



**US Army Corps
of Engineers**
Kansas City District

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

**Environmental Assessment
&
Finding of No Significant Impact**

**MANHATTAN, KANSAS,
LOCAL PROTECTION PROJECT
SECTION 216 FEASIBILITY STUDY**

August 2014



DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
600 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-289

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Summary

The city of Manhattan, Kansas, sits at the confluence of the Big Blue and Kansas Rivers. Flow on the Big Blue River is largely controlled by releases from Tuttle Creek Dam, which is approximately 6 miles north of the City of Manhattan or 12.3 miles above the confluence with the Kansas River. The existing Manhattan, Kansas, local protection project is comprised primarily of one levee unit and associated appurtenances. The levee unit withstood the Flood of 1993, but some elements of the system were seriously challenged as the flood crested. This event raised a concern that the levee may provide less than the authorized benefits for which it was designed. The US Army Corps of Engineers in cooperation with the local project sponsor (City of Manhattan, Kansas) are conducting this feasibility study to identify alternatives for flood risk reduction on the current Manhattan local protection project.

Alternatives

This EA addresses alternatives for raising the height of the Manhattan levee located along the Kansas and Big Blue rivers. Five alternatives have been considered for technical feasibility, environmental and social acceptability, and economic efficiency. These alternatives include the No Federal Action alternative, three levee raise plans of increasing height, and a single plan including a combination of a levee raise with channel widening and bridge modifications on a portion of the Big Blue River.

Plan 1 – No Federal Action Alternative: With the No Federal Action option, no increase in the current level of flood protection would occur. Structures within the protected zone would continue to be at a higher risk for flooding during large flood events.

Plan 2: This alternative would raise the current levee between stations 200+00 and 272+85 an average of 0.7 feet and a maximum of 1.5 feet. The plan includes an approximate 200-foot extension for tie-in along Casement Rd. at the upper end of Big Blue River Segment and a new sandbag gap. Gatewells would be replaced at stations 14+78, 62+20, 89+83, 163+00, and 269+50. Landside toe embankment sand drain would be installed along a portion of the Big Blue River levee segment. Relief wells would be constructed at stations 64+00 to 97+00, 110+120+00, and 265+70 to 269+50. Underseepage berms would be constructed at 120+00 to 137+00, and 165+00 to 173+50.

Plan 3 (Recommended Plan): The Recommended Plan would raise the current levee between stations 131+00 and 277+53 an average of 1.5 feet and a maximum of 3.3 feet. The plan includes an approximate 500-foot extension for tie-in along Casement Rd. at the upper end of Big Blue River Segment and a new sandbag gap. Gatewells would be replaced at stations 14+78, 62+20, 89+83, 163+00, and 269+50. Landside toe embankment sand drain would be installed along a portion of the Big Blue River levee segment. Relief wells would be constructed at stations 64+00 to 97+00, 110+120+00, and 265+70 to 269+50. Underseepage berms would be constructed at 120+00 to 137+00, and 165+00 to 173+50.

Plan 4: This plan would raise the current levee—between stations 8+50 and 72+00 and 101+00 to 277+53 an average of 2.1 feet and a maximum of 3.9 feet. There would be an approximate 1700-foot extension for tie-in along Wildcat Creek and Riley Lane at the upper end of Kansas River levee Segment as well as an approximate 500-foot extension for tie-in along Casement Rd at the upper end of Big Blue River Segment and a new sandbag gap. Thirteen gatewells would be replaced, raising of one gatewell, and strengthen one pump station. Underseepage berms would be constructed from stations 120+00 to 137+00, and 165+12 to 173+50. Landside toe embankment sand drain would be constructed along a portion of the Big Blue River Levee Segment. Relief wells would also be installed from stations 18+00 to 23+00, 64+00 to 97+00, 110+00 to 120+00, 190+00 to 210+00, and 265+70 to 272+00.

Plan 5: This plan would raise the current levee in the same locations as plan 3 with the addition of channel widening (CW). This alternative includes all the features of the Plan 3 levee raise alternative with an average raise of 1.3 feet and a maximum of 2.6 feet, in addition to excavation of approximately 200,000 cubic yards of material along the left descending bank of the Big Blue River. Both the Highway 24 and Union Pacific Railroad Bridges would be expanded and approximately 1,100 linear feet of riprap armoring would be placed around the bridge abutments.

Summary of Environmental Impacts

The Recommended Plan would raise the level of the levee, construct and/or replace other associated infrastructure. Construction of the Recommended Plan would result in minor, localized, short-term impacts to noise levels and recreation from the operation of construction equipment and closing of portions of the Linear Trail during construction. There would also be adverse impacts to terrestrial habitat and wildlife from the loss of approximately 6.23 acres of forested habitat and 0.67 acres of shrubland habitat. Efforts will be made to avoid and minimized impacts to forest, shrubland, and other native habitat during clearing and construction activities. Native vegetation may be planted in the construction easement, where appropriate following project construction to minimize the long term impact to terrestrial habitat and wildlife. The Recommended Plan would not result in any impacts to federally-listed threatened or endangered species or their designated critical habitat. The proposed action also would have no impact to sites listed on or eligible for inclusion on the National Register of Historic Places.

Mitigation Measures

The recommended plan would not affect any wetlands or water of the U.S., nor any important wildlife habitat, therefore no mitigation is proposed for this plan.

Conclusion

After evaluating the anticipated environmental, economic, and social effects of the proposed activity, it is my determination that the Recommended Plan for the Manhattan, Kansas, Flood Risk Reduction project does not constitute a major federal action that would significantly affect the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date: _____

Andrew D. Sexton
Colonel, Corps of Engineers
District Commander

**MANHATTAN, KANSAS,
LOCAL PROTECTION PROJECT
SECTION 216 FEASIBILITY STUDY
ENVIRONMENTAL ASSESSMENT
August 2014**

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers Kansas City District (CENWK) and the local project sponsor (City of Manhattan, Kansas) are conducting a feasibility study of the existing local protection project which serves a highly-developed area around downtown Manhattan, Kansas. This is a single purpose study focusing on flood risk management. The existing Manhattan, Kansas, local protection project is comprised primarily of one levee unit and associated appurtenances. The levee unit withstood the flood of 1993, but some elements of the system were seriously challenged as the flood crested. This event raised a concern that the levee may provide less than the authorized benefits for which it was designed.

The city of Manhattan is located in central Kansas, and lies at the confluence of the Big Blue River and the Kansas River (Figure 1 in Appendix I). The Big Blue River is on the east side of the downtown area and connects to the Kansas River on the southeast side of the city. The Manhattan levee unit is located generally west and north of the confluence of the Big Blue River and the Kansas Rivers, and is approximately 28,850 feet long. The levee was typically constructed with a 10-foot crown width and three horizontal to one vertical (3H: 1V) embankment slopes. A limited number of major structural features are associated with this levee.

The Corps of Engineers Tuttle Creek Lake is situated just to the north of Manhattan with the Big Blue River flowing into and out of Tuttle Creek Lake. Tuttle Creek is a major lake in the Kansas River basin system of lakes, which are critical to the Corps' flood risk management mission for both the Kansas and Missouri Rivers.

1.1 Purpose and Need for Action

The Manhattan Levee protects the majority of the downtown central business district providing protection for approximately a billion dollars of structures and other infrastructure. The original project started construction in 1961 and was finished and turned over to the local interest in 1963. During the 1993 flood the levee held during the flood crest. However, the water heights on the levee created concern that the levee would not function to the original design specifications. The existing flood risk reduction project needed action to ensure that the system provides the flood risk reduction protection as was originally designed.

1.2 Project Location

The Manhattan Levee is located west and north of the confluence of the Big Blue River and Kansas River in the city of Manhattan, Kansas, in Riley and Pottawatomie Counties. The levee embankment begins at Station 8+50 and ends at Station 272+85. The levee starts north of Wildcat Creek and is roughly aligned with 15th Street in Manhattan, Kansas. The levee follows the alignment of Wildcat Creek from Station 8+50 to Station 35+00, where it begins to parallel Pottawatomie Avenue to station 60+00. The levee alignment then turns to the northeast and turns north at 80+00 to align with the Kansas River. The alignment with the Kansas River continues to the confluence with

the Big Blue River at approximately Station 173+00. From the confluence, the levee turns towards the northwest, aligning with the Big Blue River until Station 209+00, where it turns further to the west and splits off from the Big Blue River. The levee continues in a west-northwest direction and aligns parallel to an existing drainage channel to its end at Station 272+85.

2.0 MEASURES and ALTERNATIVES

The feasibility study originally considered a variety of flood risk management measures and seven alternatives (Plans). However, in the early alternatives screening process, two alternatives that addressed a new northern levee for portions of the currently unprotected northern area subdivisions were not deemed economically feasible and were thus eliminated from further evaluation. Five alternatives were carried forward as a final array and were considered using a variety of planning criteria including technical feasibility, environmental and social acceptability, and economic efficiency among others. These alternatives include the No Federal Action alternative, three levee raise plans of increasing height, and a single plan including a combination of a levee raise with channel widening and bridge modifications on a portion of the Big Blue River.

2.1 Alternatives Considered Early but Rejected from Further Consideration

2.1.1 Levee Raise and New Northern Levee: This alternative includes raising of the existing levee as described in Plan 3, below, and construction of a new northern levee for similar protection of a currently unprotected residential area situated north of the existing protected area. This alternative was eliminated because the cost of the new northern levee produced negative net benefits.

2.1.2 Levee Raise with Channel Widening and New Northern Levee: Includes raising the existing levee as described in Plan 5, below, and construction of a new northern levee. The cost of the northern levee produced negative net benefits.

2.2 Alternatives Evaluated and Recommended Plan

2.2.1 Plan 1 – No Federal Action: With the No Federal Action option, no increase in the current level of flood protection would occur. There is currently a 1.5% (1 in 67) annual chance of a damaging flood occurring from either an overtopping or levee breach failure. Structures within the protected zone would continue to be at a higher risk for flooding during large flood events.

2.2.2 Plan 2: This alternative would raise the current levee between stations 200+00 and 272+85 an average of 0.7 feet and a maximum of 1.5 feet. The plan includes an approximate 200-foot extension for tie-in along Casement Rd. at the upper end of Big Blue River Segment and a new sandbag gap. Gatewells would be replaced at stations 14+78, 62+20, 89+83, 163+00, and 269+50. Landside toe embankment sand drain would be installed along a portion of the Big Blue River levee segment. Relief wells

would be constructed at stations 64+00 to 97+00, 110+120+00, and 265+70 to 269+50. Underseepage berms would be constructed at 120+00 to 137+00, and 165+00 to 173+50.

2.2.3 Plan 3 (Recommended Plan): The Recommended Plan would raise the current levee between stations 131+00 and 277+53 an average of 1.5 feet and a maximum of 3.3 feet. The plan includes an approximate 500-foot extension for tie-in along Casement Rd. at the upper end of Big Blue River Segment and a new sandbag gap. Gatewells would be replaced at stations 14+78, 62+20, 89+83, 163+00, and 269+50. Landside toe embankment sand drain would be installed along a portion of the Big Blue River levee segment. Relief wells would be constructed at stations 64+00 to 97+00, 110+120+00, and 265+70 to 269+50. Underseepage berms would be constructed at 120+00 to 137+00, and 165+00 to 173+50.

2.2.4 Plan 4: This plan would raise the current levee—between stations 8+50 and 72+00 and 101+00 to 277+53 an average of 2.1 feet and a maximum of 3.9 feet. There would be an approximate 1700-foot extension for tie-in along Wildcat Creek and Riley Lane at the upper end of Kansas River levee Segment as well as an approximate 500-foot extension for tie-in along Casement Rd at the upper end of Big Blue River Segment and a new sandbag gap. Thirteen gatewells would be replaced, raising of one gatewell, and strengthening of one pump station. Underseepage berms would be constructed from stations 120+00 to 137+00, and 165+12 to 173+50. Landside toe embankment sand drain would be constructed along a portion of the Big Blue River Levee Segment and the Kansas River segment. Relief wells would also be installed from stations 18+00 to 23+00, 64+00 to 97+00, 110+00 to 120+00, 190+00 to 210+00, and 265+70 to 272+00.

2.2.5 Plan 5: This plan would raise the current levee in the same locations as plan 3 with the addition of channel widening (CW). This alternative includes all the features of the Plan 3 levee raise alternative with an average raise of 1.3 feet and a maximum of 2.6 feet, in addition to excavation of approximately 200,000 cubic yards of material along the left descending bank of the Big Blue River. Both the Highway 24 and Union Pacific Railroad Bridges would be expanded and approximately 1,100 linear feet of riprap armoring would be placed around the bridge abutments.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Resources

3.1.1 Geology and Soils

The project area lies along the boundary of the Great Plains and Central Lowland physiographic provinces. The Blue River watershed north of Randolph, Kansas, is in the Dissected Till Plains section of the Central Lowland, which was glaciated during the Pleistocene time. The Dissected Till Plains section is now covered by glacial drift, which forms a discontinuous mantle over much of the area, attaining a maximum depth of 300 feet. The Lower portion of the Blue River watershed and the lower portion of the Kansas River watershed are located in the Osage Plains section where bedrock is overlain by alluvial deposits of 10 to 50 feet deep. Exposed bedrock along valley walls consist of a sequence of limestones and shales of Permian age belonging to the Council Grove group. Another 200 feet of shales and limestones of the Pennsylvanian age are located below this stratum. The Kansas River watershed covers a large area of the Great Plains provinces, with portions in the Plains Border, High Plains, and Colorado Piedmont sections.

Floodplain soils associated with the Kansas River and its tributaries are derived from alluvium. The alluvium consists of water-laid deposits of silt, clay, sand and gravel and has been modified in the past by natural phenomena such as channel migration and flooding. Other soils in the project area include those formed from the weathering of local parent material and eolian deposits transported to the area by wind. Soils of the Kansas River valley consist of sandy river wash in and immediately adjacent to the river channel and the deep, nearly-level silt and sandy loams of the first and second bottoms in the floodplain. The first bottom is next to the stream and is subject to periodic inundation, sometimes more than once a year. The second bottom represents the higher terraces above the first bottom which are less frequently inundated. Soil associations of the valley are primarily the Eudora-Kimo and Eudora-Haynie-Sarpy types. Soils of the Blue River watershed are also of the Eudora-Haynie-Sarpy type with the Sarpy series being very common in the first bottoms. In the upland areas shallower, sloping, clayey soils will be found, with some areas covered by cherty limestone soils.

3.1.2 Climate

Climate in the Kansas River and Blue River basin varies from moist subhumid in the southeast to dry subhumid in the west. Historically, the climate includes some years with intense prolonged rainfall and some with severe droughts with no cyclic pattern. The average annual rainfall for Manhattan, Kansas, is 34.8 inches. In general, the annual precipitation throughout the basin decreases from east to west. Precipitation during the summer and fall months is usually of the short duration thunderstorm type with small centers of high intensity although widespread general rains occasionally occur. Winter precipitation usually results from the passage of well developed low-pressure systems and active fronts and occurs as either rain or snow. Significant amounts of snowfall are confined to the months of October through April, inclusive, with the highest monthly average in January, February, and March. The average annual snowfall for the basin is 22 inches.

Excessively high and low temperatures are characteristic of the plains area. The average annual temperature varies from about 55° F in the west to 88° F in the east.

Severe winter weather is normally experienced in December, January, and February, and is encountered rather frequently in November and March. July and August are normally the hottest months, but maximum temperatures of over 100° F have been recorded in all months, April through October. Temperatures of -10° F to -25° F have been recorded in November through April, inclusive.

3.1.3 Water Resources and Water Quality

Water resources in the project area include surface water resources and groundwater resources. Surface water resources in or near the project area include the Big Blue River, Tuttle Creek Lake, the Kansas River, their tributaries and adjacent wetlands. Wetlands will be described in the Aquatic Habitat section. Groundwater resources in the project area include alluvial aquifers of the Big Blue and Kansas Rivers and their tributaries along with the Glacial Drift and Dakota aquifers. The city of Manhattan, Kansas, utilizes 16 water wells to supply municipal water needs, with 3 of those wells adjacent to the levee system. Tuttle Creek Lake is located in the Lower Big Blue River Watershed (HUC 10270205). The Upper Kansas River Watershed (HUC 10270101) includes the Kansas River and its tributaries upstream of its confluence with the Big Blue River and the Middle Kansas River Watershed (HUC 10270102) includes the Kansas River and its Tributaries Downstream from Tuttle Creek Lake to near Topeka, Kansas.

Federal water quality standards regulations require that states specify appropriate water uses to be achieved and protected by taking into consideration the use and value of the water body for public water supply, for propagation of fish, shellfish, and wildlife, and for recreational, agricultural, industrial, and navigational purposes, these “uses” are known as “Designated Uses.” In designating uses for a water body, the State examines the suitability of a water body for the uses based on the physical, chemical, and biological characteristics of the water body, its geographical setting and scenic qualities, and the socio-economic and cultural characteristics of the surrounding area.

The State then adopts water quality criteria with sufficient coverage of parameters and of adequate stringency to protect designated uses. Once Water Quality Standards have been adopted by the State and approved by the EPA, they are used in determining National Pollution Discharge Elimination System (NPDES) permit limits, impairment status, and Total Maximum Daily Load (TMDL) endpoints. If a water body is determined to be impaired or not meeting water quality standards, then the water body is listed on the Clean Water Act Section 303(d) list.

The Upper Kansas River (HUC 10270101) is listed as “impaired” (not meeting designated uses) due to five water quality standard parameters: total phosphorus, total suspended solids, chloride, fecal coliform, and sulfate. Wildcat Creek a tributary to the Kansas River that runs parallel to a portion of the Manhattan levee is listed as impaired for two parameters: dissolved oxygen and fecal coliform.

Tuttle Creek Lake is currently listed as being impaired for four water quality standard parameters: eutrophication, sedimentation, atrazine and alachlor. TMDLs have been developed and approved by the U.S. Environmental Protection Agency for this high priority water body for eutrophication (860 tons of phosphorus per year), atrazine (reduction of atrazine loads in Big Blue River by 75%, Little Blue River by 58%, and Black Vermillion River by 67%), sedimentation (reduction of historic storage loss rate by 45%), and alachlor (0.70 tons per day). The approved TMDL can be viewed at <http://www.kdheks.gov/tmdl/klr.htm>.

The Middle Kansas River (HUC 10270102) just downstream of its confluence with the Big Blue River is currently listed as being impaired due to four water quality standards parameters: biology, total phosphorus, total suspended solids, and fecal coliform.

Section 404 of the Clean Water Act (CWA) (33 USC 1344) requires that all activities that involve a discharge of dredged or fill materials into a Water of the United States, unless exempted, requires prior authorization from the Corps of Engineers. In addition, projects authorized under Section 404 of the CWA must also be certified in compliance with applicable state water quality standards. In Kansas the request for Section 401 water quality certification is evaluated by the Kansas Department of Health and Environment – Bureau of Environmental Quality. Since the early 1990's approximately forty Section 404 permits have been issued in the area around the Manhattan levee system. Most of those permits were issued for work on public utilities (installation or maintenance of utility lines).

3.1.4 Air Quality

Air quality monitoring by KDHE indicates that the air in Kansas is relatively clean. Currently there are no designated nonattainment areas in Kansas. Sources of air pollution in the project area would include stationary sources such as electrical power plants and industrial facilities, mobile sources such as vehicle emissions, and area sources such as small businesses and households. Within the State of Kansas, the highest levels of air pollution are associated with the most heavily urbanized areas of the state in Johnson and Wyandotte Counties east of the study area, and Sedgewick County which is far to the South of the study area. As with the vast majority of the state, air in the Manhattan area is considered to be relatively clean.

3.2 Biological Resources

3.2.1 Aquatic Habitat (including Fisheries and Wetlands)

The aquatic ecosystems in the project area consist of the Big Blue River, the Kansas River, and their tributaries and adjacent wetland/riparian areas. There is a 9

mile segment of the Big Blue River, from Tuttle Creek dam to the confluence with the Kansas River at river mile 147. Below Tuttle Creek dam the presence of Rocky Ford dam just 1 mile downstream influences the tailwater elevation in the Tuttle Creek stilling basin and in River Pond. Rocky Ford dam is practicably an impassible barrier to fish moving upstream from the lower Big Blue and Kansas Rivers. Fish populations upstream of Rocky Ford dam and below Tuttle Creek dam are supported by natural reproduction within that area or from fish that move through the conduit from Tuttle Creek Lake. As a result of this movement, the River Pond, outlet and KDWP's Rocky Ford Dam & Fishing Area contain many more typical lake fish like walleye, saugeye, white bass, black crappie, wipers and stripers. Below Rocky Ford dam the Big Blue and Kansas Rivers support a fish population that is typical of the large turbid rivers. Species found in the Kansas River, Blue River, Wildcat Creek, and tributaries in the close proximity to Manhattan include shovelnose sturgeon, paddlefish, longnose gar, shortnose gar, goldeye, American eel, gizzard shad, red shiner, common carp, speckled chub, plains minnow, common shiner, silver chub, emerald shiner, sand shiner, rosyface shiner, Topeka shiner, suckermouth minnow, bluntnose minnow, creek chub, river carpsucker, quillback, white sucker, blue sucker, smallmouth buffalo, bigmouth buffalo, black buffalo, shorthead redhorse, yellow bullhead, blue catfish, channel catfish, slender madtom, stonecat, flathead catfish, misquito fish, white bass, orangespotted sunfish, blue gill, largemouth bass, white crappie, orangethroat dartersauger, and freshwater drum (Cross and Collins, 1995)

A drainage ditch runs along the southern edge of Northeast Park. This ditch was causing large amounts of erosion so the Audubon Society, in cooperation with Kansas State University's Department of Landscape Architecture, developed and installed a meandering channel within a channel that reduced the erosion and provides ephemeral wetland features.

Wetlands on the Big Blue and Kansas River floodplain are relatively scarce, as many of these areas have been drained to facilitate agricultural production. In addition, the lack of out of bank flows, resulting from operation of the Kansas River system for flood control, has reduced or eliminated the hydrology needed to support many of these wetland areas. Most of the wetlands in the immediate project area occur along a small tributary to the Big Blue River (see map of wetland areas). These wetlands are used as settling ponds for the water treatment by the City of Manhattan. Wetland areas typically support the highest diversity and numbers of wildlife and are important to mammals, birds, reptiles, amphibians, and fish.

3.2.2 Terrestrial Habitat

In the protected area of the levee, much of the area is in residential or urban industrial use, thus lending very limited habitat (see landcover map). The undeveloped ground consists of maintained grassland and agricultural row crop production. Riverward of the levee unit, vegetation consists of maintained grassland, areas in agricultural row crop production, and remnants of the wooded riparian corridor along the

Big Blue and Kansas Rivers. Large cottonwoods, suitable as bald eagle roosts and hunting perches, are found along both rivers in the immediate project area. Native tree species within the area include cottonwood, willow, sycamore, American elm, and maple, along with grasses shrubs, and herbaceous species.

Northeast Park lies adjacent to the levee and along an unnamed tributary and contains a 28 acre restored prairie site and a smaller woodland site currently being restored that are maintained by the Northern Flint Hills Audubon Society in cooperation with the City of Manhattan. These, along with the remnant riparian areas, provide the terrestrial habitat near the project area.

3.2.3 Wildlife

Most of the habitat within the project area is found in the floodplains and associated riparian habitats of the Big Blue and Kansas Rivers, which provides rich habitat for a variety of wildlife species. Typically the habitat diversity in the residential and industrial areas is lower and diversity increases as you get to the more natural areas such as the remnant riparian areas. Mammals that would occur in the project area include terrestrial and aquatic furbearers such as beaver, mink, muskrat, opossum, coyote, raccoon, and striped skunk. Important game animals include the white-tailed deer, eastern cottontail, and fox squirrel. Thompson and Ely (1989) report that 424 bird species have been recorded in Kansas due to the state's central location. Birds that utilize the project area include a mix of permanent residents, summer residents, transients and winter residents. In addition, Tuttle Creek Lake and its associated wetlands provide important habitat to waterfowl.

