

**MAY BRANCH, FORT SMITH, ARKANSAS  
FEASIBILITY STUDY**

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# **MAY BRANCH, FORT SMITH, ARKANSAS FEASIBILITY STUDY**

## **STUDY INFORMATION**

### **STUDY AUTHORITY**

By letter dated October 12, 1992, the City of Fort Smith requested a General Investigation by the Little Rock District Corps of Engineers to study the flood problems along May Branch. A copy of the request is included in Appendix A, Section A.

The May Branch, Fort Smith, Arkansas, Feasibility Study was authorized by a March 11, 1982, resolution of the Committee on Public Works and Transportation of the United States House of Representatives. The resolution, which was sponsored by Arkansas Congressman John Paul Hammerschmidt, reads as follows:

*RESOLVED BY THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors, established by Section 3 of the River and Harbor Act approved June 13, 1902, is hereby requested to review in cooperation with the States of Arkansas and Oklahoma, political subdivisions, agencies and instrumentalities thereof, and appropriated Federal agencies as a shared effort, the report of the Chief of Engineers on the Arkansas River and tributaries, published as House Document No. 308, seventy-fourth Congress, and other pertinent reports, with a view to determining whether any modification of the recommendations contained therein are advisable at this time, with particular reference to developing an implementable plan for storage, conservation, treatment, and conveyance of water in the Arkansas River and tributaries in Arkansas and Oklahoma, for municipal, industrial, and agricultural uses and other purposes. This study should include an assessment of the usability of the water for various uses.*

### **PURPOSE AND SCOPE**

The purpose of the feasibility study is to identify, evaluate and recommend to decision makers an appropriate, coordinated, implementable solution to the identified water resources problems and opportunities along May Branch in Fort Smith, Arkansas. The feasibility report presents the results of the reconnaissance and the feasibility study phases.

## **PROJECT AREA DESCRIPTION**

### **Project Location**

May Branch is a small tributary to the Arkansas River which lies entirely within the city limits of Fort Smith, Sebastian County, Arkansas, in northwest Arkansas along the Oklahoma border. May Branch originates in the south central section of the city just south of Rogers Avenue (Arkansas Highway 22) in Creekmore Park and flows to the north and northwest to the Arkansas River. All of the original channel of May Branch from Park Avenue to the outfall at the Fort Smith Levee/Floodwall's P Street Pump Station located at North P Street and Clayton Expressway was covered and replaced by a 2.7 mile-long underground culvert system in 1910. Moreover, the channel upstream from Park Avenue has been altered by channel relocation due to railroad construction and subsequent channelization related to drainage and flood control. There is nothing left along the original course of May Branch which could be construed as "natural." The vicinity map and study area is shown on Plate 1.

The project corridor is a highly urbanized environment. In the vicinity of Park Avenue, the underground May Branch system known as the P Street Storm Sewer passes through residential neighborhoods. As one goes further downstream, the project area enters an area consisting of both residential and small business properties. At approximately Midland Avenue, there are small business and light industrial properties. The corridor crosses three mainline railroad tracks into an industrial area where the City's sewage treatment facility is located. The storm sewer ends at the P Street pumping station after passing through a weir under the P Street Bridge. The weir allows overflows to be stored in this area until the water can be emptied through the levee into the open drainage channel outlet, which goes under Clayton Expressway west into the Arkansas River.

### **Climate**

The Fort Smith climate is humid with variable temperatures that average 61<sup>0</sup>F annually. Summers are moderately long and hot with maximum temperatures occasionally exceeding 100<sup>0</sup>F. Winters are short and moderately cold. The average annual precipitation for the area is approximately 48 inches. Precipitation is distributed throughout the year, with heavier amounts occurring in the spring and lesser amounts occurring in the summer. However, high intensity rainfall causing flash floods may be experienced in any month of the year. Snowfall is light with the area receiving about 5 inches annually.

## **HISTORY OF THE STUDY**

The Definite Project Report, dated October 1945, for the Fort Smith Levee, Floodwall and Pump Stations, noted that May Branch would flood during high intensity floods upstream of the railroad embankments and that development could aggravate the flooding. Additional studies followed. In May 1992 a Section 205, Small Flood Control Project Reconnaissance Study was completed. The City of Fort Smith, Arkansas, the non-Federal sponsor, requested that the feasibility be a general investigation study. The Section 205

report was incorporated into the Arkansas River Wetlands and Flood Control Reconnaissance Report as the flood control portion of the report. The May Branch portion of the reconnaissance report was certified in August 1993. The report recommended Federal participation in a cost shared feasibility study with the City of Fort Smith, Arkansas. At that time, the city was not prepared to enter into a Feasibility Cost Sharing Agreement (FCSA).

In August 1995, FCSA negotiations resumed. However, on April 21, 1996, a devastating tornado struck Fort Smith and the lower end of May Branch. The city committed its resources to tornado repair and not until November 13, 1998, was the FCSA signed to start the feasibility study.

