansas Cities Project would cause temporary, short-term impacts to fish and wildlife from noise, dust, and the presence of workers and machinery. Runoff from construction areas, access roads, staging areas and unprotected fills could degrade water quality inside the levee system. Accidental spills of fuels, lubricants, hydraulic fluids and other petrochemicals would be harmful to aquatic life.

Construction would require fill from cropland located upstream of the Argentine Levee Unit on the Kansas River. Removal of fill material from within the cropland area has the potential to cause the loss of farmed wetland. Farmed wetland should be delineated within the borrow site and should be avoided if possible. If an unavoidable loss is incurred, the quantity and quality of the farmed wetland will determine the amount of compensation necessary to offset project losses. The wetland mitigation plan would be developed in coordination with the Corps, EPA, and the Kansas Department of Wildlife and Parks. This plan would include site locations, time frames, construction plans, a monitoring plan, progress reports, and standards of success. This plan would be a condition of any permit issued for the project. The plan should be implemented regardless of whether impacted wetlands are classified as jurisdictional for purposes of the Clean Water Act.

Although the floodway cross section will remain essentially unchanged, the heightened levees will increase flood stages downstream and upstream at very high flood stages. Flood crests may increase in height (the water has no place to go but up) and floodwaters will be impounded upstream. In 1993, the constricted Missouri River floodplain prevented the Kansas River from draining. This caused water to back up in the Kansas River, flooding far into the state of Kansas. (White House Interagency Flood plain Management Review Committee, 1994) We are concerned that if Kansas City increases the height of its levees, other levee districts upstream and downstream will face the need to build their own levees even higher to avoid increased flood damages. Such cumulative effects should be addressed during the feasibility phase and NEPA documents.

Alternative to remove Riparian Vegetation from the Lower Kansas River to increase channel capacity.

The purpose of this alternative is to increase the capacity of the lower Kansas River to carry off flood water by enlarging the cross-sectional area (deepening) and smoothing the channel. Clearing all woodland riverward of the levees is designed to increase flow velocity.

The initial and secondary impacts of the removal of riparian vegetation associated with this alternative will be devastating to wildlife populations which will be eliminated. Major impacts to reptiles, amphibians, mammals, and birds include loss of cover (for reproduction or escape) loss of food, species composition changes, decreased diversity, decreased density and numbers,

and increased susceptibility to predators. Overall, this alternative would significantly damage fish and wildlife resources and their habitat.

We assume this alternative would eliminate the island, and vegetation on the island, located mid-channel near the eastern end of the Argentine levee. Please be aware that all islands on the Kansas River are the property of the State of Kansas and are held in thrust for the people by the Kansas Department of Wildlife and Parks (Department). Any alternative that would adversely affect the island or the variety of shallow water habitats associated with the island would have to be closely coordinated with the Department.

The shallow sand substrate of the Kansas River is much more conducive to some native fish than the fast, deep Missouri. Missouri River fishes use the lower Kansas River as a backwater providing refuge from high swift turbid flows of the channelized navigation channel of the mainstream. Shovelnose sturgeons are known to seek out these calmer waters, particularly during winter. The pallid sturgeon (Scaphirhynchus albus) is a moderately large bottom-dwelling fish which occurs in low numbers in portions of the Missouri River and may occur in the lower Kansas River, below Lawrence during high Kansas River flow. Enlarging the cross-sectional area of the lower Kansas River will likely result in a "may affect" determination for the pallid sturgeon, thereby requiring formal consultation pursuant to section 7 of the Endangered Species Act.

In compliance with the requirements of Section 7 (c) of the Act, a Biological Opinion on the Operation of the Missouri River Mainstem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project and the Operation of the Kansas River Reservoir System was issued by the Service in November of 2000 and amended in 2003. It is the Service's biological opinion that the Corp's proposed continued operation of the system and the cumulative effects, are likely to jeopardize the continued existence of the least tern, piping plover, and the pallid sturgeon, but not likely to jeopardize the continued existence of the bald eagle. The jeopardy opinion is still in effect for the Kansas River System, and additional adverse impacts to pallid sturgeon habitat at the mouth of the Kansas River would be considered in light of a current jeopardy finding.

In 1980, potential recreation sites adjacent to the Kansas River were identified by the Heritage Conservation and Recreation Service (now the Park Service) as an element of the Kansas River Bank Stabilization Study. The plan proposes that the reach of the Kansas River beginning at its confluence with the Delaware River downstream to Interstate Highway 635 Bridge Crossing, a distance of 57 miles, be designated as a component of the National Wild and Scenic River System. The Plan proposed fee acquisition of 18 acres and easements on between 14 and 98 acres of land on the right bank of the river between the 635 bridge and Turner Bridge. This site was to become the downstream terminus or take out point for the recreational river segment. The western half of the Argentine Unit on the Kansas River encompasses this site. Any effort to modify or deepen the river in this area must be closely coordinated with the National Park Service.

The adverse effects to fish and wildlife and recreation from implementation of this alterative should be avoided by eliminating it from further consideration. Increasing the height of existing levees along the lower Kansas River will eliminate the need for removing large amounts of vegetation from stream banks and avoid the expense of maintenance required on channels dredged through noncohesive (sand substrate) materials. In addition, removal of riparian vegetation riverward of levees increases their risk of failure through breeching during floods based on a study of levee failures during the 1993 flood conducted by the University of Missouri.

MITIGATION DISCUSSION

To date, a formal habitat evaluation has not been conducted on habitats within the project area and none is deemed necessary.

The Service has established a mitigation policy used as guidance in determining resource categories and recommending mitigation (46 FR: 7644-7663). We have determined that most of the wildlife habitat that would be affected by the raising of existing levees and flood walls is in Resource Category No. 4" (habitats of medium to low value). For this category, loss of habitat value should be minimized.

Forested wetland and riparian woodland are consistent with Resource category No.2 that is, habitats are of high value that are relatively scarce or becoming scarce on a national or regional basis. Losses attributed to the project would require in-kind mitigation (replacement of habitat value lost with equal habitat values of the same kind of habitat as those eliminated). The cost of mitigating habitat losses should be included as a project cost. The areas of potential impact are the borrow site where farmed wetlands may be present and two small wetlands (0.027 acre combined) that would be in the footprint of the Argentine Levee Unit under the preferred alternative of the 500-year +3 raise. The Corps is proposing to mitigate the Argentine wetlands at a 1.5:1 ratio and the borrow wetland at a 1:1 ratio.

Whenever possible, we recommend upland trees within the construction right-of-way remain undisturbed. While trees are young now, they are closer to a mature and more valuable stage than newly established trees.

To minimize impacts to birds protected under the Migratory Bird Treaty Act, trees or other vegetated areas slated for grubbing or clearing should be surveyed for the presence of nesting birds during the general migratory bird nesting season of March through August. Disturbance of nesting areas should be avoided until nesting is completed. Vegetation clearing and construction related soil disturbances can cause sediment-laden runoff to enter waterways. To minimize impacts associated with erosion, contractors should employ silt curtains, coffer dams, dikes, straw bales or other suitable erosion control measures. Construction related petrochemical spills can also negatively impact fish and wildlife resources. Therefore, measures should be implemented prior to construction to minimize the likelihood of petrochemical spills.

Section 2 of the Fish and Wildlife Coordination Act requires the Service to identify project related opportunities to enhance fish and wildlife. The enhancement recommendations discussed below refer to project related creation of wildlife habitat, over and above that required to mitigate losses attributable to project construction.

The Corps should coordinate with the National Park Service and the Kansas Department of Wildlife and Parks to determine the need or desirability of an access road over Argentine Levee Unit in the vicinity of the 635 Bridge, the downstream terminus of the NRI segment of the Kansas River. Every effort should be made to preserve the native vegetation riverward of this levee unit.

Native trees, grasses and forbs, noted for their high wildlife value, could be established along the landward (where feasible) and stream side base of the existing levee system. This might help offset future losses due to increased encroachment along the rivers once flood protection is increased once again. Switch grass often takes longer to become fully established; however, when established, stand of native vegetation provide excellent soil binding characteristics, a valuable wildlife habitat and require fewer maintenance costs. The Service, Missouri Department of Conservation, the Kansas Department of Wildlife and Parks, and the Natural Resources Conservation Service offer assistance programs and could work with the cities of Kansas City to develop vegetation management plans.

The potential for aquatic and wetland restoration at Liberty Bend Cut-off should be explored in an effort to replenish this backwater area or restore (create) disconnected oxbow habitat.

Invasive species have been identified within the project area. Invasive species have been identified as a major factor in the decline of native flora and fauna and their ecosystems and impact aquatic resources. Invasive species of particular concern in Kansas are the zebra mussel (*Dreissena polymorpha*), purple loosestrife *(Lythrum salicaria*), Johnson grass (*Sorghum halepense*), sericea lespedeza (*Lespedeza cuneata*), and reed canary grass *(Phalaris arundinacea)*. Executive order 13112 Section 2 (3) directs Federal agencies to not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere and to ensure that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. Therefore, we recommend the implementation of the following Best Management Practices to prevent the transport of invasive species to or from the project areas:

> All equipment brought on site will be throughly washed to remove dirt, seeds and plant parts. Any equipment that has been in any body of water within the past 30 days will be thoroughly cleaned with hot water (hotter than 40° C or 104° F) and dried for a minimum of five days before being used at this project site. In addition, before transporting equipment from the project site all visible mud, plants, and fish/animals will be removed, all water will be eliminated, and the equipment will be throughly cleaned. Anything that came in contact with the water will be cleaned and dried following the above procedure.

RECOMMENDATIONS

In the interest of protecting fish and wildlife resources in the vicinity of the Kansas Cities local flood protection project area the following recommendations are provided.

1. Riparian and wetland habitats should be avoided to the maximum extent practicable when selecting borrow sites for the proposed levee raises and compensatory mitigation should be undertaken for unavoidable impacts.

2. Levees should be seeded with warm season grasses such as switch grass.

3. Removal of mature cottonwoods, and other native vegetation should be avoided where possible, and if they are removed, replace woody vegetation by establishing 2 acres of native vegetation for every acre impacted.

4. The Corps should create wetland mitigation habitat to compensate for the loss of wetland acreage from construction of the project. Because an, as yet, unknown number of acres of farmed wetland may be directly impacted, it may be necessary to restore non-wetland habitat to wetland habitat. Farmed wetlands should be mitigated at a 1.0 to 1.0 ratio.

5. Since channelization and levee construction have already resulted in dramatic loss of riparian and wetland habitats in the Missouri and Kansas River basins, the alternative to remove riparian vegetation to increase discharge capacity of the lower Kansas River should be dropped from further consideration.

The following recommendations describe opportunities to provide fish and wildlife enhancement through the project.

6. Encourage wetland development and hydrological re-connection to the river at existing borrow areas landward of the levee units.

7. Provide river access at the Argentine Levee segment.

8. Establish native vegetation (trees and shrubs) riverward of levee segments where riparian woodlands are sparse or nonexistent.

9. Potential for aquatic and wetland restoration at Liberty Bend Cot-off just downstream of Kansas City should be explored.

10. Utilize Best Management Practices to prevent the transfer of invasive species to or from the project areas.

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August 14, 2006

Environmental Resources Section
Planning Branch

Mr. Michael LeValley
Field Supervisor, Kansas Field Office
U.S. Fish and Wildlife Service
315 Houston, Suite E
Manhattan, Kansas 66502

Dear Mr. LeValley:

The Corps of Engineers, Kansas City District (CENWK) received your Final Fish and Wildlife Coordination Act Report dated August 4, 2006, for the Kansas Citys, Missouri and Kansas, Flood Damage Reduction Feasibility Study and Environmental Impact Statement. Here are our comments in regards to the recommendations that your office provided:

1) Comment Noted. Impacts to riparian and wetland habitats shall be avoided to the extent practicable when selecting borrow sites. Compensatory mitigation will be undertaken for significant unavoidable resource impacts as needed.

2) Comment Noted. Levee seeding is conducted in accordance with the information provided in the operation and maintenance section within the "*Guidance For The Design And Construction Within The Critical Area Of Constructed Flood Control Projects*" (http://www.nwk.usace.army.mil/local_protection/guidance.html), MAINTENANCE Chapter, paragraph 2.2 to 2.2.10. The seeding requirements meet 33CFR 208.10 Part B section, Levee Maintenance that requires levee slopes to be mowed on a regular basis for close inspection. Close inspection is required to detect settlement, sloughing, slope instability, erosion, the presence of burrowing animals, the presence of debris, encroachments that tend to weaken levees, rutting, depressions or other effects. Regular mowing also insures that deep-rooted vegetation will not become established on levee slopes. The use of switchgrass is not amenable for use on levee slopes meeting the above requirements.

3) Comment Noted. The removal of native vegetation will be avoided where possible and woody vegetation will be replaced at a 2.0:1.0 ratio.

4) Comment Noted. Mitigation for impacted wetlands will be conducted in accordance with the Corps requirements contained in Regulatory Guidance Letter No. 02-2, dated December 24, 2002. Farmed wetlands will be mitigated at a 1.0 to 1.0 ratio.

5) Comment Noted. The alternative to remove riparian vegetation from the Argentine levee unit to increase the discharge capacity of the lower Kansas River was not selected as a preferred alternative.

6) Comment Noted. Wetland development and hydrological reconnection to the river at existing borrow areas landward of the levee units will be encouraged where practicable.

7) Comment Noted. Providing river access at the Argentine levee segment is not anticipated to be a component of this project.

8) Comment Noted. The feasibility of woody vegetation establishment riverward of levee segments will be determined with the consideration of flow conveyance and levee maintenance requirements.

9) Comment Noted. Potential sites for fish and wildlife measures as part of mitigation requirements will include the Liberty Bend cut-off.

10) Best Management Practices will be used to prevent the transfer of invasive species to or from the project areas.

Additional, non-enumerated comments were noted within your report. Large trees or snags will be avoided if practicable during project implementation. Upland trees within the construction right-of-way will remain undisturbed when practicable. Areas slated for clearing and grubbing as a result of project requirements will be surveyed for the presence of nesting birds during the specified March through August timeframe. Best Management Practices would be included within the project specifications to avoid and minimize erosion and petrochemical spills within construction areas, and prevent the introduction of invasive species. Contractors will be required to submit an environmental protection plan prior to initiating construction activities.

Sincerely,

for Christopher M. White, Ph. D.
Chief, Environmental Resources Section
Planning Branch

United States Department of the Interior

National Park Service

Midwest Region
601 Riverfront Drive
Omaha Nebraska 68102-4226

APR 2 0 2006

732.17 (MWR-P/G)

Mr. Richard A. Skinker
Environmental Resources Specialist
Room 843, PM-PR
Kansas City District, U.S. Army Corps of Engineers
601 East 12th Street
Kansas City, MO 64106-2896

Dear Mr. Richard Skinker:

The National Park Service Midwest Regional Office records do show Land and Water Conservation Fund involvement in the Louis and Clark Historic Park known as Kaw Point Park 29-00559 in Kansas City Missouri.

The Riverfront Park also known as Berkley Park does not show in our records as an LWCF project. We do show a D/Riverview Park. You may want to check further to see if this is the same site.

Any further questions you may reach me at 402-661-1560.

Sincerely,

Jim Krejci
Outdoor Recreation Planner

TAKE PRIDE IN AMERICA

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Skinker, Richard A NWK

From: Chris Buckland [chris.buckland@dnr.mo.gov]
Sent: Monday, June 19, 2006 8:02 AM
To: Skinker, Richard A NWK
Subject: Re: Kansas City Levees Feasibility Study

It appears from your E-mail that this construction project will only have a temporary noise effect on Kaw Point Park. Please proceed with this project as stated below. Should this project have major changes, it is imperative that you contact our office to ensure the project will still meet a non-conversion status regarding Kaw Point Park.

Thank you for the update. Please let me know if you have questions.

Chris Buckland
DNR/DSP/PDP
Section Leader
Grants Management
P.O. Box 176
Jefferson City, MO 65102-0176
(573) 751-0848
Please note new Email
chris.buckland@dnr.mo.gov

"Skinker, Richard A NWK" <Richard.A.Skinker@nwk02.usace.army.mil>
06/16/2006 03:20 PM

To
chris.buckland@dnr.mo.gov
cc
"White, Christopher M NWK" <Christopher.M.White@nwk02.usace.army.mil>
Subject
Kansas City Levees Feasibility Study

Mr. Buckland:
For your consideration, the Kansas District is currently addressing improvements to the existing line of protection along the Kansas and Missouri Rivers. A draft Interim Feasibility Report and Environmental Impact Statement were released to the public on June 2, 2006. This study considers improvements to the Fairfax-Jersey Creek sheetpile wall, which is located between Missouri River miles +/- 367.70 to 367.86 about 0.1 miles upstream of Kaw Point Park. Kaw Point Park is listed as a Land and Water Conservation Fund project by the National Park Service. It is proposed to replace the existing sheetpiling with new sheetpiling. Sheetpile driving would be conducted from a river construction platform. Sheetpile replacement is anticipated to occur over a six- to nine month timeframe, but is not anticipated to substantially disrupt outdoor recreation. Visitors to Kaw Point Park may by subject to temporary construction noise during sheetpile driving. No post-construction noise impacts are anticipated from sheetpile wall installation. Access to the park and associated trails will not be physically impacted during construction or after construction is completed. A conversion of park property and use is not anticipated as a result of the proposed sheetpile replacement.
If you have questions or comments regarding the proposed sheetpile wall installation or any other project component please do not hesitate to contact me or Dr. Chris White, Chief, Environmental Resources Section at 816-389-3158.

Sincerely,
Richard A. Skinker
Environmental Resources Specialist
CENWK-PM-PR, Room 843
Kansas City District, U.S. Army Corps of Engineers
700 Federal Building
601 East 12th Street
Kansas City, MO 64106-2896
Phone: (816) 389-3134 Fax: (816) 389-2025
richard.a.skinker@nwk02.usace.army.mil

Appendix D

Notice of Intent, Notice of Availability, and Legal Notices

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Ground, MD 21005–5055 tel: (401) 278–5028; fax: (401) 278–5820.

SUPPLEMENTARY INFORMATION: None.

John A. Hall,

Alternate Army Federal Register Liaison Officer.

[FR Doc. 01–767 Filed 1–9–01; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army

Availability of U.S. Patents for Non-Exclusive, Exclusive, or Partially-Exclusive Licensing

AGENCY: U.S. Army Research Laboratory, Adelphi, Maryland, DoD.

ACTION: Notice.

SUMMARY: In accordance with 37 CFR 404.6, announcement is made of the availability of the following U.S. patent for non-exclusive, partially exclusive or exclusive licensing. The listed patent has been assigned to the United States of America as represented by the Secretary of the Army, Washington, DC.

This patent covers a wide variety of technical arts including: A method for determining the trajectory of a projectile.

Under the authority of section 11(a)(2) of the Federal Technology Transfer Act of 1986 (Pub. L. 99–502) and section 207 of Title 35, United States Code, the Department of the Army as represented by the U.S. Army Research Laboratory wish to license the U.S. patent listed below in a non-exclusive, exclusive or partially exclusive manner to any party interested in manufacturing, using, and/or selling devices or processes covered by this patent.

Title: Method of Passive Determination of Projectile Miss Distance.

Inventors: David B. Hills and Jonathan A. Bornstein.

Patent Number: 6,125,308.

Issued Date: September 25, 2000.

FOR FURTHER INFORMATION CONTACT: Norma Cammaratta, Technology Transfer Office, AMSRL–CS–TT, U.S. Army Research Laboratory, Adelphi, MD 20783–1197 tel: (301) 394–2952; fax: (301) 394–5818.

SUPPLEMENTARY INFORMATION: None.

John A. Hall,

Alternate Army Federal Register Liaison Officer.

[FR Doc. 01–768 Filed 1–9–01; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Intent To Prepare a Supplement to the 1992 Final Environmental Impact Statement on Modified Water Deliveries to Everglades National Park (MWD Project) To Address a Change in Design of the Levee 67 and Levee 29 Water Conveyance Features Within Water Conservation Area 3 (WCA 3), Including a Combined Operational Plan for the MWD and Canal 111 (C–111) Projects

AGENCY: U.S. Army Corps of Engineers, Department of Defense.

ACTION: Notice of intent (amendment).

SUMMARY: Reference the previous Notice of Intent published in the Federal Register of September 24, 1999 (V.64, No. 185: pages 51740–51741). The congressionally authorized MWD Project consists of structural modifications and additions to the existing C&SF Project required to improve water deliveries for ecosystem restoration of Everglades National Park (Park). The authorized plan calls for construction of six water control structures in Levee 67 (L–67) and its adjacent canal, which partition WCA 3 into two basins, WCA 3A and WCA 3B and two recently constructed structures in L–29. At the request of the local sponsor, the South Florida Water Management District (SFWMD), the Corps will be revaluating the design of the water conveyance features and addressing the need for water seepage control for WCA 3B. The authorized C–111 Project consists of Water Pumping Stations and associated canals and water detention areas within the C–111 Basin immediately south of the MWD Project limits down to tidewater. This amendment provides for the addition to the SEIS of a Combined Operational Plan for the MWD and C–111 Projects.

FOR FURTHER INFORMATION CONTACT: U.S. Army Corps of Engineers, P.O. Box 4970, Jacksonville, Florida 32232; Attn: Mr. Elmar Kurzbach, 904–232–2325.

SUPPLEMENTARY INFORMATION: 1. Alternatives to be evaluated involve combinations of gated water control structures, passive structures (fixed-crest weirs), levee removal, and canal filling to convey water from WCA 3A into WCA 3B and from WCA 3B into Northeast Shark River slough and operation of the overall system down to tidewater. Seepage control alternatives involve combinations of new operational and structural elements such as pump stations.

2. A Scoping letter and public Scoping Meeting will be used to invite comments on alternatives and issues from Federal, State, and local agencies, affected Indian tribes, and other interested private organizations and individuals.

3. The Draft SEIS will analyze issues related to recreational fishing access, WCA 3B tree island flooding, introduction of poor quality water, Everglades National Park ecosystem restoration, and agricultural and residential flood protection.

4. The alternative plans will be reviewed under provisions of appropriate laws and regulations, including the Endangered Species Act, Fish and Wildlife Coordination Act, Clean Water Act, and Farmland Protection Policy Act.

5. The Draft SEIS is expected to be available for public review in the 3rd quarter CY 2001.

Dated: December 20, 2000.

James C. Duck,

Chief, Planning Division.

[FR Doc. 01–770 Filed 1–9–01; 8:45 am]

BILLING CODE 3710–AJ–M

DEPARTMENT OF DEFENSE

Department of the Army

Intent To Prepare a Draft Environmental impact Statement (DEIS) for a Flood Damage Reduction Study, Kansas Citys, Missouri and Kansas

AGENCY: U.S. Army Corps of Engineers, Kansas City District, DoD.

ACTION: Notice of intent.