A wide variety of reptiles and amphibians can be found in the more natural portions of the project area. Species reported for Riley County include the collard lizard, ring-neck snake, horned toad, Texas horned lizard, ground skink, tiger salamander, plains spadefoot, great plains toad, Woodhouse's toad, Blanchard's cricket frog, western chorus frog, gray treefrog, plains leopard frog, bullfrog, plains narrowmouth toad, common snapping turtle, ornate box turtle, western painted turtle, midland smooth softshell turtle, western spiny softshell turtle, great plains skink, prairie-lined racerunner, western slender glass lizard, western hognose snake, eastern hognose snake, western worm snake, prairie riingneck sname, western smooth green snake, eastern yellowbelly racer, great plains rat snake, bullsnake, prairie kingsnake, common kingsnake, milk snake, plains black headed snake, flat-headed snake, red-sided garter snake, western plains garter snake, lined snake, Texas brown snake, blotched water snake, diamond-backed water snake, northern water snake, copperhead, timber rattlesnake. Garter snakes and ringnecked snakes are often seen sunning on linear trail

3.2.4 Threatened and Endangered Species

In addition to the Federally listed species below, Sprague's pipit (*Anthus spragueii*) is listed as a candidate species and the Northern long-eared bat (*Myotis septentrionalis*) is proposed for listing under the Endangered Species Act. It is unlikely that the Sprague's pipit would be found in the project area. During the design phase

prior to any construction activities a survey for northern long-eared bat (NLEB) may need to be completed to determine if they are present in the project area. It is anticipated that if the NLEB is listed then a survey protocol would be developed by the Service.

3.2.4.1 Interior Least Tern

The interior least tern (*Sterna antillarum*) was federally listed as endangered in 1985. Least terns are birds about 9 inches long with a black “crown” on their head, a snowy white underside and forehead, grayish back and wings, orange legs, and a yellow bill with a black tip. From late April to August, terns use sparsely vegetated sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines for nesting habitat. Terns nest in a shallow hole scraped in an open sandy area, gravelly patch, or exposed flat. They nest in small colonies. The chicks leave the nest only a few days after hatching, but adults continue to care for them, leading them to nearby grasses and bringing them food.

Least terns were first observed nesting on the Kansas River in 1996 at approximately river mile 131, nesting on some sandbars created by the 1993 flood. Birds have since relocated and used different sandbars and off-river habitats over time in response to revegetation of these ephemeral sandbar habitats.

There are no records to indicate that interior least terns utilize the Blue River upstream of Tuttle Creek Lake, Tuttle Creek Lake, or the Blue River between the dam and the confluence with the Kansas River. No critical habitat has been identified for the interior least tern.

3.2.4.2 Piping Plover

The piping plover (*Charadrius melodus*) was federally listed as threatened in 1985. The piping plover is a small shorebird about the size of a robin. It has a sandy colored back and white underparts, with a single black neck band, a short stout orange bill and orange legs. For nesting, piping plovers make shallow scrapes in the sand which they line with small pebbles or rocks. The female lays three to four eggs and both parents share incubation duties. The eggs hatch after about 28 days, and the young leave the nest within hours. The chicks can forage for themselves immediately, but remain near their parents for several weeks for protection and temperature control. Depending on food availability, it takes the young from around 10 to 28 days to begin flying.

The first known breeding record for the piping plover on the Kansas River occurred in 1996 when two pairs of plovers nested on newly created sandbar habitat following high flows on the Kansas River. The new nesting in Kansas on the Kansas River is a southern extension of their breeding range. Success of piping plovers since the initial 1996 nesting has been tenuous. Because much of the flow in the Kansas River has been controlled since the 1950s, sandbar habitat is usually not available for plovers. There are no records to indicate that piping plovers utilize the Tuttle Creek Lake or the Blue River between the dam and the confluence with the Kansas River.

3.2.4.3 Topeka Shiner

The Topeka Shiner (*Notropis topeka*) was federally listed as endangered in 1998. In 2004, the U.S. Fish and Wildlife Service designated critical habitat for the Topeka shiner in Iowa, Minnesota, and Nebraska, while habitat in Kansas, Missouri, and South Dakota was excluded from the designation. The Topeka shiner is a small minnow, less than three inches in total length. It is an overall silvery color, with a well defined dark stripe along its side, and a dark wedge-shaped chevron at the base of the tail fin. Males develop additional reddish coloration in all other fins during the breeding season. They occur primarily in small prairie (or former prairie) streams in pools containing clear, clean water. Most Topeka shiner streams are perennial (flow year-round), but some are small enough to stop flow during the dry summer months. In these circumstances, water levels must be maintained by groundwater seepage for the fish to survive. Topeka shiner streams generally have clean gravel, rock, or sand bottoms. The Topeka shiner is known to inhabit Wildcat creek upstream of the project location. No recent surveys have been performed in the city area of Manhattan.

3.2.4.4 Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) (NLEB) is currently proposed to be federally listed as proposed as an endangered species under the Endangered Species Act. The state of Kansas is within the known range of the NLEB. During the summer, NLEBs typically roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags. Males and non-reproductive females may also roost in cooler places, like caves or mines. This bat seems opportunistic in selecting roosts, using tree species based on presence of cavities or crevices or presence of peeling bark. It has also been occasionally found roosting in structures like barns and sheds, particularly when suitable tree roosts are unavailable. They forage for insects for insects in upland and lowland woodlots and tree-lined corridors. During winter NLEBs predominantly hibernate in caves and abandoned mine portals.

3.2.4.5 State Listed Species

In addition to those federally listed threatened and endangered species listed above, the State of Kansas maintains a list of threatened and endangered species in Kansas. Included in the planning aid letter from the US Fish and Wildlife Service found in Appendix II are the state listed threatened and endangered species and their critical habitat that are found in Riley and Pottawatomie Counties, Kansas.

3.2.5 Floodplain

The project site consists of the floodplains of the Kansas River and the Big Blue River in addition to the smaller Wildcat Creek. The floodplain in the project area has been impacted over the years due to urban and residential development in Manhattan,

Kansas. Urban development of the floodplain has fill activity, channelization of the drainages, and the development of numerous buildings, parking lots, roads, and utilities. The floodplain has also been altered by the existing Manhattan Levee system constructed in the early 1960's. The levee restricts flow from accessing the floodplain to protect the infrastructure in the downtown Manhattan area. The Dix subdivision is situated just north of the levee system and is outside the protected area. This area is subject to flooding during large events. Flow in the Big Blue River is primarily controlled by releases from the Tuttle Creek Dam several miles upstream of Manhattan. Flow in the Kansas River is largely controlled by releases from the dams located on the major tributaries of the Kansas River. These include Milford, Wilson, and Kanopolis Lakes. Each of these dams are operated as part of the larger Missouri River and Kansas River system and are operated in accordance with the 2006 Master Manual.

3.3 Hazardous, Toxic, and Radioactive Waste (HTRW)

A Phase I (limited) site assessment was conducted in February 2004 in accordance with ASTM Standard E 1527-00 (Standards on Environmental Assessment for Commercial Real Estate) for the areas near and adjacent to the levee. A search of the available environmental records, revealed five potential areas of concern. Since the 2004 Phase I assessment, one additional site has been identified near the levee.

- Manhattan PWS Wells #14 and #15- Manhattan Industrial Park North of Kretschner
This site is a CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) site. Volatile organic compounds (VOCs) have been detected at the wells intermittently since 1986. These two wells are directly adjacent to the riverward toe of the levee at approximately Station 211 +00 and Station 213+00. A specific site causing contamination in PWS #14 and #15 wells was identified as the Former Quaker Manufacturing, LLC Facility located at 1111 Kretschmer. Investigations were performed and a groundwater plume contaminated with TCE was delineated. The plume extends below the levee from station 215+00 to 218+00. A remedial action is currently ongoing and includes operation of a soil vapor extraction system and injections to enhance anaerobic bioremediation.
- Manhattan PWS Wells #12 and #13- Hayes Dr and North Kretschner Dr
This site is also a CERCLIS site. VOCs have been detected at the wells intermittently since 1986. These wells are located about 1000 feet landward of the levee, but were included due to the nature of contamination. Similar to the PWS #14 and #15 site, separate upgradient sites were identified to be the cause of contamination of the PWS wells.
- Wildcat Creek- 705 S 15th
This site contains one leaking underground storage tank with a status of Active indicating that levels of contamination exist at the site that are greater than

cleanup levels set by the state. The exact location of the tank could not be verified on the reconnaissance trip. However, an approximate location is identified on the map below. It appears the site is located on the creek side of the levee.

- Private Disposal Site

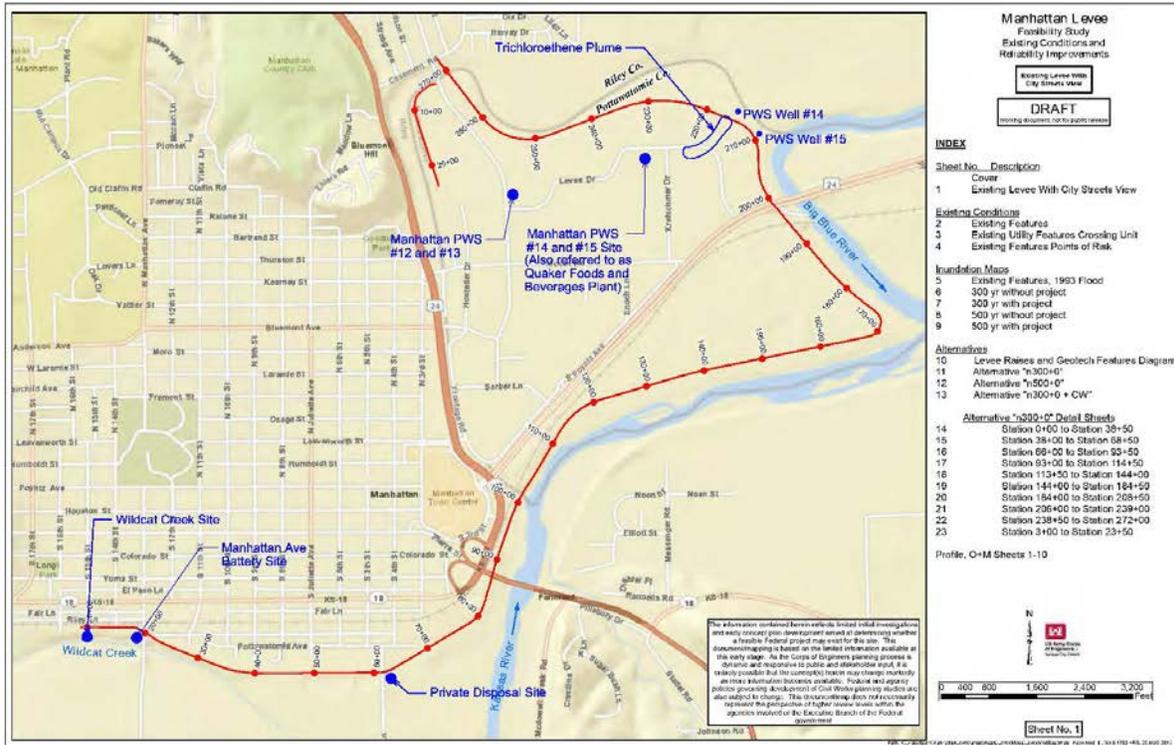
A privately owned disposal site was identified at approximately levee Station 63+00. It is located at the intersection of Temple Lane and the levee, on the southeast corner. A drainage ditch exists between the levee and the site. The site is wooded and approximately 3 acres in size. Contents of the site include large and small vehicles, trailers, loaded dumpsters, tires, and appliances. Potential soil and groundwater contamination from numerous sources is possible at this site. It has not been identified by Kansas Department of Health and Environment (KDHE) as a contaminated site

- Railroad Tracks

Railroad tracks exist adjacent to the toe of the landward side of the levee from approximately Station 89+00 to Station 120+00. Potential contamination in the immediate vicinity of the railroad tracks includes creosote from the railroad ties and petroleum products leaking from cars, including greases, hydraulic fluids, brake fluids, and fuel among other things. Since the 2004 Phase I EAS, no additional information has been found to indicate contamination of soil or groundwater along the railroad tracks or spills from rail cars.

- Manhattan Avenue Battery Site

This site is located west of 15th St, immediately adjacent to the Wildcat Creek side of the levee. The site is a former dumpsite for battery casings discarded during lead reclamation processes. In 2005, lead contaminated soil at the site was excavated and disposed of off-site. The only alternative in this area with proposed levee modifications is alternative N500.



3.4 Cultural Resources

3.4.1 Cultural Resource Laws

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (amended June 17, 1999) requires federal agencies to take into account the effects of their undertakings on historic properties. By definition, historic properties are properties eligible for or listed on the National Register of Historic Places (NRHP). Federal undertakings refer to any federal involvement including funding, permitting, licensing, or approval. Federal agencies are required to define and document the Area of Potential Effect (APE) for undertakings. The APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. For the Manhattan Levee Project the APE includes the area of construction, borrow areas, staging areas, and any temporary access roads (if needed).

In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, the Corps will coordinate the proposed land acquisition with the Kansas State Historic Preservation Officer and affiliated federally recognized Native American tribes (Tribes).

3.4.2 Cultural Resources Background Review

A literature and background review of the general Manhattan levee project area has been conducted by the District Archeologist. The review area included the proposed construction footprint and the proposed borrow area.. The review consisted of an examination of the NRHP, pertinent archeological documents in the Corps office, and the Kansas State Historical Society's Archeological Inventory (on-line).

The background review found that the majority of the Manhattan Levee project area has not been previously surveyed for cultural resource sites (see attachment). One archeological survey crosses the southern half of the project area. Three archeological sites 14RY380, 382, and 384, are mapped within the previously surveyed area very near the existing levee. All three are late 19th Century sites associated with demolished buildings. The National Register eligibility status of these sites is not reported in site files. Two other archeological sites, 14PO24 and 14PO25, are recorded 0.6 and 0.8 miles east of the northern half of the project area (see attachment). Site 14PO24 is a Historic Kansa Indian village site and 14PO25 is an earlier prehistoric village site. Both sites are considered eligible for listing in the National Register of Historic Places.

3.4.3 Cultural Resource Comments and Future Work

As the majority of the APE has not been previously surveyed and there is a potential for unrecorded archeological sites in the area, project plans will need to be reviewed by the district archeologist and the Kansas State Historic Preservation Officer to determine if archeological field investigations are needed. It is assumed that the current levee footprint is heavily disturbed and unlikely to contain intact historic properties and would likely not require a cultural resources survey. However, borrow areas, haul and access road locations, and other staging areas may require field investigations and need to be reviewed as early as possible to ensure no historic properties would be adversely affected by the project.

3.5 Socioeconomics and Environmental Justice

The Executive Order on Environmental Justice (Executive Order 12898) focuses on social equity issues, particularly any potential disproportionate impacts on minority or low-income groups. No specific geographic areas of minority or low-income groups were identified within the affected area. Looking at the population of Manhattan, the population is 83.5% white compared to 85.0% and 94.6% of Riley and Pottawatomie Counties respectively, compared to 87.4% for the State of Kansas and 78.1% in the U.S. Blacks comprise only 5.5% of the population in Manhattan, 6.6% and 1.3% in Riley and Pottawatomie Counties, compared to 6.1% in Kansas and 13.1% in the U.S. Hispanics account for 5.8% of the population on Manhattan, 6.6% and 1.3% in Riley and Pottawatomie Counties respectively, compared to 10.8% for the state and 16.7% in the U.S. A map of the percentage of minority population within each census block can be found in the Appendix I. The city of Manhattan has a median household income of \$36,630 which is lower compared to the state median household income of \$49,424,

and \$39,257 and \$53,430 for Riley and Pottawatomie Counties, respectively. A map of Median incomes by census block groups can be found in Appendix I. Manhattan has a large proportion, 28.8%, of households living below the poverty level compared to the statewide population of 12.4%. This is likely due to the presence of a large university located in Manhattan. The median income by census block groups tend to be lowest in the areas surrounding the university. A large portion of the affected area is commercial and industrial areas without residential households.

The Manhattan levee protects 1,703 residential, 390 commercial, 108 industrial, and 94 public and municipal structures, and more than 30 miles of streets and roads. The estimated total value of investment in the leveed area, including properties and contents, is approximately \$1.18 billion. The price level is October 2013 (FY14). Commercial property value, including structures and contents, totals \$585.5 million. Industrial value, including structures and contents, totals \$129.8 million. Public and municipal buildings are valued at \$114.5 million, and residential property value is more than \$305.7 million. Streets and roads in the leveed area total almost \$41.5 million.

3.6 Recreation

Several Parks and trail systems are located in the vicinity of the Manhattan Levee. Northeast Community Park is a 79 acre park located north of the northern segment of the levee. This park was a joint effort between the City of Manhattan, the Blue Earth Citizens Group, and the Northern Flint Hills Audubon Society. Just over half of the site is in turf grass activities such as ball fields and picnic areas, while the southern half is maintained as a restored native prairie and woodland. The park features the Cecil Best Memorial Birding Trail which connects Northeast Park to the Linear Park Trail. The Linear Park Trail is a combination of paved and crushed limestone trail system that runs along the top of the entire levee system. Access points and trailheads can be found at major road intersections. This trail gets a lot of pedestrian and bicycle use. Other unofficial trails that are running parallel to the levee and are within the riparian vegetation do exist and get used by hikers, bird watchers, bicyclists, and provide access to the Big Blue and Kansas River. The 5 acre Griffith Park that contains athletic fields and the 2.9 acre Sojourner Truth Park that contains picnic shelters, a playground and a butterfly garden are located near the southern portion of the levee system. Southeast Park is located south of Pillsbury Drive between the levee and the Kansas River. The approximately 25 acre Southeast Park is comprised of riparian forest with no developed park facilities. The Kansas and Big Blue Rivers provide water based recreation in the form of boating and fishing. Nearby Tuttle Creek Reservoir provides a variety of water and land based recreation opportunities.

3.7 Noise

Ambient noise along the Manhattan levee system is variable depending on the adjacent land use and proximity to major roadways. Primary sources of noise within the project area are from vehicle traffic as well as commercial/industrial operations. The northern portion of the levee system is bordered on the north by largely parkland, and to

the south by an industrial park. Traffic is light in the area and ambient noise levels are relatively low until you near US Highway 24. The area adjacent the levee near the confluence of the Big Blue and Kansas Rivers is primarily agricultural land and the municipal water treatment plant. This area is also has relatively low ambient noise levels. The area of the levee with the highest ambient noise levels are from about Station 70+00 to 110+00. This section has a high amount of traffic from adjacent US Highway 24 and Fort Riley Boulevard, as well as a cement plant and a busy commercial district. The far south and west portions of the levee are bordered by residential housing and agricultural lands and has some of the lowest ambient noise levels in the project area.

3.8 Land Use (Including Prime Farmland)

In the protected area of the levee, much of the area is in residential or urban industrial use, which includes the main downtown area as well as the Town Center Mall, Mercy Regional Health Center, and numerous other commercial, industrial, governmental, and residential structures. The undeveloped ground consists of maintained grassland and agricultural row crop production. One of the largest undeveloped areas protected by the levee is the area surrounding the sewage treatment plant near the confluence of the Big Blue and Kansas Rivers. That area is primarily in row crop agricultural production with a few small patches of forested area. Riverward of the levee unit, vegetation consists of maintained grassland, areas in agricultural row crop production, and remnants of the wooded riparian corridor along the Big Blue and Kansas Rivers. The top of the levee is utilized as a trail along most of its length.

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact federal programs have on unnecessary and irreversible conversion of farmland to non agricultural uses. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Projects are subject to FPPA requirements if they may irreversibly convert farm land to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. The Natural Resource Conservation Service (NRCS) was consulted to determine if any prime or unique farmlands are within the project area. NRCS identified that some areas of prime and/or unique farmland was present in the project area.

4.0 ENVIRONMENTAL CONSEQUENCES (IMPACTS)

4.1 Physical Resources

4.1.1 Geology and Soils

Alternative 1 – No Federal Action: No levee raise, channel widening, or earth disturbing activities would take place under the no action alternative; therefore there would be no effect on the geology or soils.

Plan 2: The plan 2 levee raise would require placement of approximately 25,726 CY of earthen fill. An additional 128,090 CY of earthen fill would be used for placement of underseepage berms. In areas where underseepage berms are placed, the topsoil is typically removed and stock piled, the fill material for the underseepage berm is placed and then the topsoil is spread evenly over the top. This maintains viable topsoil to return the land to agricultural production following construction. The total amount of fill used would be approximately 153,816 CY. An approximately 20 acre borrow area (this consists of a 15 acre primary area, with an additional 5 acres available if needed) has been selected south of the project (see map in appendix I). For this document all evaluation will treat the borrow area as a 20 acre plot. Additional soil disturbance would occur for relocation of utilities and construction of sand drains and relief wells. Approximately 26,400 linear feet of sand drains will be constructed as well as 29 relief wells between 50 to 60 feet deep. The construction contractor would be required to obtain a Section 402 NPDES stormwater permit from Kansas Department of Health and Environment (KDHE), under the Clean Water Act. Best Management Practices (BMPs) would be implemented to minimize material entering into a waterway and to minimize the introduction of fuel, petroleum products, or other deleterious material from entering the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching water sources by wind or runoff, fill would be covered, stabilized or mulched, and silt fences would be used as required.

Plan 3 (Recommended Plan): The recommended plan would require the placement of approximately 50,379 CY of earthen fill to raise the levee and an additional 128,090 CY of fill for creation of underseepage berms. The total amount of fill used would be approximately 178,469 CY. An approximately 20 acre borrow area has been identified south of the project area to obtain the needed fill. Additional soil disturbance would occur for relocation of utilities and construction of sand drains and relief wells. Approximately 26,400 linear feet of sand drains will be constructed as well as 29 relief wells between 50 to 60 feet deep. The construction contractor would be required to obtain a Section 402 NPDES stormwater permit from Kansas Department of Health and Environment (KDHE), under the Clean Water Act. Best Management Practices (BMPs) would be implemented to minimize material entering into a waterway and to minimize the introduction of fuel, petroleum products, or other deleterious material from entering the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching water sources by wind or runoff, fill would be covered, stabilized or mulched, and silt fences would be used as required.

Plan 4: The levee raise would require the use of approximately 83,965 CY of earthen fill for the raise and approximately 191,053 CY for the placement of underseepage berms. In addition, an extension of a levee along Wildcat creek would require approximately 7,059 CY of earthen fill. The total amount of fill used would be

approximately 282,077 CY. An approximately 20 acre borrow site has been identified south of the project location, however, additional sites may need to be identified to acquire the needed amount of fill. Additional soil disturbance would occur for relocation of utilities and construction of sand drains and relief wells. Approximately 26,400 linear feet of sand drains will be constructed as well as 45 relief wells between 50 to 60 feet deep. The construction contractor would be required to obtain a Section 402 NPDES stormwater permit from Kansas Department of Health and Environment (KDHE), under the Clean Water Act. Best Management Practices (BMPs) would be implemented to minimize material entering into a waterway and to minimize the introduction of fuel, petroleum products, or other deleterious material from entering the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching water sources by wind or runoff, fill would be covered, stabilized or mulched, and silt fences would be used as required.

Plan 5: This alternative would have similar impacts and use similar quantities of fill for the levee raise and underseepage berms as the recommended plan. The channel widening would remove approximately 200,000 CY of material from the left descending stream bank of the Big Blue River. This alternative would also involve the expansion of the Highway 24 Bridge and replacement of a new Union Pacific Railroad bridge, both of which would require extensive excavation. Approximately 5,194 tons of 24-inch riprap will be used to armor approximately 1,100 linear feet of the Big Blue River bank to protect against erosion around the structures and other vulnerable areas. In addition to the Clean Water Act Section 404 and 401 authorizations, the construction contractor would be required to obtain a Section 402 NPDES stormwater permit from Kansas Department of Health and Environment (KDHE), under the Clean Water Act. Best Management Practices (BMPs) would be implemented to minimize material entering into a waterway and to minimize the introduction of fuel, petroleum products, or other deleterious material from entering the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching water sources by wind or runoff, fill would be covered, stabilized or mulched, and silt fences would be used as required.

4.1.2 Climate

All Alternatives – None of the project alternatives would have more than a de minimus impact on climate. However, the U.S. Global Change Research Program expects that there will be large changes in the climate during the life of the project. Average annual temperatures in the area are anticipated to increase. It is anticipated that there will be more large rainfall events and more periods of drought. In this regard, the alternative(s) that have the most resiliency (operate under the widest range of conditions), would have the highest chance for success and the least likelihood of failure.