### **NON-FEDERAL SPONSOR AND AGENCY COORDINATION**

The Non-Federal sponsor is the City of Fort Smith, Arkansas. This report was prepared in coordination with the following agencies and the railroads.

Natural Resources Conservation Service. Coordination with this agency was conducted by telephone on November 23, 1999. The agency has provided oral information relevant to the preparation of the Environmental Assessment (EA), i.e., the project will have no impacts on prime farmland. The agency's regulations specify that any prime farmland, which a state or local government has designated through zoning or planning for commercial, industrial, or residential use, i.e., "committed to urban development," is outside the agency's definition of prime farmland (Federal Register, Volume 49 No. 130, p. 27717).

Arkansas Natural Heritage Commission. Coordination with this agency was conducted by letter dated July 28, 1999. Appendix A, Section A, provides a letter from ANHC, dated August 12, 1999, in which the agency indicates the absence of element occurrences within the project area. Examination of the ANHC Annual Report for 2004 has shown that there have been no additional plant and animal species added to the list for tracking in Sebastian County since 1999.

State Historic Preservation Office. Coordination with this agency was conducted by letter dated July 28, 1999. The agency provided confirmation that no known cultural resources would be impacted by the project.

US Fish and Wildlife Service. The Fish and Wildlife Coordination Report is included in Appendix A, Section D. The report indicates minimal impacts on wildlife and other biota from the construction of the proposed project and that reconstructing of the open channel will provide minimal aquatic habitat improvement. Appendix A, Section A, provides a letter from US Fish and Wildlife Service (USFWS), dated August 3, 1999, in which USFWS indicates there are no federally listed threatened and endangered species having a potential for impacts within the project area. Appendix A, Section A, also includes a 2004 response from USFWS with the same finding.

Arkansas Game and Fish Commission. This agency provided a letter dated February 27, 2006, to assist the US Fish and Wildlife Service in its preparation of the Fish and Wildlife Coordination Act Report. See Appendix A, Section D.

Arkansas Department of Environmental Quality (ADEQ). A manual search of agency records was conducted in 1999 and the information obtained was used in preparation of the environmental assessment. Further coordination was done in the conduct of the Hazardous, Toxic, and Radiological Waste (HTRW) investigations. ADEQ reviewed the HTRW investigations and provided a letter dated June 18, 2004. An analysis of water samples showed that contamination for the proposed route C1/D1 is minimal, and in the June 18, 2004 letter, the ADEQ did not object to the project. See the HTRW attachment to the Engineering Appendix (Appendix C).

Railroads. Arkansas-Missouri, Kansas City Southern, Fort Smith Railroad, and Union Pacific were contacted concerning the channel alignment concerning railroad crossings and right of way. The railroad by letter dated October 10, 2002, stated that its fee-owned acres were available for purchase and that it could offer a Disclaimer for its “easement” only property. See the Engineering Appendix and the Real Estate Supplement for further discussion.

## **PRIOR PROJECTS AND REPORTS**

The following is a partial list of the previous studies, reports and projects in the vicinity of May Branch in the Fort Smith area.

- Arkansas River Wetlands and Flood Control Reconnaissance Report dated October 1992. The flood control portion the report was certified 2 August 1993 with the feasibility to proceed under May Branch, Fort Smith, Arkansas.
- Flood Insurance Study, Fort Smith, Arkansas, dated July 1991.
- Survey Report, Arkansas River in the vicinity of Fort Smith-Van Buren, Arkansas, dated March 1987.
- Detailed Project Report, Mill Creek, Fort Smith, Arkansas, Small Flood Control Project (Section 205), dated June 1985. Construction of this channel and bridge-widening project was completed in 2003.
- Detailed Project Report, Little Massard Creek, Fort Smith, Arkansas. Small Flood Control Project (Section 205) dated June 1983. Operation and maintenance of this channel and bridge-widening project was assumed by the city of Fort Smith in 1984.

- Stage 1, Reconnaissance Report for the Fort Smith-Van Buren General Investigations Study, dated September 1983. Some of the flood problems identified in this study were addressed under the Continuing Authorities Program.
- Engineering Study, Drainage Facilities – “P” Street Combined Sewer. Fort Smith, Arkansas, Mickle Associates, dated August 1970.
- Fort Smith Levee and Floodwall. This Federally constructed local flood protection project consists of an earth-fill levee, concrete floodwall, four drainage structures and two pumping stations (including the P Street station) on the right bank of the Arkansas River at Fort Smith. The project was completed in 1951 and is operated and maintained by the city of Fort Smith.

## **PLANNING PROCESS AND REPORT ORGANIZATION**

The feasibility study process used a systematic approach to the preparation and evaluation of alternative plans to address study area problems and opportunities. This provides a sound and documented basis for decision makers to judge the recommended solutions.