SUMMARY: the Kansas Citys, Missouri and Kansas, Local Flood Protection Project is an existing flood damage reduction project comprised of 7 existing levee units: Argentine Levee Unit; Armourdale Levee Unit; Birmingham Levee Unit; Central Industrial District (CID) Levee Unit; East Bottoms Levee Unit; Fairfax-Jersey Creek Levee Unit; and the North Kansas City Levee Unit. The purpose of this study is to consider the economic, environmental, and social impacts that may occur as a result of various alternatives being considered in a flood damage reduction study, concerning flood protection provided by the existing Kansas Citys, Missouri and Kansas, Local Flood Protection Project to determine if increases in flood protection are warranted, under the authority of Section 216 of the 1970 Flood Control Act, Kansas City, Missouri and Kansas City, Kansas.

FOR FURTHER INFORMATION CONTACT: Questions regarding the proposed study and DEIS can be answered by the Project Manager, Ronald G. Jansen, P.E., telephone number (816) 983–3258, Formulation Section, Planning Branch, U.S. Army Corps of Engineers, 700 Federal Building, 601 E. 12th Street, Kansas City, Missouri 64106–2896.

SUPPLEMENTARY INFORMATION: 1. The Kansas City District (KCD), Corps of Engineers, is undertaking a Flood Damage Reduction Study, to update and verify data on the existing level of flood protection, of the Kansas Citys, Missouri and Kansas, Local Flood Protection Project, to determine if any increases in protection are warranted, under the authority of section 216 of the 1970 Flood Control Act.

2. The Kansas Citys, Missouri and Kansas, Local Flood Protection Project is an existing flood damage reduction project which provides local flood protection for the metropolitan areas of Kansas City, Missouri and Kansas City, Kansas. The project is comprised of 7 existing levee units: Argentine Levee Unit located in Kansas City, Wyandotte County, Kansas; Armouradale Levee Unit located in Kansas City, Wyandotte County, Kansas; Birmingham Levee Unit located in Kansas City, Clay County, Missouri; Central Industrial District (CID) Levee Unit located in Kansas City, Wyandotte County, Kansas and Kansas City, Jackson County, Missouri; East Bottoms Levee Unit located in Kansas City, Jackson County, Missouri; Fairfax-Jersey Creek Levee Unit located in Kansas City, Wyandotte County, Kansas; and the North Kansas City Levee Unit located in Kansas City and North Kansas City, Clay County, Missouri. The project extends over the lower 9.5 miles of the Kansas River and on the Missouri River from 6.5 miles upstream to 9.5 miles downstream. The existing project consists principally of levees, floodwalls, bridge and approach alterations, and channel modification and alteration. The project provides protection to a 32-square-mile area of heavily urbanized floodplain at the confluence of the two rivers.

3. KCD's study will evaluate the no action alternative as well as various structural and non-structural alternatives to determine:

a. Flood damage reduction costs and benefits;

b. regional social and economic impacts; and,

c. environmental impacts and mitigation measures.

Reasonable alternatives KCD will examine include the feasibility of various structural and non-structural measures to reduce flood damage within areas protected by the existing Kansas Citys, Missouri and Kansas, Local Flood Protection Project. Structural alternatives will involve minor increases in height of the existing levee to protect, in most instances, existing urban development.

4. Scoping Process.

a. A public workshop will be held at Kansas City in Spring 2001. The exact date, time, and location of the workshop will be announced when the details are finalized. Additional workshops will be held as the study progresses to keep the public informed. Coordination meetings will be held as needed with affected/concerned local, State, and Federal governmental entities.

These workshops and meetings, as well as any meetings which were previously held regarding this project, will serve as the collective scoping process for preparation of the DEIS. No formal "scoping" meeting will be held.

Draft documents forthcoming from the study will be distributed to Federal, State, and local agencies, as well as interested members of the general public, for review and comment.

b. Significant issues to be analyzed in depth include evaluations of:

(1) level of flood protection provided by the existing flood protection project;

(2) costs and benefits associated with alternatives that increase the flood protection level of the existing flood protection project,

(3) impacts to fish and wildlife resources,

(4) recreation,

(5) cultural resources,

(6) navigation and

(7) water supply.

c. Environmental consultation and review will be conducted in accordance with the requirements of the National Environmental Policy Act of 1969, as per regulations of the Council of Environmental Quality (Code of Federal Regulations parts 40 CFR 1500–1508), and other applicable laws, regulations, and guidelines.

5. The anticipated date of availability of the DEIS for public review is August 2002.

John A. Hall,

Alternate Army Federal Register Liaison Officer.

[FR Doc. 01–769 Filed 1–9–01; 8:45 am]

BILLING CODE 3710–KN–M

DEPARTMENT OF DEFENSE

Department of Army; Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement (DEIS) for a Proposed Green Book Flood Control Project, Upper Portion of the Green Brook SubBasin of the Raritan River Basin Middlesex, Somerset and Union Counties, State of New Jersey

AGENCY: U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: The U.S. Army Corps of Engineers (USACE), New York District, announces its intent to prepare an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA), in accordance with the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA and the Department of the Army, USACE Procedures for Implementing NEPA of New Jersey. Flood protection methods for the three study areas of the Green Brook Sub-basin; the Upper Portion, the Lower Portion and the Stony Brook Portion; were previously evaluated in the USACE 1980 Environmental Impact Statement and the USACE May 1997 Final General Reevaluation Report and Supplemental Environmental Impact Statement. Action within the Upper Portion of the Sub-basin was deferred until this time based on a degree of public concern regarding previously proposed flood control plans for the Upper Portion. The USACE has initiated a Reformulation Study to evaluate reasonable solutions to flooding problems in the Upper Portion previously identified in the May 1977 GRR. In accordance with USACE policies, the Reformulation Study will evaluate a range of alternatives including nonstructural measures, channel modifications, flood control tunnels, surface diversions, and detention structures.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and draft EIS can be answered by Ms. Megan B. Grubb, (212) 264–5759, U.S. Army Engineer District, New York Planning Division, Attn: CENAN–PL–EA, 26 Federal Plaza, New York, NY 10278–0090.

SUPPLEMENTARY INFORMATION:

Background

The Green Book Sub-basin of the Raritan River Basin has been subject to frequently severe and sometimes

quality and on the bull trout spawning area under the preferred alternative. The Final EIS should evaluate additional reductions in sediment loading to West Gold Creek.

Rating EC2.

Final EISs

EIS No. 20060112, ERP No. F–OSM–D36120–PA, ADOPTION—Dents Run Watershed Ecosystem Restoration, Construction and Operation of Six Acid Mine Drainage Abatement Projects, Implementation, Benezette Township, Susquehanna River Basin, Elk County, PA.

Summary: No formal comment letter was sent to the preparing agency.

EIS No. 20060116, ERP No. F–NPS–F65076–OH, First Ladies National Historic Site General Management Plan, Implementation, Canton, OH.

Summary: EPA does not object to the proposed action.

EIS No. 20060129, ERP No. F–FRC–E03014–FL, Cypress Pipeline Project and Phase VII Expansion Project, Construction and Operation, U.S. Army COE Section 10 and 404 Permits, Northern and Central Florida.

Summary: EPA continues to have environmental concerns about impacts to wetland.

EIS No. 20060134, ERP No. F–SFW–K99034–CA, Coachella Valley Multiple Species Habitat Conservation Plan (MSHCP), Santa Rosa and San Jacinto Mountains Trails Plan, Issuance of Incidental Take Permit, Riverside County, CA.

Summary: EPA does not object to the proposed action.

Dated: May 30, 2006.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E6–8593 Filed 6–1–06; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–6675–7]

Environmental Impacts Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–7167 or *http://www.epa.gov/compliance/nepa/*.

Weekly receipt of Environmental Impact Statements

Filed May 22, 2006 through May 26, 2006 pursuant to 40 CFR 1506.9.

EIS No. 20060217, Final Supplement, COE, IL, Upper Des Plaines River, Proposed Flood Damage Reduction (Site 37 on Upper Des Plaines River), Prospect Heights, Cook County, IL, Wait Period Ends: June 26, 2006, Contact: Keith Ryder 312–846–5587

The above EIS should have appeared in FR on May 26, 2006 the Wait Period is Calculated from May 26, 2006.

EIS No. 20060218, Draft EIS, FHW, NY, Williamsville Toll Barrier Improvement Project, Improvements from New York Thruway, Interstate 90 between Interchange 48A and 50, Funding, Erie and Genesee Counties, NY, Comment Period Ends: July 17, 2006, Contact: Amy Jackson-Grove 518–431–4125.

EIS No. 20060219, Final EIS, COE, VA, Craney Island Eastward Expansion, Construction of a 580-acre Eastward Expansion of the Existing Dredged Material Management Area, Port of Hampton Roads, Norfolk Harbor and Channels, VA, Wait Period Ends: July 3, 2006, Contact: Craig Seltzer 757–201–7390.

EIS No. 20060220, Draft EIS, BLM, ID, Snake River Birds of Prey National Conservation Area, Resource Management Plan, Implementation, Ada, Canyon, Elmore, Owyhee Counties, ID, Comment Period Ends: August 17, 2006, Contact: Mike O'Donnell 208–384–3315.

EIS No. 20060221, Draft EIS, CGD, MA, Neptune Liquefied Natural Gas Deepwater Port License Application, Proposes to Construct, Own and Operate a Deepwater Port, northeast of Boston and south-southeast of Gloucester, MA, Comment Period Ends: July 17, 2006, Contact: M.A. Prescott 202–372–1451.

EIS No. 20060222, Draft EIS, COE, 00, Kansas Citys, Missouri and Kansas Flood Damage Reduction Study, Improvements to the Existing Line of Protection, Birmingham, Jackson, Clay Counties, MO and Wyandotte County, KS, Comment Period Ends: July 17, 2006, Contact: Christopher M. White 816–389–3158.

EIS No. 20060223, Draft EIS, FRC, 00, Carthage to Perryville Project, Construction and Operation of a Natural Gas Pipeline Facilities, CenterPoint Energy Gas Transmission, Located in various counties and parishes in eastern Texas and northern Louisiana, Comment Period Ends: July 17, 2006, Contact: Todd Sedmak 1–866–208–3372.

EIS No. 20060224, Final EIS, GSA, WA, Peace Arch Port of Entry Redevelopment Project, Improvements to Security, Safety and Functionality, Canadian Border in Blaine, Whatcom County, WA, Wait Period Ends: July 3, 2006, Contact: Michael Levine 253–931–7263.

EIS No. 20060225, Final EIS, BLM, NV, Sheep Complex, Big Springs and Owyhee Grazing Allotments Sensitive Bird Species Project, Determine Impacts of Livestock Grazing, Elko County, NV, Wait Period Ends: July 3, 2006, Contact: Bryan Fuell 775–753–0200.

EIS No. 20060226, Final EIS, FHW, CA, Lincoln Bypass Construction, South of Industrial Boulevard to North of Riosa Road, Funding and U.S. Army COE Section 404 Permit, Issuance, Placer County, CA, Wait Period Ends: July 5, 2006, Contact: Maiser Khaled 916–498–5020.

EIS No. 20060227, Draft EIS, COE, 00, White River Minimum Flood Study, Manages the Water and Land Areas at Five Reservoirs: Beaver, Table Rock, Bull Shoals, Norfork and Greers Ferry, Little Rock District, AR and MO, Comment Period Ends: July 17, 2006, Contact: Mike Biggs 501–324–5842.

EIS No. 20060228, Final Supplement, COE, MA, Boston Harbor Inner Harbor Maintenance Dredging Project, Updated Information, Boston Harbor, Mystic River and Chelsea River, MA, Wait Period Ends: July 3, 2006, Contact: Michael F. Keegan 978–318–8087.

Amended Notices

EIS No. 20060132, Draft EIS, AFS, ID, White/White Analysis Project, Proposes Vegetative Management and Watershed Improvement, Lolo Creek, Chamook Creek, White Creek, Mike White Creek, Nevada Creek, and Utah Creek, Lochsa Ranger District, Clearwater National Forest, Idaho and Clearwater County, ID, Comment Period Ends: June 15, 2006, Contact: Steve Bess 208–926–4274.

Revision to FR Notice Published April 14, 2006: Comment Period Extended from May 30, 2006 to June 15, 2006.

EIS No. 20060183, Final EIS, FAA, UT, St. George Municipal Airport Replacement, Funding, City of St. George, Washington County, UT, Wait Period Ends: July 3, 2006, Contact: T.J. Stetz 425–227–2611.

Revision to **Federal Register** Notice Published May 19, 2006: Wait Period Extend from June 19, 2006 to July 3, 2006.

EIS No. 20060190, Final EIS, AFS, MI, Ottawa National Forest, Proposed Land and Resource Management Plan, Forest Plan Revision, Implementation, Baraga, Gogebic, Houghton, Iron, Marquette and Ontonagan Counties,

AFFIDAVIT OF PUBLICATION

THE KANSAS CITY STAR COMPANY, publishers of THE KANSAS CITY STAR, a newspaper published in the City of Kansas City, County of Jackson, State of Missouri, confirms that the notice and/or advertisement of

US ARMY CORP OF ENGINEERS
ATTN MATTHEW VANDENBERG
700 FEDERAL BUILDING
KANSAS CITY MO 64106
24172028

3893146

a true copy of which is hereto attached, was duly published in the above said newspaper

FOR THE PERIOD OF: 1 Day (s)

COMMENCING: July 2,2006

ENDING: July 2,2006

STAR EDITION (S): 7/2/

STAR PAPER (S): 188

VOLUME: #126

Subscribed and sworn to before me, this Monday, 03 July, 2006 .
I certify that I was duly qualified as a Notary Public for the State of Missouri, commissioned in Jackson County, Missouri. My commission expires August 18, 2006.

Laura S. Keeling

Laura S. Keeling, Notary

LEGAL NOTICE

Notice of Public Meeting for U.S. Army Corps of Engineers Draft Environmental Impact Statement and Kansas City Levees Feasibility Study on July 13th 2006 starting at 6:30 p.m. at the Jack Reardon Convention Center, 500 Minnesota Ave, Kansas City, Kansas.

The Draft Environmental Impact Statement (DEIS) and the Kansas City Levees Feasibility Study examine alternatives and a proposed plan for improvements to the existing levee system aimed at reducing flood risk and improving levee reliability in the Kansas City metropolitan area.

The Kansas City Local Flood Protection Project is an existing flood damage reduction project comprised of seven levee units: Argentine Unit; Armourdale Unit; Birmingham Unit; Central Industrial District Unit; East Bottoms (Northeast Industrial District) Unit; Fairfax-Jersey Creek Unit; and the North Kansas City Unit.

The seven levee system provides flood protection to about 32 square miles of mostly urban, industrial, commercial and some residential property adjacent to the Kansas and Missouri Rivers in the Kansas City metropolitan area. Businesses in the protected area provide employment for approximately 90,000 individuals. In addition, the protected area has over 19,000 residents.

Individuals, organizations, and agencies may participate by attending the public meeting or by emailing comments on the DEIS to Dr. Christopher White at Christopher.m.white@nwk02.usace.army.mil, by mail to Kansas City District, Corps of Engineers, 601 E. 12th Street, Kansas City, Missouri 64106-2896, and by phone 816-389-3158 prior to July 17, 2006. The DEIS may be viewed at local libraries or downloaded on the Internet at http://www.nwk.usace.army.mil/projects/7levees.

Affidavit in Proof of Publication

STATE OF KANSAS
Douglas County

Erika Gray of the Legal Dept. of the Lawrence Daily Journal-World being first duly sworn, deposes and says:

That this daily newspaper printed in the State of Kansas, and published in and of general circulation in Douglas County, Kansas, with a general paid circulation on a daily basis in Douglas County, Kansas, and that said newspaper is not a trade, religious or fraternal publication, and which newspaper has been admitted to the mails as periodicals class matter in said County, and that a notice of which is hereto attached, was published in the regular and entire issue of the Lawrence Daily Journal-World.

Said newspaper is published daily 365 days a year; has been so published continuously and uninterruptedly in said county and state for a period of more than five years prior to the first publication of said notice and been admitted at the post office of Lawrence in said County as second class matter.

That the attached notice is a true copy thereof and was published in the regular and entire issue of said newspaper for 1 consecutive days/weeks the first publication thereof being made as aforesaid on 07/02/2006 with publications being made on the following dates:

07/02/2006

Erika Gray

Subscribed and sworn to before me this 7-3-06

Notary Public

My Appointment expires 3-15-2007

NOTARY PUBLIC
My Appt. Expires
STATE OF KANSAS

Publication Charges	$80.40
Notary And Affidavit	$3.00
Additional Copies	$0.00
	$83.40

(First published in the Lawrence Daily Journal-World July 2, 2006)

LEGAL NOTICE

Notice of Public Meeting for U.S. Army Corps of Engineers Draft Environmental Impact Statement and Kansas City Levees Feasibility Study on July 13th, 2006, starting at 6:30 p.m., at the Jack Reardon Convention Center, 500 Minnesota Ave., Kansas City, Kansas.

The Draft Environmental Impact Statement (DEIS) and the Kansas City Levees Feasibility Study examine alternatives and a proposed plan for improvements to the existing levee system aimed at reducing flood risk and improving levee reliability in the Kansas City metropolitan area.

The Kansas City Local Flood Protection Project is an existing flood damage reduction project comprised of seven levee units: Argentine Unit; Armourdale Unit; Birmingham Unit; Central Industrial District Unit; East Bottoms (Northeast Industrial District) Unit; Fairfax-Jersey Creek Unit; and the North Kansas City Unit.

The seven levee system provides flood protection to about 32 square miles of mostly urban, industrial, commercial and some residential property adjacent to the Kansas and Missouri Rivers in the Kansas City metropolitan area. Businesses in the protected area provide employment for approximately 90,000 individuals. In addition, the protected area has over 19,000 residents.

Individuals, organizations, and agencies may participate by attending the public meeting or by emailing comments on the DEIS to Dr. Christopher White at Christopher.m.white@nwk02.usace.army.mil, by mail to Kansas City District, Corps of Engineers, 601 E. 12th Street, Kansas City, Missouri 64106-2896, and by phone 816-389-3158 prior to July 17, 2006. The DEIS may be viewed at local libraries or downloaded on the Internet at http://www.nwk.usace.army.mil/projects/7levees.

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Appendix E

DEIS Comments and Responses

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Agency and Tribal Government Letters

From: RBeilfus@kdhe.state.ks.us [mailto:RBeilfus@kdhe.state.ks.us]
Sent: Friday, July 21, 2006 9:41 AM
To: White, Christopher M NWK
Cc: SSattert@kdhe.state.ks.us; DCarlson@kdhe.state.ks.us; DSnethen@kdhe.state.ks.us
Subject: KDHE Bureau of Water Comments on Kansas City Levees Feasibility Study

Dr. White:

On behalf of KDHE's Bureau of Water, I would like to offer the following comments on the Kansas City Levees Feasibility Study.

1) If the proposal involves construction activities that result in disturbing 1 acre or more, the project owner needs to file s National Pollutant Discharge Elimination System (NPDES) permit application for stormwater runoff resulting from construction activities to KDHE. Any questions regarding the required permitting should be directed to Joe Mester at (785) 296-6804. 1

2) Any work conducted around municipal , commercial, or industrial storm sewer outlets or wastewater outlets needs to be closely coordinated with the facility owner to ensure operations are not interrupted. 2

3) Any work conducted around or near an industrial or municipal water intake needs to be closely coordinated with the owner to ensure that operation/use is not interrupted. 3

4) Watershed Restoration and Protection Strategy (WRAPS) development projects have been proposed for the Lower Kansas and Missouri river basins. The goal of a WRAPS development project is to identify key watershed stakeholders, document watershed issues of concern, and form a watershed stakeholder group to lead future WRAPS activities. These proposed WRAPS project are likely to begin during FFY 2007. The Corp would be considered a key stakeholder within these basins and they are encouraged to participate in the WRAPS process. For more information about the Lower Kansas river WRAPS project, please contact Tim Christian with the Kansas Alliance for Wetlands and Streams (KAWS) at (620) 241-3636. For more information about the Missouri river WRAPS project, please contact Gary Satter with the Glacial Hills RC&D at (785) 945-6292. 4

5) High priority TMDL concerns within the Kansas and Missouri basins include bacteria, eutrophication (excess nutrients), and sedimentation. The Watershed Management Section recommends the following water quality protection measures to address these TMDL concerns:

A) Protect and enhance riparian vegetation (buffers) and wetlands along rivers and tributaries to filter nonpoint source pollutants from adjacent uplands and stabilize streambanks.
B) Stabilize sloughing streambanks and , where feasible, reconnect rivers and tributaries to their flood plains and wetlands. This will allow flood waters to deposit sediment in flood plains and encourage nutrient uptake by riparian vegetation. 5

Rob J. Beilfuss
Kansas Department of Health and Environment Bureau of Water Watershed Management Section 1000 SW Jackson St., Suite 420 Topeka, Ks. 66612-1367
Phone:785-296-5535
Fax:785-296-5509
E-mail:rbeilfus@kdhe.state.ks.us

1 The Corps will obtain the NPDES prior to construction.

2 Noted

3 Noted

4 The Corps is currently working through the Kansas Water Office as a stakeholder on the state's WRAPS program. Contacts have been identified between the states and the Corps and the Corps plans to continue as a stakeholder through the water quality and watershed planning programs, which includes the Kansas City levees project area.

5 The Corps incorporates BMPs for erosion and pollution control measures during all construction activities.

From: Richard Allen [mailto:Richard Allen@kcmo.org]
Sent: Tuesday, July 18, 2006 2:18 PM
To: White, Christopher M NWK
Cc: Richard C Coleman
Subject: Levee Project

Dr White,

I received a copy of the announcement for the environmental impact study for future improvement to the seven existing Levees in the Kansas City Area.. The project looks like it includes the seven existing levee areas.
We support the concept for using levees for trails. I worked in Manhattan Kansas for 9 years for their Parks and Recreation Department where they had roughly 5 miles of levee trail on the Linear Park Trail. This was before the 1993 flood and no problems occurred as result of the trails on the levee system. 1

Is there plans for levee work on the Blue River? We would like trails on any future levees plan on the Blue River Greenway and other levees in the Kansas City Area. We also have concerns that the levee system at Blue River and 71 hwy and future sections may negatively impact areas of Swope Park along the Blue River. 2

You may call me at 513-7713.

Thank you.

Richard Allen
Landscape Architect

1 The authorized channel modifications are located along 12.5 miles of the Blue River in Kansas City, Missouri, from the mouth of the Missouri River to 63rd Street. The project consists of widening the channel with a combination of concrete paving, rock or stone protected slopes and grass slopes. The Blue River Greenway Master Plan Phase I Report completed in January 2005 incorporates trail planning as a component of the overall greenway plan of the authorized project area. A separate report also documents a conceptual route for a trail from Swope Park to Truman Road. As part of the Corps planning process, stakeholders and agencies will be notified and consulted regarding any future plans along the Blue River in the Swope Park area.

2 As part of the Corps planning process, stakeholders and agencies will be notified and consulted regarding any future plans along the Blue River in the Swope Park area.

From: Rudy Reynolds [mailto:Reynolds@ksdot.org]
Sent: Monday, July 17, 2006 4:03 PM
To: White, Christopher M NWK; NPS@kdhe.state.ks.us
Cc: Kenneth Hurst
Subject: PERMIT 200601672 DATED 02JUN06- PUBLIC NOTICE OF LEVEE IMPROVEMENTS-KANSAS CITY DISTRICT-SECTION 401 WATER QUALITY CERTIFICATION

USACOE: Gentlemen please consider this E-Mail as written response to the Public Notice noted above.