4.1.3 Water Resources and Water Quality

Plan 1 No Federal Action – The no action alternative would not result in any impact to water resources or water quality.

Plans 2, 3 & 4: There is a small chance that during construction water quality might be impacted from runoff. Best Management Practices (BMPs) such as erosion control fences; storing equipment, solid waste, and petroleum products away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. The construction contractor would also be required to obtain a Section 402 NPDES stormwater permit from Kansas Department of Health and Environment (KDHE), under the Clean Water Act (CWA).

Plan 5: This plan would result in impacts similar to those found in plan 3 with the addition of impacts derived from the channel widening activities. Construction of the channel widening would have an impact on turbidity and possibly other water quality parameters at the construction location and downstream during construction. Following construction the turbidity and water quality of the Big Blue River should return to preconstruction levels. The flow patterns within the project site would be altered as the channel widening would create a wider cross section. This would have a minor impact on the channel height and width and the flow pattern of the Big Blue River in this reach. Construction activities with this alternative would occur in a jurisdictional water of the United States and require Section 404 authorization and Section 401 State Water Quality Certification under the CWA. The construction contractor would also be required to obtain a Section 402 NPDES stormwater permit from KDHE, under the CWA.

4.1.4 Air Quality

Plan 1: No Federal Action – Under the no action alternative, there would be minor O&M activities to the existing levees and structures but the impact to air quality would be negligible.

Plans 2-5: With each of these plans there would be minor localized negative impacts to air quality during construction from dust and from emissions from construction equipment. Dust mitigation measures, such as spraying bare soil with water, would be utilized to minimize the impact.

4.2 Biological Resources

4.2.1 Aquatic Habitat (including Fisheries and Wetlands)

Alternative 1 No Federal Action – The no action alternative would not have any activities that would affect aquatic habitat.

Plans 2, 3 & 4: There would be no impact to fish aquatic habitat with construction of any of these plans, including fisheries and wetlands. All construction activity would take place outside the stream channel and/or wetland areas. Since all activity would take place on the existing levee which already limits the floodplain connectivity in the project area, the limited amount of raise would not affect the floodplain connectivity in terms of aquatic habitat.

Plan 5: The channel widening construction activities would have a short term negative impact on aquatic habitat. There would be a disturbance to the physical habitat in the project area as well as an increase in the suspended sediments and turbidity. Some of the more mobile aquatic organisms and fish species will leave the site during construction activities. There may be some loss of the less mobile organisms. Following construction the suspended sediment and turbidity levels would return to pre-construction conditions and it is anticipated that fish and other aquatic species would return to the site. The channel widening would result in a long term increase in aquatic habitat. An additional 19.7 acres of aquatic habitat would be added to the Big Blue River as a direct result of widening the channel. The quality of that habitat could vary depending on the final design of that portion of the stream. It is anticipated that habitat features would be designed in and constructed should this alternative be selected. Construction activities would occur in jurisdictional waters of the United States and require Section 404 authorization and Section 401 State Water Quality Certification under the Clean Water Act before work begins. If this alternative is selected and a more detailed design is drafted, a Section 404 (b)(1) Evaluation Report would be prepared for this action and appropriate mitigation determined for impacts to waters of the U.S. A Section 402 NPDES stormwater permit, as required by the Clean Water Act, would be obtained by the construction contractor prior to the start of construction and BMPs would be implemented.

4.2.2 Terrestrial Habitat

In order to measure impacts to terrestrial habitat, the lateral expansion of the levee footprint from the raise and underseepage berms along with the footprint of the permanent and temporary construction easements. The assumption for this analysis is all habitat within the construction easement would be destroyed or adversely impacted. This is a conservative estimate, as it is likely much of the habitat within the construction easement may be able to be avoided or the impacts minimized, however it will be used here to compare alternatives. ER 1110-2-1150, Engineering and Design for Civil Works Projects, Paragraph 13.6.8 states that the project design shall seek to avoid and minimize adverse environmental impacts and when possible be in concert with the surrounding environment. Temporary construction easements as well as the permanent

easements that are cleared during construction will be planted with native vegetation where possible following construction. During the design phase effort should be made to incorporate where practicable the use of native vegetation and to identify potential ways to enhance or expand existing riparian corridors. All trees at least 50 feet tall and/or greater than 24-inch dbh riverside of the levees should be avoided. These trees are utilized as perching/roosting trees by the bald eagle. Regardless of the action alternative selected, contractors would be required to follow best management practices to avoid the introduction and spread of invasive species.

Plan 1 No Federal Action – The no-action alternative would not result in any ground disturbing activity except for periodic mowing of the levee crown and side slopes to eradicate any woody vegetation growth.

Plan 2: Plan 2 and Plan 3 have very similar footprints and the constructions easements are almost identical. Therefore, their impacts to terrestrial habitat will be the same. See the description for Plan 3 below for description of impacts to terrestrial habitat. This alternative would require approximately 137,000 cubic yards of borrow material which would be obtained from the approximately 20 acre borrow location(s) identified on the map in appendix I. The proposed borrow site is currently in row crop agricultural production. The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds and their eggs, parts, and nests. Takings could result from projects in prairies, wetlands, stream and woodland habitats, and those that occur on bridges and other structures if swallow or phoebe nests are present. While the provisions of the MBTA are applicable year round, most migratory bird nesting activity in Kansas occurs during the period of January (owls, and hawks) through August (goldfinches) (USFWS, 2013). Clearing of vegetation should be avoided during this period if possible. If vegetation clearing takes place during the nesting season, then the area to be cleared should be surveyed by a qualified biologist prior to clearing activity.

Plan 3 (Recommended Plan): Impacts to terrestrial habitats come from the lateral expansion of the levee footprint from the levee raise, underseepage berms, and landside toe embankment sand drains. It is also assumed that there will be disturbance to all the areas within the permanent and temporary construction easements. This would result in an impact of 6.23 acres of forested area, 0.67 acres of shrubland area, 17.50 of grassland most of which is mowed turfgrass, and 7.74 acres of cultivated cropland. In some cases these are relatively small isolated patches of impacts, while in other areas the impacts can extend linearly for some distance along a forested area. This would decrease the width of the forested stands which may affect the habitat suitability for species that need larger blocks of habitat. The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds and their eggs, parts, and nests. Takings could result from projects in prairies, wetlands, stream and woodland habitats, and those that occur on bridges and other structures if swallow or phoebe nests are present. While the provisions of the MBTA are applicable year round, most migratory bird nesting activity in Kansas occurs during the period of January (owls, and hawks) through August (goldfinches). Clearing

of vegetation should be avoided during this period if possible. If vegetation clearing takes place during the nesting season, then the area to be cleared should be surveyed by a qualified biologist prior to clearing activity. This alternative would require approximately 158,000 cubic yards of borrow material which would be obtained from an approximately 20 acre location(s) identified on the map in appendix I. The proposed borrow location is currently in agricultural row crop production.

Plan 4: Impacts to terrestrial habitats come from the lateral expansion of the levee footprint from the levee raise, underseepage berms, and landside toe embankment sand drains. It is also assumed that there will be disturbance to all the areas within the permanent and temporary construction easements. The footprint of this alternative is similar to Plan 3; however the footprint is expanded slightly to allow for the slightly higher and wider levee raise. Plan 5 would result in greater acreage of impacts to forested area, shrubland, grassland, and cultivated cropland. The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds and their eggs, parts, and nests. Takings could result from projects in prairies, wetlands, stream and woodland habitats, and those that occur on bridges and other structures if swallow or phoebe nests are present. While the provisions of the MBTA are applicable year round, most migratory bird nesting activity in Kansas occurs during the period of January (owls, and hawks) through August (goldfinches). Clearing of vegetation should be avoided during this period if possible. If vegetation clearing takes place during the nesting season, then the area to be cleared should be surveyed by a qualified biologist prior to clearing activity. This alternative would require approximately 249,000 cubic yards of borrow material which would be obtained from an approximately 20 acre borrow location identified in appendix I. That area is currently in row crop agricultural production. Due to the amount of fill material needed for this alternative, additional borrow locations may need to be identified to obtain the necessary fill quantities.

Plan 5: Plan 5 would have all the impacts of Plan 3 plus the additional impact related to channel widening activity. It would add an additional 8.6 acres of terrestrial habitat impact almost all of which is riparian forested areas. This would constitute a large portion of the riparian habitat in the area of the channel widening. The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds and their eggs, parts, and nests. Takings could result from projects in prairies, wetlands, stream and woodland habitats, and those that occur on bridges and other structures if swallow or phoebe nests are present. While the provisions of the MBTA are applicable year round, most migratory bird nesting activity in Kansas occurs during the period of January (owls, and hawks) through August (goldfinches). Clearing of vegetation should be avoided during this period if possible. If vegetation clearing takes place during the nesting season, then the area to be cleared should be surveyed by a qualified biologist prior to clearing activity. This alternative would require approximately 158,000 cubic yards of borrow material which would come from the identified 20 acre borrow site. If material excavated from the channel can be utilized for the levee raise and underseepage berms then the size of borrow area could potentially decrease.

4.2.3 Wildlife

Plan 1 No Federal Action – Existing management would continue under the no action alternative. There would be some negligible temporary disturbance from maintenance mowing of the levee slope to bird species that like short grass (larks, robins, etc.). Once mowing is complete, birds would be expected to return to utilizing these areas. No other impacts to wildlife are anticipated from this alternative.

Plan 2: There would be both short-term adverse construction-related impacts, as well as long-term impacts to wildlife from loss of habitat from this alternative. These impacts would be similar to the impacts described for Plan 3 below. There would be a direct loss of forested area, shrubland, and grassland habitat, thus resulting in less available habitat for wildlife species. The construction easement areas would be planted with native species where possible following construction.

Plan 3 (Recommended Plan): There would be both short-term construction-related impacts, as well as long-term, minor impacts to wildlife from loss of habitat from this alternative. Noise and ground disturbance from construction activities would cause the more mobile animals to leave the project area. Some of the less mobile fauna would be killed. Following construction some of those mobile fauna that left would be expected to return to the area. The areas along the Big Blue and Kansas Rivers and elsewhere adjacent the levee represent some of the best remaining forested habitats in the urban Manhattan area. The loss of forested, shrubland and grassland habitats would have an adverse impact to animals utilizing those habitats, particularly those that require larger patch size of habitats such as the least flycatcher, American redstart, and red-eyed vireo (Hayden, 1995). A decrease in patch size can lead to increases in nest predation and nest parasitism (Wilcove, 1985; May and Robinson, 1985; Burger, 1988). The construction easement areas would be replanted with native vegetation where possible following construction.

Plan 4: Plan 4 has a slightly larger footprint than the Plan 3, which would lead to an increased amount of impact compared to Plan 3 due to higher wildlife habitat losses (forested, shrubland, and grassland). There would be both short-term construction-related impacts, as well as long-term impacts to wildlife from loss of habitat from this alternative. Noise and ground disturbance from construction activities would cause the more mobile animals to leave the project area. Some of the less mobile fauna would be killed. Following construction some of those mobile fauna that left would be expected to return to the area. Larger portions of patches would be adversely affected than Plan 3, thus leading to greater impact to those species that utilize those corridors/patches. Some of the bird species may be most affected by the decrease in patch size as a few species are sensitive to having large undisturbed blocks of habitat. The construction easement areas would be planted with native vegetation where possible following construction.

Plan 5: This alternative would have all the affects described for Plan 3 but would also have the affects to wildlife related to the channel widening activity. The channel widening would take place along approximately 4,400 feet of the left bank of the Big Blue River. This would result in disturbance to approximately 19.7 acres of the Big Blue River Channel and approximately 8.6 acres of area along the river which is mostly a forested riparian corridor. Many animal species use the riparian corridor as routes for movement. This alternative would remove much of the corridor. This would have an adverse impact on many of the species that utilize this riparian habitat. Those semi-aquatic species such as, raccoons, mink, and river otters would be driven from the area during construction and much of their near-shore feeding/foraging habitat would be altered by the channel widening activities. Eventually, the near shore habitat and forage (invertebrates, freshwater mussels, etc.) would recover, however the lack of riparian corridor vegetation along the river would make it less attractive to these species. Mitigation to offset impacts to waters of the U.S. would be needed should this alternative be chosen for construction.

4.2.4 Threatened and Endangered Species

Plan 1 No Federal Action – Under the no action alternative there would be no impact to any federally listed threatened or endangered species or their critical habitat.

Plan 2: No known federally listed threatened or endangered species or designated critical habitat is present within the project area. The footprint of the alternative would not impact any habitat known to be utilized by the federally listed threatened and endangered species for Riley and Pottawatomie Counties, therefore this alternative would have no affect on threatened and endangered species. If the long-eared bat becomes listed prior to construction, the USFWS will be consulted and potentially a survey conducted to determine the presence or absence of the long-eared bat within the project footprint.

Plan 3 (Recommended Plan): No known federally listed threatened or endangered species or designated critical habitat is present within the project area. The footprint of the alternative would not impact any habitat known to be utilized by the federally listed threatened and endangered species for Riley and Pottawatomie Counties, therefore this alternative would have no affect on threatened and endangered species. If the long-eared bat becomes listed prior to construction, the USFWS will be consulted and potentially a survey conducted to determine the presence or absence of the long-eared bat within the project footprint.

Plan 4: No known threatened or endangered species or designated critical habitat is present within the project area. The footprint of the alternative would not impact any habitat known to be utilized by the federally listed threatened and endangered species for Riley and Pottawatomie Counties, therefore this alternative would have no affect on threatened and endangered species. If the long-eared bat becomes listed prior to construction, the USFWS will be consulted and potentially a

survey conducted to determine the presence or absence of the long-eared bat within the project footprint.

Plan 5: The federally-listed interior least tern and piping plover have been known to nest on the nearby Kansas River. Recent surveys have not found them in or near the project area. It is unlikely that either of these species would be present on the proposed project, however, USFWS should be contacted prior to construction and a cursory survey of the project site conducted to ensure no listed species are present. Plan 5 is not likely to adversely affect any listed species or their critical habitat. If the long-eared bat becomes listed prior to construction, the USFWS will be consulted and potentially a survey conducted to determine the presence or absence of the long-eared bat within the project footprint.

4.2.5 Floodplain

Executive Order 11988 directs federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development where ever there is a practicable alternative. Due to the nature of this project, there are no feasible alternatives to providing the flood risk reduction without being located within the floodplain.

Plan 1 No Federal Action – The floodplain would remain highly altered due to the development and existing levee system. The levee would become overtopped somewhere between the nominal 1% to 0.5% chance flood event.

Plan 2: This alternative would raise a portion of the levee an average of 0.7 feet and a maximum raise of 1.5 feet. The raise would take place at approximately levee station 200+00 to 272+85. The inside of the levee area would be protected to pass the nominal 0.5% chance flood event profile at which point the levee would overtop and flood the interior area. The maximum the water surface elevation would raise upstream of the levee near the Dix subdivision would be just a few inches.

Plan 3 (Recommended Plan): The recommended plan would have an average raise approximately 1.5 feet with a maximum raise of 3.3 feet. The approximate location of the raise is from levee station 131+00 to 277+53. This alternative would protect the area within the levee to pass the nominal 0.33% chance flood event profile at which point it would overtop and flood the interior. The maximum that the water surface would raise near the Dix subdivision is less than 5 inches. Which would not increase the area of floodplain inundated by very much but would be a slight increase in water depth in the inundated area.

Plan 4: This alternative would have an average raise of approximately 2.1 feet and a maximum of 3.9 feet. In addition there would be an extension of the levee along Wildcat Creek. The levee raise would occur at approximately levee station -8+50 to 72+00 and 101+00 to 277+53. The extension along Wildcat Creek would provide

addition protection at very high flood stages. It would disconnect the creek from its floodplain along its left bank in that area. However the floodplain in that area is almost completely developed so it would have a minor impact to floodplain ecology. In the area upstream of the levee near the Dix subdivision, the maximum water elevation change would be less than one-half foot of rise over the existing levee water surface elevation in that area.

Plan 5: This alternative would have an average levee raise of approximately 1.3 feet with a maximum raise of 2.6 feet. The raise would be located along approximately levee station 131+00 to 277+53. A portion of the Big Blue River Channel would be widened removing area that is currently on the left bank floodplain. This would be a loss of approximately 8.6 acres of riparian floodplain. This alternative would have less of a water surface elevation change upstream in the area of the Dix subdivision than the recommended alternative.

4.3 Hazardous, Toxic, and Radioactive Waste (HTRW)

Plan 1 No Federal Action – There would be no impact to hazardous, toxic, or radioactive wastes.

Plan 2: A sub-surface plume of Trichloroethylene (TCE) is located on the National Guard base and extends under the levee at approximately stations 216+00 to 217+00. The plume is currently being treated with injections of sodium lactate to enhance anaerobic bioremediation of the contaminants. Borrow would be placed on top of the area of the plume in the levee raise. A sand drain would be constructed on the landward side of the levee. The depth of the sand drain would be shallow enough that it would not intersect with the plume and bring contaminants to the surface. Relief wells are proposed from station 64+00 to 97+00 and 110+00 to 120+00. Although no known groundwater contamination has been identified, the potential exists. Due to the urban nature of the area, there is always a small chance of discovering an unknown site during construction. If that occurs all construction in the area would cease until an evaluation is made by a HTRW expert.

Plan 3 (Recommended Plan): As with Plan 2, A sub-surface plume of Trichloroethylene (TCE) is located on the National Guard base and extends under the levee at approximately stations 216+00 to 217+00. The plume is currently being treated with injections of sodium lactate to enhance anaerobic bioremediation of the contaminants. Borrow would be placed on top of the area of the plume in the levee raise. A sand drain would be constructed on the landward side of the levee. The depth of the sand drain would be shallow enough that it would not intersect with the plume and bring contaminants to the surface. Relief wells are proposed from station 64+00 to 97+00 and 110+00 to 120+00. Although no known groundwater contamination has been identified, the potential exists. Due to the urban nature of the area, there is always a small chance of discovering an unknown site during construction. If that occurs all construction in the area would cease until an evaluation is made by a HTRW expert.

Plan 4: This alternative would have similar impacts to Plans 2 & 3; however it has a 1,820 foot extension of the southern levee. The proposed alignment of that extension would go through a private disposal site. Junk yards and industrial areas typically have a higher probability for containing contaminants. The extension would also through or near the Manhattan Avenue Battery Site. If this alternative was chosen a more thorough survey of contaminants would need to be performed to identify any HTRW concerns and possible routing shifts.

Plan 5: This alternative would have similar impacts to plans 2 & 3. There are no known HTRW sites located in the area of the channel widening.

4.4 Cultural Resources

Plan 1 No Federal Action: The no action alternative would have no impacts to cultural resources.

Plan 2: This alternative would have little likelihood of impacting historic properties along the existing levee alignment. However, any borrow areas and associated impact areas (haul roads, storage areas, etc.) would need to be evaluated as to potential to contain historic properties. An archeological survey would be required prior to impact if the borrow or associated areas are found to have the potential for historic properties. All work would be coordinated with the Kansas State Historic Preservation Officer and affiliated Native American Tribes.

Plan 3 (Recommended Plan): This alternative would have little likelihood of impacting historic properties along the existing levee alignment. However, any borrow areas and associated impact areas (haul roads, storage areas, etc.) would need to be evaluated as to potential to contain historic properties. An archeological survey would be required prior to impact if the borrow or associated areas are found to have the potential for historic properties. All work would be coordinated with the Kansas State Historic Preservation Officer and affiliated Native American Tribes.

Plan 4: This alternative would have little likelihood of impacting historic properties along the existing levee alignment. However, any borrow areas and associated impact areas (haul roads, storage areas, etc.) would need to be evaluated as to potential to contain historic properties. An archeological survey would be required prior to impact if the borrow or associated areas are found to have the potential for historic properties. All work would be coordinated with the Kansas State Historic Preservation Officer and affiliated Native American Tribes.

Plan 5: This alternative would have little likelihood of impacting historic properties along the existing levee alignment. The proposed channel widening in this alternative may require the removal of the active Union Pacific railroad bridge in Linear Park that spans the Blue River. The bridge may be eligible for the National Register of Historic Places. Its removal would require coordination with the State Historic Preservation Officer (SHPO) and interested groups. If eligible, mitigation measures would likely be

required. In addition, any required borrow areas and associated impact areas (haul roads, storage areas, etc.) would need to be evaluated as to potential to contain historic properties. An archeological survey would be required prior to impact if the borrow or associated areas are found to have the potential for historic properties. All work would be coordinated with SHPO and affiliated Native American Tribes.

4.5 Socioeconomics and Environmental Justice

The Executive Order on Environmental Justice (Executive Order 12898) focuses on social equity issues, particularly any potential disproportionate impacts on minority or low-income groups. No specific geographic areas of minority or low-income groups were identified within the affected area. None of the alternatives would have an adverse impact on any low-income or minority populations.

Plan 1 No Federal Action – This alternative would result in expected annual damages of \$6,745,300 (October 2013 prices). The no action alternative damages for the 1% flood could total \$331.7 million, and the 0.2% flood could total \$717.7 million. The number of structures affected in a 1% chance flood, given the without project conditions is about 1,700. The number of structures affected in a 0.2% chance flood, given the without project conditions is about 2,200.

Plan 2: Each of the construction alternatives had costs annualized using the FY2014 project interest rate of 3.5% and a 50-year period of analysis. Then net annual benefits were estimated, and a Benefit-Cost Ratio (BCR) was determined. Plan 2 had net annual benefits of \$2,082,800 and a BCR of 2.9. This is the second highest BCR of the action alternatives behind only the Recommended Plan.

Plan 3 (Recommended Plan): The recommended alternative had estimated annual net benefits of \$2,852,100 and a BCR of 3.5. This alternative had the highest net benefit and BCR of all the action alternatives.

Plan 4: This alternative had estimated annual net benefits of \$2,762,700 and a BCR of 2.2, which is the next to lowest of the action alternatives.

Plan 5: This alternative had estimated annual net benefits of \$1,393,800 and a BCR of 1.5. This is the lowest BCR of all of the action alternatives.

4.6 Recreation

Plan 1 No Federal Action – There would be no impact to recreation from the no-action alternative.

Plan 2: The linear trail is located on top of the levee for much of the distance of the levee. Linear trail is a multi-purpose trail that receives bicycle and foot traffic from walkers/joggers. During construction portions of the trail would need to be closed to recreational use. This would have a short-term negative impact on recreational use.

Construction activities could be sequenced so only a portion of the trail is closed at a time, minimizing the impact to recreation to just the portion under construction. Following construction activities the trail would be restored to pre-construction condition and recreational activity would resume. This would result in no long-term impacts to recreation.

Plan 3 (Recommended Plan): This plan would result in near identical impacts to recreation as found in Plan 2. Short-term impacts from partial trail closure would occur and last only during construction of a particular levee section. No long term impacts to recreation would occur.

Plan 4: This plan would result in near identical impacts to recreation as found in Plan 2. Short-term impacts from partial trail closure would occur and last only during construction of a particular levee section. No long term impacts to recreation would occur.

Plan 5: This alternative would result in the short-term trail closures similar to the other levee raise alternatives. This alternative likely result in longer period of trail closures near the Highway 24 and Union Pacific Railroad bridges as they undergo alteration and/or replacement. The channel widening activities may have a minor effect on recreational boating during construction and constructions on the bridges.

4.7 Noise

Plan 1 No Federal Action – There would be no impact to noise levels from the no action alternative. Noise levels would remain that of a largely urban commercial and industrial area over most of the project area.

Plan 2: There would be minor noise impacts from construction activities from equipment. The impacts would be local to the project area and short-term in duration. Occurring where the construction activity is currently taking place and would typically be limited to the daylight hours. Noise levels would return to pre-construction levels following construction.

Plan 3 (Recommended Plan): There would be minor noise impacts from construction activities from equipment. The impacts would be local to the project area and short-term in duration. Occurring where the construction activity is currently taking place and would typically be limited to the daylight hours. Noise levels would return to pre-construction levels following construction.

Plan 4: This alternative would have temporary noise impacts similar to alternatives 2 and 3, however the footprint is extends further on both ends of the levee into more residential type areas from the levee extension and Casement Road tie-in. There would be minor noise impacts from construction activities from equipment. The impacts would be local to the project area and short-term in duration. Noise levels would return to pre-construction levels following construction.

Plan 5: This alternative would have the similar impact for the levee raise; however the channel widening and bridge expansion and replacements would have much larger footprints for a longer duration. The area of noise generation with this alternative would extend to the left bank of the Big Blue River. The area of impact on that side of the river is largely agricultural with some commercial businesses nearby. The expansion and replacement of the bridges would require a greater number of construction equipment increasing the generated noise levels. The elevated noise levels would last for a much longer time than the other alternatives, however, they would return to pre-construction levels following completion of construction.

4.8 Land Use (Including Prime Farmland)

The project footprint used for analysis was the actual footprint of the levee raise and the permanent easement. In addition it also includes the temporary construction easement. This provides a conservative estimate as it is likely that not all of the area within the construction easement would be impacted. Much of the impacts that do occur within the construction period would be temporary and where possible the land would return to its previous land use following construction or planted with native vegetation where possible.

Plan 1 No Federal Action – The land use under the no action would remain the same, primarily a heavily developed urban, industrial and residential area.

Plan 2: As this alternative has a very similar footprint to the recommended plan please see the environmental consequences section below for impacts.

Plan 3 (Recommended Plan): The effects on land use for the levee raise alternatives are linear in fashion, paralleling the levee. The total project footprint including the permanent and temporary construction easements is approximately 36.9 acres. This includes about 2.2 acres of barren land, 7.7 acres of cultivated agricultural land, 6.2 acres of forested land, 17.5 acres of grassland most of which is maintained turf, 0.7 acres of grassland, with the remaining footprint consisting of impervious surfaces, and other miscellaneous uses.

Plan 4: This alternative would have a much larger footprint than the Recommended Plan and would therefore have an increase in the land use impact. This alternative also includes the 1,700 foot levee extension of the Kansas River segment which involves placing a new section of levee and easements where there currently is not any. That area is primarily grassland utilized for hay production, and it also traverses through some industrial and residential properties.

Plan 5: This alternative would have the same land use impacts as the recommended plan along the levee. This plan also includes the channel widening that would take approximately 8.6 acres that are currently riparian forest and convert that land into part of the river channel.

5.0 CUMULATIVE IMPACTS

The Council on Environmental Quality Regulations defines cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (CEQ, 1997).

The cumulative impacts addressed in this document consist of the impacts of multiple actions that result in similar effects on the natural resources. The geographical areas of consideration are actions located along the Manhattan Levee and the Big Blue and Kansas Rivers.

Past and current urban and agricultural development in the floodplain have led to implementation of numerous measures to protect these assets. Channelization of streams and rivers, construction of levees, stabilization of banklines, draining and filling of wetlands on the floodplain, and eventually the construction of the major flood control levees and reservoirs have had some adverse cumulative impacts on the ecosystem while minimizing the economic and social effects associated with out of bank flows. Some of these efforts began as early as the first settlers arrived in Kansas, with the vast majority of the major levee and reservoir projects started to be planned and built as a result of the damage from the 1951 flood. Due to the highly erosive nature of the Kansas River most of the channelization efforts have been limited to urban areas or smaller tributaries. Compared to other large mid-western rivers, the Kansas River is relatively un-channelized for large portions of its length. The proposed levee raise would not result in additional channelization features, therefore it wouldn't have an adverse cumulative effect on channelization.

As levees prevent overbank flow into the floodplain to protect infrastructure, it also reduces floodplain storage capacity, and the exchange of nutrients and sediments between the rivers and overbank areas. Most of the major levee systems within the Kansas River basin (Manhattan, Topeka, and Lawrence) were built in the middle of the last century. The affects of these levee systems has been in place for 50 plus years and have changed little over time. No new major levee systems on the Kansas River are planned within the foreseeable future. As the Manhattan levee is an existing levee system only being raised to the approximate original design capacity, it would have almost no change in the cumulative impacts to floodplain storage capacity and nutrient exchange.

Flows in the Kansas River basin are largely influenced by a series of reservoirs. Upstream of the city of Manhattan, the Tuttle Creek reservoir is operated as part of a larger Missouri River/Kansas River system of flood control. Which means releases from the dam may be impacted by events in other parts of the larger Missouri River basin to meet certain minimum flow targets or prevent flooding downstream. A master manual

of the Missouri/Kansas River system along with annual operating plans detail the conditions of operation for each of the dams in the system. The Tuttle Creek Dam controls the flow of the Big Blue River downstream of the dam. The proposed project would not have an adverse cumulative impact to flows during most flow conditions. Only during extremely high flow events equivalent to the nominal 0.33% chance flood event profile or higher would there be a negligible, less than 5 inch, rise in the water surface upstream.

According to the 2010 U.S. Census the population of Manhattan has grown approximately 16.6% from the 2000 Census. Manhattan, Kansas population levels continue to grow leading to increased development. As housing developments in unprotected areas of the floodplains grow and the values of the structures increase there is increasing pressure to build additional flood risk reduction measures.

The recommended plan would bring the level of protection for the existing Manhattan levee system back up near its original design standard. As the recommended plan is largely raising existing levee with only a slight increase in the riverward side increase, the flow within the river(s) would only be affected during extremely large events (greater than the 200-year or 0.5% flood), therefore the recommended plan would have only a minor adverse impact. Therefore, the proposed project would not cause any significant cumulative impacts to the human environment.

6.0 CONCLUSION

The recommended plan would have no impacts to federally-listed threatened or endangered species, or their designated critical habitat, and would not have negative impacts to sites listed, or eligible for inclusion, on the National Register of Historic Places. Minor long-term impacts would occur to the terrestrial habitat and wildlife as a result of removing trees some trees along the right of way. With time, the minor long-term impacts would be reduced as trees become reestablished within the construction easement area. The recommended plan would best meet the purpose and need of the project by providing for increased flood risk reduction with limited impacts to the environment in a cost effective manner. For reasons described in this EA, the Recommended Plan would not result in any significant long-term impacts to the human environment.

7.0 COORDINATION AND COMMENTS

Scoping for the project has included a public workshop held on the evening of April 17, 2013 at the Manhattan Fire Station Located at 2000 Denison Avenue in Manhattan, Kansas. The meeting consisted of an approximately 45 minute presentation on the proposed project and the operation of the Tuttle Creek Dam, and then an open house style forum with a series of stations staffed by Corps of Engineers and City of Manhattan staff. Comment cards were handed out to all participants to receive any comments or feedback on the proposed project. Only one card was returned.

There were also two meetings with the Manhattan City Commission where the meetings were open to the public. The first was held on March 28, 2013 and included a Corps presentation and question and answer session for the purposes of presenting early study findings on existing conditions and offering a series of early alternatives for information and feedback from the Commission and public in attendance. The second Commission meeting was held on January 7, 2014. This meeting was also open to the public. The meeting included a Corps presentation and question and answer session for purposes of offering a tentatively recommended plan for levee improvements and a project implementation schedule for information and feedback from the commission and the public in attendance. Both meetings were held in the Commission Auditorium in City Hall.

The Draft Feasibility Report, Environmental Assessment and Draft Finding of No Significant Impact were released for a thirty (30) day public review starting on June 13, 2014. Notice of Availability was sent to the individuals and organizations on the NWK Regulatory mailing list. The Public Notice as well as a copy of the report and supporting documents were also posted to the NWK internet page, and available at the Manhattan City Hall and the local public library. Comments were received from the Choctaw Nation of Oklahoma, Federal Aviation Administration, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and one private individual. A more detailed description of the public involvement process and the comments can be found in the Public Involvement Appendix of the Feasibility Report/

Extensive coordination with the Manhattan Field Office of the U.S. Fish and Wildlife Service has been performed. A copy of the draft and final Coordination Act reports can be found in Appendix II of this EA.

8.0 AGENCY COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS

Compliance with other environmental laws is listed below.

Federal Polices	Compliance
Archeological Resources Protection Act, 16 U.S.C. 470, et seq.	Not Applicable
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.	Not Applicable
Marine Protection Research and Sanctuary Act, 33 U.S.C. 1401, et seq.	Not Applicable
Migratory Bird Treaty Act, 16 U.S.C. 703	Full Compliance
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.	Not Applicable
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 post authorization).
- 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.

9.0 REFERENCES

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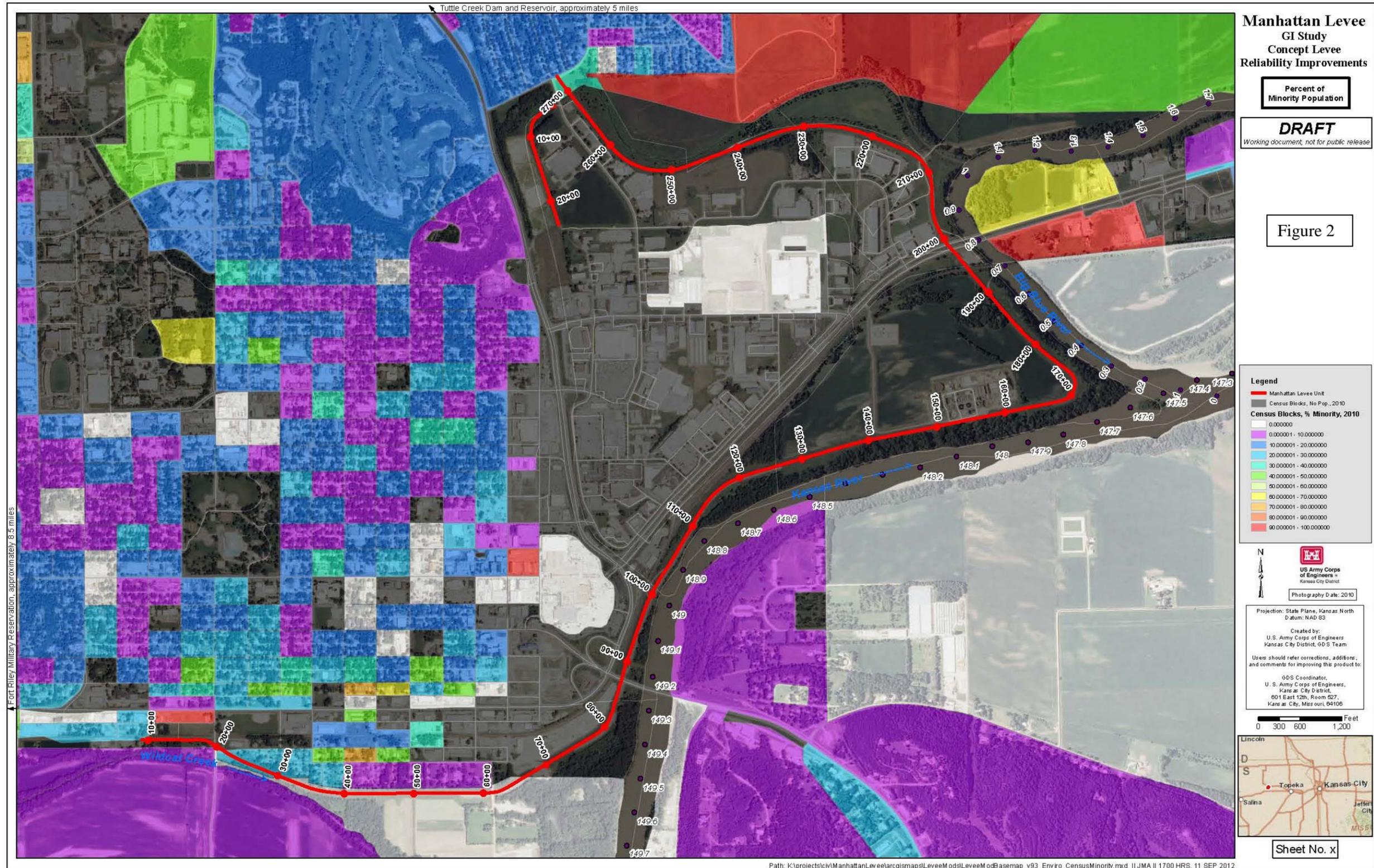
10.0 LIST OF PREPARERS

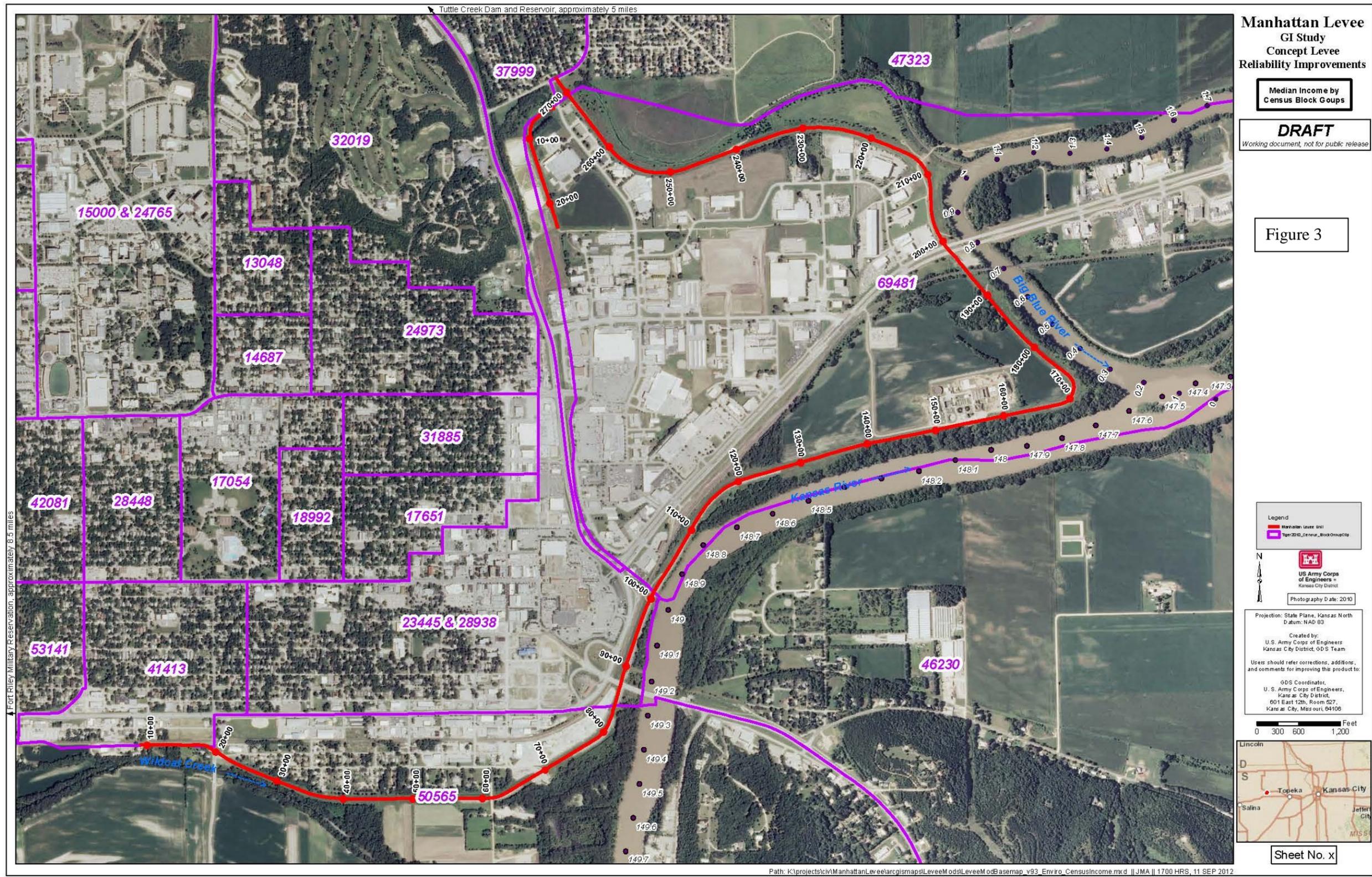
This EA and FONSI were prepared by Curtis Hoagland, Environmental Resource Specialist, with socioeconomic assistance provided by Ms. Margaret Ryan, Economist, and cultural resource assistance provided by Mr. Timothy Meade, District Archeologist. The address of the preparers is: U.S. Army Corps of Engineers, Kansas City, District; PM-PR, Room 529, 601 E. 12th Street, Kansas City, Missouri 64106.

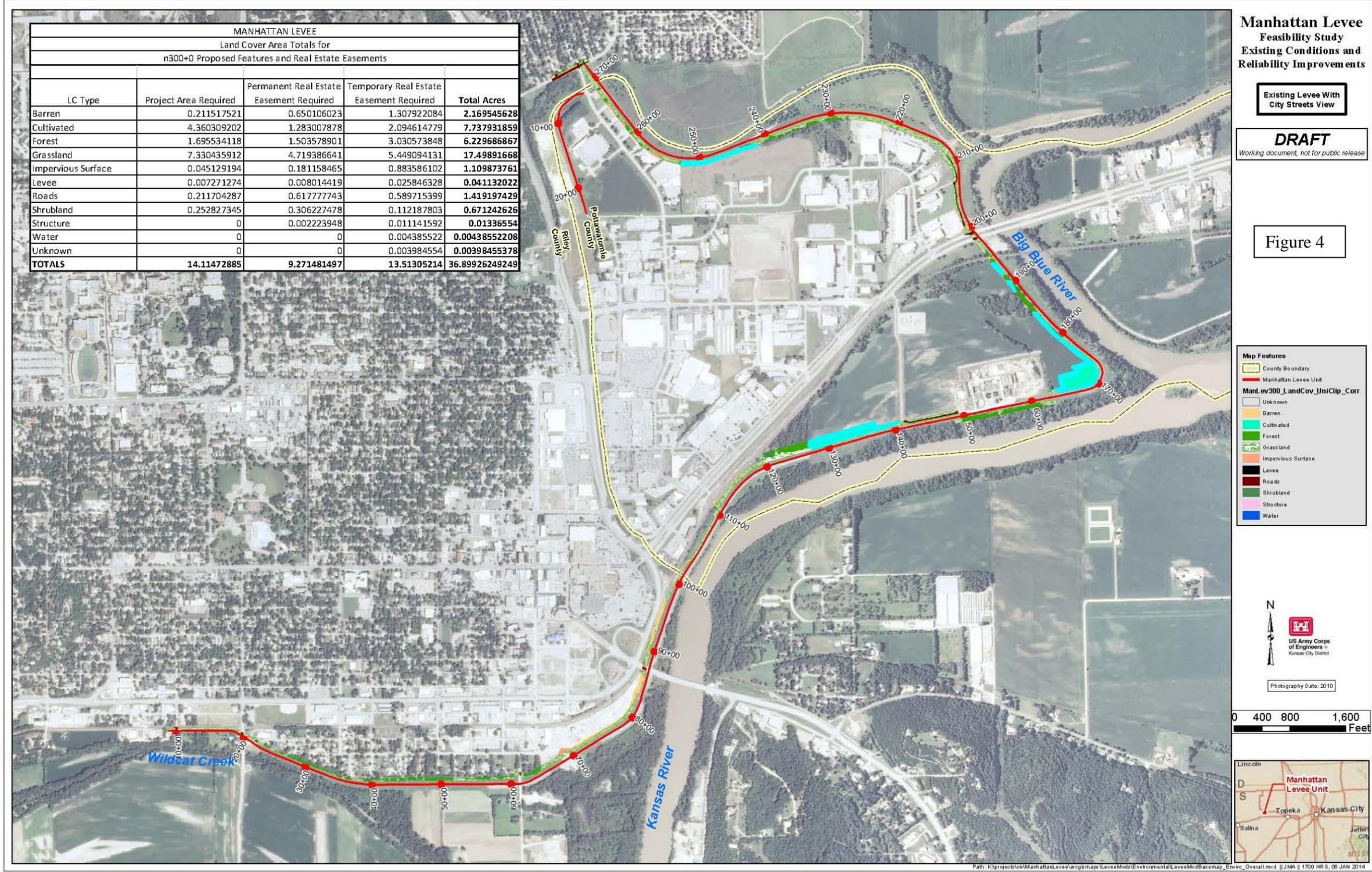
11.0 APPENDICES

APPENDIX I - PROJECT MAPS









Manhattan Levee Feasibility Study
Existing Conditions and Reliability Improvements

Existing Levee With City Streets View

DRAFT
 Working document, not for public release

Figure 4

Map Features

- County Boundary
- Manhattan Levee Unit
- ManLev300_LandCov_UniClip_Corr
- Unknown
- Barren
- Cultivated
- Forest
- Grassland
- Impervious Surface
- Levee
- Roads
- Shrubland
- Structure
- Water

N

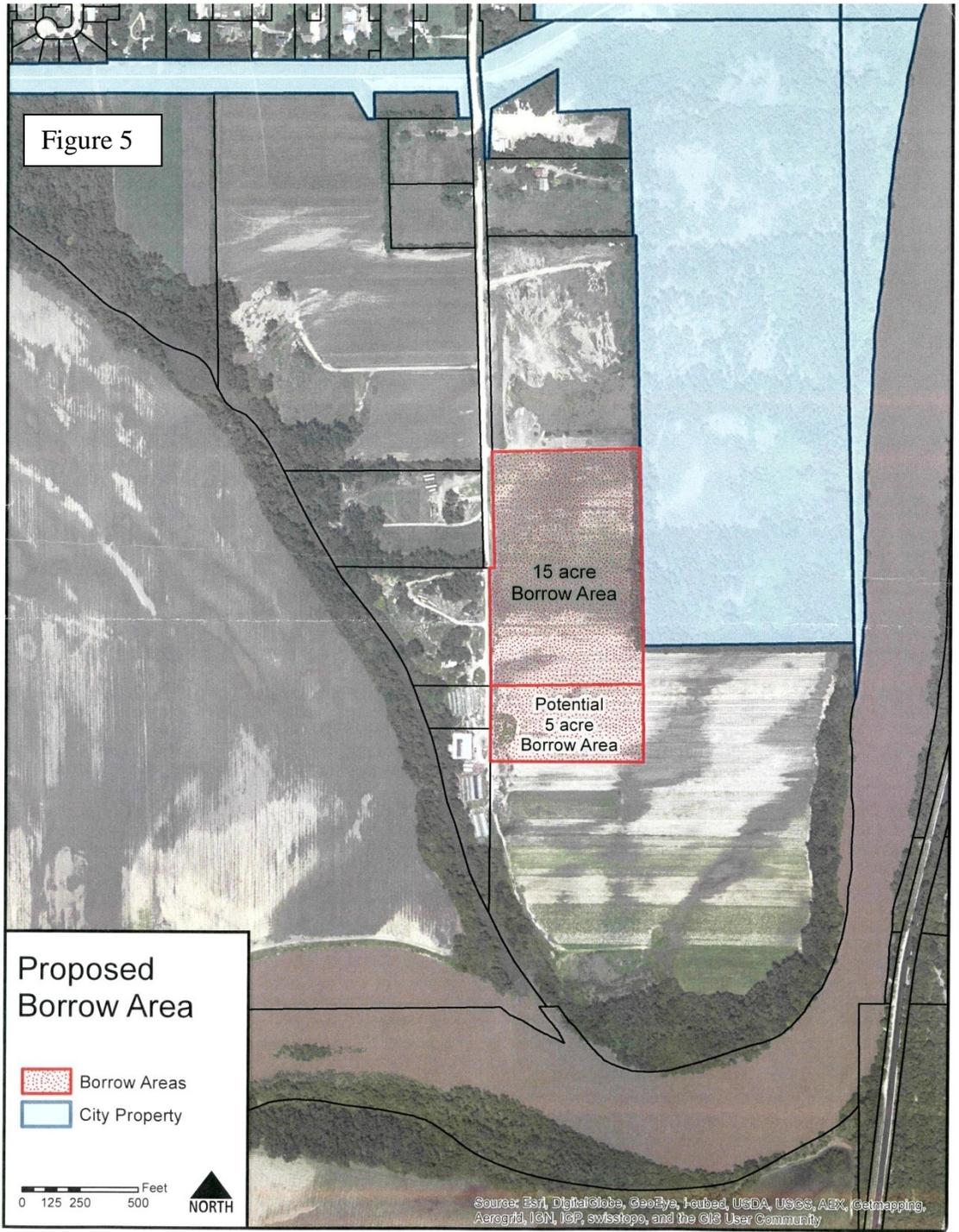
US Army Corps of Engineers
 Kansas City District

Photography Date: 2010

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APPENDIX II - AGENCY CORRESPONDENCE



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502

September 24, 2013

Curtis Hoagland
PM-PR
US Army Corps of Engineers, Kansas City District
601 East 12th Street
Kansas City, MO 64106

Dear Mr. Hoagland:

The U.S. Fish and Wildlife Service (Service) submits this Planning Aid Letter (PAL) concerning the preliminary alternatives considered for the Section 216 Feasibility Report and Environmental Assessment for proposed improvements to the Manhattan, Kansas Levee located in Riley County, Kansas known as the Manhattan Levee Feasibility Study. The letter focuses on the fish and wildlife resources, needs, opportunities, and impacts associated with this project as they affect fish and wildlife resources.