The Kansas Department of Transportation (KDOT) endorses the efforts to maintain and upgrade flood control levees in the Kansas City Area. We have no adverse comments on the proposed project.

Please be aware that KDOT has an interest in the proposed project and as a concerned stakeholder in public infrastructure requests that the Agency (KDOT) be included in future notifications, reports, and development of construction plans for the proposed levee projects. 1

Robert R.Reynolds, P.E.
Senior Squad Leader, State Bridge Office
700 S.W. Harrison St. Topeka, KS66603-3754
785-296-4398 reynolds@ksdot.org

1 Noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

Dr. Christopher M. White
Kansas City Levees Project
Kansas City District, Corps of Engineers
601 E. 12th Street, Room 843
Kansas City, Missouri 64106-2896

JUL 17 2006

Dear Dr. White,

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Kansas City Levees Project. Our review is provided pursuant to the National Environmental Policy Act (NEPA) 42 U.S.C. 4231, Council on Environmental Quality (CEQ) regulations 40 C.F.R. Parts 1500-1508, and Section 309 of the Clean Air Act (CAA). The DEIS was assigned the Council on Environmental Quality (CEQ) number 20060222.

Based on our overall review and the level of our comments, the EPA has rated the DEIS for this project LO (Lack of Objections). This rating indicates that EPA's review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

Although the majority of the levee sites were thoroughly investigated for contamination and appropriately avoided or mitigated, the CID unit is known to contain hazardous waste contamination and until the analysis in completed, potential impacts exist. Therefore, EPA recommends that the hazardous waste investigation be completed for the Central Industrial District (CID) Levee unit prior to the final EIS, and that the findings of that investigation be considered in selecting the preferred alternative for this specific levee improvement. 1

Also, we recommend that the Final Environmental Impact Statement (FEIS) include the hazardous waste descriptions for both the Armourdale, and the CID units within the Hazardous Waste Management section (DEIS Section 3.1.7). Although both of these sites receive varying degrees of coverage on HTRW considerations elsewhere in the DEIS (noting that CID information deficiencies could be important to preferred alternative selection and mitigation needs), they are not described within section 3.1.7. 2

We appreciate having the opportunity to work with the Kansas City District in a formal Cooperating Agency role, and to provide comments regarding this project and your DEIS. If you have any questions or concerns, please contact Kim Johnson at (913) 551-7975.

Sincerely,

Joseph E. Cothern
NEPA Team Leader
Environmental Services Division

1 Additional hazardous waste investigations for the Armourdale and CID units will be conducted during phase II of the project. The findings of the investigations will be considered in selecting the preferred alternative for these levee units.

2 The FEIS will include all of the information available regarding the hazardous waste descriptions for the Armourdale and CID units. Information located in sections 4.8.7 and 4.8.8 of the DEIS will be moved to section 3.1.7 of the FEIS.

From: Don Boos [mailto:don.boos@dnr.mo.gov]
Sent: Monday, July 17, 2006 10:54 AM
To: White, Christopher M NWK
Cc: Hansen, Rick MVS; stuart.miller@mdc.mo.gov; Carl Stevens; Shannon Bruns
Subject: RE: Army Corps of Engineers, Kansas City District, PN06-01672/CEK001096

The Missouri Department of Natural Resources' Water Protection Program has reviewed Public Notice No. PN06-01672/CEK001096 in which the purpose is to determine whether or not one or more plans for improvements to the existing levee system aimed at reducing flood risk and improving levee reliability is technically viable, economically feasible, and environmentally acceptable, or if no action is warranted. Failure of any part of the existing flood damage reduction system during a major flood would have significant adverse impacts on the human environment including property damage and potential loss of human life. Considering these potential significant impacts on the human environment, and in accordance with the National Environmental Policy Act, the Corps initiated preparation of a Draft Interim Feasibility Report and Draft Environmental Impact Statement (DIFR/DEIS). The Draft Interim Feasibility Report (DIFR) and DEIS presents an analysis of several alternatives considered during scoping and a detailed analysis of each levee unit to determine what action, or if any action, is warranted to minimize the potential loss of human life and property damage related to failure of the levee system in the event of a major flood. Proposed alternatives identified to improve flood damage reduction reliability include, but are not limited to: earthen levee raise, pump station modifications, floodwall replacement, stoplog gaps, top caps, rock toes, pressure relief wells, floodwall modification using buttresses, new sheetpile wall, buried collector system, and the no action alternative. This DIFR/DEIS identifies a combination of measures as the Corps' Recommended Plan and presents an analysis of the environmental impacts associated with the alternatives listed above.

A jurisdictional wetland determination concluded that 3 wetlands would be affected by the proposed project for a total impact of 0.2 acre.

The proposed project is the existing levee system which protects areas in the Cities of Kansas City, North Kansas City and Birmingham, Jackson and Clay Counties, Missouri, and the City of Kansas City, Wyandotte County, Kansas.

We offer the following comments:

1. This is a very extensive project with the potential to impact a substantial amount to the waters of the state. Best Management Practices should be followed in order to prevent soil erosion and sediment from entering waters of the state. | 1

2. There should be no filling of jurisdictional springs or springs with connectivity to a jurisdictional stream. | 2

3. Care should be taken to keep machinery out of the waterway as much as possible. Fuel, oil and other petroleum products, equipment and any solid waste shall not be stored below the ordinary high water mark (OHWM) at any time or in the adjacent floodway | 3

1 The Corps incorporates BMPs for erosion and pollution control measures during all construction activities.

2 No springs are anticipated to be filled as a result of this project.

3 Noted.

beyond normal working hours. All precautions should be taken to avoid the release of wastes or fuel to streams and other adjacent waterbodies as a result of this operation.

4. Clearing of vegetation/trees should be the minimum necessary to accomplish the activity. 4

5. The riparian area, banks, etc., should be restored to a stable condition to protect water quality as soon a possible. Seeding/planting of native vegetation, mulching and needed fertilization shall be within three days of final contouring, or as soon as possible as seasonal timing permits. On-site inspections of these areas shall be conducted by the permittee as necessary to ensure successful revegetation and stabilization and to ensure that erosion and deposition of soil in waters of the state is not occurring from this project. 5

6. Only clean fill or other type of materials should be used with department approval. 6

7. Work should be conducted during low flow whenever possible. 7

8. Channel modifications should not be conducted as part of this project because of cumulative impacts to watersheds, including flooding, bank instability, loss of aquatic habitat (pool and riffle complexes), bed degradation, loss of storm water retention and loss of riparian areas. Channel modifications are any activities that alter the width, depth, length, and/or sinuosity of a waterway. This would include, but is not limited to, moving/relocation, shortening, cutting off, straightening, widening or modifying the cross section of or fills in a stream channel, whether natural or previously altered. This would not include bank sloping activities on the bank being stabilized. Excavation of the opposite bank of the stabilization project or the stream channel bed for the purpose of redirecting flow are considered channel modification activities. 8

9. There should be no net loss of aquatic habitat for any project that permanently impacts and/or destroys aquatic habitat. 9

10. Mitigation should consist of approximately 0.21 acre. A detailed mitigation plan should be submitted to the Missouri Department of Natural Resources' Water Protection Program. 10

11. The following materials are not suitable for bank stabilization and should not be used to their potential to cause violations of the general criteria of the Water Quality Standards, 10 CSR 20-7.031 (A) – (H): 11
a. Earthen fill, gravel, broken concrete where the majority of material is less than 12 inches in diameter, and fragmented asphalt, since these materials are usually not substantial enough to withstand erosive flows;
b. Concrete with exposed rebar;
c. Tires, vehicles or vehicle bodies, construction or demolition debris are solid waste and are excluded from placement in the waters of the state; and
d. Liquid concrete, including grouted riprap, if not placed as part of an engineered structure.

Recycled concrete may be used provided that it is clean material broken into appropriately sized pieces (greater than 12 inches) of riprap with no protruding rebar.

Thank you for the opportunity to comment on this proposed project. If you have any questions, please contact Shannon Bruns of the NPDES Permits and Engineering Section at (573) 526-1535.

SB:pc

4 Noted.

5 Riparian areas and banks will be stabilized during the construction phase. Inspections will be conducted.

6 Only clean fill will be used.

7 Construction activities will occur during times of low flow.

8 Channel modifications are not a component of Phase I activities.

9 No net loss is expected with this project.

10 The 0.21 mitigation acreage is located in Kansas and the Corps plans to follow the appropriate guidelines.

11 Noted.

United States Department of the Interior

TAKE PRIDE IN AMERICA

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
Post Office Box 25007 (D-108)
Denver, Colorado 80225-0007

July 6, 2006

9043.1
ER 06/0587

Dr. Christopher M. White
Kansas City District, Corps of Engineers
601 East 12th Street
Kansas City, Missouri 64106-2896

Dear Dr. White:

The Department of the Interior (Department) has reviewed the Department of the Army, Corps of Engineers' (Corps) Draft Environmental Impact Statement (DEIS) for the Flood Damage Reduction Study, Missouri and Kansas River, and offers the following comments.

SPECIFIC COMMENTS

Page 21, Section 3.1.2, Water Resources and Water Quality

The section would be improved by a discussion of ground-water resources, most importantly the relation between ground water and surface water (whether the rivers are gaining or losing) and the direction of ground-water flow. This discussion would enhance the public's understanding of the potential impacts of the various strategies on contaminant movement described later in the DEIS. 1

Page 51, Section 4.3.2, East Bottoms Levee Unit Alternative, Lines 2469–2470

The DEIS states that relief wells will be located away from known contaminant plumes. However, not being located in an area of a known contaminant plume is different than being located in an area known to be free of contamination, i.e., the condition of the area could be unknown (and assumed uncontaminated), or sampling could confirm that the area is free from contamination before the wells are installed. If sampling is to be conducted before siting the relief wells, the water-quality sampling effort should be described in the draft EIS. Similarly, ground-water sampling to aid in the citing of the relief wells should be described in Section 4.3.6, North Kansas City Levee Unit - National Starch Site Alternative, lines 2528–2529. 2

1 Groundwater information was added to section 4.3.

2 Information regarding the presence/absence of contamination and sampling was added to sections 4.3.2 and 4.3.6.

KANSAS

DEPARTMENT OF WILDLIFE AND PARKS — KATHLEEN SEBELIUS, GOVERNOR

7-9-2006

Dr. Chris White
Environmental Section Chief
Kansas City District, Corps of Engineers
Room 843, PM_PR
601 E. 12th Street
Kansas City, MO 64106-2896

Track: 20060411
WY
Ref: D1.0500

Dear Dr. White:

We have reviewed PN #200601672, a Draft EIS related to the upgrades to levee system projects in the Kansas City area of Wyandotte County, KS, as well as in the State of Missouri. Proposed alternatives include earthen levee raise, pump station modifications, floodwall replacement, stop log gaps, top caps, and rock toes, pressure relief wells, floodwall modification using buttresses, new sheetpile walls, buried collector system, and no action. The project was reviewed for potential impacts on crucial wildlife habitats, current state-listed threatened and endangered wildlife species, and public recreation areas for which this agency has some administrative authority.

A joint response was developed between KDWP and the USFWS in regards to the project on May 3, 2006 identifying resource concerns related to the alternatives proposed. We would like to remind the Corps that KDWP has permitting authority over projects that impact habitats for state-listed species under state statutes of the Kansas Nongame and Endangered Species Conservation Act of 1975 and it is the project sponsor's responsibility to contact our office for a permit application if impacts to Threatened or Endangered species are anticipated. Please review our website for information on these species and their critical habitats http://www.kdwp.state.ks.us/news/other_services/threatened_and_endangered_species.

Of primary concern would be removal of perch or roost trees for the Bald Eagle (T), and any disturbance to the bed or banks of the Kansas or Missouri Rivers that may impact habitat for fish species including the Flathead Chub, Sturgeon Chub, Pallid Sturgeon, Sicklefin Chub, Silverband Shiner, and western Silvery Minnow. 1

Thank you for the opportunity to provide these comments and recommendations.

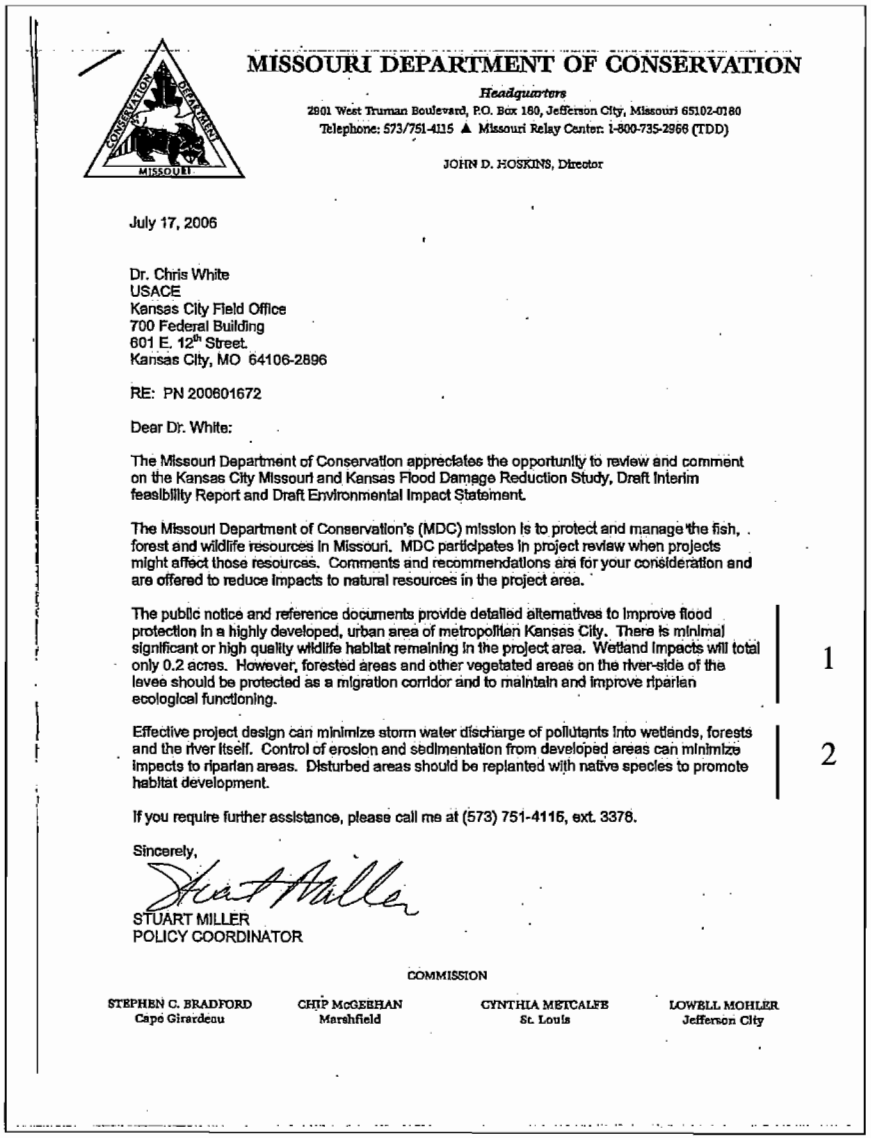
Sincerely,

Nate Davis, Aquatic Ecologist
Environmental Services Section

xc: KDWP Reg FW Sup, Wolfe
KDHE, Mueldener
USFWS, LeValley
USEPA, Mulder

Pratt Operations Office
512 SE 25th Ave., Pratt, KS 67124-8174
Phone 620-672-5911 Fax 620-672-6020 www.kdwp.state.ks.us

1 Removal of riparian trees will be minimized and site inspection prior to construction will be conduct to ensure compliance with the Endangered Species Act for protection of the Bald Eagle.



MISSOURI DEPARTMENT OF CONSERVATION

Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180

Telephone: 573/751-4115 ▲ Missouri Relay Center: 1-800-735-2966 (TDD)

JOHN D. HOSKINS, Director

July 17, 2006

Dr. Chris White
USACE
Kansas City Field Office
700 Federal Building
601 E. 12th Street.
Kansas City, MO 64106-2896

RE: PN 200601672

Dear Dr. White:

The Missouri Department of Conservation appreciates the opportunity to review and comment on the Kansas City Missouri and Kansas Flood Damage Reduction Study, Draft Interim Feasibility Report and Draft Environmental Impact Statement.

The Missouri Department of Conservation's (MDC) mission is to protect and manage the fish, forest and wildlife resources in Missouri. MDC participates in project review when projects might affect those resources. Comments and recommendations are for your consideration and are offered to reduce impacts to natural resources in the project area.

The public notice and reference documents provide detailed alternatives to improve flood protection in a highly developed, urban area of metropolitan Kansas City. There is minimal significant or high quality wildlife habitat remaining in the project area. Wetland impacts will total only 0.2 acres. However, forested areas and other vegetated areas on the river-side of the levee should be protected as a migration corridor and to maintain and improve riparian ecological functioning. 1

Effective project design can minimize storm water discharge of pollutants into wetlands, forests and the river itself. Control of erosion and sedimentation from developed areas can minimize impacts to riparian areas. Disturbed areas should be replanted with native species to promote habitat development. 2

If you require further assistance, please call me at (573) 751-4115, ext. 3378.

Sincerely,

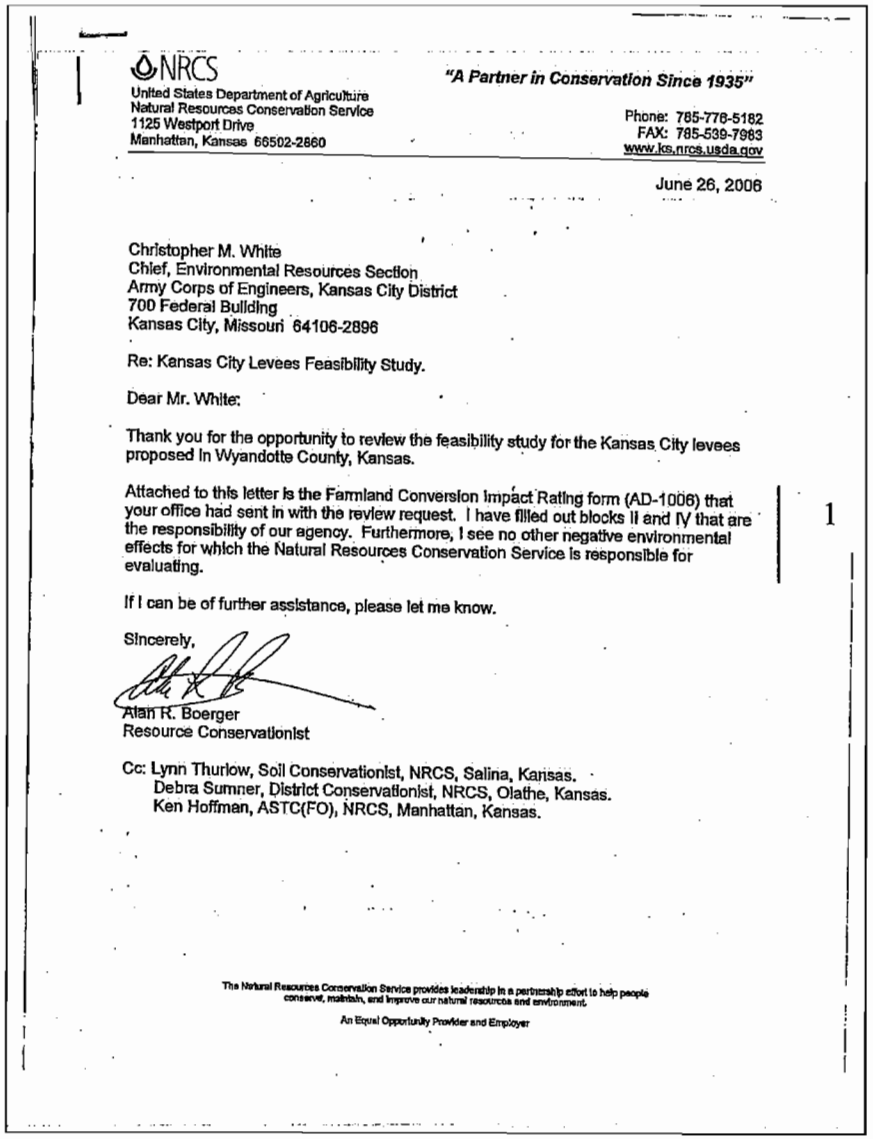
STUART MILLER
POLICY COORDINATOR

COMMISSION

STEPHEN C. BRADFORD, Cape Girardeau — CHIP McGEEHAN, Marshfield — CYNTHIA METCALFE, St. Louis — LOWELL MOHLER, Jefferson City

1 Efforts will be taken to protect riparian habitat during construction.

2 The Corps incorporates BMPs for erosion and pollution control measures during all construction activities.



NRCS
United States Department of Agriculture
Natural Resources Conservation Service
1125 Westport Drive
Manhattan, Kansas 66502-2860

"A Partner in Conservation Since 1935"

Phone: 785-776-5182
FAX: 785-539-7983
www.ks.nrcs.usda.gov

June 26, 2006

Christopher M. White
Chief, Environmental Resources Section
Army Corps of Engineers, Kansas City District
700 Federal Building
Kansas City, Missouri 64106-2896

Re: Kansas City Levees Feasibility Study.

Dear Mr. White:

Thank you for the opportunity to review the feasibility study for the Kansas City levees proposed in Wyandotte County, Kansas.

Attached to this letter is the Farmland Conversion Impact Rating form (AD-1006) that your office had sent in with the review request. I have filled out blocks II and IV that are the responsibility of our agency. Furthermore, I see no other negative environmental effects for which the Natural Resources Conservation Service is responsible for evaluating. 1

If I can be of further assistance, please let me know.

Sincerely,

Alan R. Boerger
Resource Conservationist

Cc: Lynn Thurlow, Soil Conservationist, NRCS, Salina, Kansas.
Debra Sumner, District Conservationist, NRCS, Olathe, Kansas.
Ken Hoffman, ASTC(FO), NRCS, Manhattan, Kansas.

The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

An Equal Opportunity Provider and Employer

1 NRCS correspondence and the Farmland Conversion Impact Rating form have been included in the administrative record.

U.S. Department of Homeland Security

United States Coast Guard

Captain of the Port
Sector Upper Mississippi River

1222 Spruce Street, Suite 8.104E
St. Louis, MO 63129
Staff Symbol CPREV
Phone: (314) 269-2500
Fax: (314) 269-2742
Email: Patrick.w.clark@uscg.mil

16000
July 14, 2006

Christopher M. White, Ph.D.
Kansas City Levees Project
Kansas City District, Corps of Engineers
601 E. 12th Street, Room 843
Kansas City, Missouri 64106-2896

Dear Sir:

We have reviewed the Draft Environmental Impact Statement and Draft Interim Feasibility Report (DEIS/DIFR) and have no navigational concerns with the proposed plan.

If you have any questions please feel free to contact LCDR Patrick Clark at 314-269-2500.