This PAL has been developed in cooperation with the Kansas Department of Wildlife, Parks, and Tourism and is submitted in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) When more definitive plans are developed, we will study the proposal and any alternatives and prepare more detailed comments and recommendations. The Fish and Wildlife Service will provide a draft and final Fish and Wildlife Coordination Act Report after a recommended plan has been selected.

GENERAL DESCRIPTION OF THE PROJECT AREA

The City of Manhattan covers an area of approximately 18.79 square miles and as of the 2010 census, the city population was 52,281. Manhattan is located in the Flint Hills region of Kansas, which consists of continuous rolling hills covered in tall grasses. The current downtown area, the original site of Manhattan, was built on a broad, flat floodplain at the junction of the Kansas and Big Blue rivers. The floodplains of the Big Blue and Kansas River in the study area have been predominantly developed as residential and business areas. Manhattan has faced recurring flooding during times of heavy precipitation. The largest floods in the town's history were in 1903, 1908, 1951 and 1993. In 1993 the emergency flood gates for Tuttle Creek Reservoir were opened, which combined with large outflows from other reservoirs on tributaries to the Kansas River, resulted in an increase in the flood levels in the City of Manhattan.

Tuttle Creek Dam and Reservoir is located on the Big Blue River approximately six miles north of the City of Manhattan or 12.3 miles above its confluence with the Kansas River near river mile 147. Construction of the Dam was initiated 1952 and storage of water in the lake began in 1962. The lake became fully operational for all Congressionally authorized purposes when it reached multipurpose pool in April of 1963. Tuttle Creek Reservoir controls the flow of the Big Blue River downstream of the dam.

The construction of the Manhattan, Kansas Flood Protection Project (Manhattan levee) was initiated in 1961 and the completed project was transferred to the City of Manhattan for operation and maintenance in 1963. The Manhattan levee provides a limited amount of protection to the City of Manhattan from flooding along two major rivers, the Kansas River and the Big Blue River. The Manhattan Levee consists of a primarily earthen levee (5.4 miles), various interior drainage features, pump plants, and levee underseepage controls.

The Big Blue River tieback elevation was originally designed for an 110,000 cfs release from Tuttle Creek Reservoir plus two feet of freeboard. The existing levee withstood the 1993 Flood, with flows of 60,000 cfs on the Big Blue River and peak flows of 100,000 cfs on the Kansas River, but releases from Tuttle Creek Dam created a near overtopping situation at some Big Blue River levee locations. The 1993 event raised concerns that the levee may provide much less than the design level of performance.

The Manhattan Levee is located in Riley and Pottawatomie Counties. For the purpose of the feasibility study the Manhattan levee is described as two major segments:

1. The Big Blue segment extends along the right bank of the Big Blue River from upstream near Casement Road down to the Kansas River confluence.
2. The Kansas River segment starts on high ground on the left bank of Wildcat Creek in the vicinity of 4th Street and then extends along the left bank of the Kansas River to the mouth of the Big Blue River.

Evaluation of Alternatives Considered

The feasibility study includes preliminary engineering, formulation of project alternatives, environmental assessment, economic evaluations, and real estate studies. The Corps has stated that the early alternatives examination show that construction of certain levee reliability improvements and raising the existing Big Blue Levee segment produce solid positive net benefits and offers a good opportunity to pursue a Federal cost-shared project with the Corps.

The feasibility study is exploring four alternatives:

1. N200+0 levee raise from Station 200+00 to 273+00 with an approximate 200-foot extension up Casement Road via a road raise on the Big Blue River Segment. This alternative would raise the levee an average of $\frac{3}{4}$ foot. A 17-acre borrow area would be required for this alternative.
2. N300+0 levee raise from Station 131+00 to 273+00 with an approximate 450-foot

extension up Casement Road via a road raise on the Big Blue River segment. This alternative would raise the levee an average of 1.5 feet. An approximately 20-acre borrow area would be required for this alternative.

3. N500+0 levee raise from Station 0+00 to 72+00 and from 101+00 to 273+00. This alternative would include a 1700-foot extension along the Kansas River that runs parallel to the railroad to reach high ground on that side, and a 500-foot extension up Casement Road via a road raise on the Big Blue River segment to tie into high ground. This alternative would raise the levee an average of 2 feet. An approximately 65-acre borrow area would be required for this alternative.
4. N300+0 plus channel widening on the Big Blue River. Channel widening would occur north of the confluence of the Big Blue River and Kansas River beginning approximately at River Mile (RM) 0.4 and proceed northeasterly upstream to approximately RM 1.3. The channel widening would affect the U.S. 24 bridge across the Big Blue River.

The Corps has indicated that the N300+0 levee raise alternative appears to be the best candidate for the National Economic Development (NED) plan at this time. This alternative would raise the Big Blue River portion of the levee an average of 1.5 feet with up to a 3.3-foot raise in some locations. The preliminary cost estimate for this alternative is \$18 million in 2012 dollars.

Also considered late in the feasibility study was a plan to extend the levee northward to protect additional development in the northern area, including the Dix Addition which sustained considerable damage in the 1993 flood. However, the Corps determined that a northern extension of the levee would be economically unfeasible per Corps guidelines for Federal Civil Works projects. A northern levee extension would add yet another constriction to a river system that has already lost much of its flood plain function to levees. Flood events are important for fish in terms of habitat creation. Building new levees would further reduce flood plain function and processes that create and sustain habitat. New levees would have a potential to impact wetlands and riparian areas.

A draft digital document titled Manhattan Levee Mapbook Alternatives 27MAR2013 depicts a candidate borrow area south of Knox Road and east of the Northeast Park. We determined the geographical coordinates to be 39.1987E, 96.5410 W. Although our land cover database indicates that the majority of the area is primarily cropland, there is a small area of woodland along the southwestern edge. The Northern Flint Hills Audubon Society sponsored Cecil Best Birding Trail and the associated bluebird trail goes through this woodland area.

AQUATIC RESOURCES

The Big Blue River extends approximately nine miles downstream of Tuttle Creek Lake to its confluence with the Kansas River at river mile 147. Both the Kansas River and the Big Blue River in Riley and Pottawatomie Counties are classified as a high priority resource in the Kansas Stream and River Fishery Resource Evaluation (Kansas Fish and Game Commission, 1981). Both rivers support a fish population that is typical of the large turbid rivers. Common species of fish found would likely include common carp, gars, drum, buffaloes, gizzard shad, channel catfish, flathead catfish, white bass, walleye, saugeye and crappie, and wipers.

The levee system includes part of Wildcat Creek. This reach of Wildcat Creek historically contained Topeka shiners (*Notropis topeka*), federally listed as endangered. Although the reach of Wildcat Creek through the City of Manhattan has not been sampled in recent times, upstream reaches on Ft Riley are known to contain healthy populations of Topeka shiners.

Natural processes that create and sustain habitat in the aquatic system are often damaged by flood control projects. These processes include a natural range of variability of flows, channel meandering and flood plain storage, large woody debris recruitment, and sediment routing and transport. Such processes are important to retain or restore because native aquatic species have adapted to them and cannot thrive when they are damaged. Many of these processes have been significantly altered in the Big Blue and Kansas rivers by previous flood control measures including the construction and operation of Tuttle Creek Reservoir, the existing Manhattan Levee system, and the rerouting of the Big Blue River channel, and in Wildcat Creek from development and the removal of the riparian area. We urge the Corps to evaluate and prioritize alternatives, mitigation, and restoration opportunities from a process-based approach that determines whether a proposal will further degrade, maintain, or enhance natural riverine processes. We believe this approach is more likely to result in a preferred alternative that can meet the project objectives and restore habitat conditions for fish and wildlife.

TERRESTRIAL RESOURCES

The floodplains of the Big Blue River and Kansas River in the project area are largely developed, but there is a narrow band of riparian vegetation riverward of the levee unit. This riparian area consists of woody vegetation, native grasses and forbs, and domestic-turf grasses. The dominant trees in these riparian bands would likely include American elm, black walnut, bur oaks, chinkapin oak, eastern cottonwood, hackberry, hawthorn, honey locust, Osage orange, redbud, rough-leaf dogwood, slippery elm, smooth sumac, green ash, and red mulberry. Deciduous shrubs include rough-leaf dogwood, buckbrush, elderberry, fragrant sumac, gooseberry, poison ivy, and the prairie rose. There are areas along the levee that are being invaded by bush honeysuckle which quickly crowds out the native plants. The upland hillsides are occupied by grasses and oak-hickory forest associations with some areas dominated by eastern red cedar.

Mammals in the project area are those typically associated with riparian areas and those that are fairly tolerant of human activity. These would likely include beaver, mink, muskrat, squirrels, opossum, coyote, raccoon, striped skunk, cottontail rabbits, white-tailed deer, red and gray fox, and various species of mice.

The avifauna of the study area includes permanent residents, summer residents, transients, and winter residents. Birds observed in the area by local birdwatchers encompass upland grassland birds, aquatic birds, and woodland birds. These include, but are not limited to, bald eagle, blue-winged teal, turkey vulture, sharp-shinned hawk, red-tailed hawk, American kestrel, green heron, killdeer, yellow-billed cuckoo, yellow-shafted flicker, red-bellied woodpecker, downy woodpecker, eastern kingbird, great crested flycatcher, least flycatcher, eastern wood-pewee,

barn swallow, cliff swallow, blue jay, American crow, black-capped chickadee, tufted titmouse, white-breasted nuthatch, marsh wren, American robin, eastern bluebird, European starling, red-eyed vireo, orange-crowned warbler, yellow warbler, yellow-rumped warbler, American redstart, meadowlark, red-winged blackbird, common grackle, brown-headed cowbird, orchard oriole, northern oriole, northern cardinal, indigo bunting, American goldfinch, Harris' sparrow, chipping sparrow, dark-eyed junco, American tree sparrow, blue-gray gnatcatcher, and rose-breasted grosbeak.. Breeding species observed include: common yellowthroat, song sparrow, red-winged blackbird, American goldfinch, dickcissel, ring-necked pheasant, eastern meadowlark, western kingbird, eastern kingbird, kingfisher, blue heron, white egret, Canada geese, and other waterfowl species. In April of 2009 a group of about 5 whooping cranes were observed in fields adjoining the Kansas River southeast of Manhattan near Zeandale, Kansas (Dan Mulhern, pers. Comm.).

The riparian areas that remain along the Big Blue and Kansas Rivers are among the highest quality habitat in the City of Manhattan. These riparian areas offer the greatest vegetative diversity and degree of interspersions of habitat types, which is important to many wildlife species. Additionally, riparian areas are important for preventing streambank erosion, intercepting sediments and pollutants before entering streams, providing shade, and providing vegetative detritus to streams. Riparian areas provide recreational opportunities through fishing, nature study, and wildlife observation. Because of the extensive development within the floodplain, the habitat value of the remaining areas of native vegetation riverward of the levees is greatly increased. Activities associated with the project should seek to avoid disturbance of the riparian area. If mitigation measures are needed, these could include the expansion of the riparian area and enhancement of the riparian area from the removal of invasive species and the planting of native species to add diversity.

RECREATION

The City of Manhattan maintains Linear Park, a hiking/biking trail which includes the crest of the levee. It is common to see snakes, typically small garter snakes and an occasional ring-neck snake, sunning themselves on the trail or in the riprap on the sides of the levee. Mountain bike trails take off from Linear Park and traverse the woody riparian area riverward of the levee. Linear Park is heavily used by the residents of Manhattan both for recreation and as an alternative transportation route by pedestrians and bicyclists. Trail closings due to construction activity will be a disruption to the user community and would be acutely felt. Trail closings should be kept to a minimum both in length of area and amount of time closed. Mitigation measures should seek to provide an alternative route around the construction areas and preserve the connectivity of the trail.

The City of Manhattan created Northeast Park and Fairmont Park after the flood of 1993. Northeast Park is located northwest of the levee toward the northern extent of the levee and south of Knox Road. Fairmont Park is located on the south side of the Kansas River east of Highway 177.

Both parks are primarily used for open space recreation. In Northeast Park soccer and baseball

occupies areas in the northern part of the park. A small playground has been constructed at the northwest corner. The Northern Flinthills Audubon Society (NFHAS) has developed several features associated with Northeast Park. NFHAS restored and maintains a 28-acre native grass prairie in the southern part of the park. The Cecil Best Birding Trail, which incorporates a bluebird trail, begins close to the levee south of Highway 24 and wanders through a woody area entering the southwest corner of the park close to the native grass area. A wetland swale locally called the "Leander" was developed in a drainage ditch. A hiking/biking trail connects to Linear Trail and surrounds the perimeter of the native prairie area and continues through the Park. The Park has a restroom facility with flush toilets in the northeast corner of the park. In addition, the old Big Blue River channel runs through the southern end of the park.

Several residential properties and a trailer court were bought out after the 1993 flood in the Fairmont Park area. Fairmont Park is used for open space recreation such as soccer and has a few facilities such as a baseball field, frisbee golf course, and off-leash dog areas. Hiking trails along the top of the levee and through the riverward riparian area have been developed and are maintained by local volunteers. A boat ramp has been constructed off Highway 177 on the southwest side of the Kansas River bridge.

CUMULATIVE IMPACT FACTORS

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

The following are events which we know about and believe should be considered in the cumulative impact analysis for this project.

Although the floodway cross section will remain essentially unchanged for all alternatives except the N300+0 plus channel widening, the heightened levees may further constrict flood waters. This may cause flood crests to increase in height (the water has no place to go but up) and floodwaters would be more likely to 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). While the N300+0 alternative would result in levee heights that are near or just below the original design height, other alternatives would result in increased levee heights or new levees. An increase in levee heights and/or new levees may induce downstream levee districts to build their own levees even higher to avoid increased flood damages.

Heavy precipitation events (in approximately 2009) produced a large bank scour on Wildcat Creek which damaged part of the Linear Park trail system in the area locally known as the Pecan Grove. The City of Manhattan conducted a bank stabilization effort. Other areas along Wildcat Creek are experiencing bank failure, notably an area adjacent to the Garden Way Apartment

complex just off west Anderson Street. In 2012 the Natural Resources Conservation Service proposed and then withdrew plans to construct bank armoring along this section. Continued development in the watershed of Wildcat Creek, particularly in the floodplain will increase surface water runoff into Wildcat Creek and promote erosion along the Creek. The increase in water flow and velocities in Wildcat Creek will likely increase downstream flooding and erosion.

There has been some recent discussion from citizens about constructing buildings, such as a new City of Manhattan Park Department building, in Fairmont Park. This would seem to be at odds with the Park providing flood storage capability and the removal of homes from this area to prevent damages from future flooding. Building permanent structures in Fairmont Park would increase the amount of impervious area, decrease the amount of area available to store water, and may increase surface water runoff into the Kansas River resulting in higher water levels.

Levees have constrained the river and isolated the flood plain, greatly reducing flood plain storage of water, sediments, and nutrients. The City of Manhattan has allowed development in areas that previously stored flood water and were flooded in the 1993 floods. The development of these flood prone areas further eliminates flood storage areas that alleviated the effects of flooding. In addition, areas along the Big Blue River in Pottawatomie County have been cleared of much of the riparian vegetation and then lined with riprap and other bank stabilization efforts to alleviate bank erosion to allow development. Because these areas have been developed, increasing the amount of impermeable surfaces in the watershed while eliminating flood prone/flood water storage areas, surface water runoff will increase along with increased flow heights and velocities. As a result, we would expect flooding to occur with less precipitation and the damages associated with the flooding to be greater.

ENDANGERED AND THREATENED SPECIES AND FEDERAL TRUST RESOURCES

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.

The Topeka shiner, federally listed as endangered, is known to inhabit Wildcat Creek. Although the reach of Wildcat Creek through the City has not been surveyed, Topeka shiners are known to inhabit Wildcat Creek on Ft. Riley and on the outskirts of the City of Manhattan.

The interior least tern (*Sterna antillarum*), federally listed as endangered, and the piping plover (*Charadrius melodus*), federally listed as threatened, nest and forage on the Kansas River. Recent surveys have not found them in the project area. However, nesting and foraging sites for both species vary spatially from year to year. Before any construction begins, the Corps should check on the species current status with us. It may be necessary to conduct surveys to determine the location of nesting and foraging sites each breeding season.

Bald eagles are frequently observed flying over both the Big Blue River and the Kansas River and perching in trees along both rivers. Although bald eagles are no longer on the threatened or endangered species list, they are protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Development in the Manhattan area continues to degrade riparian habitat and destroy trees that the eagles use.

The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. Takings could result from projects in prairies, wetlands, stream and woodland habitats, and those that occur on bridges and other structures if swallow or phoebe nests are present. While the provisions of MBTA are applicable year-round, most migratory bird nesting activity in Kansas occurs during the period of January (owls, and hawks) through August (goldfinches).

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. A list of Kansas listed threatened and endangered species and Species in Need of Conservation (SINC) for Riley County is attached to this letter. Please note that the Plains minnow listed as a SINC species on the list is now classified as threatened. The list is subject to change and updated information should be requested from the Environmental Services Section, Kansas Department of Wildlife and Parks, 512 SE 25th Ave., Pratt, KS 67124-8174.

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. We encourage the Corps and local sponsor to perform Hazard Analysis and Critical Control Points (HACCP) planning for invasive species control and to implement best management practices to prevent the transference of invasive species to or from the project site. Tools to perform HACCP planning are available at <http://haccp-nrm.org/>. HACCP planning focuses attention on critical control points where non-target species can be removed. Documenting risks and methods used to remove non target species gives managers a strategic method to make consistent decisions based on identified risks. Planning builds a logical framework of information to weigh risks for species spread against management benefits.

Invasive species have been identified as a major factor in the decline of native flora and fauna. 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. We strongly encourage the inclusion of best management practices for the prevention of invasive species transfer in all project plans such as the following example:

All equipment brought on site will be thoroughly 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 greater 140° F (typically the temperature found at commercial truck washes) 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 thoroughly cleaned. Anything that came in contact with water will be cleaned and dried following the above procedure.

Wetland Information

Small off-channel wetlands are likely to be present in the project area. A jurisdictional wetland determination will be necessary if levee alignments, improvements, or borrow areas directly impact wetlands. The quantity and quality of impacted wetland habitat will determine the amount of compensation necessary to offset project losses. If impacts to wetlands are unavoidable, a wetland mitigation plan should be developed in coordination with the Service, the Environmental Protection Agency, and the Kansas Department of Wildlife, Parks, and Tourism. This plan would be a condition of any Section 404 permit issued for the project. We recommend that all wetland impacts be mitigated regardless of the regulatory nature of the wetland impacted. Minimum replacement ratios for compensatory wetland mitigation should be based on the following guidelines:

U.S. Fish and Wildlife Service, Region 6
 Wetland Mitigation Policy Guidance (8/97)
 Recommended Minimum Replacement Ratios

<u>Mitigation Type</u>	<u>Ratio</u>	<u>Type of Wetland Being Mitigated</u>
Advance Creation	1.5:1	forested, scrub-shrub
	1:1	emergent
Concurrent Creation	2:1	forested, scrub-shrub
	1.5:1	emergent
Advance Restoration	1.5:1	forested, scrub-shrub
	1:1	emergent
Concurrent Restoration	2:1	forested, scrub-shrub
	1.5:1	emergent
Advance Enhancement	3:1	forested, scrub-shrub
	2:1	emergent
Concurrent Enhancement	4:1	forested, scrub-shrub
	3:1	emergent

Fish and Wildlife Problems, Needs, Opportunities, and Concerns

The Big Blue River and Kansas River have been heavily impacted by previous flood control activities. Both rivers still provide valuable fish and wildlife habitat even in urban settings. However, these habitats have been degraded over the years. Although this importance may be difficult to quantify, it should be taken into consideration when identifying project related opportunities to enhance fish and wildlife resources.

Flood and erosion control have resulted in the loss of opportunity for the river to meander and avulse, natural processes that create habitat such as side channels, oxbows, and wetlands. Bank armoring or channelization in one place tends to transfer erosive energy of flooding downstream. This results in additional bank armoring or flood protection in other locations with a cumulative loss of habitat. Not only is more habitat lost through these actions, but the opportunity for natural processes to create more habitat is progressively eliminated through time.

The levee work would be expected to result in the loss of riparian vegetation. The Corp's own vegetation management standards prescribe tree removal along existing levees. Removal of mature trees, and other native vegetation should be avoided where possible, and if they are removed, should be replaced by establishing 2 acres of native vegetation for every acre impacted with similar native species composition to that which is lost.

The loss of riparian vegetation degrades habitat for fish. Many juvenile fish use the margins of stream channels where, under natural conditions, vegetation and large woody debris create slower velocities and provide cover. Without these refugia, small fish can be flushed prematurely during high flows. Studies comparing fish densities next to hardened versus natural stream banks found that the highest number of fish were found adjacent to natural river banks. Older levees where vegetation had been allowed to grow had more fish than new or recently "maintained" levees, although fewer than natural banks (Peters, R.J. et. al., 1998. Seasonal fish densities near river banks stabilized with various stabilization methods: first year report of the flood technical assistance project, Retrieved on September 20, 2013 from <http://www.fws.gov/wafwo/fisheries/Publications/FP125.pdf>. See also Rehabilitation of banks and riparian zone, Retrieved September 20, 2013 from <http://evidence.environment-agency.gov.uk/FCERM/en/SC060065/MeasuresList/M5/M5T5/M5T5Eff.aspx>). A study of fish densities associated with riprap, log jams, and mud banks on the Kansas River concluded that while construction of intermittent riprap may locally increase species richness and diversity in rivers which contain a high proportion of habitat generalists, continuous riprap that constrains natural riverine processes may still be detrimental to riverine ecosystems at larger spatial scales. (White, Katherine, J. Gerken, C. Paukert, and A. Makinster, 2009. Fish community structure in natural and engineered habitats in the Kansas River, Retrieved September 20, 2013 from <http://web.missouri.edu/~paukertc/reprints/KSR%20rip%20rap%20White.pdf>)

Native trees, grasses and forbs, noted for their high wildlife value, could be established along the landward (where feasible) and riverside of the existing levee system. This might help offset future losses due to increased encroachment along the rivers once flood protection is increased. Native vegetation often takes longer to become fully established; however, when established,

stands of native vegetation provide excellent soil binding characteristics, valuable wildlife habitat and requires fewer maintenance costs. The Service, the Kansas Department of Wildlife, Parks, and Tourism, and the Natural Resources Conservation Service offer assistance programs and could work with the City of Manhattan to develop vegetation management plans.

Planting of the floodway to native trees, shrubs, and grasses within the levee system would do much to preserve wildlife habitat in close proximity to the Manhattan urban area. We also encourage the Corps and the City of Manhattan to develop public access to floodway habitats and the Kansas and Big Blue Rivers where appropriate. Opportunities and programs through the Federal Water Project Recreation Act (Public Law 89-72) are available to project sponsors to cost share (75 percent Federal, 25 percent non-Federal) features which enhance fish and wildlife habitat over the existing condition.

The non-native, invasive brome and fescue grasses used on the levee could be replaced with native grasses which would provide a higher habitat value than the non-native grasses. The USDA – Natural Resource Conservation Service’s Plants Database (<http://plants.usda.gov/java/>) lists three species of fescue that are native to Kansas: clustered fescue (*Festuca paradoxa*), nodding fescue (*Festuca subverticillata*), and Rocky Mountain fescue (*Festuca saximontana*). Clustered fescue and nodding fescue have been found in Riley and Pottawatomie Counties while Rocky Mountain fescue has not been found in either county. Other native grasses which might be suitable for use on the levees include buffalo grass (*Bouteloua dactyloides*) and western wheat grass (*Pascopyrum smithii*).

Non structural measures should be incorporated wherever possible because they would have little impact to and in some cases could help restore, natural processes. Nonstructural measures include relocation or removal of structures, improving bank vegetation, land use controls, and flood proofing.

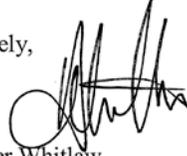
The candidate borrow area should be designed to avoid the woodland area, the Cecil Best Birding Trail and the associated bluebird trail. We recommend a minimum 100-foot buffer be left between the wooded area and the borrow area and be planted to native grass. The buffer area will lessen the disturbance to birds and wildlife in the wooded area and trail users.

If feasible, a shallow wetland created in the borrow area would add an additional component for wildlife habitat in the area, enhancing bird populations as well as amphibians and reptiles. Many floodplain wetlands have likely been destroyed or disturbed in the Manhattan area by development and the creation of the levee system. Creating wetlands where possible would diversify habitat and offset the historical loss of wetlands in the area.

There may be alternatives to using a borrow site to obtain soil to build the levee. The Kansas Water office is currently studying the feasibility of dredging a portion John Redmond Reservoir. The cost of transporting dirt from the dredging may be offset by the cost of containing the dredged material. Another possibility may be to dredge a portion of Tuttle Creek Reservoir and used the dredged material for the levee work.

Thank you for the opportunity to comment on this project. If you have any questions, please contact me or Susan Blackford of my staff at (785) 539-3474.

Sincerely,

A handwritten signature in black ink, appearing to read 'Heather Whitlaw', with a large circular flourish on the left side.

Heather Whitlaw
Field Supervisor

cc: KDWP, Pratt, KS (Environmental Services)

HB/shb

enclosure

enclosure for Manhattan Levee Project PAL
Kansas Department of Wildlife, Parks, and Tourism
Riley County, Kansas Threatened & Endangered Species and Species in Need of Conservation

Updated: 6/1/05

Riley County



Riley County 48.48 kB

THREATENED AND ENDANGERED SPECIES

American Burying Beetle *Nicrophorus americanus* State: END Federal: END Critical Habitat: NO
Bald Eagle *Haliaeetus leucocephalus* State: THR Federal: THR 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
Least Tern *Sterna antillarum* 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
Silver Chub *Macrhybopsis storeniana* State: END Federal: NA Critical Habitat: NO
Snowy Plover *Charadrius alexandrinus* State: THR Federal: NA Critical Habitat: NO
Sturgeon Chub *Macrhybopsis gelida* State: THR Federal: CAN Critical Habitat: YES
Topeka Shiner *Notropis topeka* State: THR Federal: END Critical Habitat: YES
Whooping Crane *Grus americana* State: END Federal: END Critical Habitat: NO

SPECIES IN NEED OF CONSERVATION

Black Rail *Laterallus jamaicensis* State: SNC Federal: NA Critical Habitat: NA
Black Tern *Chlidonias niger* State: SNC Federal: NA Critical Habitat: NA
Bobolink *Dolichonyx oryzivorus* State: SNC Federal: NA Critical Habitat: NA
Eastern Hognose Snake *Heterodon platirhinos* State: SNC Federal: NA Critical Habitat: NA
Franklin's Ground Squirrel *Spermophilus franklinii* State: SNC Federal: NA Critical Habitat: NA
Golden Eagle *Aquila chrysaetos* State: SNC Federal: NA Critical Habitat: NA
Henslow's Sparrow *Ammodramus henslowii* State: SNC Federal: NA Critical Habitat: NA
Highfin Carpsucker *Carploides velifer* State: SNC Federal: NA Critical Habitat: NA
Long-billed Curlew *Numenius americanus* State: SNC Federal: NA Critical Habitat: NA
Plains Minnow *Hybognathus placitus* State: ~~SNC~~ Federal: NA Critical Habitat: NA State: THR
Short-eared Owl *Asio flammeus* State: SNC Federal: NA Critical Habitat: NA
Southern Bog Lemming *Synaptomys cooperi* State: SNC Federal: NA Critical Habitat: NA
Timber Rattlesnake *Crotalus horridus* State: SNC Federal: NA Critical Habitat: NA
Western Hognose Snake *Heterodon nasicus* State: SNC Federal: NA Critical Habitat: NA
Whip-poor-will *Campylorhynchus vociferus* State: SNC Federal: NA Critical Habitat: NA
Yellow-throated Warbler *Dendroica dominica* State: SNC Federal: NA Critical Habitat: NA

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Kansas
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Threatened and Endangered (T&E) Species

- PIPING PLOVER** *Charadrius melodus*
State: Threatened Federal: Threatened Critical Habitat: Yes
- STURGEON CHUB** *Macrhybopsis gelida*
State: Threatened Federal: Candidate Critical Habitat: Yes
- SILVER CHUB** *Macrhybopsis storeriana*
State: Endangered Federal: N/A Critical Habitat: Yes
- LEAST TERN** *Sterna antillarum*
State: Endangered Federal: Endangered Critical Habitat: Yes
- PLAINS MINNOW** *Hybognathus placitus*
State: Threatened Federal: N/A Critical Habitat: Yes
- SHOAL CHUB** *Macrhybopsis hyostoma*
State: Threatened Federal: N/A Critical Habitat: Yes
- AMERICAN BURYING BEETLE** *Nicrophorus americanus*
State: Endangered Federal: Endangered Critical Habitat: No
- EASTERN SPOTTED SKUNK** *Spilogale putorius*
State: Threatened Federal: N/A Critical Habitat: No
- SNOWY PLOVER** *Charadrius alexandrinus*
State: Threatened Federal: N/A Critical Habitat: No

Species In Need of Conservation (SINC)

- Southern Bog Lemming** *Synaptomys cooperi*
State: SINC Federal: N/A Critical Habitat: No
- Whip-poor-will** *Camprimukus vociferus*
State: SINC Federal: N/A Critical Habitat: No
- Yellow-throated Warbler** *Dendroica dominica*
State: SINC Federal: N/A Critical Habitat: No
- Black Tern** *Chlidonias niger*

State: SINC Federal: N/A Critical Habitat: No
Short-eared Owl <i>Asio flammeus</i>
State: SINC Federal: N/A Critical Habitat: No
Franklin's Ground Squirrel <i>Spermophilus franklinii</i>
State: SINC Federal: N/A Critical Habitat: No
Golden Eagle <i>Aquila chrysaetos</i>
State: SINC Federal: N/A Critical Habitat: No
Highfin Carpsucker <i>Carpododes velifer</i>
State: SINC Federal: N/A Critical Habitat: No
Timber Rattlesnake <i>Crotalus horridus</i>
State: SINC Federal: N/A Critical Habitat: No
Southern Redbelly Dace <i>Phoxinus erythrogaster</i>
State: SINC Federal: N/A Critical Habitat: No
Blue Sucker <i>Cypleptus elongatus</i>
State: SINC Federal: N/A Critical Habitat: No
Eastern Hognose Snake <i>Heterodon platirhinos</i>
State: SINC Federal: N/A Critical Habitat: No
Common Shiner <i>Luxilus cornutus</i>
State: SINC Federal: N/A Critical Habitat: No
Johnny Darter <i>Etheostoma nigrum</i>
State: SINC Federal: N/A Critical Habitat: No
Bobolink <i>Dolichonyx oryzivorus</i>
State: SINC Federal: N/A Critical Habitat: No
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FINAL FISH AND WILDLIFE
COORDINATION ACT REPORT
FOR THE
MANHATTAN, KANSAS
MANHATTAN LEVEE FEASIBILITY STUDY

PREPARED FOR THE

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

Prepared by

U.S. Fish and Wildlife Service
Kansas Ecological Services Field Office
Manhattan, Kansas
August, 2014

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EXECUTIVE SUMMARY

The City of Manhattan, Kansas sits at the confluence of the Big Blue River, the Kansas River, and Wildcat Creek. Flow on the Big Blue River is largely controlled by releases from Tuttle Creek Dam, which is approximately six miles north of the City of Manhattan and 12.3 miles above the confluence with the Kansas River. The existing Manhattan Kansas local protection project is primarily comprised of one levee unit and associated appurtenances. The levee unit withstood the Flood of 1993, but some elements of the system were seriously challenged as the flood crested. This event raised a concern that the levee may provide less than the authorized benefits for which it was designed. The US Army Corps of Engineers in cooperation with the local project sponsor (City of Manhattan, Kansas) are conducting a feasibility study to identify alternatives for flood risk reduction on the current Manhattan local protection project.

The Corp's Draft Feasibility Study (DFS) stated that Plan 3 – 0.33% Plan (formerly named the N300+0 levee raise alternative) is the National Economic Development (NED) plan and the recommended plan. This alternative would raise the Big Blue River portion of the levee an average of 1.5 feet with up to a 3.3-foot raise in some locations to the 300-year level of protection (0.33% flood) with zero freeboard. The stationing of the levee raise would be from approximately 131+00 to 273+00 with an approximately 500-foot extension for tie-in along Casement Road to the upper end of the Big Blue River Segment and include a new sandbag gap. The project would also entail the construction of associated infrastructure consisting of gatewells, landside toe embankment sand drains, relief wells, collector ditches, and underseepage berms.

Riparian vegetation is the only resource of significance anticipated to be impacted by the proposed flood control work. Approximately 6.23 acres of forested habitat and 0.67 acre of shrubland habitat would be lost.

RECOMMENDATIONS

1. Riparian and wetland habitats should be avoided to the maximum extent practicable during construction and when selecting borrow sites for the proposed levee improvements. Since channelization, levee construction and floodplain development have already resulted in dramatic loss of riparian and wetland habitats in the Kansas River basin within the project area, the Corps should focus on bare or cropland areas for borrow.
2. The non-native, invasive brome and fescue grasses used on the levee could be replaced with native grasses which would provide a higher habitat value than the non-native grasses. The USDA – Natural Resource Conservation Service's Plants Database (<http://plants.usda.gov/java/>) lists three species of fescue that are native to Kansas: clustered fescue (*Festuca paradoxa*), nodding fescue (*Festuca subverticillata*), and Rocky Mountain fescue (*Festuca saximontana*). Clustered fescue and nodding fescue

have been found in Riley and Pottawatomie Counties while Rocky Mountain fescue has not been found in either county. Other native grasses which might be suitable for use on the levees include buffalo grass (*Bouteloua dactyloides*) and western wheat grass (*Pascopyrum smithii*).

3. Removal of woodlands and other native vegetation should be avoided where possible. Upland trees within the construction right-of-way should remain undisturbed if possible. If avoidance is not possible a plan to replace those habitat losses should be developed in coordination with the U.S. Fish and Wildlife Service (Service) and the Kansas Department of Wildlife, Parks and Tourism (KDWPT).

4. Bald eagle potential roost and nest sites should be protected and preserved by retaining mature trees and old growth stands, particularly within one-half mile from water. If any project activity appears likely to harass or disturb any bald eagle observed at or near the project area the Service should be notified prior to commencement of the activity, so that an assessment may be made of the potential for adverse impacts.

5. All disturbed areas should be immediately planted with native vegetation following construction to prevent erosion and the establishment of invasive species.

6. Best Management Practices to prevent the transport of invasive species to or from the construction sites should be included as an integral component of the project.

7. Establish native vegetation riverward of levee segments where riparian woodlands are sparse or nonexistent or where invasive species have become established.

8. Runoff from construction areas into streams, rivers and wetlands should be avoided. Inadvertent trampling by workers or machinery in those areas should be prevented.

9. The potential use of borrow sites for wetland and aquatic habitat enhancement and public recreation should be investigated with the project sponsors and borrow site owners.

10. If possible, establish replacement areas prior to the onset of impacts from the project to lessen the impacts to wildlife from habitat loss.

11. Closings of the trails in Linear Park should be kept to a minimum both in length of area and amount of time closed. Alternative route(s) should be provided around the construction areas to preserve the connectivity of the trail.

12. Mark and/or modify all overhead lines incorporating the guidelines found in the following documents:

Avian Protection Plan (APP) Guidelines

(http://www.aplic.org/uploads/files/2634/APPguidelines_final-draft_Aprl2005.pdf);

“Suggested Practices for Avian Protection on Power lines: The State of the Art in 2006”

([http://www.aplic.org/uploads/files/2643/SuggestedPractices2006\(LR-2\).pdf](http://www.aplic.org/uploads/files/2643/SuggestedPractices2006(LR-2).pdf)); and

“Reducing Avian Collisions with Power Lines: the State of the Art in 2012 (Avian Power Line Interaction Committee (APLLIC), 2012)
(http://www.aplic.org/uploads/files/11218/Reducing_Avian_Collisions_2012watermarkLR.pdf).

INTRODUCTION

This Final Fish and Wildlife Coordination Act Report (FCAR) is submitted pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), and the fiscal year 2013 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 Manhattan, Kansas Levee Feasibility Study. The FCAR is designed to accompany and is to be incorporated into the Corps' Final Feasibility Study/Environmental Assessment on the proposed project. The Service has previously provided a draft Planning Aid Letter (PAL) dated June 14, 2013, a final PAL dated September 24, 2013, and a Draft Fish and Wildlife Coordination Act Report (DCAR) dated March 2014. The CAR has been prepared in cooperation with the Kansas Department of Parks, Wildlife, and Tourism (KDWPT). A letter of concurrence from KDWPT, if it is forthcoming, will be forwarded to the Kansas City District, Corps of Engineers to include as an appendix to the FCAR.

This study was authorized under authority of Section 205 of the Flood Control Act of 1948, as amended.

The Big Blue River tieback elevation was originally designed for an 110,000 cfs release from Tuttle Creek Reservoir plus two feet of freeboard. The existing levee withstood the 1993 Flood, with flows of 60,000 cfs on the Big Blue River and peak flows of 100,000 cfs on the Kansas River, but releases from Tuttle Creek Dam created a near overtopping situation at some Big Blue River levee locations. The 1993 event raised concerns that the levee may provide much less than the design level of performance.

The Manhattan Levee is located in Riley and Pottawatomie Counties. The Manhattan Levee consists primarily of an earthen levee (5.4 miles), various interior drainage features, pump plants, and levee underseepage controls. For the purpose of the feasibility study the Manhattan levee is described as two major segments (Figure 1):

1. The Big Blue segment extends along the right bank of the Big Blue River from upstream near Casement Road down to the Kansas River confluence.
2. The Kansas River segment starts on high ground on the left bank of Wildcat Creek in the vicinity of 4th Street and then extends along the left bank of the Kansas River to the mouth of the Big Blue River.

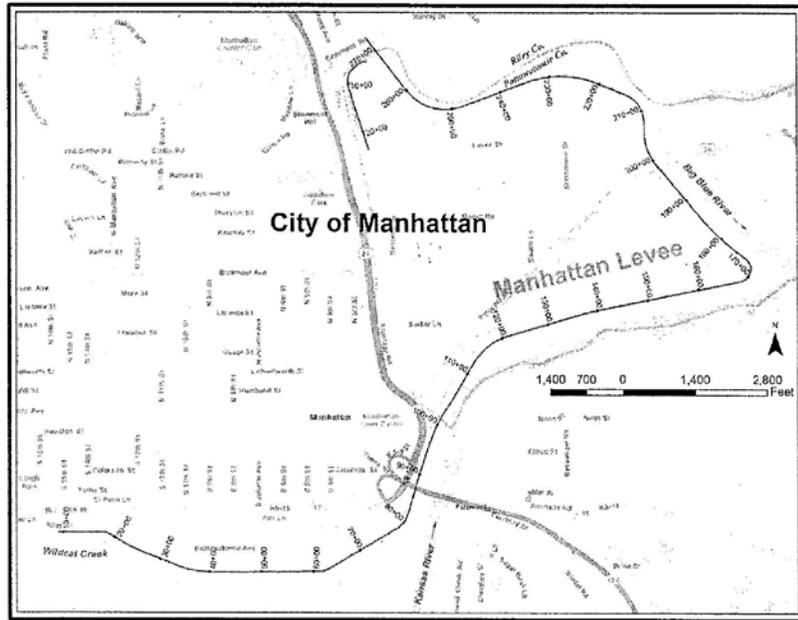


Figure 1. Project Area. Levee shown as red line.

The Corps has indicated that Plan 3 appears to be the best candidate for the National Economic Development (NED) plan and is the recommended plan. This alternative would raise the Big Blue River portion of the levee an average of 1.5 feet with up to a 3.3-foot raise in some locations. The preliminary cost estimate for this alternative is \$18 million in 2012 dollars.

The Recommended Plan would raise the existing levee to the 300-year level of protection (0.33% flood) with zero freeboard. The stationing of the levee raise would be from approximately 131+00 to 273+00 with an approximately 450-foot extension up Casement Road (via a road raise) on the Big Blue River Segment that is needed to meet high ground. Gatewells would be replaced at stations 14+78, 62+20, 89+83, 163+00, and 269+50. Landside toe embankment sand drains would be installed at stations 8+00, to 97+00, 110+00 to 137+00, and 165+00 to 269+50. Relief wells and collector ditches would be constructed at stations 64+00 to 97+00, 110+00 to 120+00, and 265+70 to 269+50. Underseepage berms would be constructed at 120+00 to 137+00, and 165+00 to 177+00.

Riparian vegetation is the only resource of significance anticipated to be impacted by the proposed flood control work. The Corps estimates that 6.23 acres of forested habitat and 0.67 acres of shrubland habitat would be lost. Although the amount of forested and shrubland riparian habitat lost may appear to be low, this type of native vegetation represents valuable wildlife habitat. To minimize the long term impact to terrestrial habitat and wildlife the Corps is proposing to plant native vegetation where possible

following construction in the temporary construction easements and the permanent easements that were cleared during construction and to identify potential ways to enhance or expand existing riparian corridors. We support this initiative. Planting of disturbed areas to native vegetation is important to prevent the colonization of these areas by exotic, invasive, and undesirable species (e.g. bush honeysuckle, eastern red cedar, reed canary grass) which would provide little value for wildlife but would provide entry point for invasion into adjacent areas further degrading the remaining wildlife habitat.

The Corps has inspected the levee and project area and has found no wetlands or other Waters of the U.S. that would be impacted by the project.

The levee constitutes a major portion of Linear Park, a trail system for walking, hiking, and bicycling. Off-road bicycling trails take off from Linear Park and traverse the woody riparian area riverward of the levee. Linear Park is heavily used by the residents of Manhattan both for recreation and as an alternative transportation route by pedestrians and bicyclists. Trail closings due to construction activity would be a disruption to the user community and would be acutely felt.

DESCRIPTION OF THE STUDY AREA

The City of Manhattan covers an area of approximately 18.79 square miles and as of the 2010 census, the city population was 52,281. Manhattan is located in the Flint Hills region of Kansas, which consists of continuous rolling hills covered in tall grasses. The current downtown area, the original site of Manhattan, was built on a broad, flat floodplain at the junction of the Kansas and Big Blue rivers. The floodplains of the Big Blue and Kansas River in the study area have been predominantly developed as residential and business areas. Manhattan has faced recurring flooding during times of heavy precipitation. The largest floods in the town's history were in 1903, 1908, 1951 and 1993. In 1993 the emergency flood gates for Tuttle Creek Reservoir were opened, which combined with large outflows from other reservoirs on tributaries to the Kansas River, resulted in an increase in the flood levels in the City of Manhattan.

Tuttle Creek Dam and Reservoir is located on the Big Blue River approximately six miles north of the City of Manhattan or 12.3 miles above its confluence with the Kansas River near river mile 147. Construction of the Dam was initiated 1952 and storage of water in the lake began in 1962. The lake became fully operational for all congressionally authorized purposes when it reached multipurpose pool in April of 1963. Tuttle Creek Reservoir controls the flow of the Big Blue River downstream of the dam.

The construction of the Manhattan, Kansas Flood Protection Project (Manhattan levee) was initiated in 1961 and the completed project was transferred to the City of Manhattan for operation and maintenance in 1963. The Corps states that the Manhattan levee provides a limited amount of protection to the City of Manhattan from flooding along two major rivers, the Kansas River and the Big Blue River.

The levee was built close to the Big Blue and Kansas Rivers constricting their floodplains and limiting the amount of riparian habitat (Figure 3). The areas between the river and levees contain much of the remaining available wildlife habitat in the project area.

The latest proposed borrow area is within a row crop field adjacent to the original levee borrow area which has developed into forested wetland and shrub-scrub wetland as shown on the National Wetland Inventory map.

The soils of the project area typically are classified within the Eudora-Haynie-Sarpy soil series. These are deep, nearly level silt loams, very fine sandy loams, and loamy fine sands on terraces and flood plains. The soils along the Kansas and Big Blue Rivers in the City of Manhattan typically fall into the Eudora series which occurs on the bottom lands along the Kansas and Big Blue Rivers. The soils around Wildcat Creek and south of the K-177 Kansas River Bridge, which includes the proposed borrow area, are of the Haynie soil series which consist of very fine sandy loam. In general the more sandy soils occur on the lowest bottoms next to the river channels and the soils that have higher clay content are on the highest terraces farthest from the channels. Eudora soils are on upper terraces that are rarely flooded. Haynie soils are on the flood plain and are well drained. Sarpy soils are also associated with flood plains and are described as being excessively drained.

Terrestrial Resources

Most of the vegetation in the study area has been greatly impacted by urban development and agricultural land clearing. The major land use adjacent to the project area is urban, with cropland being the second major land use. There are a few small patches of native prairie and woodlands near the project area most notably the restored native prairie and woodland areas in Northeast Park. The project area itself, consisting of the levee and the land between the levee and the banks of the Kansas River, Big Blue River, and Wildcat Creek, is primarily used for recreation. The majority of the grasslands within the project footprint are either mowed turf grass or un-mowed areas that contain a majority of non-native species with a few native grass or forb species scattered within them. Domestic grass is used for landcover on the levee. The area riverward of the levee contains much of the remaining native vegetation and wildlife habitat. There is a narrow linear strip of riparian woodlands along most of the length of the rivers in the project area consisting of native tree species like cottonwood, willow, sycamore, American elm, and maple, along with grasses, shrubs, and herbaceous species (Figure 2). Historically the riparian vegetative community consisted of American elm, bur oak, poplar, sycamore, red-bud, hackberry, and buckeye. Common species of shrubs included poison ivy, greenbrier, gooseberry, and coral berry. Common shrubs vines included Virginia creeper, poison oak, and grapes. Violets and nettles were abundant herbs (Dice, 1923).

The riparian woodland that remains along the two rivers and Wildcat Creek is the highest quality habitat in the project area. It offers the greatest vegetative diversity and degree of interspersions with other habitat types, which is important to many wildlife species providing food and cover for local wildlife, many neotropical migrant birds, and wintering habitat for the bald eagle. Riparian woodlands have been found to support significantly higher abundance and diversity of bird species compared to upland forests (Brinson 1981). The lack of native vegetation is a limiting factor for the populations of these species. Additionally, riparian woodlands are important for preventing streambank erosion; intercepting sediments and pollutants before entering streams; providing shade and leaf detritus to the stream; and providing recreational opportunities through fishing, nature study, and wildlife observation. Linear corridors of habitat, such as that found along the Kansas River, allow animals to disperse throughout their ranges, preventing genetic isolation and allowing the reestablishment of populations in areas where wildlife may have been eliminated in the past.

The Kansas River, Big Blue River and Wildcat Creek also provide important habitat for wildlife. The rivers provide waterfowl and shorebird resting, feeding, and staging areas during migration. In spring and summer, sandbars and islands provide protected feeding and potential nesting sites for Canada geese and shorebirds. Stream banks provide habitat for bank swallows, belted kingfishers, beaver, and muskrat. The remaining areas of native vegetation provide vital habitat for local wildlife and migrating songbirds.

Thompson and Ely (1989) report that 424 bird species have been recorded in Kansas. The state's central location is an important contributing factor to this large species count, containing both eastern deciduous forest and the central grasslands and it is on a major flyway. Kansas is also a wintering area for far-northern birds, as well as a breeding area for typically southern species. Kansas' major rivers funnel in stragglers from the Rocky Mountains. Many migratory songbird species are dependent on woodlands, and especially riparian woodlands, for food, shelter, and rearing of young. As a prairie state, bird species dependent on grasslands are predominant in Kansas. However, as a group, grassland birds are declining at a faster rate than any other group of birds in North America.