Sincerely,

S. E. ENGLEBERT
Captain
U.S. Coast Guard

Copy: Reader File

U.S. Department
Of Transportation

Federal Aviation Administration

Central Region
Iowa, Kansas
Missouri, Nebraska

901 Locust
Kansas City, Missouri 64106-2325

June 19, 2006

Mr. Christopher M. White, Ph.D.
Kansas City Levees Project
Kansas City District, Corps of Engineers
601 E. 12th Street
Kansas City, MO 64106-2896

Dear Mr. White:

The Federal Aviation Administration (FAA) reviews other federal Agency environmental from the perspective of the FAA's area of responsibility; that is, whether the proposal will have effects on aviation and other FAA responsibilities. We generally do not provide comments from an environmental standpoint. Therefore, we have reviewed the material furnished with the June 2, 2006, transmittal letter, concerning the Flood Damage Reduction Study, Missouri and Kansas Rivers, and have no comments regarding environmental matters.

However, we remind you that you will need to consider whether or not the project will require formal notice and review from an airspace standpoint. The requirements for this notice may be found in Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace. This regulation is contained under Subchapter E, Airspace of Title 14 of the Code of Federal Regulations. We would like to remind you that if any part of the project exceeds notification criteria under FAR Part 77, notice should be filed at least 30 days prior to the proposed construction date. Questions concerning this matter should be directed to Ms. Brenda Mumper at (816) 329-2524.

1

Sincerely,

Mark H. Schenkelberg, P.E.
Environmental Program Manager

1 Noted

300 Rivergate Center
600 Broadway
Kansas City, Missouri 64105-1554

816/474-4240
816/421-7758 FAX
www.marc.org

MARC
Mid-America Regional Council

Friday, July 14, 2006

Dr. Christopher White
U.S. Army Corps of Engineers
Kansas City District
601 East 12th Street
Kansas City, MO 64106-2896

Dear Dr. White:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement and Kansas City Levees Feasibility Study. The Mid-America Regional Council has a keen interest in the development of trails along the Missouri and Kansas Rivers. We understand that numerous comments have been given in support of recreational trails on the levees. We believe that recreational tails on the levees can be accomplished while maintaining a high degree of levee integrity and pubic safety. Ample precedents for this work may be found within other Corps districts, many of which address concerns about trail users on levees.

We applaud the decision of the Kansas City District Corp office to provide technical assistance to levee districts and support dialogue between levee unit sponsors and trail proponents.

This kind of commitment will be necessary as the region continues to develop over 1000 miles of trails through the MetroGreen plan. The levees represent the backbone of this system and important links to future river crossings. In 20005, TTPC formed the River Crossing Task Force to develop policy recommendations concerning bicycle and pedestrian accommodations on projects that span the Kansas and Missouri Rivers within MARC's jurisdiction. The River Crossing Task Force represented a diverse group of 32 organizations. A MARC Policy on Bicycle and Pedestrian Accommodation on Missouri and Kansas River Bridges was adopted by the MARC Board on April 25, 2006. 1

In response to the adopted policy and input on I-29/I-35 Paseo Corridor Draft Environmental Impact Statement (EIS), the Missouri Department of Transportation (MoDOT) is directing consultants to study the feasibility of bicycle/pedestrian crossings for the Missouri River. As future bicycle and pedestrian crossings become reality the importance of trails on levees will increase.

We thank you for your consideration of our interests, and would be more than happy to discuss these and other issues with you in greater detail at any time. MARC has a keen interest in working with all stakeholders to see the levees opened to trail use as soon as possible.

Sincerely,

Tom Jacobs
Manager, Environmental Programs

Chair
Dr. Charles A. Eddy
Councilman
Kansas City, MO

1st Vice Chair
Carol Marinovich
Mayor/CEO
Unified Government of Wyandotte County/ Kansas City, KS

2nd Vice Chair
Gary Mallory
Presiding Commissioner
Cass County, MO

Treasurer
Tom Brown
Commissioner
Clay County, MO

Secretary
Ronald Shaffer
Mayor
Prairie Village, KS

Executive Director
David A. Warm

1 This project does not preclude the future development of trails.

Matt Blunt, Governor • Doyle Childers, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

JUL 17 2006

Dr. Christopher M. White
Kansas City District, Corps of Engineers
601 East 12th Street
Kansas City, Missouri 64106-2896

Attn: Kansas City Levee DEIS/DIFR

Dear Dr White:

Thank you for providing an opportunity for our department to review Draft Interim Feasibility Report (DIFR) and Draft Environmental Impact Statement (DEIS) for the Flood Damage Reduction Study and to provide comments.

The proposed levee project protects an estimated $16 billion of investments and resources and includes a power plant, an airport, key rail yards and main line track, essential roadways and bridges, oil and gas pipelines and storage facilities, and other vital energy, industrial and commercial infrastructure. Failure of the levee system would have adverse and possibly catastrophic impact on this essential infrastructure. For these reasons, the department agrees that action should be taken to strengthen the levee system.

In the DEIS, the Corps acknowledges that the Missouri River and Blue River are listed on the 303(d) list of impaired waters for the protection of warm water aquatic life and human health risks associated with fish consumption advisories due to contaminants in fish tissue (chlordane and PCBs). The Blue River segment within the project area is 303(d) listed as impaired due to excessive levels of chlordane. The Missouri Clean Water Commission classified the Blue River as a "Metropolitan No-Discharge Stream" in 1967 and has prevented new point sources from being permitted to discharge into the river, although existing discharges continue to be permitted. The department anticipates no significant impacts to water quality. The DEIS acknowledges that there is a low probability for the inadvertent loss of a small amount of soil into the adjacent waterway. The department acknowledges the Corps' evaluation of compliance with Sections 401/404 of the Clean Water Act and plans to pursue appropriate water quality and land disturbance permits.

Recycled Paper

The department endorses the Corps' intention to use best management practices as proposed in the DEIS, such as temporary controls to minimize erosion and sediment runoff from construction areas and the grading and seeding of disturbed areas upon the completion of construction. These practices help to prevent the introduction of sediment and construction debris into the adjacent waterways, wetlands, and riparian resources. The department also endorses the Corps' intent to use best management practices related to the operation of construction equipment to minimize the loss of soil, petroleum products, or other deleterious material and their introduction into the waterway and adjacent resources.

The department has previously reviewed and commented on the cultural resources surveys conducted by the Corps of Engineers and these documents were included in the appendices of the DEIS. We have no additional comments at this time. The department requests that information documenting any revisions should be submitted to our State Historic Preservation Office for further review if the project plans changes. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

If you have any questions, please contact Mr. Robert Stout of my staff at P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7402.

Sincerely,

DEPARTMENT OF NATURAL RESOURCES

Doyle Childers
Director

DC:jm

From: Repatriation Tribal Historic Preservation Office [mailto:pawneeodyssey@yahoo.com]
Sent: Wednesday, June 28, 2006 2:19 PM
To: White, Christopher M NWK
Subject: Permit # 200601672

Dear Chris; in regards to this project, The Pawnee Nation has no objection, and wishes you well on this necessary and important project. Thank you.

Francis Morris
Repatriation Coordinator/THPO
THe Pawnee Nation of Oklahoma

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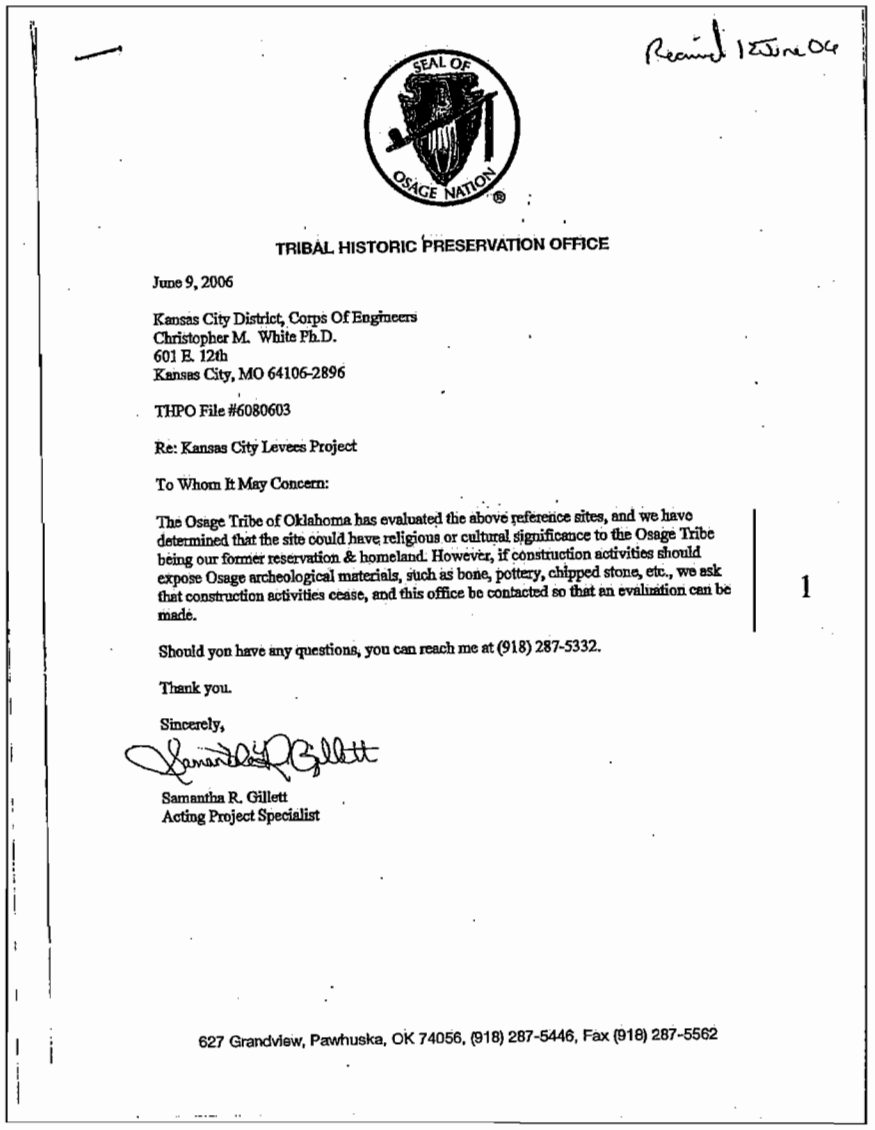
7/27/2006



Rec'd 12 June 06

TRIBAL HISTORIC PRESERVATION OFFICE

June 9, 2006

Kansas City District, Corps Of Engineers
Christopher M. White Ph.D.
601 E. 12th
Kansas City, MO 64106-2896

THPO File #6080603

Re: Kansas City Levees Project

To Whom It May Concern:

The Osage Tribe of Oklahoma has evaluated the above reference sites, and we have determined that the site could have religious or cultural significance to the Osage Tribe being our former reservation & homeland. However, if construction activities should expose Osage archeological materials, such as bone, pottery, chipped stone, etc., we ask that construction activities cease, and this office be contacted so that an evaluation can be made. 1

Should you have any questions, you can reach me at (918) 287-5332.

Thank you.

Sincerely,

Samantha R. Gillett
Acting Project Specialist

627 Grandview, Pawhuska, OK 74056, (918) 287-5446, Fax (918) 287-5562

1 In the event that any archaeological materials are exposed, construction activities will cease in the area of discovery, the Corps' unanticipated discovery procedures will be followed, and we will contact your tribe.

Individual and Organization Letters (examples)

Friends of the Kaw

"To protect and preserve the Kansas River"

July 17, 2006

Dr. Christopher White
Kansas City District
Corps of Engineers
601 E. 12th Street
Kansas City, Missouri 64106-2896

RE: DEIS

Dear Dr. White,

Friends of the Kaw is a not-for-profit grassroots environmental organization whose mission is:

- To protect and preserve the Kansas River for present and future generations.
- To advocate for the rehabilitation of the Kansas River's environs, including its water quality and wildlife habitat.
- To promote compatible public recreational uses of the Kansas River and encourage the development of adequate public access.
- To these ends we shall seek to cooperate with other persons, organization and public agencies.

In regard to the Draft Environmental Impact Statement and Kansas City Levees Feasibility Study we believe that additional engineered actions to a river system should be avoided unless absolutely necessary. We believe that all communities along the Kansas River should be required to adhere to strict development codes that would abate additional loads of storm water delivered to the Kansas River. Alternatives such as enchanced wetlands and promotion of public and personal rain gardens should be considered instead of the extremely costly plan to raise the Kansas River levees and additional five feet. 1 2

The construction of a project of this magnitude will most likely adversely affect the water quality and the wildlife habitat. If this project is approved we ask that every effort to minimize damage to both the water quality and wildlife habitat be taken. 3

Friends of the Kaw
P.O. Box 1612,
Lawrence, KS 66044
Kansas City:
913-963-3460;
Lawrence:
785-312-7200

Report River Pollution:
1-866-RIV-KEEP

Email:
Riverkeeper@Kansas River.com

Website:
www.KansasRiver.com

KANSAS RIVERKEEPER®

WATERKEEPER® ALLIANCE

1 Engineering is required to facilitate improvements to an existing engineered system.

2 Approximately 92% of the Kansas River basin lies upstream of Wamego. The peak flows seen in the Kansas River are mostly generated from the large rural basins of the Smoky Hill River, Republican River, and the Blue River. Local efforts concerning urban wetlands and rain gardens would likely not substantially impact the peak flows seen on the Kansas River.

3 Short-term, temporary construction impacts are anticipated as a result of this project. Efforts to minimize water quality and wildlife habitat will be taken.

Lastly, the Kansas River is one of only three public rivers in the state of Kansas and up until the last 3 years public access to this river was virtually impossible from the WaterOne jetty to the confluence of Missouri River where the Kansas City Levees are located. A public river with no access is virtually forgotten and pollution and abuse go almost unchecked. The Kansas River is a very important source of drinking water for northeast Kansas and one of the few river recreational opportunities in this area. If the construction project to raise the levees is approved it should be approved with the understanding that public access to the levees should be accommodated unless it is deemed a risk to national security. 4

Thank you for your consideration.

Laura Calwell

Laura Calwell, Kansas Riverkeeper for Friends of the Kaw

4 See Section 1.6 of the FEIS for response to comments related to public access and recreation along the levees.

From: cfmpilot@aol.com [mailto:cfmpilot@aol.com]
Sent: Wednesday, July 05, 2006 2:18 PM
To: Rossi, Michael A Col NWK
Subject: Seven Levees Support Letter

Col Rossi,

Please route this question to the proper party to clarify a point regarding the Seven Levees project. We are discussing this project at the CIDA meeting this Monday, July 10th, and expect to issue a letter with the strongest possible support prior to the July 17 closing of the comment period, but have a detailed question regarding what I believe to be a minor understatement of the Benefits of the NED. Question follows;

The B/C for the overall project, as stated in Table 18 (pg. 68) is 8.1. My question is, does this include the increase in flood protection for the areas downslope behind the levees not included in the interim report ? (Specifically, the Central Industrial District Kansas floodwall) Even though the costs of work on the remaining two levee systems is not included in the interim report, I believe the case is rightly made for the B/C to include those benefits for the protection of those property values downslope, especially in light of the following statement made earlier in the same document (which I believe applies equally to Argentine); 1

Note: Flooding from a CID-KS segment failure will affect all of the protected area within the CID unit (both MO and KS); and similarly a CID-MO segment failure will affect all of the protected area within the CID unit (both MO and KS).

Thanks for your time and attention.

Sincerely,

Tom Roberts, President,
Central Industrial District Association

Tom Roberts, President

7/27/2006

cfm Distributors, Inc.
1104 Union Avenue
Kansas City, MO 64101 USA
phone 816-842-5400
fax 816-842-2681
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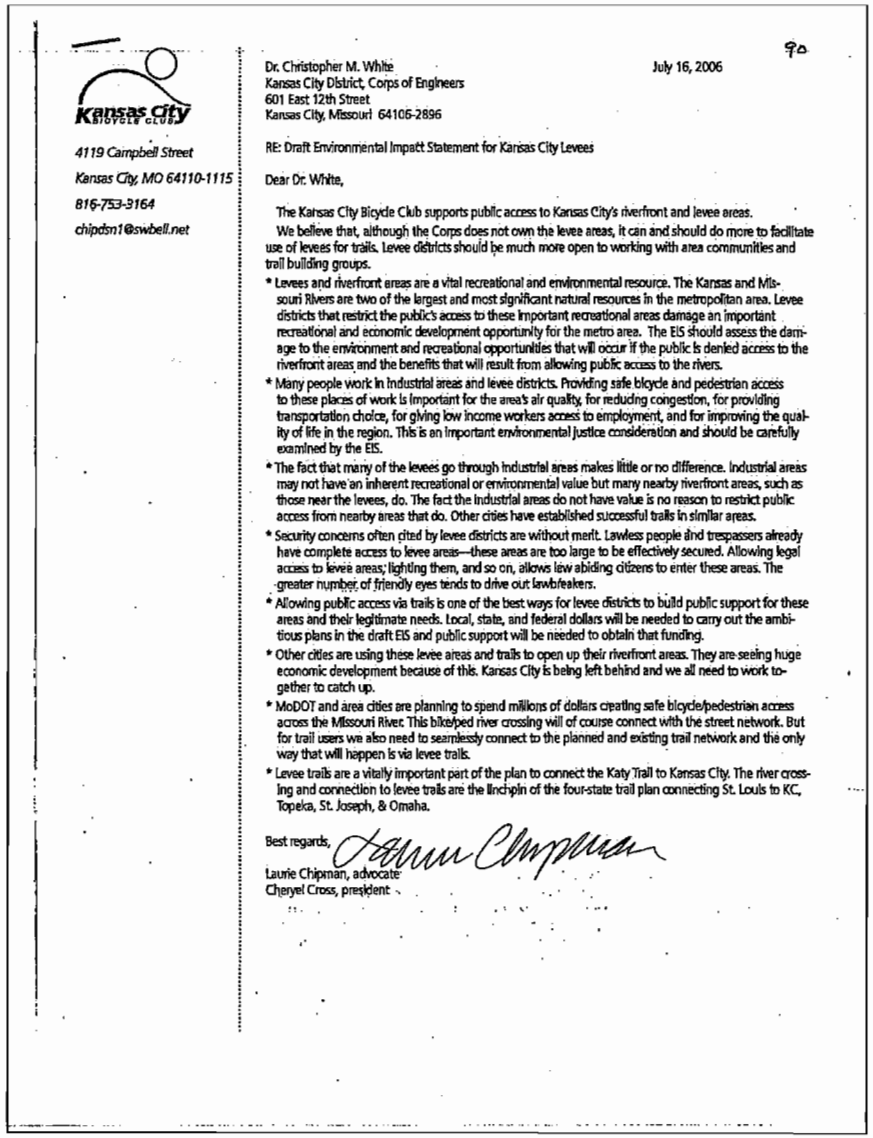
1 In accordance with HQUSACE policy and guidance requirements, the B/C ratio compares the specific costs of the project with the specific benefits provided by the proposed project. The proposed Argentine raise alternative and the proposed projects in the Missouri River Units covered in the interim feasibility report do not provide flood damage reduction benefits for the Armourdale or CID Units. The benefits, costs and B/C ratio shown in the interim feasibility report reflect only the benefits and costs for proposed projects in the Units covered in the interim report. The final report will show the benefits and costs for the Overall Plan for all the Units (including the Armourdale and CID Units).

90



Kansas City Bicycle Club

4119 Campbell Street
Kansas City, MO 64110-1115
816-753-3164
chipdsn1@swbell.net

Dr. Christopher M. White
Kansas City District, Corps of Engineers
601 East 12th Street
Kansas City, Missouri 64106-2896

July 16, 2006

RE: Draft Environmental Impact Statement for Kansas City Levees

Dear Dr. White,

The Kansas City Bicycle Club supports public access to Kansas City's riverfront and levee areas.

We believe that, although the Corps does not own the levee areas, it can and should do more to facilitate use of levees for trails. Levee districts should be much more open to working with area communities and trail building groups.

* Levees and riverfront areas are a vital recreational and environmental resource. The Kansas and Missouri Rivers are two of the largest and most significant natural resources in the metropolitan area. Levee districts that restrict the public's access to these important recreational areas damage an important recreational and economic development opportunity for the metro area. The EIS should assess the damage to the environment and recreational opportunities that will occur if the public is denied access to the riverfront areas and the benefits that will result from allowing public access to the rivers.
* Many people work in industrial areas and levee districts. Providing safe bicycle and pedestrian access to these places of work is important for the area's air quality, for reducing congestion, for providing transportation choice, for giving low income workers access to employment, and for improving the quality of life in the region. This is an important environmental justice consideration and should be carefully examined by the EIS.
* The fact that many of the levees go through industrial areas makes little or no difference. Industrial areas may not have an inherent recreational or environmental value but many nearby riverfront areas, such as those near the levees, do. The fact the industrial areas do not have value is no reason to restrict public access from nearby areas that do. Other cities have established successful trails in similar areas.
* Security concerns often cited by levee districts are without merit. Lawless people and trespassers already have complete access to levee areas—these areas are too large to be effectively secured. Allowing legal access to levee areas, lighting them, and so on, allows law abiding citizens to enter these areas. The greater number of friendly eyes tends to drive out lawbreakers.
* Allowing public access via trails is one of the best ways for levee districts to build public support for these areas and their legitimate needs. Local, state, and federal dollars will be needed to carry out the ambitious plans in the draft EIS and public support will be needed to obtain that funding.
* Other cities are using these levee areas and trails to open up their riverfront areas. They are seeing huge economic development because of this. Kansas City is being left behind and we all need to work together to catch up.
* MoDOT and area cities are planning to spend millions of dollars creating safe bicycle/pedestrian access across the Missouri River. This bike/ped river crossing will of course connect with the street network. But for trail users we also need to seamlessly connect to the planned and existing trail network and the only way that will happen is via levee trails.
* Levee trails are a vitally important part of the plan to connect the Katy Trail to Kansas City. The river crossing and connection to levee trails are the linchpin of the four-state trail plan connecting St. Louis to KC, Topeka, St. Joseph, & Omaha.

Best regards,

Laurie Chipman, advocate
Cheryel Cross, president

See Section 1.6 of the FEIS for response to comments related to public access and recreation along the levees.