Reptiles and amphibians found in Riley County include the collard lizard, ring-neck snake, horned toad, Texas horned lizard, ground skink, tiger salamander, plains spadefoot, great plains toad, Woodhouse's toad, Blanchard's cricket frog, western chorus frog, gray treefrog, plains leopard frog, bullfrog, plains narrowmouth toad, common snapping turtle, ornate box turtle, western painted turtle, midland smooth softshell turtle, western spiny softshell turtle, great plains skink, prairie-lined racerunner, western slender glass lizard, western hognose snake, eastern hognose snake, western worm snake, prairie ringneck snake, western smooth green snake, eastern yellowbelly racer, great plains rat snake, black rat snake, bullsnake, prairie kingsnake, common kingsnake, milk snake, plains black headed snake, flat-headed snake, red-sided garter snake, western plains garter snake, lined snake, Texas brown snake, blotched water snake, diamond-backed water snake, northern water snake, copperhead, timber rattlesnake. Garter snakes and

ringneck snakes are often seen sunning on Linear Trail (Susan Blackford pers. observation).

Aquatic Resources

Ninety-nine species of fish inhabit the Kansas River basin of which at least 19 are probably introduced, non-native species. The distribution and abundance of most species have changed markedly in this century in response to reservoir construction and land use changes. Species found in the Kansas River, Blue River, Wildcat Creek and tributaries in the close proximity to Manhattan include shovelnose sturgeon, paddlefish, longnose gar, shortnose gar, goldeye, American eel, gizzard shad, red shiner, common carp, speckled chub, plains minnow, common shiner, silver chub, emerald shiner, sand shiner, rosyface shiner, Topeka shiner, suckermouth minnow, bluntnose minnow, creek chub, river carpsucker, quillback, white sucker, blue sucker, smallmouth buffalo, bigmouth buffalo, black buffalo, shorthead redhorse, yellow bullhead, blue catfish, channel catfish, slender madtom, stonecat, flathead catfish, misquifish, white bass, orangespotted sunfish, bluegill, largemouth bass, white crappie, orangethroat darter, sauger, and freshwater drum (Cross and Collins, 1995).

In a 1977 report, published by the Kansas Forestry, Fish and Game Commission (Dowlin, et al, 1977) angler utilization from approximately Junction City to Kansas City was 29,909 angler days per year. With increasing population during the last 20 years within the river corridor from Junction City to Kansas City, recreation and angler days have, no doubt, also increased.

The Kansas River adjacent to Manhattan is likely under-utilized by the resident population. This may be due, in part to a lack of adequate access or development of park lands riverward of the flood control levee system. However, recent efforts have been made to address this issue. Several boat launching facilities and river user access sites have been constructed along the Kansas River in recent years. One access site named the Fairmont Park Boat Ramp, on the south side of the River under the K-177 highway bridge over the Kansas River at River Mile 149.3, was constructed in 2008 near the project area. A long time established boat ramp is located on the Big Blue River near the US 24 bridge. Boating use, including canoes and kayaks, in the Big Blue River and Kansas River adjacent to Manhattan is a popular activity. Fairmont Park on the south side of the Kansas River (downstream from the boat ramp) was established following the 1993 flood and has river access via trails.

Wetlands

The Corps stated in the Draft EA that no wetlands have been identified in the project's footprint area. However, there are wetlands near the project site. The NWI identifies wetlands landward of the levee and in-stream wetlands in the Kansas River (Figures 4, 5 and 6). In addition, the original borrow area used for the initial construction of the Manhattan Levees has developed into wetlands as identified on the NWI (Figure 3). The latest proposed borrow area for this project is located adjacent to the original borrow site.

Federal Threatened and Endangered Species and Trust Resources

Section 7 of the Endangered Species Act, 87 Stat. 884, as amended, requires Federal Agencies 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 that there will be beneficial effects, further consultation is not necessary.

Species listed under the Endangered Species Act (ESA) for Riley County are the interior least tern (*Sterna antillarum*), listed as endangered; piping plover (*Charadrius melodus*), listed as threatened; and the Topeka shiner (*Notropis topeka*), listed as endangered. The Sprague's pipit (*Anthus spragueii*), is a candidate species. In addition, the northern long-eared bat (*Myotis septentrionalis*) (NLEB) is currently proposed for listing under the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Least Tern and Piping Plover: The high flows on the Kansas River in July 1993 and in May 1995 caused many new high elevation sandbars on the Kansas River. This flood-induced habitat was attractive to piping plovers, and least terns. The first documented nesting of least terns and piping plovers was in 1996 and 1997, respectively (Busby 1997). This was the first nesting of piping plover ever recorded in Kansas and the first time least terns were known to nest along the Kansas River. Since 1998, nesting locations of these two bird species have been monitored throughout the breeding season to determine productivity of the species (Boyd 2005).

Our office has worked closely with the Kansas City District Corps of Engineers (Corps) to monitor nesting tern and plover colonies on the Kansas River. We are involved in water release decisions made by the Corps in an attempt to avoid direct take of active nests. Beginning in 1997, the Service's Kansas Field Office staff has conducted boat surveys of the upper Kansas River, searching for tern and plover nesting colonies. Currently, there are no tern and plover nests near the project site. However, suitable

habitat exists in the Kansas River near the Manhattan Levee project area. Even though project activities are not anticipated to directly impact this habitat, construction activities could disturb nesting least terns and piping plovers from noise and human and machine movement. Least terns and piping plovers generally nest between May 1st and August 31st. If construction occurs in areas visible to unvegetated sand bars in the Kansas River during those dates, we recommend that the area be surveyed by a qualified biologist to locate any nesting least terns or piping plovers. If nesting least terns or piping plovers are located, this office should be consulted.

Topeka Shiner: The Topeka shiner historically inhabited Wildcat Creek in the Manhattan area. There have been no recent surveys on Wildcat Creek through the City of Manhattan to document the continued presence of Topeka shiners in this reach. However, surveys have confirmed their presence in Wildcat Creek on Ft. Riley and downstream of Ft. Riley to the west side of Manhattan. Sedimentation and runoff from construction areas into Wildcat Creek should be avoided. Given the current project plans in that no work will be conducted in streams or rivers we have not discussed timing restrictions and other conditions to protect the Topeka shiner. Should that change please contact this office to discuss your plans.

Sprague's Pipit: The Sprague's pipit is a small passerine bird (about the size of a bluebird) of the open grasslands. Although it prefers large tracts of shortgrass prairie for nesting, they seem to be a generalist in their preferences during migration and may occur infrequently in any short grass habitat of any size anywhere in Kansas during migration. It feeds and nests exclusively on the ground. Insects, spiders and some seeds comprise its diet. Spring migration primarily occurs in April and May while fall migration occurs primarily from late September through early November. It is unlikely that they would be found in the project area.

Northern Long-Eared Bat: The northern long-eared bat (NLEB) is currently proposed for listing under the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). The final listing decision for the NLEB is expected in April 2015. At this time, no critical habitat has been proposed for the NLEB. The state of Kansas is within the known range of the NLEB and there are historical sightings from Riley County. During the summer, NLEBs typically roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥ 3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on presence of cavities or crevices or presence of peeling bark. It has also been occasionally found roosting in structures like barns and sheds, particularly when suitable tree roosts are unavailable. They forage for insects in upland and lowland woodlots and tree lined corridors. During the winter, NLEBs predominately hibernate in caves and abandoned mine portals. NLEB maternity habitat is defined as suitable summer habitat used by juveniles and reproductive females. NLEB home ranges, consisting of maternity, foraging, roosting, and commuting habitat, typically occur within three miles of a documented capture record or a positive identification of NLEB from properly deployed acoustic devices, or within 1.5 miles of a known suitable roost tree.

(<http://www.fws.gov/midwest/angered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>). Additional habitat types may be identified as new information is obtained.

Pursuant to Section 7(a)(4) of the ESA, federal action agencies are required to confer with the Service if their proposed action is likely to jeopardize the continued existence of the NLEB (50 CFR 402.10(a)). Action agencies may also voluntarily confer with the Service if the proposed action may affect a proposed species. Species proposed for listing are not afforded protection under the ESA; however as soon as a listing becomes effective, the prohibition against jeopardizing its continued existence and take applies **regardless of an action's stage of completion**. If the agency retains any discretionary involvement or control over on-the-ground actions that may affect the species after listing, section 7 applies. Therefore, if suitable NLEB habitat is present within the proposed project area, we recommend further coordination with our office to avoid potential project delays should the species be listed. NLEB survey may be necessary depending on the time of tree clearing. Additional information regarding NLEB and conference procedures can be found

(<http://www.fws.gov/midwest/angered/mammals/nlba/index.html>)

<http://www.fws.gov/midwest/angered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>.

Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act (MBTA), construction activities in prairies, wetlands, streams, and woodland habitats, including the removal of upland borrow, and those that occur on bridges (e.g., which may affect swallow nests on bridge girders) that would otherwise result in the taking of migratory birds, eggs, young, and/or active nests should be avoided. Although the provisions of the MBTA are applicable year-round, most migratory bird nesting activity in Kansas occurs during the period of April 1 to July 15. However, some migratory birds are known to nest earlier than this (e.g., hawks, owls, and eagles) and some later (e.g., goldfinches). If the proposed project may result in the take of nesting migratory birds, the Service recommends a field survey during the nesting season of the affected habitats and structures to determine the presence of active nests. The location of active nests should be avoided until all young have fledged to avoid a taking under the MBTA. Our office should be contacted immediately for further guidance if a field survey identifies the existence of one or more active bird nests that cannot be avoided temporally or spatially by the planned activities.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) which is known to occur in the project area, is protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). A variety of human activities can potentially impact bald eagles, affecting their ability to forage, nest, roost, breed, or raise young. Bald eagles are frequently observed near or in the project area roosting in trees, loafing on sandbars in the river, and flying along the river corridor. Although nesting occurs nearby (around Tuttle Creek Reservoir, on Ft. Riley, and upstream and downstream of the project site along the

Kansas River), there have been no nests observed in the project area at this time. However, this is subject to change as bald eagles change nesting trees or new pairs establish territories. Bald eagles use large live trees and snags for perches.

The USFWS has developed National Bald Eagle Management Guidelines (<http://www.fws.gov/midwest/eagle/pdf/NationalBaldEagleManagementGuidelines.pdf>) to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. These Guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act.

We encourage you to protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within one-half mile from water. If any project activity appears likely to harass or disturb any bald eagle observed at or near the project area the Service should be notified prior to commencement of the activity, so that an assessment may be made of the potential for adverse impacts.

State Listed Species

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 habitat where they are likely to occur, to obtain a project action permit from the Secretary of the Kansas Department of Wildlife, Parks and Tourism (KDWP) 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 areas.

The KDWP maintains a list of State listed threatened and endangered species and species in need of conservation (SINC). As these lists are periodically updated, the Corps should contact KDWP directly for the most current information at Environmental Services Section, 512 SE 25th Ave, Pratt KS 67124-8174.

State-listed endangered species in Riley County include American burying beetle (*Nicrophorus americanus*), Eskimo curlew (*Numenius borealis*), least tern (*Sterna antillarum*), peregrine falcon (*Falco peregrinus*), silver chub (*Macrhybopsis storeriana*), and whooping crane (*Grus americana*). KDWP has designated critical habitat for the least tern.

State listed threatened species in Riley County includes bald eagle (*Haliaeetus leucocephalus*), eastern spotted skunk (*Spilogale putorius*), piping plover (*Charadrius melodus*), plains minnow (*Hybognathus placitus*), snowy plover (*Charadrius alexandrinus*), sturgeon chub (*Macrhybopsis gelida*), and Topeka shiner (*Notropis topeka*). KDWP has designated critical habitat for the bald eagle, piping plover, sturgeon chub, and Topeka shiner.

SINC species listed for Riley County include the black rail (*laterallus jamaicensis*), black tern (*Chlidonias niger*), bobolink (*Dolichonyx oryzinvorus*), eastern hognose snake (*Heterodon platirhinos*), Franklin's ground squirrel (*Spermophilus franklinii*), golden eagle (*Aquila chrysaetos*), Henslow's sparrow (*Ammodramus henslowii*), highfin carpsucker (*Carpionodes velifer*), long-billed curlew (*Numenius americanus*), , short-eared owl (*Asio flammeus*), southern bog lemming (*Synaptomys cooperi*), southern flying squirrel (*Glaucomys volans*), tadpole madtom (*Noturus gyrinus*), timber rattlesnake (*Crotalus horridus*), western hognose snake (*Heterodon nasicus*), whip-poor-will (*Camprimulgus vociferous*), and yellow-throated warbler (*Dendroica dominica*).

EVALUATION OF ALTERNATIVES CONSIDERED

The feasibility study includes preliminary engineering, formulation of project alternatives, environmental assessment, economic evaluations, and real estate studies. The Corps has stated that the early alternatives examination show that construction of certain levee reliability improvements and raising the existing Big Blue Levee segment produce solid positive net benefits and offers a good opportunity to pursue a Federal cost-shared project with the Corps.

The DFS explored five alternatives:

Plan 1 – No Federal Action Alternative: The No Federal Action option would result in no increase in the current level of flood protection. Structures within the protected zone would continue to be at a higher risk for flooding during large flood events. This plan was previously named the No Federal Plan.

Plan 2 – 0.5% Plan: This alternative would raise the current levee to pass the nominal 0.5% chance flood event profile. The stationing of the raise would be from approximately 200+00 to 272+85 with an approximately 200-foot extension for tie-in along Casement Rd upper end of Big Blue River Segment to include a new sandbag gap. Gatewells would be replaced at stations 14+78, 62+20, 89+83, 163+00, and 269+50. A Landside toe embankment sand drain would be installed along a portion of the Big Blue River levee segment. Relief wells would be constructed at stations 64+00 to 97+00, 110+120+00, and 265+70 to 269+50. Underseepage berms would be constructed at 120+00 to 137+00, and 165+00 to 173+50. This plan was previously named the N200+0.

Plan 3 – 0.33% Plan (Recommended Plan): The Recommended Plan would raise the current levee to pass the nominal 0.33% chance flood event profile. The stationing of the levee raise would be from approximately 131+00 to 277+53 with an approximately 500-foot extension for tie-in along Casement upper end of Big Blue River Segment to include a new sandbag gap. Gatewells would be replaced at stations 14+78, 62+20, 89+83, 163+00, and 269+50. A landside toe embankment sand drain would be installed along a portion of the Big Blue River levee segment. Relief wells would be constructed at stations 64+00 to 97+00, 110+120+00, and 265+70 to 269+50. Underseepage berms

would be constructed at 120+00 to 137+00, and 165+00 to 173+50. This plan was previously named the N300+0.

Plan 4 – 0.2% Plan: This plan would raise the current levee to pass the nominal 0.2% chance flood event profile. The stationing of the raise would be from approximately - 8+50 to 72+00 and from 101+00 to 277+53'. There would also be an approximately 1700-foot extension for tie-in along Wildcat Creek and Riley Lane upper end of Kansas River levee Segment. An approximately 500-foot extension for tie-in along Casement Rd upper end of Big Blue River Segment to include new sandbag gap. Thirteen gatewells would be replaced, raising of one gatewell, and strengthen one pump station. Underseepage berms would be constructed from stations 120+00 to 137+00, and 165+12 to 173+50. Landside toe embankment sand drain would be constructed along a portion of the Big Blue River Levee Segment. Relief wells would also be installed from stations 18+00 to 23+00, 64+00 to 97+00, 110+00 to 120+00, 190+00 to 210+00, and 265+70 to 272+00. This plan was previously named the N500+0.

Plan 5 – 0.33% + CW: This plan would raise the current levee according to plan 3 with the addition of channel widening (CW). This alternative includes all the features of the Plan 3 levee raise alternative in addition to excavation of approximately 200,000 cubic yards of material along the left descending bank of the Big Blue River. Both the Highway 24 and Union Pacific Railroad Bridges would be expanded and approximately 1,100 linear feet of riprap armoring would be placed around the bridge abutments. This plan was previously named the N300+0 plus channel widening.

Also considered late in the feasibility study was a plan to extend the levee northward to protect additional development in the northern area, including the Dix Addition which sustained considerable damage in the 1993 flood. However, the Corps determined that a northern extension of the levee would be economically unfeasible per Corps guidelines for Federal Civil Works projects. A northern levee extension would add yet another constriction to a river system that has already lost much of its flood plain function to levees. Flood events are important for fish in terms of habitat creation. Building new levees would further reduce flood plain function and processes that create and sustain habitat. New levees would have a potential to impact wetlands and riparian areas.

Plan 1 would not affect wildlife or habitats as there would be no Federal Action and therefore conditions would remain similar to current conditions. Plan 2 and Plan 3 do not differ significantly in impacts to wildlife and habitats. Plan 4 would incur additional losses of riparian woodlands, shrublands, and other vegetation due to the 1700 foot tie-in along Wildcat Creek. Plan 5 would have similar terrestrial impacts to Plan 3 but could incur significant impacts to aquatic habitats due to the channel widening in the Big Blue River. The channel widening would directly alter the pattern, profile, and dimensions in this reach of the Big Blue and would likely instigate physical changes upstream and downstream of the widened reach.

We have no objection to the selection of Alternative Plan 3 as the Recommended Plan and National Economic Development (NED) plan. We believe that this plan will meet the Corp's objectives while having minimal environmental impacts in the project area.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Much of the land adjacent to the project areas has been converted to urban uses and cropland. The top of the levee is used for Linear Trail, a hiking and bicycling trail. The riparian area between the levee and the Kansas River, Big Blue River, and Wildcat Creek is some of the highest quality habitat remaining in the area of Manhattan, Kansas. Recreation in the form of hiking, bicycling and bird watching are the primary human uses of the riparian area. We do not anticipate any significant change in land use, and therefore impacts to fish and wildlife resources, if the project does not occur.

FISH AND WILDLIFE RESOURCES WITH THE PROJECT

Construction activities 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. Runoff from construction sites into streams, rivers and wetlands should be avoided. The proximity of the project area to streams, rivers and wetlands is very close in some locations. Inadvertent trampling by workers or machinery in these areas should be prevented.

Grassland strips occurring on and adjacent to the levee and the toe would be temporarily impacted during construction. Impacts would be temporary but would cease to provide habitat to wildlife during project construction and for approximately two to three years after project completion or until the grassland vegetation is well established.

Riparian vegetation is the only resource of significance anticipated to be impacted by the proposed flood control work. The few, remaining areas of native vegetation represent valuable wildlife habitat. Areas of native vegetation should be avoided. Work in the riparian areas area will displace wildlife that currently use the areas due to disturbances from noise, dust, human activity, machinery and destruction of habitat. Depending on construction timing, this displacement could result in serious consequences to wildlife such as loss of reproduction and possible death of individual animals from dispersal from the area, accidents (crossing roads and unknown hazards in new areas), starvation, competition for other areas, etc. There is little refuge habitat in close proximity to the project area for displaced wildlife to move into. Available habitat is presumably at carrying capacity which further reduces the likelihood of wildlife surviving the displacement and intensifies the competition for the limited habitat available. Although the temporal displacement from disturbance may be relatively short, the repercussions

could be long-term. Establishment of replacement areas prior to the onset of project construction would lessen the impacts to wildlife from habitat loss.

Severing travel corridors, whether from physical construction activity or behavioral avoidance of construction activities, could cause wildlife to seek alternative routes or be prevented from moving between habitats. Wildlife travel corridors linking other areas of suitable floodplain upstream and downstream of the project area should be maintained during project construction. If construction will disrupt the entire area from the levee riverward to the streambank or riverbank alternative travel corridors should be established before construction begins on that levee segment especially if wildlife would be compelled to cross a road to alternative areas. This could involve constructing road crossings to assist wildlife in crossing over or under a road, erecting barriers to redirect wildlife to suitable crossing locations, or to encourage wildlife to use a wildlife crossing.

The Corps has not found any wetlands in the project area. The National Wetland Inventory does not identify any wetlands in the project area. However, there are identified wetland areas adjacent to the project area within the Kansas River channel, landward of the levee near the project area, and near the latest proposed borrow area (Figures 3 – 6). Indirect impacts to these wetlands should be avoided.

The Corps has removed from consideration two potential borrow areas due to wetlands and/or historical concerns. The latest proposed borrow area is within a row crop field adjacent to the original levee borrow area. The original levee borrow area has developed into forested wetland and shrub-scrub wetland as shown on the National Wetland Inventory map (Figure 3). The new proposed borrow area should not impact these wetlands so long as erosion and runoff are controlled so they don't enter the adjacent wetlands and equipment is kept out of the wetlands.

WILDLIFE AND HABITAT IMPACTS

The Service has established the Fish and Wildlife Service Mitigation Policy (46 FR: 7644-7663) to be used as guidance in determining resource categories and recommending mitigation. For the purposes of this CAR, the word "mitigation" refers to taking steps to avoid or minimize negative environmental impacts. These steps can include avoiding the impact; rectifying the impact by repairing or restoring the affected environment; reducing the impact; or compensating the impact by replacing or providing substitute resources.

We have determined that most of the wildlife habitat that would be affected by the raising of existing levees consisting of the levee footprint and easements is in Resource Category No. 4 (habitats of medium to low value). This resource is primarily comprised of the domestic, non-native grasses used on the levee. For this category, loss of habitat value should be minimized.

Riparian woodlands 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 replacement (replacement of habitat value lost with equal habitat values of the same kind of habitat as those eliminated). Another alternative to replace the lost habitat would be to simply replace two acres of in-kind habitat for every acre lost. Further, we recommend that 3 trees be planted to replace every tree lost in acknowledgment that many of those planted trees will not survive to maturity. Replacing two acres for every acre lost would provide space for the replacement trees. The establishment of native vegetation may take years, or even decades for woodlands resulting in long-term temporal loss of habitat. This temporal loss of habitat should be factored into the calculations to determine replacement values. The cost of replacing habitat losses should be included as a project cost. Plans to replace these high value areas should be developed in cooperation with the Service and KDWPT. The plans should include baseline information, site objectives, work plans (design and construction details), success criteria, performance standards, monitoring protocols, long-term management strategies and adaptive management procedures.

We advocate protecting local genotypes by using plant sources that are within 100 miles in latitude and 200 miles in longitude of the planting site. Plants evolve to local conditions (climate, soil, moisture conditions, etc.) and can develop different genetic structure (genotypes) within the same species. Gene pools of remnant plant communities can be altered genetically by the invasion of non-native genotype plant species.

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 replace losses attributable to project construction.

If agreeable to the project sponsors and borrow site owners, borrow sites could be designed and managed to enhance wetland and aquatic habitat, and provide recreational access.

Whenever possible, we recommend upland trees within the construction right-of-way remain undisturbed. While some of the trees may be young now, they are closer to a mature and more valuable stage than newly established trees.

Native trees, grasses and forbs, noted for their high wildlife value, could be established along the landward and river-side base of the existing levee system. Native vegetation often takes longer to become fully established; however when established, stands of native vegetation provide excellent soil binding characteristics, valuable wildlife habitat and require fewer maintenance costs. The Service, the Kansas Department of Wildlife and Parks, and the Natural Resource Conservation Service offer assistance programs and could work with the City of Manhattan to develop vegetation management plans.

Trees at least 50 feet tall and /or 24-inches dbh riverside of the levees should be avoided. Removal of these trees may adversely affect the habitat of the bald eagle.

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 adjacent to floodplain water bodies or tributaries affected by the project. 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. Invasive species of particular concern in Kansas include the zebra mussel (*Dreissena polymorpha*), Eurasian watermilfoil (*Myriophyllum spicatum*), purple loosestrife (*Lythrum salicaria*), Johnson grass (*Sorghum halepense*), sericea lespedeza (*Lespedeza cuneata*), salt cedar (*Tamarix spp.*), 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. Proactive measures to prevent the inadvertent spread of exotic and invasive species would appear to satisfy this directive. Therefore we recommend the implementation of the following BMP.

All equipment brought on site will be thoroughly 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 greater 140° F (typically the temperature found at commercial car washes) 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 thoroughly cleaned. Anything that came in contact with water will be cleaned and dried following the above procedure.