U.S. Army Corps of Engineers, Kansas City District

Appendix F

Missouri Department of Conservation Natural Heritage Database Report for Clay and Jackson Counties, Missouri

Kansas Department of Wildlife and Parks State-Listed Threatened and Endangered Species in Wyandotte County, Kansas

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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Heritage database: Results for Clay county

Common Name	Scientific Name	state rank	global rank	state status	federal status
FLOATING FOXTAIL GRASS	ALOPECURUS AEQUALIS	S2	G5	-	-
GREAT BLUE HERON Species Info.	ARDEA HERODIAS	S5	G5	-	-
LAKE-BANK SEDGE	CAREX LACUSTRIS	S2	G5	-	-
HIGHFIN CARPSUCKER Species Info.	CARPIODES VELIFER	S2	G4G5	-	-
NORTHERN HARRIER Species Info.	CIRCUS CYANEUS	S1S2	G5	E	-
	CREEKS AND SMALL RIVERS (PRAIRIE REGION)	-	-	-	-
	DRY-MESIC FOREST	-	-	-	-
GOLDIE'S FERN	DRYOPTERIS GOLDIANA	S2	G4	-	-
GREAT PLAINS SKINK Species Info.	EUMECES OBSOLETUS	S2	G5	-	-
	FRESHWATER MARSH	-	-	-	-
PLAINS KILLIFISH Species Info.	FUNDULUS ZEBRINUS	S2	G5	-	-
	MESIC FOREST	-	-	-	-
	MESIC LIMESTONE/DOLOMITE FOREST	-	-	-	-
PIED-BILLED GREBE Species Info.	PODILYMBUS PODICEPS	S2	G5	-	-
SORA Species Info.	PORZANA CAROLINA	S2	G5	-	-
PALLID STURGEON Species Info.	SCAPHIRHYNCHUS ALBUS	S1	G1G2	E	E
REGAL FRITILLARY	SPEYERIA IDALIA	S3	G3	-	*
PLAINS SPOTTED SKUNK	SPILOGALE PUTORIUS INTERRUPTA	S1	G5T4	E	*
OVAL LADIES' TRESSES	SPIRANTHES OVALIS VAR EROSTELLATA	S2	G5T?	-	-

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Heritage database: Results for Jackson county

Common Name	Scientific Name	state rank	global rank	state status	federal status
AURICULATE FALSE FOXGLOVE	AGALINIS AURICULATA	S2	G3	-	*
GREAT BLUE HERON Species Info.	ARDEA HERODIAS	S5	G5	-	-
	CREEKS AND SMALL RIVERS (PRAIRIE REGION)	-	-	-	-
	DEEP MUCK FEN	-	-	-	-
	DRY-MESIC LIMESTONE/DOLOMITE FOREST	-	-	-	-
LITTLE BLUE HERON Species Info.	EGRETTA CAERULEA	S2	G5	-	-
PEREGRINE FALCON Species Info.	FALCO PEREGRINUS	S1	G4	E	-
	LIMESTONE GLADE	-	-	-	-
BLACK-CROWNED NIGHT-HERON Species Info.	NYCTICORAX NYCTICORAX	S2	G5	-	-
A BEARD-TONGUE	PENSTEMON COBAEA VAR COBAEA	S1	G4T?	-	-
PIED-BILLED GREBE Species Info.	PODILYMBUS PODICEPS	S2	G5	-	-
OVAL LADIES' TRESSES	SPIRANTHES OVALIS VAR EROSTELLATA	S2	G5T?	-	-
BARN OWL Species Info.	TYTO ALBA	S2	G5	E	-
ROCK ELM	ULMUS THOMASII	S2	G5	-	-

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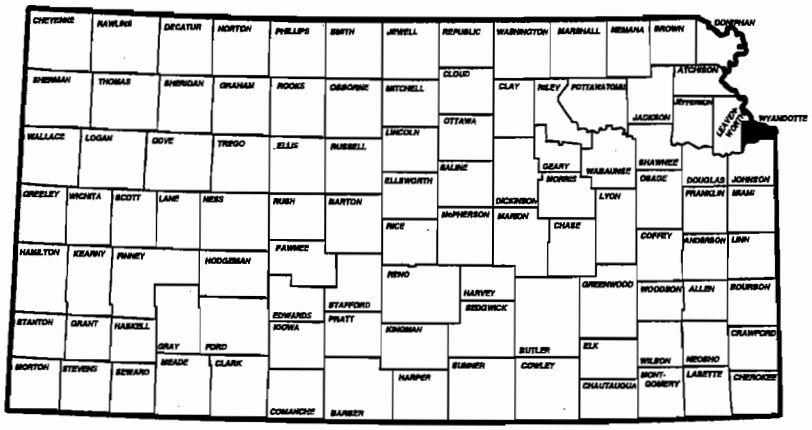
WYANDOTTE COUNTY

COUNTY LOCATOR MAP



STATUS KEY

THR = Threatened

END = Endangered

SNC = Species In Need of Conservation

CAN = Canidate Listing

NA = Not Applicatable

THREATENED & ENDANGERED (T&E)SPECIES

American Burying Beetle *Nicrophorus americanus*
State: END Federal: END Critical Habitat: NO

Bald Eagle *Haliaeetus leucocephalus*
State: THR Federal: THR Critical Habitat: YES

Chestnut Lamprey *Ichthyomyzon castaneus*
State: THR Federal: NA Critical Habitat: YES

Eastern Spotted Skunk *Spilogale putorius*
State: THR Federal: NA Critical Habitat: NO

Eskimo Curlew *Numenius borealis*
State: END Federal: END Critical Habitat: NO

Flathead Chub *Platygobio gracilis*
State: THR Federal: NA Critical Habitat: YES

Least Tern *Sterna antillarum*
State: END Federal: END Critical Habitat: YES

Pallid Sturgeon *Scaphirhynchus albus*
State: END Federal: END Critical Habitat: YES

Peregrine Falcon *Falco peregrinus*
State: END Federal: NA Critical Habitat: NO

Piping Plover *Charadrius melodus*
State: THR Federal: THR Critical Habitat: YES

Redbelly Snake *Storeria occipitomaculata*
State: THR Federal: NA Critical Habitat: YES

Sicklefin Chub *Macrhybopsis meeki*
State: END Federal: CAN Critical Habitat: YES

Silver Chub *Macrhybopsis storeriana*
State: END Federal: NA Critical Habitat: YES

Silverband Shiner *Notropis shumardi*
State: THR Federal: NA Critical Habitat: YES

Smooth Earth Snake *Virginia valeriae*
State: THR Federal: NA Critical Habitat: YES

Snowy Plover *Charadrius alexandrinus*
State: THR Federal: NA Critical Habitat: NO

Sturgeon Chub *Macrhybopsis gelida*
State: THR Federal: CAN Critical Habitat: YES

Western Silvery Minnow *Hybognathus argyritis*
State: THR Federal: NA Critical Habitat: YES

SPECIES IN NEED OF CONSERVATION (SINC)

Black Tern *Chlidonias niger*
State: SNC Federal: NA Critical Habitat: NA

Blue Sucker *Cycleptus elongatus*
State: SNC Federal: NA Critical Habitat: NA

Bobolink *Dolichonyx oryzivorus*
State: SNC Federal: NA Critical Habitat: NA

Brassy Minnow *Hybognathus hankinsoni*
State: SNC Federal: NA Critical Habitat: NA

Cerulean Warbler *Dendroica cerulea*
State: SNC Federal: NA Critical Habitat: NA

Eastern Hognose Snake *Heterodon platirhinos*
State: SNC Federal: NA Critical Habitat: NA

Ferruginous Hawk *Buteo regalis*
State: SNC Federal: NA Critical Habitat: NA

Golden Eagle *Aquila chrysaetos*
State: SNC Federal: NA Critical Habitat: NA

Plains Minnow *Hybognathus placitus*
State: SNC Federal: NA Critical Habitat: NA

River Shiner *Notropis blennius*
State: SNC Federal: NA Critical Habitat: NA

Short-eared Owl *Asio flammeus*
State: SNC Federal: NA Critical Habitat: NA

Southern Flying Squirrel *Glaucomys volans*
State: SNC Federal: NA Critical Habitat: NA

Timber Rattlesnake *Crotalus horridus*
State: SNC Federal: NA Critical Habitat: NA

Whip-poor-will *Camprimulgus vociferus*
State: SNC Federal: NA Critical Habitat: NA

Yellow-throated Warbler *Dendroica dominica*
State: SNC Federal: NA Critical Habitat: NA

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U.S. Army Corps of Engineers, Kansas City District

Appendix G

Common Mammals, Birds, Amphibians, Reptiles and Fish of the Project Area

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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Appendix G

Common Mammals, Birds, Amphibians, Reptiles and Fish of the Project Area

Common mammals that may be found in the study area include:

white-tailed deer (*Odocoileus virginianus*)
opossum (*Didelphis marsupialis*)
cottontail rabbit (*Sylvilagus floridanus*)
beaver (*Castor canadense*)
striped skunk (*Mephitis mephitus*)
plains pocket gopher (*Geomys bursarius*)
least shrew (*Cryptotis parva*)
wood rat (*Neotoma floridana*)
big brown bat (*Eptesicus fuscus*)
meadow jumping mouse (*Zapus hudsonius*)
woodland white-footed mouse (*Peromyscus leucopus*)
plains harvest mouse (*Reithrodontomys montanus*)
western harvest mouse (*Reithrodontomys megalotis*)
prairie white-footed mouse (*Peromyscus maniculatus*)
thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*)
coyote (*Canis latrans*)
raccoon (*Procyon lotor*)
muskrat (*Ondatra zibethica*)
badger (*Taxidea taxus*)
fox squirrel (*Sciurus niger*)
little brown bat (*Myotis lucifugus*)
hoary bat (*Lasiurus cinereus*) eastern
eastern mole (*Scalopus aquaticus*)

Common resident or migrant birds that may be found in the study area include:

great blue heron (*Ardea heordias*)
green heron (*Butorides virescens*)
blue-winged teal (*Anas discors*)
wood duck (*Aix sponsa*)
mallard (*Anas platyrhynchos*)
red-tailed hawk (*Buteo jamaicensis*)
black-eyed chickadee (*Parus atricapillus*)
tufted titmouse (*Parus bicolor*)
starling (*Sturnus vulgaris*)
American kestrel (*Falco sparverius*)
turkey vulture (*Cathartes aura*)
house sparrow (*Passer domesticus*)
robin (*Turdus migratorius*)
western meadowlark (*Sturnella neglecta*)
red-winged blackbird (*Agelaius phoeniceus*)
common grackle (*Quiscalus quiscula*)
Harris' sparrow (*Zonotrichia querula*)
tree sparrow (*Spizella arborea*)
chipping sparrow (*Spizella passerina*)
belted kingfisher (*Ceryle alcyon*)
whip-poor-will (*Caprimulgus vociferus*)
western kingbird (*Tyrannus verticalis*)
horned lark (*Cremophilia alpestris*)
blue jay (*Cyanocitta cristata*)
purple martin (*Progne subis*)
rock dove (*Columba livia*)
barred owl (*Strix varia*)
common crow (*Corvus brachyrhynchos*)
warbling vireo (*Vireo gilvus*)
yellow-breasted chat (*Decteria virens*)
bobwhite quail (*Colinus virginianus*)
morning dove (*Zenaida macroura*)
field sparrow (*Spizella pusilla*)
American coot (*Fulica americana*)
killdeer (*Charadrius vociferus*)
spotted sandpiper (*Actitis macularia*)
great horned owl (*Bubo virginianus*)

Appendix G – continued

screech owl (*Otus asie*)
common night hawk (*Chordeiles minor*)
red-bellied woodpecker (*Centurus carolinus*)
red-headed woodpecker (*Melanerpes erythrocephalus*)
house wren (*Troglodytes aedon*)
eastern wild turkey (*Meleagris gallopovo*)
brown thrasher (*Toxostoma rufum*)

Common reptiles that may be found in the study area include:
snapping turtle (*Chelydra serpentine*)
ornate box turtle (*Terrapene ornata*)
painted turtle (*Chrysemys picta*)
smooth soft-shelled turtle (*Apalone mutica*)
spiny soft-shelled turtle (*Apalone spinifera*)
common five lined skink (*Eumeces fasciatus*)
ground skink (*Scincella lateralis*)
black rat snake (*Elaphe obsoleta*)
western slender glass lizard (*Ophisaurus attenuatus*)
prairie ringnecked snake (*Diadophis punctatus*)
Eastern hog-nosed snake (*Heterodon platyrhinos*)
Eastern yellow-bellied racer (*Coluber constrictor*)
bullsnake (*Pituophis melanoleucus*)
prairie king snake (*Diadophis punctatus arnyi*)
diamond backed water snake (*Nerodia rhombifer*)
red-sided garter snake (*Thamnophis sirtalis*)
copperhead (*Agkistrodon contortrix*)

Common amphibians that may be found in the study area include:

tiger salamander (*Ambystoma tigrinum*)
bullfrog (*Rana catesbeiana*)
leopard frog (*Rana pipiens*)
Blanchard's cricket frog (*Acris crepitans*)
plains spadefoot toad (*Scapahiopus bombifrons*)
western chorus frog (*Pseudacris triseriata*)
Woodhouse's toad (*Bufo woodhousei*)
plains leopard frog (*Rana blairi*)

Appendix G – continued
Principal fish species of the Lower Kansas and Missouri Rivers at Kansas City:

channel catfish (*Ictalurus punctatus*)*
gizzard shad (*Dorsoma cepadianum*)*
shortnose gar (*Lepisosteus platostomus*)*
carp (*Cyprinus carpio*)*
sand shiner (*Notropis ludibundus*)
freshwater drum (*Aplodinotus grunniens*)
black bullhead (*Ameiurus melas*)
bigmouth buffalo (*Ictiobus cyprinellus*)
green sunfish (*Lepomis cyanellus*)
shovelnose sturgeon (*Scaphirhynchus platorhynchus*)
shorthead redhorse (*Moxostoma macrolepidotum*)
blue catfish (*Ictalurus furcatus*)
flathead catfish (*Pylodictis olivaris*)
longnose gar (*Aplodinotus grunniens)*
bluegill (*Lepomis macrochirus*)
goldeye (*Hiodon alosoides*)
fathead minnow (*Pimephales promelas*)
white crappie (*Pomoxis annularis*)
quillback (*Carpiodes cyprinus*)
river carpsucker (*Carpiodes carpio*)*
walleye (*Stizostedion vitreum*)
smallmouth buffalo (*Ictiobus bubalus*)*

*Dominant species

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U.S. Army Corps of Engineers, Kansas City District

Appendix H

Common Trees, Shrubs and Grasses within the Study Area

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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Appendix H

Common Trees, Shrubs and Grasses Within the Study Area

Predominant tree species found on the project lands include:

honey locust (*Gliditsia triacanthos*)
sycamore (*Platanus occidentalis*)
black walnut (*Juglans nigra*)
green ash (*Fraxinus pennsylvanica*)
chinkapin oak (*Quercus muehlenbergii*)
eastern cottonwood (*Populus deltoides*)
hackberry (*Celtis occidentalis*)
eastern red cedar (*Juniperus virginiana*)
box elder (*Acer negundo*)
osage-orange (*Maclura pomifera*)
slippery elm (*Ulmus rubra*)
red mulberry (*Morus rubra*)
black willow (*Salix nigra*)
white mulberry (*Morus alba*)
shingle oak (*Quercus imbricaria*)
silver maple (*Acer saccharinum*)

Deciduous shrubs on the project lands include:

rough leaf dogwood (*Cornus drummondii*)
buckbrush (*Symphoricarpos orbiculatus*)
elderberry (*Sambucus canadensis*)
fragrant sumac (*Rhus aromatica*)
Japanese honeysuckle (*Lonicera japonica*)
smooth sumac (*Rhus glabra*)
gooseberry (*Ribes missouriense*)
poison ivy (*Toxicodendron radicans*)
prairie rose (*Rosa arkansana*)

Grass cover on the project lands include:

Kentucky bluegrass (*Poa pratensis*)
Virginia wild rye (*Elymus canadensis*)
switchgrass (*Panicum virgatum*)
K-31 Fescue (*Festuca elatior*)
domestic ryegrass (*Elymus multiflorum*)
foxtail grass (*Setaria* spp.)
Johnson grass (*Sorghum halepense*)
domestic ryegrass (*Lolium perenna*)
smooth brome (*Bromus inermis*)
cheatgrass (*Bromus tectorum*)

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U.S. Army Corps of Engineers, Kansas City District

Appendix I

Cultural Resource Coordination

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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KANSAS

05-04-023

Kansas State Historical Society
Jennie Chinn, *Executive Director*

KATHLEEN SEBELIUS, GOVERNOR

April 15, 2005

Timothy Meade
US Army COE
Kansas City District
700 Federal Bldg
Kansas City MO 64106-2896

RE: Argentine Levee Improvements in Kansas City, KS
Wyandotte County

Dear Mr. Meade:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the above referenced project in accordance with 36 CFR 800. The project as proposed should have no effect on properties listed on the National Register of Historic Places or otherwise identified in our files. This office has no objection to implementation of the project.

Any changes to the project area that include additional ground disturbing activities will need to be reviewed by this office prior to beginning construction. If construction work uncovers buried archeological materials, work should cease in the area of the discovery and this office should be notified immediately.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Will Banks 785-272-8681 (ex. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
State Historic Preservation Officer

Christy Davis
Deputy State Historic Preservation Officer

CD/cg

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 205 • Fax 785-272-8682 • Email jchinn@kshs.org • TTY 785-272-8683
www.kshs.org

KANSAS

KSR&C No. 06-04-041

Kansas State Historical Society
Cultural Resources Division

KATHLEEN SEBELIUS, GOVERNOR

April 12, 2006

Timothy Meade
Cultural Resource Manager
Dept of the Army
Kansas City District COE
700 Federal Bldg
Kansas City MO 64106-2896

RE: Kansas River Levee Improvements – Armourdale Levee Unit
Wyandotte County

Dear Mr. Meade:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the above referenced project in accordance with 36 CFR 800. The project as proposed should have no effect on properties listed on the National Register of Historic Places or otherwise identified in our files. This office has no objection to implementation of the project.

Any changes to the project area that include additional ground disturbing activities will need to be reviewed by this office prior to beginning construction. If construction work uncovers buried archeological materials, work should cease in the area of the discovery and this office should be notified immediately.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston 785-272-8681 (ex. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
State Historic Preservation Officer

Timothy Weston for

Patrick Zollner
Deputy State Historic Preservation Officer

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 240 • Fax 785-272-8682 • TTY 785-272-8683
www.kshs.org

KANSAS

KSR&C No. 06-04-04

Kansas State Historical Society
Cultural Resources Division

KATHLEEN SEBELIUS, GOVERNOR

April 12, 2006

Timothy Meade
Cultural Resource Manager
Dept of the Army
Kansas City District COE
700 Federal Bldg
Kansas City MO 64106-2896

RE: Kansas River Levee Improvements – Central Industrial (CID) Levee Unit
Wyandotte County

Dear Mr. Meade:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the above referenced project in accordance with 36 CFR 800. The project as proposed should have no effect on properties listed on the National Register of Historic Places or otherwise identified in our files. This office has no objection to implementation of the project.

Any changes to the project area that include additional ground disturbing activities will need to be reviewed by this office prior to beginning construction. If construction work uncovers buried archeological materials, work should cease in the area of the discovery and this office should be notified immediately.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston 785-272-8681 (ex. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
State Historic Preservation Officer

Timothy Weston for

Patrick Zollner
Deputy State Historic Preservation Officer

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www.kshs.org

KANSAS

KSR&C No. 04-10-126

Kansas State Historical Society
Dick Pankratz, *Director, Cultural Resources Division*

KATHLEEN SEBELIUS, GOVERNOR

December 7, 2004

Christopher M White PhD
Chief, Environmental Resources Section
Department of the Army
Kansas City District COE
700 Federal Building
Kansas City MO 64106-2896

RE: Argentine Levee Improvements – Borrow Activity
Wyandotte County

Dear Mr. White:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the above referenced project in accordance with 36 CFR 800. The project as proposed should have no effect on properties listed on the National Register of Historic Places or otherwise identified in our files. This office has no objection to implementation of the project.

Any changes to the project area that include additional ground disturbing activities will need to be reviewed by this office prior to beginning construction. If construction work uncovers buried archeological materials, work should cease in the area of the discovery and this office should be notified immediately.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Will Banks 785-272-8681 (ex. 214) or Jennifer Epperson (ex. 225). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
State Historic Preservation Officer

Richard Pankratz

Richard Pankratz, Director
Cultural Resources Division

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 217 • Fax 785-272-8682 • Email dpankratz@kshs.org • TTY 785-272-8683
www.kshs.org

CULTURAL RESOURCE ASSESSMENT
Section 106 Review

CONTACT PERSON/ADDRESS

Timothy Meade
Cultural Resources Manager
Corps of Engineers, Kansas City District
700 Federal Building
Kansas City, Missouri 64106-2896

C:

Joe Cothern, EPA

PROJECT:

East Bottoms Unit Flood Protection System Improvements

FEDERAL AGENCY

COE

COUNTY:

JACKSON

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

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

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

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

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

By: Mark A. Miles — June 8, 2005

Mark A. Miles, Deputy State Historic Preservation Officer — Date

MISSOURI DEPARTMENT OF NATURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
P.O. Box 176, Jefferson City, Missouri 65102

For additional information, please contact Judith Deel, (573) 751-7862. Please be sure to refer to the project number: 111-JA-05

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KANSAS

KSR&C No. 05-03-140

Kansas State Historical Society
Jennie Chinn, *Executive Director*

KATHLEEN SEBELIUS, GOVERNOR

March 24, 2005

Christopher M White PhD
Chief, Environmental Resources Section
Department of the Army
Kansas City District COE
700 Federal Building
Kansas City MO 64106-2896

RE: Fairfax/BPU Floodwall Improvements
Wyandotte County

Dear Mr. White:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the above referenced project in accordance with 36 CFR 800. The project as proposed should have no effect on properties listed on the National Register of Historic Places or otherwise identified in our files. This office has no objection to implementation of the project.

Any changes to the project area that include additional ground disturbing activities will need to be reviewed by this office prior to beginning construction. If construction work uncovers buried archeological materials, work should cease in the area of the discovery and this office should be notified immediately.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Will Banks 785-272-8681 (ex. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
State Historic Preservation Officer

William E. Banks
for

Christy Davis
Deputy State Historic Preservation Officer

CD/cg

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext: 205 • Fax 785-272-8682 • Email jchinn@kshs.org • TTY 785-272-8683
www.kshs.org

KANSAS

KSR&C No. 05-03-137

Kansas State Historical Society
Jennie Chinn, *Executive Director*

KATHLEEN SEBELIUS, GOVERNOR

March 24, 2005

Timothy Meade
Cultural Resource Manager
Department of the Army
Kansas City District COE
700 Federal Building
Kansas City MO 64106-2896

RE: Improvements to Jersey Creek Sheet Pile Wall
Wyandotte County

Dear Mr. Meade:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the above referenced project in accordance with 36 CFR 800. The project as proposed should have no effect on properties listed on the National Register of Historic Places or otherwise identified in our files. This office has no objection to implementation of the project.

Any changes to the project area that include additional ground disturbing activities will need to be reviewed by this office prior to beginning construction. If construction work uncovers buried archeological materials, work should cease in the area of the discovery and this office should be notified immediately.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Will Banks 785-272-8681 (ex. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
State Historic Preservation Officer

William E. Banks

Christy Davis for
Deputy State Historic Preservation Officer

CD/cg

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www.kshs.org

CULTURAL RESOURCE ASSESSMENT
Section 106 Review

CONTACT PERSON/ADDRESS

Timothy Meade
Cultural Resources Manager
Corps of Engineers, Kansas City District
700 Federal Building
Kansas City, Missouri 64106-2896

C:

Joe Cothern, EPA

PROJECT:

North Kansas City Levee Unit, Harlem Section

FEDERAL AGENCY

COE

COUNTY:

CLAY

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

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

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

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

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

By: Mark A. Miles — June 8, 2005

Mark A. Miles, Deputy State Historic Preservation Officer — Date

MISSOURI DEPARTMENT OF NATURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
P.O. Box 176, Jefferson City, Missouri 65102
For additional information, please contact Judith Deel, (573) 751-7862. Please be sure to refer to the project number:
025-CL-05

CULTURAL RESOURCE ASSESSMENT
Section 106 Review

CONTACT PERSON/ADDRESS

Timothy Meade
Cultural Resources Manager
Corps of Engineers, Kansas City District
700 Federal Building
Kansas City, Missouri 64106-2896

C:

Joe Cothern, EPA

PROJECT:

North Kansas City Levee Unit at National Starch Site

FEDERAL AGENCY

COE

COUNTY:

CLAY

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

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

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

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

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

By: Mark A Miles — May 27, 2005

Mark A. Miles, Deputy State Historic Preservation Officer — **Date**

MISSOURI DEPARTMENT OF NATURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
P.O. Box 176, Jefferson City, Missouri 65102
For additional information, please contact Judith Deel, (573) 751-7862. Please be sure to refer to the project number: 021CL05-H128

US Army Corps of Engineers, Kansas City District

Appendix J

Section 404 of the Clean Water Act Compliance Review Documents (Public Notice/Draft 404(b)(1) Evaluation)

Kansas Citys, Missouri and Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

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PUBLIC NOTICE

US Army Corps
of Engineers
Kansas City District

Permit No. 200601672
Issue Date: June 2, 2006
Expiration Date: July 17, 2006

45-Day Notice

JOINT PUBLIC NOTICE: This public notice is issued jointly with the Kansas Department of Health and Environment. The Department of Health and Environment will use the comments to this notice in deciding whether to grant Section 401 water quality certification. Commenters are requested to furnish a copy of their comments to the Kansas Department of Health and Environment, Bureau of Water – Watershed Management Section, 1000 SW Jackson Street, Suite 420, Topeka, Kansas 66612-1367.

APPLICANT: Kansas City District, Corps of Engineers
Room 843, PM-PR
601 E. 12th Street
Kansas City, Missouri 64106-2896

PROJECT LOCATION (As shown in the enclosed media): The existing levee system protects areas in the Cities of Kansas City, North Kansas City and Birmingham, Jackson and Clay Counties, Missouri, and in the City of Kansas City, Wyandotte County, KS.

AUTHORITY: Section 404 of the Clean Water Act (33 USC 1344). The U.S. Army Corps of Engineers, Kansas City District, at the request and with the cooperation of the five distinct non-Federal sponsors of the seven levee units in the Kansas City metropolitan area, has undertaken this study of the Kansas Citys, Missouri and Kansas, Flood Damage Reduction Study, Missouri and Kansas Rivers. The Corps is undertaking this study under the authority of Section 216 of the 1970 Flood Control Act.

ACTIVITY: The purpose of this study is to determine whether one or more plans for improvements to the existing levee system aimed at reducing flood risk and improving levee reliability is technically viable, economically feasible, and environmentally acceptable, or if no action is warranted. Failure of any part of the existing flood damage reduction system during a major flood would have significant adverse impacts on the human environment including property damage and potential loss of human life. Considering these potential significant impacts on the

human environment, and in accordance with the National Environmental Policy Act, the Corps initiated preparation of a Draft Interim Feasibility Report and Draft Environmental Impact Statement (DIFR/DEIS). This Draft Interim Feasibility Report (DIFR) and DEIS presents an analysis of several alternatives considered during scoping and a detailed analysis of each levee unit to determine what action, or if any action, is warranted to minimize the potential loss of human life and property damage related to failure of the levee system in the event of a major flood. Proposed alternatives identified to improve flood damage reduction reliability include, but are not limited to: earthen levee raise, pump station modifications, floodwall replacement, stoplog gaps, top caps, and rock toes; pressure relief wells; floodwall modification using buttresses; new sheetpile wall; buried collector system; and the no action alternative. This DIFR/DEIS identifies a combination of measures as the Corps' Recommended Plan and presents an analysis of the environmental impacts associated with the alternatives listed above.

WETLANDS: A jurisdictional wetlands determination concluded that 3 wetlands would be affected by the proposed project for a total impact of 0.2 acres.

CULTURAL RESOURCES: The proposed project has been reviewed in compliance with the National Historic Preservation Act of 1966 (Public Law 89-665) including a check of the National Register of Historic Places and supplements thereto and coordination has been completed with the Kansas State and Missouri State Historic Preservation Officers (SHPO). No archeological sites will be impacted by the proposed project. The basement of an historical structure will be protected by the proposed project. No properties listed or proposed for listing in the National Register were identified in the project areas.

ENDANGERED SPECIES: Four Federally-listed threatened or endangered species are dependent on the Missouri and Kansas Rivers and their floodplains within the vicinity of the project area (Wyandotte County in Kansas, and Platte, Clay, and Jackson Counties in Missouri). In compliance with the Endangered Species Act, a preliminary determination has been made that the described work will not affect species designated as threatened or endangered or adversely affect critical habitat. The U.S. Fish and Wildlife Service (FWS), in a Draft Fish and Wildlife Coordination Act Report and supplemental letter, stated that the proposed project area would not adversely impact federally listed threatened and endangered species.

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

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

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

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

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

ADDITIONAL INFORMATION: This Draft Interim Feasibility Report (DIFR) and DEIS has been prepared by KCD and may be viewed at the following website: http://www.nwk.usace.army.mil/projects/7levees/ or may be obtained by writing to the applicant address above, **Attn: CENWK-PM-PR or by calling the Environmental Section Chief, Dr. Chris White at 816-389-3158; Christopher.m.white@usace.army.mil.**

The review of this Public Notice, Draft Environmental Impact Statement and Draft Interim Feasibility Report are being conducted concurrently to incorporate appropriate comments in the same document. A copy of this public notice along with the photograph may also be viewed at the following website: http://www.nwk.usace.army.mil/regulatory/public_notices.htm

NOTICE TO EDITORS: This notice is provided as background information for your use in formatting news stories. This notice is not a contract for classified display advertising.

APPENDIX J

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION (40 CFR 230)

KANSAS CITYS LEVEES FEASIBILITY STUDY
AND ENVIRONMENTAL IMPACT STATEMENT

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APPENDIX J

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION (40 CFR 230)

KANSAS CITYS LEVEES FEASIBILITY STUDY
AND ENVIRONMENTAL IMPACT STATEMENT

PROJECT DESCRIPTION

a. Location. The project area consists of the seven levee units that provide flood protection for areas in Kansas City, North Kansas City and Birmingham, Jackson and Clay Counties, Missouri and in Kansas City, and Wyandotte County, Kansas. The levee units include the Argentine, Armourdale, Birmingham, Central Industrial District (CID), East Bottoms, Fairfax-Jersey Creek, and the North Kansas City unit (Figure 1). The protective works primarily consist of levees, floodwalls, bridge and approach alterations, and channel improvements over the lower 9.5 miles of the Kansas River and on the Missouri River from 6.5 miles upstream to 9.5 miles downstream of the mouth of the Kansas River. The 32-square-mile protected area covers the heavily industrialized floodplains of the two rivers.

b. General Description. The existing flood protection measures incorporated into each levee unit were engineered to provide the appropriate type of overtopping and/or underseepage control for effective system reliability. The overtopping and underseepage control measures present within the existing levee units include earthen levees and berms, floodwalls, sheetpile walls, pressure relief wells, buried collector systems, and pump stations. Combinations of these features are present within some of the levee units as determined appropriate by engineering studies to provide the most effective overtopping and underseepage flood protection. The locations of the proposed work within each unit are variable and dependent on the location of existing flood protection features and observations from previous flood events.

The preferred alternatives for each of the Missouri levee units and the Argentine unit in Kansas are the National Economic Development (NED) plans, which provide the greatest net benefits to the public. The tentative preferred alternative for the Armourdale and Central Industrial District levee units is the nominal 500-year+3 levee raise and underseepage controls to provide equitable protection for the Kansas units. Preferred alternatives and tentative preferred alternatives are discussed below.

MISSOURI RIVER

East Bottoms: The preferred alternative for the East Bottoms unit is the installation of pressure relief wells. Relief wells would be installed along the landside toe of the levee between stations 405+00 and 420+00. This alternative is an augmentation to an existing collector system.

Fairfax-Jersey Creek Board of Public Utilities (BPU) Floodwall: The preferred alternative for the BPU floodwall is to construct an additional row of piles and a foundation slab

extension to strengthen the existing floodwall. An additional row of auger cast piles would be installed on the landward side of the pile cap. A foundation slab extension would be implemented to facilitate pile installation. Additional piles and the slab extension would be installed the entire length of the existing floodwall between stations 287+85 and 302+32.

Fairfax-Jersey Creek Sheetpile Wall: The preferred alternative for the Fairfax-Jersey Creek Sheetpile Wall is the installation of an open cell sheetpile wall landside of the existing floodwall. Sheetpile would be driven by a crane into the existing stability berm between stations 23+30 and 29+99.

North Kansas City-Harlem: The preferred alternative for the North Kansas City, Harlem area is a buried collector system. An underground water collection system consisting of perforated pipe would be installed the full length of the levee between stations 212+00 to 239+40 along the landside toe to intercept seepage. Six manholes would be placed along the system to collect seepwater. Portable pumps would be used to pump seepwater back over the levee during high water events.

North Kansas City-National Starch: The preferred alternative for the National Starch site in North Kansas City consists of relief well installation and pump station construction. Pressure relief wells and a pump station would be installed into the existing stability berm landward of the existing levee between stations 255+95 and 274+10. The area of surface excavation for a rock-lined conveyance path, if constructed, would measure approximately 325 feet X 50 feet (0.37 acres).

KANSAS RIVER

Argentine: The preferred alternative for the Argentine unit is the nominal 500-year+3 levee raise and underseepage improvements including buried collector, relief well, stability berm, underseepage berm, and filter blanket construction. Two stoplogs would be raised. The levee raise would be accomplished by constructing earthen levee and floodwalls.

Armourdale: Preliminary levee raise alternatives proposed for this unit include the nominal 500-year+0, 500-year+1, 500-year+2, and 500-year+3. A preferred alternative for this unit has not been identified. The tentative preferred alternative for the Armourdale unit is the nominal 500-year+3 levee raise, which includes underseepage control measures and stabililty berm requirements. The raise would include increasing the height of the existing earthen levee with additional earthen levee or floodwall atop the existing levee. Existing floodwalls would be either removed or replaced, or new floodwall would be constructed landside of existing floodwall. In addition to earthen levee and floodwalls, this raise includes pump plant modification and/or replacement, and the installation of relief wells or a buried collector system to relieve underseepage pressures. Borrow soil would be placed primarily landward of the existing levee and floodwall to facilitate the levee improvements.

Central Industrial District: Preliminary levee raise alternatives for the Central Industrial District unit (CID) include the nominal 500-year+0, 500-year+1, 500-year+2, and 500-year+3. A preferred alternative for this unit has not been identified. The tentative preferred

alternative for this unit is the nominal 500-year+3 levee raise, which includes pump plant, relief well, and buried collector construction to provide underseepage control. The levee raise would include increasing the height of the existing earthen levee and most likely, new floodwall would be constructed landside of existing floodwall instead of a complete removal and replacement of the floodwalls. Borrow soil would be placed primarily landward of the existing levee and floodwall to facilitate the levee improvements.

c. Authority and Purpose. The Kansas Citys project is a unit of the Missouri River basin comprehensive plan authorized by the 1936, 1944, 1946 and 1954 Flood Control Acts that provides local flood protection for the metropolitan areas of Kansas City, Missouri and Kansas City, Kansas. This study is being conducted under the authority provided by Section 216 of the 1970 Flood Control Act. This Act provides authority to reexamine completed civil works projects. Section 216 reads as follows:

> *"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects, the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to the significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying structures or their operation, and for improving the quality of the environment in the overall public interest."*

Section 216 of the 1970 Flood Control Act provided continuing authority to examine completed Federal projects to determine whether the projects are providing benefits as intended. The results of this examination indicate that increasing the level of protection provided by the Kansas Citys system may be technically and economically feasible without unacceptable environmental or social impacts. Accordingly, a Federal interest exists in designing and constructing improvements because of the potential to benefit the National economy.

d. General Description of Fill Material. The soils mapped within the proposed borrow area include the Haynie, Eudora, and Sarpy soil series. Exploratory soil borings were conducted in January 2005 (Figures 2-9). The boring logs document an impervious soil layer consisting of silts and clays extending up to six feet below the surface followed by sandy aquifer. The central part of the borrow area has a thin layer of sand at the surface, varying between 1 and 4.5 feet in thickness, followed by 3 to 4 feet of silts and clay, on top of the sandy aquifer. Soil boring logs are located at the end of this document. The total quantity of material estimated to be removed from the proposed borrow site located within the Kansas River floodplain on the left bank between approximate river miles 11 and 13 is 725,919 bank cubic yards (bcy).

The rock used to construct the conveyance path at the National Starch site if needed would be in conformance with the guidelines provided in the "slope protection" section within the "*Guidance For The Design And Construction Within The Critical Area Of Constructed Flood Control Projects*" (http://www.nwk.usace.army.mil/local_protection/guidance.html), MAINTENANCE Chapter. It is most likely that 6-inches of bedding will be placed below 18 inches of rip-rap comprised of 200 pound stones of Burlington limestone. The rock would be sound, durable stone, free of cracks, seams, shale parting, and overburden soil, and

approximately rectangular in cross shape. Deleterious substances in rock, which include soft, friable particles, rock fines (3-inches and smaller); objectionable materials and other foreign matter would not exceed 5%.

e. Description of the Proposed Fill Placement Sites.

KANSAS RIVER

Argentine Unit. Borrow soil would be placed within the floodplain of the Kansas River on the left bank between approximate river miles 10.1 and 4.7 to facilitate an earthen levee raise and the construction of underseepage control measures within the Argentine unit (Figure 10). Site visits and examination of National Wetland Inventory maps of the project area revealed that two palustrine emergent wetlands would be impacted by the proposed levee raise. The total area of these wetlands measuring approximately 0.027 acres would be filled.

Proposed Borrow Area. Soil would be removed from the floodplain of the Kansas River on the left bank between approximate river miles 11 and 13 (Figure 11). A farmed wetland measuring about 0.17 acres would likely be either excavated, or otherwise impacted by borrow activities.

MISSOURI RIVER

North Kansas City Unit-National Starch site. The area of potential proposed fill at the National Starch site is located within the floodplain of the Missouri River on the left bank between approximate Missouri River miles 364.9 and 365.2 (Figure 12). This area is comprised of riparian vegetation. It is currently undetermined if a conveyance path would be constructed to return Missouri River water that seeps through the levee back into the Missouri River. Trees within an area measuring about 0.37 acres would be cleared to facilitate conveyance path construction. A small amount of rock used to line the conveyance path may inadvertently enter the Missouri River.

f. Description of Disposal Method. Materials would be placed at the fill site by mechanical means. Equipment would be standard earthmoving construction equipment.

1. REVIEW OF COMPLIANCE (§230.10[A]-[D])

A review of the proposed activity indicates that:

a. The proposed fill placement occurs in a special aquatic site. The activity associated with the fill placement must have direct access or proximity to, or be located in, the aquatic ecosystem to fulfill its basic purpose.

b. The activity does not appear to (1) violate applicable state water quality or effluent standards (401 Water Quality Certification is pending); (2) jeopardize the existence of Federally listed endangered or threatened species or their habitat; and (3) violate requirements of any Federally designated marine sanctuary.

c. The activity will not cause or contribute to significant degradation of water of the United

States including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, or economic values.

d. Appropriate and practicable steps would be taken to minimize potential adverse impacts of the borrow placement on the aquatic ecosystem.

2. TECHNICAL EVALUATION FACTORS (SUBPARTS C-F)

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

1. Substrate impacts. The substrate is considered to be hydric soils.
2. Suspended particulates/turbidity impacts. Fill activities associated with the levee project are not expected to produce any significant change in suspended particulate matter or turbidity for the Missouri River, Kansas River, Blue River, or other drainages located in the project area. No noticeable impacts to dissolved oxygen levels, toxic metals, organics or pathogens would be anticipated. Photosynthetic, filter feeder, and sight feeder impacts are expected to be minimal.
3. Water column impacts. Water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients, and eutrophication would not be significantly affected by the project.
4. Alteration of current patterns and water circulation. No adverse effects to current patterns or water circulation were identified.
5. Alteration of normal water fluctuations/hydroperiod. No adverse effects to normal water fluctuations/hydroperiod were identified.
6. Alteration of salinity gradients. Salinity determinations are not applicable to the area.

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

1. Effect on threatened/endangered species and their habitat. Four Federally-listed threatened or endangered species were reported by the USFWS as dependent on the Missouri and Kansas Rivers and their floodplains within the study area: the threatened bald eagle (*Haliaeetus leucocephalus*), threatened piping plover (*Charadrius melodus*), endangered least tern (*Sterna antillarum*) and endangered pallid sturgeon (*Scaphirhynchus albus*). Threatened or endangered species are discussed in the preceding Environmental Impact Statement (Section 3, Affected Environment, subparagraph 3.2.5, Threatened and Endangered Species and Section 4, Environmental Consequences, subparagraphs 4.14.1 through 4.14.9). It has been determined that there would be no impacts to federally listed species or their critical habitats as a result of this project.
2. Effect on the aquatic food web. The proposed actions should have no significant effect on the aquatic food web. No significant impacts to benthos, plankton, or nekton are anticipated. Disruption to fish and aquatic life would be minimal to non-existent because these species occur in the Missouri, Kansas, and Blue Rivers, which would not be significantly affected by the selected plan.
3. Effect on wildlife (mammals, birds, reptiles, and amphibians). The proposed project

features primarily impact riparian and wetland habitat, which are proposed to be replaced. The riparian vegetation and wetlands are the habitat types of value to area wildlife. It is anticipated that wildlife habitat will not significantly change as a result of the proposed action. The existing wetlands are considered marginal in habitat value, as they are relatively small and dominated by nuisance species that form dense monocultures and inhibit plant diversity. Both wetlands contain cattails (*Typha* sp.) and one wetland contains reed canarygrass (*Phalaris arundinaceae*).

c. Special Aquatic Sites (Subpart E)

1. Sanctuaries.
2. Wetlands.
3. Mud flats.
4. Vegetated shallows.
5. Coral reefs.
6. Riffle and pool complexes.

The proposed action would have no adverse effect on sanctuaries; mud flats; vegetated shallows; or riffle and pool complexes. An evaluation of impacts to coral reefs is not applicable to this project.

The proposed levee and borrow areas would directly impact approximately 0.27 acres of emergent wetland and 0.17 acres of farmed wetland.

d. Human Use Characteristics (Subpart F)

1. Effects on municipal and private water supplies
2. Recreational and commercial fisheries impacts
3. Effects on water related recreation
4. Aesthetic impacts
5. Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

The proposed action would have no substantial adverse effect on municipal and private water supplies; recreational or commercial fisheries; or water-related recreation, national historic monuments, or similar preserves. Kaw Point Park was constructed in part with Land and Water Conservation Act funds. A conversion of use park use is not anticipated from the construction of the Fairfax-Jersey Creek sheetpile wall, located upstream of the Park. Sheetpile wall construction is estimated between 6 and 9 months. A waiver would be sought if the construction sheetpile wall would exceed twelve months. Aesthetics would be primarily impacted by increased levee heightening and secondarily by underseepage control features.

3. EVALUATION OF FILL MATERIAL (SUBPART G)

a. The following information has been considered in evaluating the biological availability of possible contaminants in fill material: physical characteristics. Fill material would be obtained primarily from one borrow site located west of the project area, within the Kansas River floodplain. Construction material would be chemically stable and noncontaminating. Construction would take place adjacent to areas with contaminated soil, but not within areas of known contaminated soil. Neither the fill nor its placement would cause relocation or increases of contaminants in the aquatic system. Certification of the project under Section 401 of the Clean Water Act would be received from the Missouri Department of Natural Resources.

b. Exploratory soil borings and chemical analysis sampling was conducted in January 2005. Grab samples for volatile organic compounds (VOCs) and composite samples for metals, pesticides, herbicides, and semivolatile organic compounds (SVOCs). All parameters tested were below action levels.

4. DISPOSAL SITE DELINEATION (§230.11[F])

a. The following factors, as appropriate, have been considered in evaluating the disposal site: depth of water at the disposal site, current velocity, direction, variability at disposal site, and the degree of turbulence. The sites have also been evaluated for the presence of special aquatic sites and waters of the U.S.

b. Mixing Zone Determination: An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are appropriate.

5. ACTIONS TO MINIMIZE ADVERSE EFFECTS (SUBPART H)

All appropriate and practicable steps, as warranted, would be taken through application of recommendations of §230.70-230.77 to insure minimal adverse effects of the proposed fill placement. These actions include the following:

a. In order to minimize and/or avoid adverse effects on the aquatic ecosystem, the Corps will minimize impacts to riparian timber to the extent practicable and use uncontaminated fill material. Disturbed areas will be graded and seeded upon completion of shaping. All activities will comply with standard Corps measures, directives, and policies to insure environmental protection during construction and minimize construction-related pollution. The following lists some of the environmental protection measures and policies.

    (1) Temporary erosion control measures (silt fences, berms, dikes, drains, etc.) will be provided and maintained.

    (2) KCD will obtain an NPDES permit from KDHE and MDNR for stormwater discharges from the project's construction work areas. All requirements of the NPDES stormwater discharge permit received from these agencies will be incorporated into project plans and specifications.

(3) Wastewater would not be allowed to re-enter the Missouri, Kansas, or Blue Rivers or their tributaries.

(4) If necessary, contaminated ground will be excavated; disposed of in compliance with applicable city/state/Federal regulations; replaced with suitable fill material; finished with topsoil; and seeded.

(5) Dust will be reduced in work areas by sprinkling with water or other methods that are permitted to reduce hazard and nuisance.

(6) Contractors will employ machinery of appropriate size for the fill placement activities.

b. Impacts to 185 acres of riparian vegetation along the Kansas River were avoided by foregoing the channel clearing and tree removal alternatives proposed. However, two emergent wetlands will be filled to facilitate an earthen levee raise. Minimization of impacts to riparian vegetation would be accomplished by using structures, primarily floodwalls, to achieve levee heightening in combination with earthen berms or without earthen berms. A draft wetland mitigation plan is in preparation and is discussed briefly below. Details of the mitigation plan are pending.

c. To replace 0.027 acres of emergent wetland and 0.17 acres of farmed wetland that would be impacted by the project, the location, hydrology, form and depth of the existing wetlands would be similar to replace the functions provided by the impacted wetlands. There is a limited amount of real estate for wetland mitigation in the highly urbanized and industrialized project area, and much of the open land adjacent to the rivers within the project area is known to have hazardous waste concerns. It is proposed to mitigate emergent wetland impacts at a 1.5:1 ratio and farmed wetlands at a 1.0:1 ratio, and establish 0.21 acres of wetland just landward of the levee toe where hydrology is provided by runoff from the adjacent levee slope. The existing wetland vegetation is comprised of cattails and reed canarygrass, which are known to result in monocultures and may prevent the establishment of additional wetland plant species. Wetland vegetation consisting of sedges (*Carex*), smartweed (*Polygonum*), or other appropriate species would be established within the mitigated wetland.

d. The area of riparian habitat anticipated to be impacted by the proposed construction would total approximately 0.38 acres. About 0.37 of this acreage is attributed to the potential tree clearing adjacent to the National Starch site that would be required to construct a seepwater conveyance path. About 0.01 acres of additional riparian impact would result from removing individual trees for construction. Tree replacement would be conducted at a 2.0:1 ratio and consist of planting bare root seedlings of native bottomland, hardwood tree species or shrubs or seedlings of the riparian species impacted on 8-foot centers within the Argentine foreshore or other suitable spacing or location within, or adjacent to the project area. If the proposed total acreage of trees to be replaced cannot be established within a single location due to a lack of available real estate, individual trees or small groups of trees

would be planted where space is available within, or adjacent to the project area.