All overhead transmission lines should be modified or marked to reduce the likelihood of bird collisions with the lines or bird electrocutions on the lines. The interactions of migratory birds (e.g. eagles, hawks, owls, waterfowl, waterbirds, and songbirds) may create operational risks, health and safety concerns, and avian injuries or mortalities. The frequency of electrocutions and collisions and the associated outages has been dramatically reduced in areas where efforts have been made to retrofit or replace hazardous poles and mark lines (APLIC 2006 and APLIC 2012). The design and placement of transmission lines and towers can increase or decrease the exposure for bird collisions (APLIC 2012). Early evaluation of risk factors for bird electrocution and collision can reduce the risk potential and may reduce the need for costly modifications later. Since the plans for the levee improvement include moving transmission poles and lines it would be a cost effective time to mark the lines, conduct an avian risk assessment and develop an avian protection plan for the levee project.

RECREATION

The levee constitutes a major portion of Linear Park, a trail system for walking, hiking, and bicycling. Off-road bicycling trails take off from Linear Park and traverse the woody riparian area riverward of the levee. Linear Park is heavily used by the residents of Manhattan both for recreation and as an alternative transportation route by pedestrians and bicyclists. Trail closings due to construction activity would be a disruption to the user community and would be acutely felt. Trail closings should be kept to a minimum both in length of area and amount of time closed. Alternative route(s) around the construction areas should be designed, and constructed if necessary, to preserve the connectivity of the trail.

RECOMMENDATIONS

1. Riparian and wetland habitats should be avoided to the maximum extent practicable during construction and when selecting borrow sites for the proposed levee improvements. Since channelization, levee construction and floodplain development have already resulted in dramatic loss of riparian and wetland habitats in the Kansas River basin within the project area, the Corps should focus on bare or cropland areas for borrow.
2. The non-native, invasive brome and fescue grasses used on the levee could be replaced with native grasses which would provide a higher habitat value than the non-native grasses. The USDA – Natural Resource Conservation Service’s Plants Database (<http://plants.usda.gov/java/>) lists three species of fescue that are native to Kansas: clustered fescue (*Festuca paradoxa*), nodding fescue (*Festuca subverticillata*), and Rocky Mountain fescue (*Festuca saximontana*). Clustered fescue and nodding fescue have been found in Riley and Pottawatomie Counties while Rocky Mountain fescue has not been found in either county. Other native grasses which might be suitable for use on the levees include buffalo grass (*Bouteloua dactyloides*) and western wheat grass (*Pascopyrum smithii*).
3. Removal of woodlands and other native vegetation should be avoided where possible. Upland trees within the construction right-of-way should remain undisturbed if possible. If avoidance is not possible a plan to replace those habitat losses should be developed in coordination with the U.S. Fish and Wildlife Service (Service) and the Kansas Department of Wildlife, Parks and Tourism (KDWPT).
4. Bald eagle potential roost and nest sites should be protected and preserved by retaining mature trees and old growth stands, particularly within one-half mile from water. If any project activity appears likely to harass or disturb any bald eagle observed at or near the project area the Service should be notified prior to commencement of the activity, so that an assessment may be made of the potential for adverse impacts.
5. All disturbed areas should be immediately planted with native vegetation following construction to prevent erosion and the establishment of invasive species.
6. Best Management Practices to prevent the transport of invasive species to or from the construction sites should be included as an integral component of the project.
7. Establish native vegetation riverward of levee segments where riparian woodlands are sparse or nonexistent or where invasive species have become established.
8. Runoff from construction areas into streams, rivers and wetlands should be avoided. Inadvertent trampling by workers or machinery in those areas should be prevented.

9. The potential use of borrow sites for wetland and aquatic habitat enhancement and public recreation should be investigated with the project sponsors and borrow site owners.

10. If possible, establish replacement areas prior to the onset of impacts from the project to lessen the impacts to wildlife from habitat loss.

11. Closings of the trails in Linear Park should be kept to a minimum both in length of area and amount of time closed. Alternative route(s) should be provided around the construction areas to preserve the connectivity of the trail.

12. Mark and/or modify all overhead lines incorporating the guidelines found in the following documents:

Avian Protection Plan (APP) Guidelines

(http://www.aplic.org/uploads/files/2634/APPguidelines_final-draft_Apr12005.pdf);

“Suggested Practices for Avian Protection on Power lines: The State of the Art in 2006”

([http://www.aplic.org/uploads/files/2643/SuggestedPractices2006\(LR-2\).pdf](http://www.aplic.org/uploads/files/2643/SuggestedPractices2006(LR-2).pdf)); and

“Reducing Avian Collisions with Power Lines: the State of the Art in 2012 (Avian Power Line Interaction Committee (APLIC), 2012)

(http://www.aplic.org/uploads/files/11218/Reducing_Avian_Collisions_2012watermarkLR.pdf).

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Office
2609 Anderson Avenue
Manhattan, Kansas 66502-2801

August 6, 2014

Curtis Hoagland,
Kansas City District, Corps of Engineers
601 East 12th Street
Kansas City, Missouri 64106-2896

RE: Manhattan, Kansas Levee Feasibility Study Final Coordination Act Report

FWS Tracking # 2014-CPA-0583

Dear Mr. Hoagland:

This Final Fish and Wildlife Coordination Act Report (FCAR) is provided pursuant to the Fiscal Year 2012 Scope of Work (SOW) Agreement for the Section 216 Feasibility Report for Improvements to Flood Damage Reduction Measures Along Manhattan, KS Levee System (Manhattan Levee), between the U.S. Fish and Wildlife Service (Service) and the Kansas City District, Corps of Engineers (Corps). The FCAR fulfills the obligations of the SOW Agreement. This FCAR was prepared in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and constitutes the report of the Secretary of the Interior on the project within the meaning of Section 2(b) of this Act.

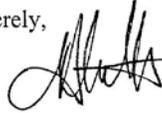
Cooperation and information utilized in preparation of this report was obtained from the Kansas Department of Wildlife, Parks, and Tourism (KDWPT) and the Corps. The Service solicited comments from KDWPT. Their comments and recommendations have been reflected in the Final Coordination Act Report (FCAR). To date we have not received a letter of concurrence from them. Their concurrence letter, if it is forthcoming, will be sent to you to include as an appendix to the FCAR.

We appreciate the opportunity to discuss impacts to fish and wildlife anticipated by implementation of this project.

- 1 -

Thank you for the opportunity to comment on this project. If you have any questions, please contact me or Susan Blackford of my staff at (785) 539-3474.

Sincerely,



Heather Whitlaw
Field Supervisor

HW/shb



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Office
2609 Anderson Avenue
Manhattan, Kansas 66502-2801

August 6, 2014

Jason Luginbill,
Kansas Department of Wildlife, Parks, and Tourism
1020 S. Kansas Ave., Suite 200
Topeka, KS 66612-1327

RE: Manhattan, Kansas Levee Feasibility Study Final Coordination Act Report

FWS Tracking # 2014-CPA-0583

Dear Mr. Luginbill:

Enclosed is a copy of the Final Fish and Wildlife Coordination Act Report (FCAR) for the Section 216 Feasibility Report for Improvements to Flood Damage Reduction Measures Along Manhattan, KS Levee System (Manhattan Levee). This FCAR was prepared in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and constitutes the report of the Secretary of the Interior on the project within the meaning of Section 2(b) of this Act.

Cooperation and information utilized in preparation of this report was obtained from the Kansas Department of Wildlife, Parks, and Tourism (KDWPT) and the Corps. The Service solicited comments from KDWPT throughout the process and those comments and recommendations have been reflected in the Final Coordination Act Report (FCAR). To date we have not received a letter of concurrence from KDWPT. Your concurrence letter, if it is forthcoming, will be forwarded to the Corps of Engineers to be included as an appendix to the FCAR.

Thank you for your cooperation on this project. If you have any questions, please contact me or Susan Blackford of my staff at (785) 539-3474.

Sincerely,

Heather Whitlaw
Field Supervisor

- 1 -



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502-6172



August 6, 2014

MEMORANDUM

To: Region 6, Chief of Endangered Species

From: Kansas Ecological Field Office Supervisor 

Subject: Manhattan, KS Levee Final Coordination Act Report

General Comments

This Final Fish and Wildlife Coordination Act Report (FCAR) is provided pursuant to the Fiscal Year 2012 Scope of Work (SOW) Agreement for the Section 216 Feasibility Report for Improvements to Flood Damage Reduction Measures Along Manhattan, KS Levee System (Manhattan Levee), between the U.S. Fish and Wildlife Service (Service) and the Kansas City District, Corps of Engineers (Corps). The FCAR fulfills the obligations of the SOW Agreement. This FCAR was prepared in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and constitutes the report of the Secretary of the Interior on the project within the meaning of Section 2(b) of this Act.

cc: Robert Stewart, USFWS Region 6, Regional Environmental Officer

U.S.



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FISH AND WILDLIFE SERVICE
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502-6172



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MEMORANDUM

To: USFWS Region 6, Regional Environmental Officer

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cc: Bridget Fahey, USFWS Region 6, Chief of Endangered Species



U.S. Fish and Wildlife Service National Wetlands Inventory

Mar 28, 2014



- Wetlands**
- Freshwater Emergent
 - Freshwater Forest/Shrub
 - Estuarine and Marine Deepwater
 - Estuarine and Marine
 - Freshwater Pond
 - Lake
 - Riverine
 - Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All data is based on information stated in specifications with the project contract found on the Wetlands Mapper web site.

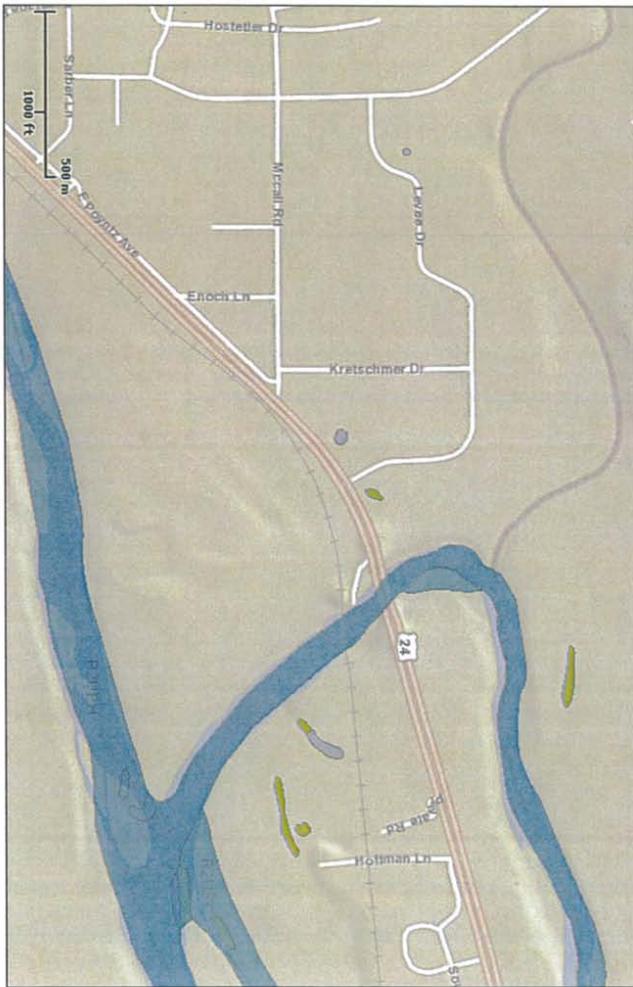
User Remarks:

Figure 3: NWI Map of Proposed Borrow Area



U.S. Fish and Wildlife Service National Wetlands Inventory

Mar 28, 2014

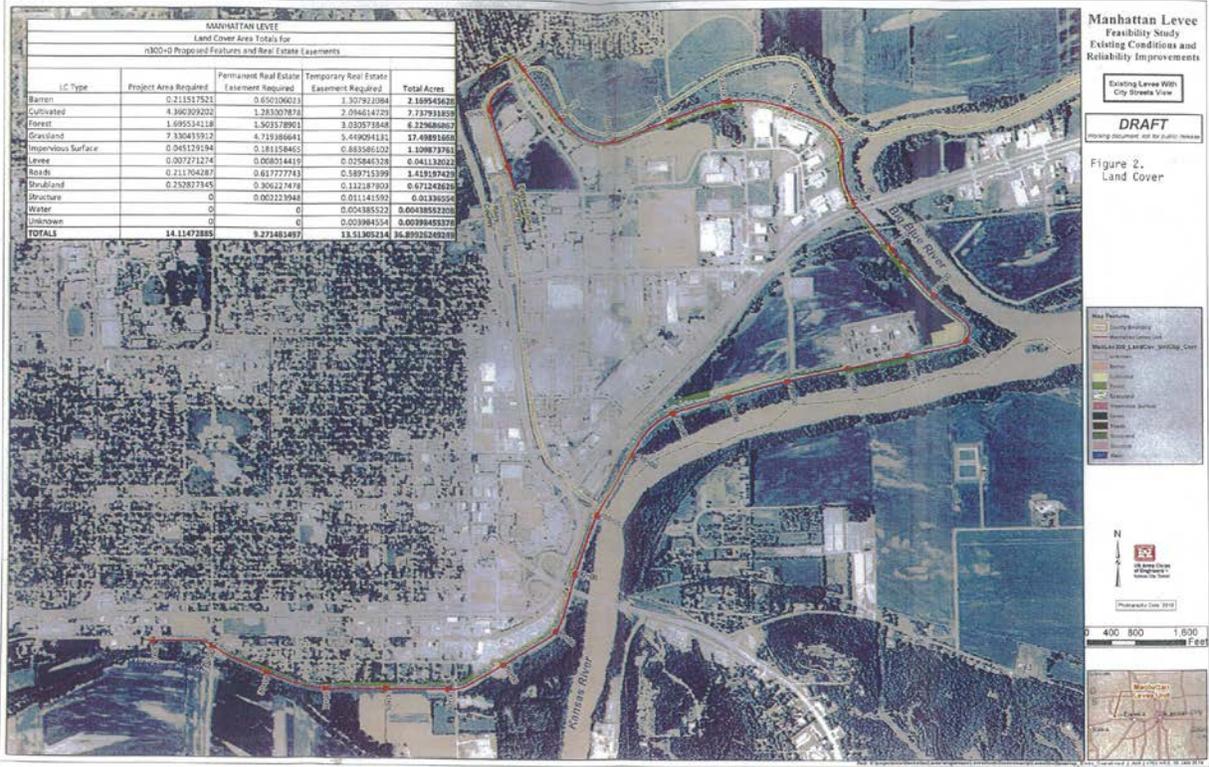


- Wetlands**
- Freshwater Emergent
 - Freshwater Forested/Shrub
 - Estuarine and Marine Deepwater
 - Estuarine and Marine
 - Freshwater Pond
 - Lake
 - Riverine
 - Other

User Remarks:

Figure 6. NWI Map for Northeast Portion of Project Area

This map is for general reference only. The U.S. Fish and Wildlife Service is not responsible for the accuracy or completeness of the data shown on this map. For more information, visit the Wetlands Mapper web site.



APPENDIX III - CULTURAL RESOURCES



DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
600 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-2896

May 22, 2014

REPLY TO
ATTENTION OF

Environmental Resources Section
Planning Branch

Ms. Jennie A. Chinn
Executive Director, State Historic Preservation Officer
Kansas State Historical Society
6425 S. W. 6th Avenue
Topeka, Kansas 66615-1099

Dear Ms. Chinn:

The U.S. Army Corps of Engineers, Kansas City District (Corps) and the City of Manhattan are partnering on a Section 216 flood risk management project for the levee unit that protects Manhattan. The existing levee unit withstood the flood of 1993, but some elements of the system were seriously challenged as the flood crested. This event raised a concern that the levee may provide less than the authorized benefits for which it was designed. The recommended flood protection would raise the height of the levee within the existing foot print and add a small additional segment. This letter initiates Section 106 coordination for the project.

The city of Manhattan is situated at the confluence of the Big Blue River and the Kansas River. The Big Blue River is on the east side of the downtown area and confluences with the Kansas River on the southeast side of the city. The Manhattan levee unit is located west and north of the confluence of the Big Blue River and the Kansas Rivers, and is approximately 5.48 miles in length (see attachment). The typical levee profile consists of a 10-foot crown width with a typical three horizontal to one vertical embankment slope.

The recommended project plan would raise the existing levee to a 300 year flood event level of protection. The plan would also require an approximate 500 foot long levee segment addition to be located along Casement Road at the upper end of the Big Blue River Segment. Other features would include a new sandbag gap; five gatewells to be placed along the levee, a landside toe embankment to be placed along a segment of the Big Blue River levee segment; five relief wells; and two under seepage berms. The proposed work would require borrow material. The proposed borrow area would be up to 20 acres in size and would be excavated to approximately six feet in depth (see attachment).

A background cultural resource literature review was conducted of the project vicinity. Documents reviewed included the National Register of Historic Places (NRHP); the Kansas State Historical Society's Archeological Inventory (on-line); and various cultural resource reports including the Manhattan Archeological Survey Phases I and II (Ritterbush 2009). In addition, historic Kansas River channel maps (Dort 1976) were consulted to determine archeological potential for the proposed borrow area.

The background review found that the majority of the Manhattan levee project area has not been previously surveyed for cultural resource sites (see attachments). One archeological survey for a bridge replacement project on K-18/K-177 at the Kansas River bisects the project area. This survey project resulted in the identification and NRHP eligibility testing of six sites, 14RY380- 384 and 365. All six sites were the demolished ruins of historic structures and all were determined not eligible for the NRHP. Two prehistoric archeological sites, 14PO24 and 14PO25, are recorded 0.6 and 0.8 miles east of the northern half of the levee area. Site 14PO24 is an Historic Kansa Indian village site and 14PO25 is an earlier prehistoric village site. Both sites are considered eligible for listing in the NRHP. The NRHP-eligible Bluemont Mound Site (14RY32) and Bluemont Youth Cabin, a WPA structure are both mapped near the north end of the levee. Site 14RY38, the Macy Site, a NRHP eligible multi-component site is mapped east of the Kansas River and approximately a quarter mile southeast of the levee project. No sites are mapped within the vicinity of the proposed borrow area. However, three mound sites (14RY37, 84, and 307) are mapped on the bluff on the east side of the Kansas River. None of the above mentioned sites would be impacted by the proposed construction or borrowing activity.

The majority of the project area is along the existing levee which has been severely disturbed by construction of the levee. The two areas of project disturbance outside of the existing levee footprint are the proposed 500 foot levee segment and the borrow area. Neither has been professionally surveyed for archeological sites. An examination of the proposed borrow area with historic Kansas River channel maps found that the proposed borrow location is situated immediately north of the 1909-1913 Kansas River channel and entirely within an area marked by previous scars (see attachment). The age of the former channels the scars represented is unclear. The borrow areas used for the initial levee construction are located immediately east of the proposed borrow areas.

The proposed borrow area, identified by Ritterbush as the Hunters Island area, was not surveyed during that 2009 investigation, but was given a general archeological evaluation. Ritterbush noted the old meander scars in the area and postulated that given the active nature of the area that surface deposits would likely only be of recent age. She also noted that there could be isolated pockets of deeply buried material especially around former ox bow lakes and edges of the stream valleys. Neither landform is present within the area of the proposed borrow area.

Examination of the proposed levee extension and berm area found that the area is within the residential and commercial Manhattan area and has been disturbed by typical urban development including road construction activity, land clearing, utility installation, and residential development. The disturbance is evident in the attached Google Earth image from 1991. It appears unlikely that any intact unrecorded archeological sites eligible for the NRHP would remain within the project area in the extension area.

In sum, the work on the existing levee alignment and levee extension area would likely have no impact on historic properties because of extensive previous disturbances. As for the proposed borrow area, it is likely that the river channel has crossed the proposed borrow area at some point, but it is unclear when that would have occurred. As such, it is unknown whether NRHP eligible archeological sites could be present in the area.

At this time we are requesting your concurrence and comment on the Corps recommendations below. As the work on the levee alignment and new levee segment and berm is on heavily disturbed areas, project construction would likely have no effect on historic properties. However, because of the uncertainty of the archeological potential of the borrow area, an archeological survey or geoarcheological evaluation of the proposed borrow location appears warranted. As permission to conduct the survey has not been granted and funds for the survey are not yet available at this stage of the study, the survey would be conducted during project design. Also, in the unlikely event that archeological materials are discovered during construction, work in the area of discovery will cease and the discovery investigated by a qualified archeologist. The findings on the discovery would be coordinated with your office and appropriate federally recognized Native American tribes.

Thank you for your consideration in this matter. If you have any questions or have need of further information please contact me at timothy.m.meade@usace.army.mil or at (816) 389-3138.

Sincerely,



Timothy Meade
District Archeologist

Enclosures

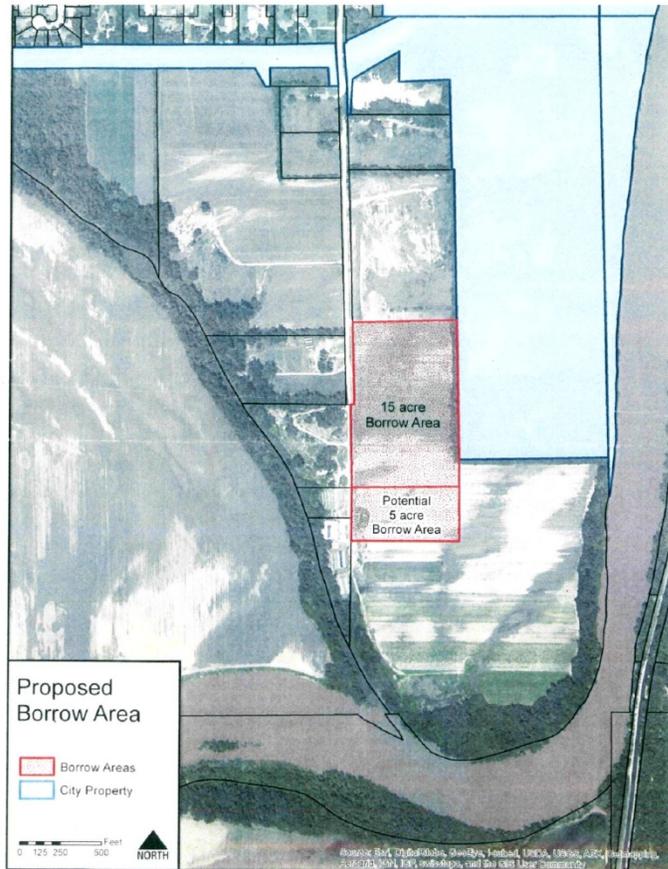


Figure 1. Manhattan levee study area.



Figure. Proposed levee extension and berm area on 1991 Google Earth image depicting disturbances within the project area.

Figure 2. Proposed borrow area.



6425 SW 6th Avenue
Topeka, KS 66615



phone: 785-272-8681
fax: 785-272-8682
cultural_resources@kshs.org

Kansas Historical Society

Sam Brownback, Governor
Jennie Chinn, Executive Director

KSR&C No. 14-05-235

May 29, 2014

Timothy Meade
District Archeologist/Tribal Liaison
U.S. Army Corps of Engineers
Kansas City District
600 Federal Building
601 E. 12th Street
Kansas City, Missouri 64106-2896

Via E-Mail

RE: Flood Control Levee Improvements
City of Manhattan
Pottawatomie and Riley Counties

Dear Mr. Meade:

In accordance with 36 CFR 800, the Kansas State Historic Preservation Office has reviewed your letter and attached documentation (dated May 22, 2014) describing plans for improvements to the City of Manhattan's flood control levee system. Given the level of existing disturbance associated with the levee system, our office agrees that archeological survey is not warranted for the actual levee improvements, including the proposed extension along Casement Road. The proposed borrow locality in the Hunter's Island area along the Kansas River at the mouth of Wildcat Creek is, as you noted, a different matter. The area's archeological potential, though not high, cannot be entirely discounted. Our office therefore concurs that archeological survey and/or geoarcheological investigation of the proposed borrow area is an appropriate course of action.

Any changes to the project, which 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 at 785-272-8681 (ext. 214).

Sincerely,

Jennie Chinn, Executive Director and
State Historic Preservation Officer

Patrick Zollner
Deputy SHPO