6. FACTUAL DETERMINATIONS (§230.11)

A review of the appropriate information as identified in items 2-5 above indicates that there is minimal potential for short-term or long term environmental effects of the proposed fill placement as related to: a. Physical substrate disposal site; Water circulation, fluctuation, and salinity; c. Suspended particulates/turbidity; d. Contaminant availability; e. Aquatic ecosystem structure and function; f. Disposal site; and

g. Determination of Cumulative Impacts on the Aquatic Ecosystem. No short-term or long-term environmental effects of the proposed fill as related to substantial cumulative impacts are expected. Impacts from construction would be minor and temporary. Impacts to natural resources were avoided or otherwise, minimized. Approximately 185 acres of riparian vegetation, considered a high value habitat by the USFWS in their draft Coordination Act Report (CAR), along the Argentine foreshore, was avoided by selecting the nominal 500-year+3 levee raise over the tree clearing and/or channel modification. However, the preferred levee raise requires filling two emergent wetlands. One farmed wetland will either be excavated or otherwise impacted by borrow activities. The draft plan for replacing wetlands that could not be avoided and replanting trees is discussed above.

   The borrow soil used in levee construction would be composed of chemically stable, noncontaminating material. Therefore, no detrimental cumulative or secondary impacts are expected to occur.

h. Determination of Secondary Impacts on the Aquatic Ecosystem. No short-term or long-term environmental effects of the proposed fill placement as related to secondary impacts are expected. Regarding E.0 11988, Flood Plain Management, there is limited very limited land available for development, and some available acreage has hazardous waste issues. The project entails increasing the reliability of the existing system as opposed to new levee construction. Therefore, secondary impacts to wetlands from future development pressures should not occur. Any development that would occur in the project area would be subject to Clean Water Act regulations and subject to an evaluation for consideration of a Section 404 permit. Actions initiated by the local sponsors that are not included in this project are not considered secondary impacts of the project. The local sponsor would be required to obtain a Section 404 permit prior to the discharge of dredged or fill material for their respective projects.

7. EVALUATION RESPONSIBILITY:

Prepared by: 08-07-06

Mr. Richard A. Skinker – Biologist DATE
Environmental Resources Section

Reviewed by: 8/8/06

Dr. Christopher M. White, Chief DATE
Environmental Resources Section

Reviewed by: 8/9/06

Mr. Joseph M. Hughes, Chief DATE
Regulatory Branch

8. FINDINGS:

I find that the proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines.

8/9/06

Michael A. Rossi DATE
Colonel, Corps of Engineers

U.S. Army Corps of Engineers, Kansas City District

Figures

Kansas Citys, Missouri & Kansas
Flood Damage Reduction Study
Final Environmental Impact Statement

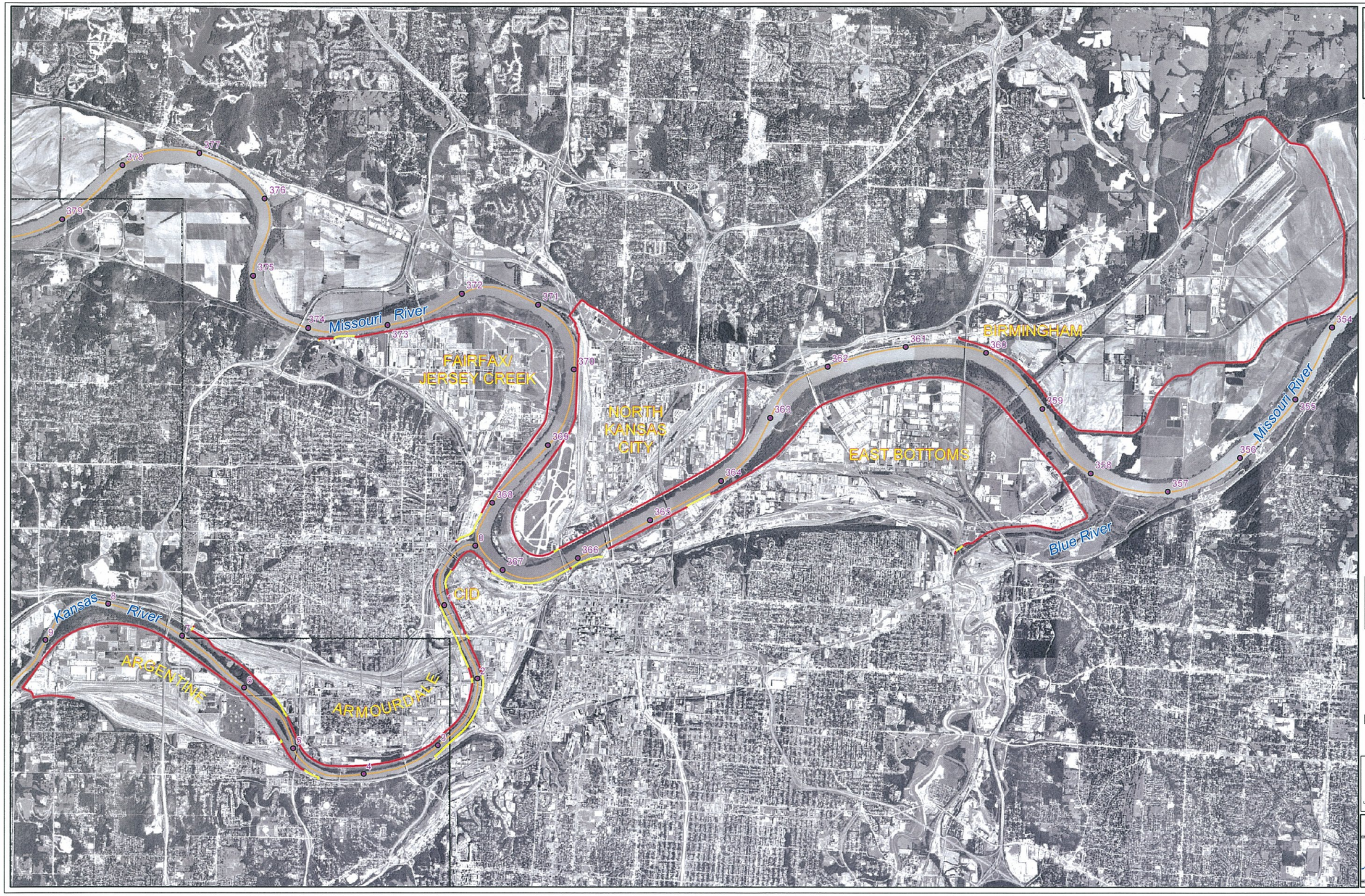
Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

Study Area Levee Units and Protected Areas

Figure 1-1



N

KEY

Existing Levee/Floodwall

- Floodwall
- Levee

0 1,450 2,900 5,800 Feet

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

Created by: U.S. Army Corps of Engineers
Kansas City District, GDS Team

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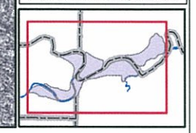

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

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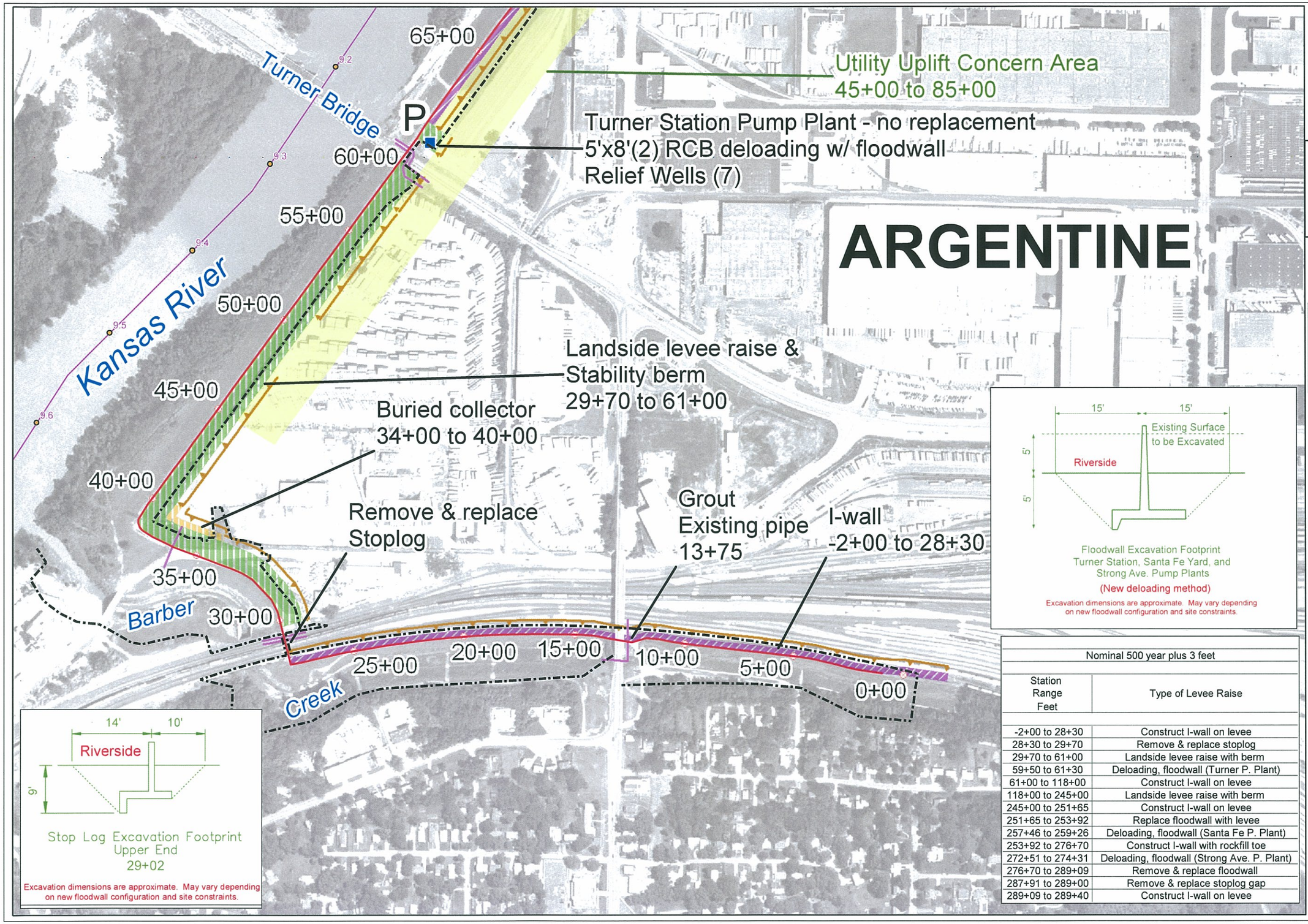
Argentine Levee Unit Location and Preferred Alternative Stations 0+00 to 60+00

Nom500yr + 3 ft.

Figure 1-2



Floodwall Excavation Footprint
Turner Station, Santa Fe Yard, and
Strong Ave. Pump Plants
(New deloading method)

Excavation dimensions are approximate. May vary depending on new floodwall configuration and site constraints.

Stop Log Excavation Footprint
Upper End
29+02

Excavation dimensions are approximate. May vary depending on new floodwall configuration and site constraints.

Nominal 500 year plus 3 feet	
Station Range Feet	Type of Levee Raise
-2+00 to 28+30	Construct I-wall on levee
28+30 to 29+70	Remove & replace stoplog
29+70 to 61+00	Landside levee raise with berm
59+50 to 61+30	Deloading, floodwall (Turner P. Plant)
61+00 to 118+00	Construct I-wall on levee
118+00 to 245+00	Landside levee raise with berm
245+00 to 251+65	Construct I-wall on levee
251+65 to 253+92	Replace floodwall with levee
257+46 to 259+26	Deloading, floodwall (Santa Fe P. Plant)
253+92 to 276+70	Construct I-wall with rockfill toe
272+51 to 274+31	Deloading, floodwall (Strong Ave. P. Plant)
276+70 to 289+09	Remove & replace floodwall
287+91 to 289+00	Remove & replace stoplog gap
289+09 to 289+40	Construct I-wall on levee

NOTES:

1. Utility easements are not shown.
2. Levee raise shown stopping at levee centerline for clarity. Raise actually involves entire levee crown width.

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers
- Utility uplift concern areas within 300' of levee centerline
- Utility Crossings

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Floodwall raise
- Buried collector
- Levee raise
- Soils replacement, Filter blanket
- I-walls

N

Photography Date: 2001

Feet
0 110 220 440

Projection: UTM Zone 15, Feet
Datum: NAD 83

Created by: U.S. Army Corps of Engineers
Kansas City District, GDS Team

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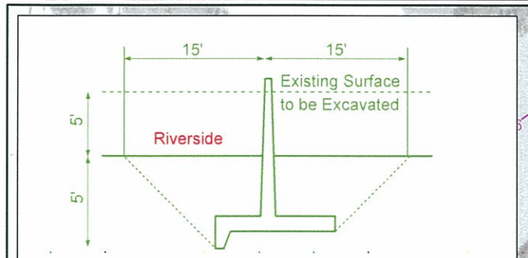

Floodwall Excavation Footprint
Turner Station, Santa Fe Yard, and
Strong Ave. Pump Plants

(New deloading method)

Excavation dimensions are approximate. May vary depending on new floodwall configuration and site constraints.

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

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Argentine Levee Unit Location and Preferred Alternative Stations 60+00 to 125+00

Nom500yr + 3 ft.

Figure 1-3

NOTES:

1. Utility easements are not shown.
2. Levee raise shown stopping at levee centerline for clarity. Raise actually involves entire levee crown width.

Key

- Project Wetlands
- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers
- Utility uplift concern areas within 300' of levee centerline
- Utility Crossings

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Floodwall raise
- Buried collector
- Levee raise
- Soils replacement, Filter blanket
- I-walls

N

0 110 220 440 Feet

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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601 East 12th, Room 812, Kansas City, Missouri, 64106

Kansas River

8.5
8.8
8.9
9
7.7

105+00
110+00
115+00
120+00
125+
100+00
95+00
90+00
85+00
80+00
75+00
70+00
65+00

Harcros Wetland

Harcros Plant

Landside levee raise & Stability Berms 118+00 to 245+00

I-wall 61+00 to 118+00

Utility Uplift Concern Area 110+00 to 140+00

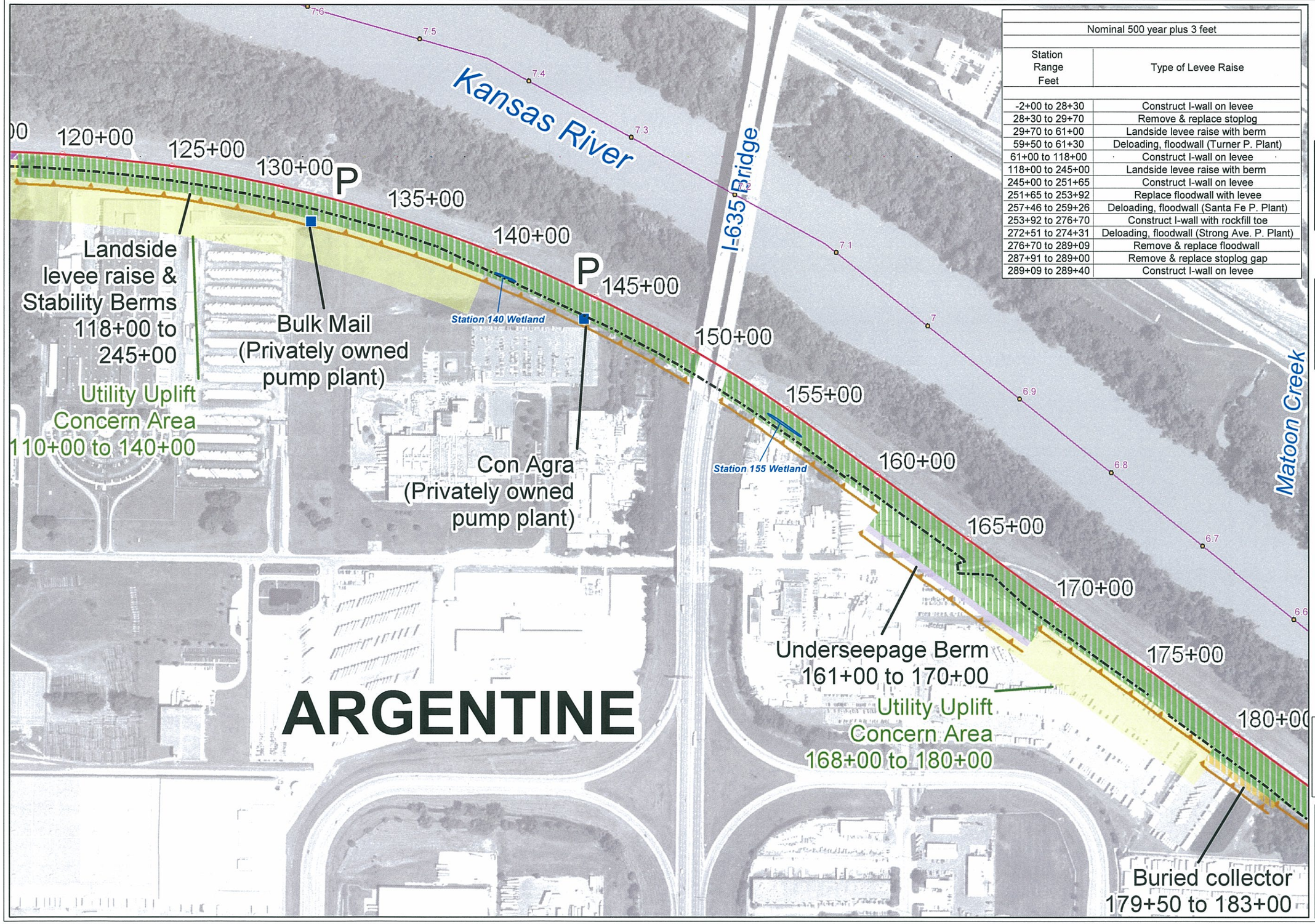
Utility Uplift Concern Area 45+00 to 85+00

P

Turner Station Pump Plant - no replacement
5'x8'(2) RCB deloading w/ floodwall
Relief Wells (7)

ARGENTINE

Nominal 500 year plus 3 feet	
Station Range Feet	Type of Levee Raise
-2+00 to 28+30	Construct I-wall on levee
28+30 to 29+70	Remove & replace stoplog
29+70 to 61+00	Landside levee raise with berm
59+50 to 61+30	Deloading, floodwall (Turner P. Plant)
61+00 to 118+00	Construct I-wall on levee
118+00 to 245+00	Landside levee raise with berm
245+00 to 251+65	Construct I-wall on levee
251+65 to 253+92	Replace floodwall with levee
257+46 to 259+26	Deloading, floodwall (Santa Fe P. Plant)
253+92 to 276+70	Construct I-wall with rockfill toe
272+51 to 274+31	Deloading, floodwall (Strong Ave. P. Plant)
276+70 to 289+09	Remove & replace floodwall
287+91 to 289+00	Remove & replace stoplog gap
289+09 to 289+40	Construct I-wall on levee



Nominal 500 year plus 3 feet	
Station Range Feet	Type of Levee Raise
-2+00 to 28+30	Construct I-wall on levee
28+30 to 29+70	Remove & replace stoplog
29+70 to 61+00	Landside levee raise with berm
59+50 to 61+30	Deloading, floodwall (Turner P. Plant)
61+00 to 118+00	Construct I-wall on levee
118+00 to 245+00	Landside levee raise with berm
245+00 to 251+65	Construct I-wall on levee
251+65 to 253+92	Replace floodwall with levee
257+46 to 259+26	Deloading, floodwall (Santa Fe P. Plant)
253+92 to 276+70	Construct I-wall with rockfill toe
272+51 to 274+31	Deloading, floodwall (Strong Ave. P. Plant)
276+70 to 289+09	Remove & replace floodwall
287+91 to 289+00	Remove & replace stoplog gap
289+09 to 289+40	Construct I-wall on levee

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

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Argentine Levee Unit Location and Preferred Alternative Stations 120+00 to 180+00

Nom500yr + 3 ft.

Figure 1-4

NOTES:

1. Utility easements are not shown.
2. Levee raise shown stopping at levee centerline for clarity. Raise actually involves entire levee crown width.

Key

- Project Wetlands
- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers
- Utility uplift concern areas within 300' of levee centerline
- Utility Crossings

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Floodwall raise
- Buried collector
- Levee raise
- Soils replacement, Filter blanket
- I-walls

N

Feet
0 100 200 400

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

Created by: U.S. Army Corps of Engineers
Kansas City District, GDS Team

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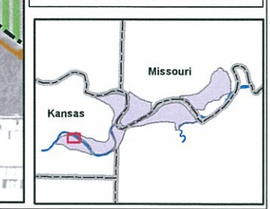

Nominal 500 year plus 3 feet	
Station Range Feet	Type of Levee Raise
-2+00 to 28+30	Construct I-wall on levee
28+30 to 29+70	Remove & replace stoplog
29+70 to 61+00	Landside levee raise with berm
59+50 to 61+30	Deloading, floodwall (Turner P. Plant)
61+00 to 118+00	Construct I-wall on levee
118+00 to 245+00	Landside levee raise with berm
245+00 to 251+65	Construct I-wall on levee
251+65 to 253+92	Replace floodwall with levee
257+46 to 259+26	Deloading, floodwall (Santa Fe P. Plant)
253+92 to 276+70	Construct I-wall with rockfill toe
272+51 to 274+31	Deloading, floodwall (Strong Ave. P. Plant)
276+70 to 289+09	Remove & replace floodwall
287+91 to 289+00	Remove & replace stoplog gap
289+09 to 289+40	Construct I-wall on levee

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

Argentine Levee Unit Location and Preferred Alternative Stations 180+00 to 240+00

Nom500yr + 3 ft.

Figure 1-5

NOTES:

1. Utility easements are not shown.
2. Levee raise shown stopping at levee centerline for clarity. Raise actually involves entire levee crown width.

180+00
185+00
190+00
195+00
200+00
205+00
210+00
215+00
220+00
225+00
230+00
235+00
240+00

Buried collector
179+50 to 183+00

Landside levee raise & Stability berm
118 to 245+00

Filter blanket
202+00 to 207+00

Grout existing pipe
210+73

West Kansas Ave. Bridge

Kansas River

6.4
6.3
6.2
6.1
6
5.9
5.8
5.7
5.6
5.5
5.4

Fairbanks Plant

Sinclair Plant

ARGENTINE

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers
- Utility uplift concern areas within 300' of levee centerline
- Utility Crossings

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Floodwall raise
- Buried collector
- Levee raise
- Soils replacement, Filter blanket
- I-walls

N

Feet
0 112.5 225 450

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

Created by: U.S. Army Corps of Engineers
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ARGENTINE

Landside levee raise &
Stability berm
118 to 245+00

Filter blanket
244+00 to 246+00

I-wall
245+00 to 251+65

Replace floodwall with levee
251+65 to 253+92

Remove and replace Argentine Pump Plant
9.5'x9' RCB

Santa Fe Yards Pump Plant
4'x5' RCB deloading with floodwall

I-wall with
Rock fill toe
253+92 to 276+70

Utility Uplift Concern Area
248+00 to 275+00

Strengthen Strong Ave. Pump Plant
7'x7' RCB Strengthen box and
Deloading with floodwall

Remove & replace floodwall
276+70 to 289+09

Buried collector
278+00 to 289+09

Remove & replace
Stoplog

I-wall
289+09 to 289+40

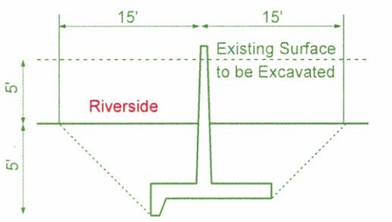
240+00
245+00
250+00
255+00
260+00
265+00
270+00
275+00
280+00
285+00

P
P
P

Kansas River
18th St. Bridge
Santa Fe Depot

5.3
5.2
5.1
5
4.9
4.8
4.7
4.6

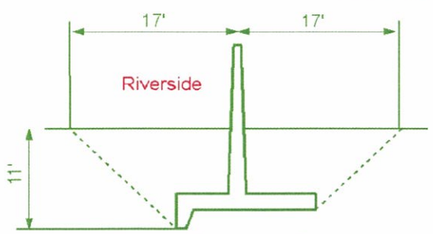
Nominal 500 year plus 3 feet	
Station Range Feet	Type of Levee Raise
-2+00 to 28+30	Construct I-wall on levee
28+30 to 29+70	Remove & replace stoplog
29+70 to 61+00	Landside levee raise with berm
59+50 to 61+30	Deloading, floodwall (Turner P. Plant)
61+00 to 118+00	Construct I-wall on levee
118+00 to 245+00	Landside levee raise with berm
245+00 to 251+65	Construct I-wall on levee
251+65 to 253+92	Replace floodwall with levee
257+46 to 259+26	Deloading, floodwall (Santa Fe P. Plant)
253+92 to 276+70	Construct I-wall with rockfill toe
272+51 to 274+31	Deloading, floodwall (Strong Ave. P. Plant)
276+70 to 289+09	Remove & replace floodwall
287+91 to 289+00	Remove & replace stoplog gap
289+09 to 289+40	Construct I-wall on levee



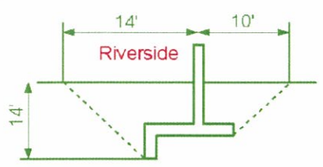
Floodwall Excavation Footprint
Turner Station, Santa Fe Yard, and
Strong Ave. Pump Plants
(New deloading method)

Excavation dimensions are approximate. May vary depending on new floodwall configuration and site constraints.

Argentine Unit
(Existing Structures)



Floodwall Excavation Footprint
Sta. 276+70 to 287+87



Stop Log Excavation Footprint
Sta. 287+87 to 289+09

Excavation dimensions are approximate. May vary depending on new floodwall configuration and site constraints.

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

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Argentine Levee Unit Location and Preferred Alternative Stations 240+00 to 289+00

Nom500yr + 3 ft.

Figure 1-6

NOTES:

1. Utility easements are not shown.
2. Levee raise shown stopping at levee centerline for clarity. Raise actually involves entire levee crown width.

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers
- Utility uplift concern areas within 300' of levee centerline
- Utility Crossings

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Floodwall raise
- Buried collector
- Levee raise
- Soils replacement, Filter blanket
- I-walls

N

Feet
0 112.5 225 450

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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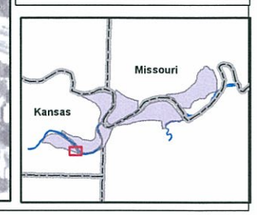

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Feasibility Study

28 APR 06

Armourdale Levee Unit Location

Figure 1-7

Maroon Creek

Kansas River

N

KEY

Existing Levee Features

StaFeatCode

Closure Structure

Pump Plant

Existing Levee/Floodwall

Floodwall

Levee

0 350 700 1,400

Photography Date: 2001

Projection: UTM Zone 15, Feet
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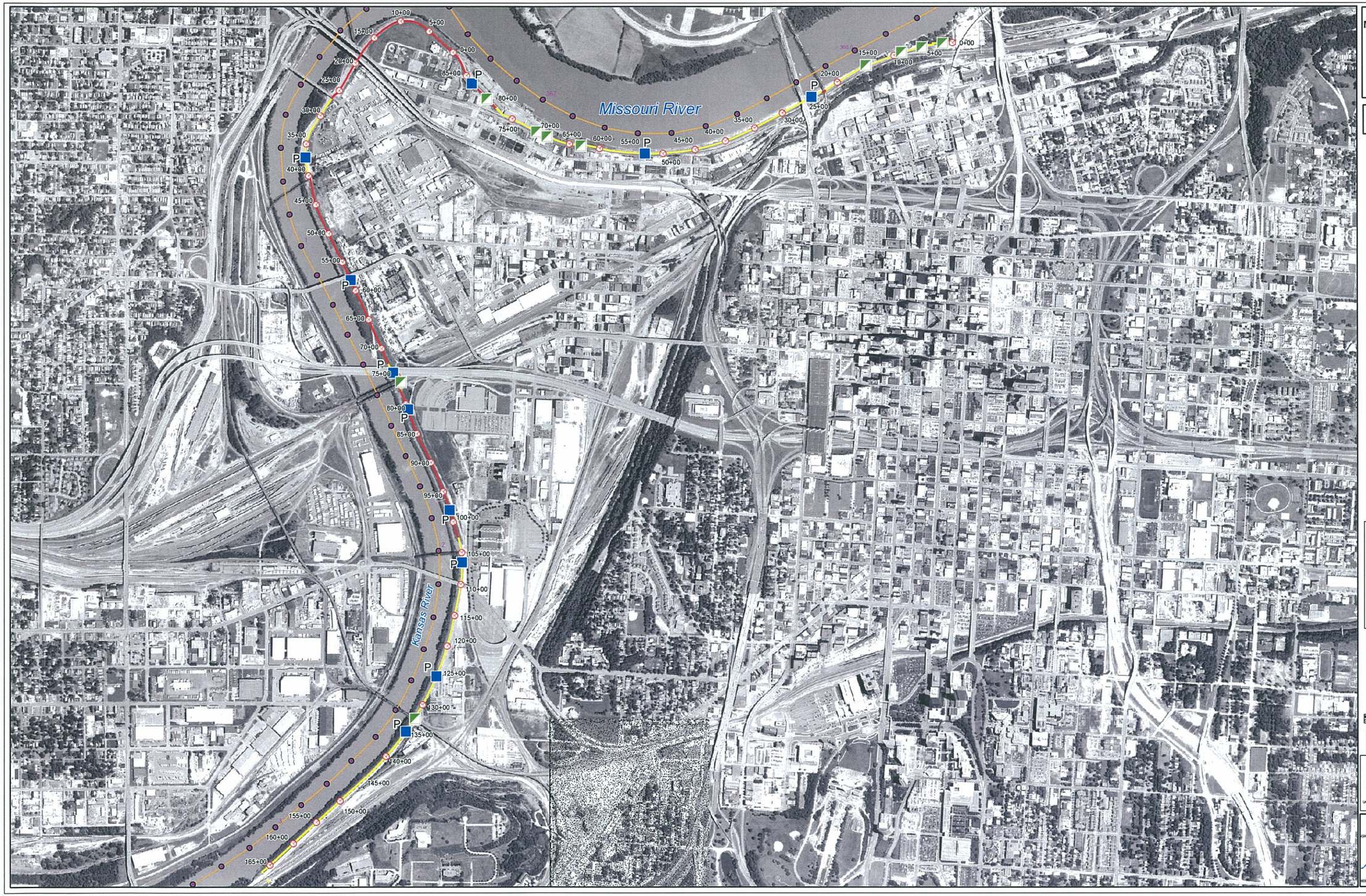

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

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Central Industrial District Levee Unit Location

Figure 1-8

N

KEY

Existing Levee Features

StaFeatCode

Closure Structure

Pump Plant

Existing Levee/Floodwall

Floodwall

Levee

0 350 700 1,400

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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Kansas City District, CDG Team

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East Bottoms

Locate relief wells within the existing right of way (Between center of levee and fence). Not proposing to cross into private property limits. Relief well solution

355+00
360+00
365+00
370+00
375+00
380+00
385+00
390+00
395+00
400+00
405+00
410+00
415+00
420+00
425+00
430+00
435+00

MO. River
357.9
373.6

Blue River

Existing Buried Collector System

End of Work Area

Header collection system routed from relief wells to Hawthorne Pump Plant ditch.

Hawthorne Pump Plant

P

Start of Work Area

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

East Bottoms Levee Unit Location and Preferred Alternative

Pressure Relief Wells

Figure 1-9

NOTE: Utility easements are not shown.

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Relief Wells Points

N

0 112.5 225 450 Feet

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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Missouri River

373.8 373.7 373.6 373.5 373.4 373.3

280+00 285+00 290+00 295+00 300+00 305+00

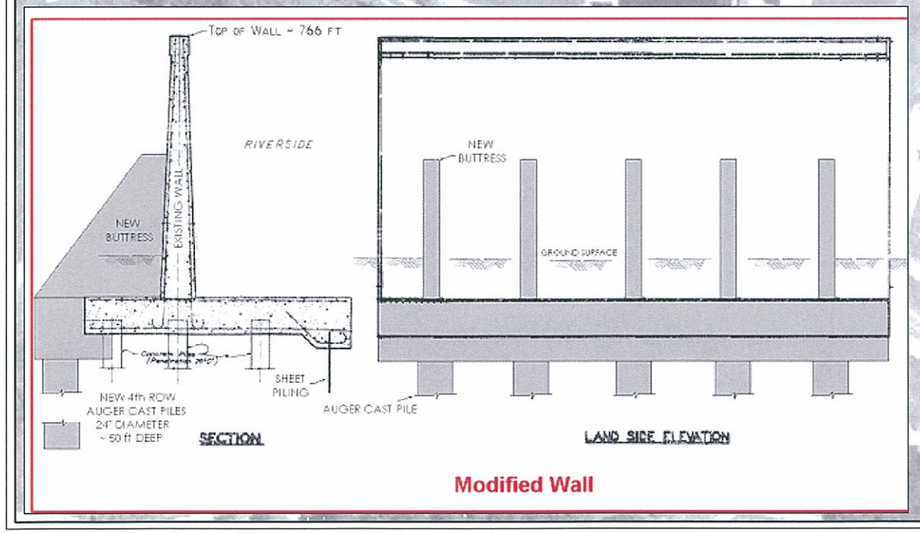
P

End of Floodwall

Start of Floodwall

Pumphouse Number 1
Abandoned, basement to be filled.

Modify Existing Floodwall



Modified Wall

Fairfax Jersey Creek

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

Fairfax-Jersey Creek Levee Unit Location BPU Floodwall Preferred Alternative

Construct and Additional Row of Piles and Foundation Slab Extension

Figure 1-10

NOTE: Utility easements are not shown.

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Modify Existing Floodwall

N

Feet
0 55 110 220

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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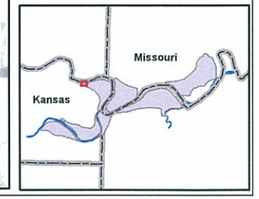

Fairfax Jersey Creek

Jersey Creek

35+00

30+00

P

STA 29+98
End Sheetpile

Jersey Creek Outfall

All Work within Existing Right of Way

Missouri River

367.9

367.8

25+00

Driven Sheetpile
Wall System

Sheetpile and Wharf Improvements between STA 17+70 to STA 23+30 to be performed by others. Not included within Federal Cost Shared Project.

STA 23+30
End Wharf

367.7

20+00

Wharf Area

STA 17+70
Start Wharf

STA 15+70
Begin Sheetpile

15+00

367.6

10+00

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

Fairfax-Jersey Creek Levee Unit Location Sheetpile Wall Preferred Alternative

Open Cell Sheetpile Wall

Figure 1-11

NOTE: Utility easements are not shown.

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

Driven Sheetpile

- Above ground
- Below ground

Driven Sheetpile, Wharf Area

- Above ground
- Below ground

N

Feet
0 60 120 240

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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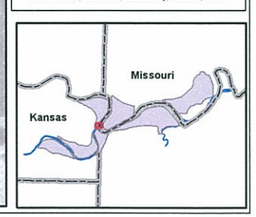

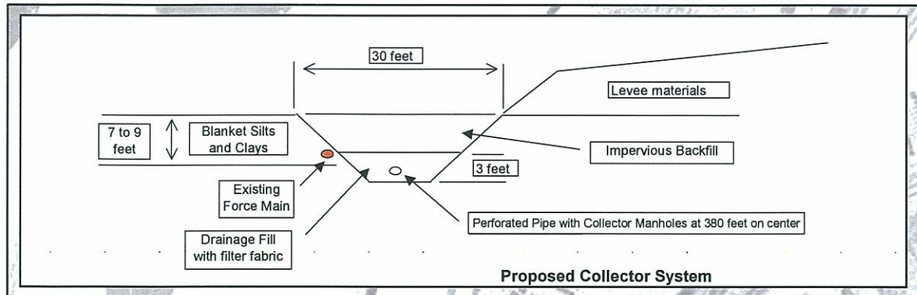

Proposed Collector System

North Kansas City

Existing Harlem Sanitary Pump Station

Existing 8" Force Main 4 ft deep

End of work Area

245+00

240+00

235+00

230+00

225+00

220+00

215+00

210+00

205+00

200+00

New pumping vaults along buried collector alignment not shown.

Start of Work Area

Existing 8" Force Main 4 ft deep

Heart of America Bridge

A.S.B. Bridge

Missouri River

Broadway Bridge

Hannibal Bridge

365.6

365.7

365.8

365.9

366.0

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

North Kansas City Levee Unit Location

Harlem Preferred Alternative

Buried Collector System

Figure 1-12

NOTE: Utility easements are not shown.

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Buried collector
- Existing Power Poles

N

0 90 180 360 Feet

Photography Date: 2001

Projection: UTM Zone 15, Feet
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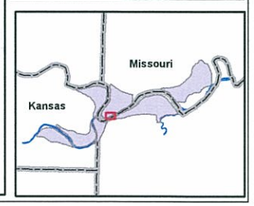

North Kansas City

Proposed Relief Well and Collector System - Flows to Pump Station

End of Work Area

280 ft offset from C/L of levee

Proposed Pump Station

Start of Work Area

290+00

285+00

280+00

275+00

270+00

265+00

260+00

255+00

250+00

245+00

Paseo Bridge

Missouri River

364.7

364.8

364.9

365.0

P

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

North Kansas City Levee Unit Location

National Starch Preferred Alternative

Relief Wells and Pump Station

Figure 1-13

NOTE: Utility easements are not shown.

Key

- Existing Right of Way
- Temporary Easement Requirement
- 373.6 River Mile Markers

Existing Levee Features

- P Pump Plant

Existing Levee/Floodwall

- Floodwall
- Levee

Potentially Affected Areas

- Relief Wells Points

N

0 90 180 360 Feet

Photography Date: 2001

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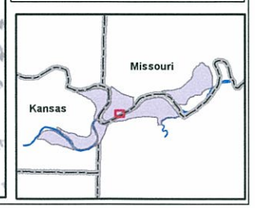

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

Birmingham Levee Unit Location

Figure 1-14

Little Shoal Creek

Missouri River

N

KEY

Existing Levee Features

Closure Structure

Pump Plant

Existing Levee/Floodwall

Floodwall

Levee

0 625 1,250 2,500 Feet

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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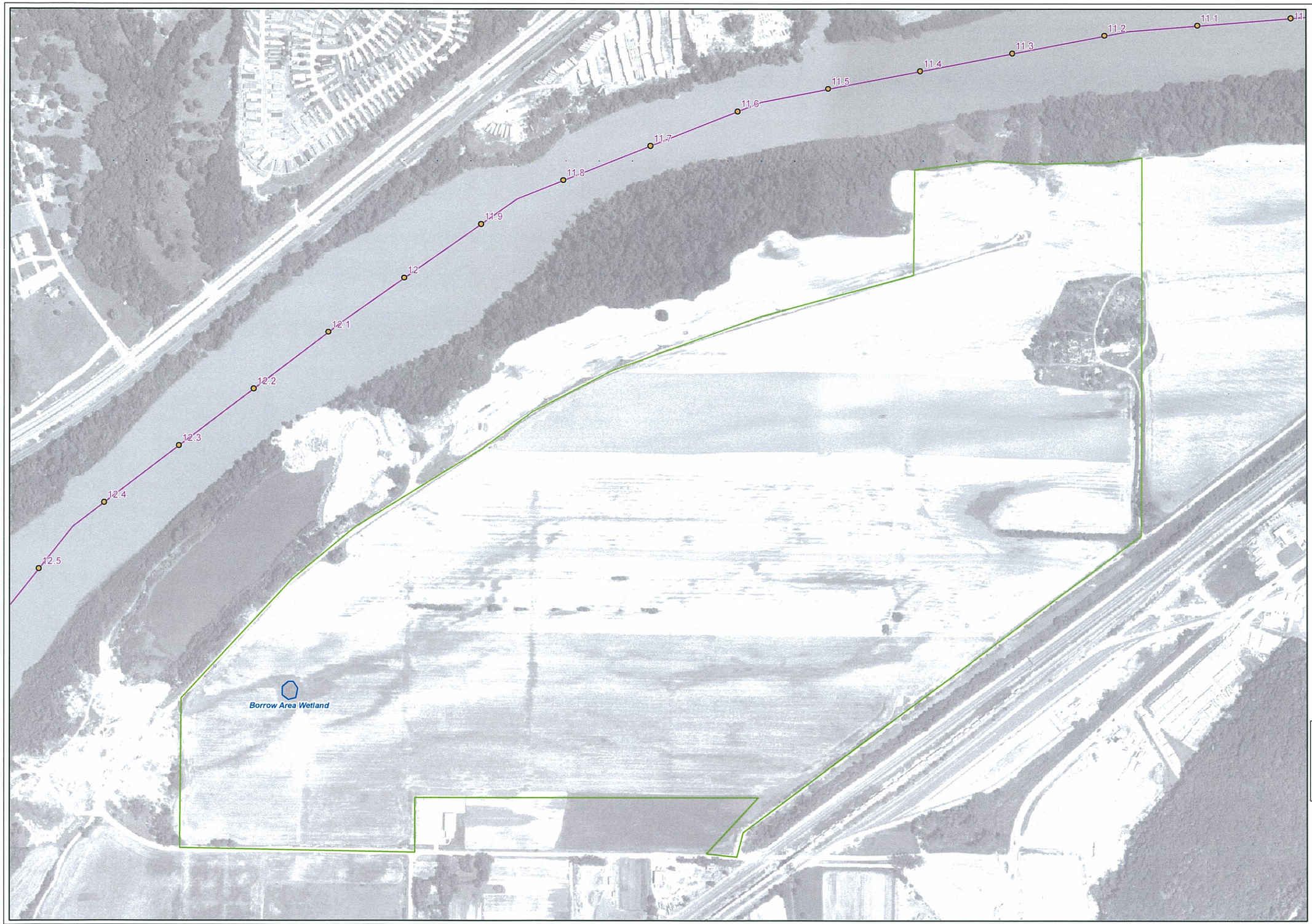
Feasibility Study

28 APR 06

Proposed Borrow Area Location

Figure 1-15

NOTE: Utility easements are not shown.



Key

Project Wetlands

Borrow Area

373.6 River Mile Markers

N

0 150 300 600 Feet

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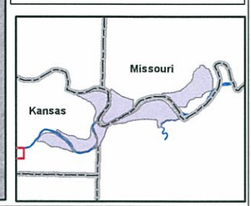

KC Flood Damage Reduction Study w/ Potential EJ areas

PLATTE COUNTY
CLAY COUNTY
WYANDOTTE COUNTY
KANSAS
MISSOURI
JACKSON COUNTY
RIVERSIDE QUINDARO BEND
FAIRFAX JERSEY CREEK
NORTH KANSAS CITY
CENTRAL INDUSTRIAL DISTRICT (CID)
EAST BOTTOMS
BIRMINGHAM DD
COURTNEY
ARGENTINE
ARMOURDALE
VER OLDHAM SEC 2
M SEC 1
Missouri River
Kansas River
64152 64151 64118 64118 64119 64158 64068 64058 64161 64161 64150 64117 64116 66104 66115 64120 64050 64053 64054 64053 66101 66102 64123 64124 64125 66118 64101 64105 64106 64102 64127 64126 66111 64108 66105 66106 64109 64128 64129 66103 64111 66160 64110 64130 64133 66216 66203 66202 66205 64112 64055 64052

Legend

- Missouri River Miles
- Interstates
- US HWY
- State HWY
- Areas Behind Levees
- Zip Code Boundary
- County Boundary
- State Boundary

Potential EJ Indicator

- Minority >= 25% & Poverty <= 25%
- Minority <= 25% & Poverty >= 25%
- Minority >= 25% & Poverty >= 25%
- No Match

Miles
0 0.5 1 2

N W E S

KS MO

NOTE: The Environmental Protection Agency does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any injury or loss resulting from reliance upon the information shown.

'Minorities' is the percentage of minority individuals relative to the total population per block group. 'Below Poverty' is the percentage of the total block group population with income below the poverty level in 1999. Block group geography and demographic data are based on the 2000 census.

JMA Information Technology

EPA Region 7 ENSV Division

WO# 06-177 jmb 5/3/06

Kansas Citys, Missouri and Kansas Flood Damage Reduction Project

Feasibility Study

28 APR 06

North Kansas City Hillside Ditch and Levee Tieback

Figure 5-1

470+00
460+00
450+00
440+00
430+00
420+00
410+00
400+00
390+00
380+00
370+00
360+00
Hillside Ditch
Rock Creek
Missouri River
363
P

N

KEY

Existing Levee Features
StaFeatCode
Closure Structure
Pump Plant
Existing Levee/Floodwall
Floodwall
Levee
Name
Streams
Ditches

0 175 350 700 Feet

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Feasibility Study

28 APR 06

Fairfax-Jersey Creek Levee Unit Downstream Tieback

Figure 5-2

NOTE: Utility easements are not shown.

Key

- Downstream Tieback
- 373.6 River Mile Markers

Existing Levee/Floodwall

- Floodwall
- Levee

N

Feet
0 60 120 240

Photography Date: 2001

Projection: UTM Zone 15, Feet
Datum: NAD 83

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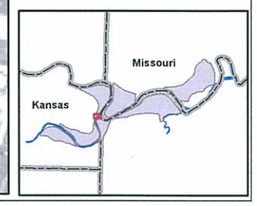
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