The process involved all of the six functional planning steps:

- (1) Specification of water and related land resources problems and opportunities;
- (2) Inventory, forecast and analysis of water and related land resources conditions within the study area;
- (3) Formulation of alternative plans;
- (4) Evaluation of the effects of the alternative plans;
- (5) Comparison of the alternative plans; and
- (6) Selection of the recommended plan.

The Reconnaissance Report emphasized the identification of the water resource problems and the formulation of alternatives to determine if there was a solution that warranted Federal participation in feasibility studies. The emphasis of this Feasibility Report is on the evaluation of alternatives, assessment of impacts, and selection of a recommended plan. The goal of the feasibility study is to identify the plan that reasonably maximizes net economic benefits and to recommend for construction the plan that best meets the community goals of economic development, protecting and restoring the environmental, the well being of the people, the prevention of loss of life, and the preservation of cultural values.

The following are some of the issues that are addressed in the feasibility study and environmental analysis in consultation with state and Federal resource agencies and the public.

## **PROBLEMS AND OPPORTUNITIES**

### **OVERVIEW**

The problems in the May Branch Basin are:

- 1) Flood damages to industry, businesses and residences, and
- 2) Loss of aquatic habitat.

### **FLOOD DAMAGE REDUCTION**

Typically, for small basins like the May Branch basin, flooding is of a flashy, short duration nature. Runoff from the 5.3-square mile drainage area of May Branch frequently exceeds the capacity of the P Street storm sewer, which is the major drainage outlet for the May Branch basin, and causes an estimated \$1.5 million in average annual flood damages. The estimated value of the 136 structures (\$13.2 million) and their contents in the 500-year floodplain is \$44.2 million. The value of the 106 (127) structures in the 10-year (100-year) floodplain is \$5.4 million (\$9.2 million). Inadequately sized storm sewer inlets cause localized ponding problems. This ponded water remains in the streets until the storm sewer can pass the water. Several major thoroughfares transverse the floodplain including Midland Blvd.(Average Daily Traffic, ADT, in 2000 of 9,700), O Street (ADT-10,300), and Grand Avenue (ADT-17,000) that are subject to flooding by the 100-year event.

On April 24, 2004, a 13-year old boy slipped into one of P Street Storm Sewer's side drains during a heavy rain. He was swept through the dark tunnel for about 1.5 miles until he escaped with minor injuries at the weir at the P Street Bridge. There is an opportunity to open up the channel to allow for rescue of persons falling into the drainage system.

Runoff in excess of the sewer capacity flows overland and along the streets following the general alignment of the P Street Storm Sewer. At the point where the storm sewer intersects with the three main line railroad tracks, the runoff ponds up until it overtops the railroad embankment. The floodwaters then pond behind the Fort Smith Levee until evacuated through the levee outlet into the Arkansas River. Flow at the outlet is normally by gravity flow; however, when the river is high, the pumps are activated.

It has been determined that the runoff from a storm event with a recurrence interval of approximately ten years will exceed the storm sewer capacity. However, there are significant flood damages in the upper three reaches of May Branch with a 5-year recurrence interval. A major flood event occurred in spring 1990. At that time, the Arkansas River experienced high flows and the P Street gravity outlet on May Branch was closed. Pumping and the P Street storm sewer could not handle the flow. The heavy rainfall resulted in flooding that caused major property damage. An estimated \$2.5 million in damages occurred to 26 businesses and 44 residential units. An estimated 180 people reside within the 500-year flood plain. The opportunity exists to improve the social well being of those who live and work in the flood-prone area along May Branch by alleviating the flood damages to the homes, businesses, and infrastructure.

## **ECOSYSTEM RESTORATION**

Tunneling the lower two thirds of the May Branch channel into the P Street storm sewer around 1910 reduced to virtually nonexistent, the aquatic habitat existing along May Branch when it was an open channel. The opportunity exists to reconstruct the May Branch channel, which would restore some minor aquatic habitat.

## **OBJECTIVES, CONSTRAINTS AND CRITERIA**

### **NATIONAL OBJECTIVES**

The Federal objective of water and related resources planning is to contribute to national economic development (NED) consistent with protecting the Nation's environment, in accordance with national environmental statutes and applicable executive orders and law. Planning objectives are more specific in terms of expected or desired outputs. Water resources project plans have the National goal to alleviate problems and take advantage of opportunities to increase the net value of the National output of goods and services, expressed in monetary units that accrue in the planning area and the rest of the Nation. Protection of the Nation's environment is achieved when damage to the environment is eliminated or avoided and important cultural and natural aspects of our nation's heritage are preserved. Further, the objective in National Ecosystem Restoration planning is to increase the net quantity and/or quality of desired ecosystem resources and expressed quantitatively for the planning area and in the rest of the Nation.

### **PLANNING OBJECTIVES AND CONSTRAINTS**

The planning objectives for this study are to develop a flood protection project to alleviate the flooding along May Branch. The National Economic Development plan is to be defined while preserving the environment and promoting the well-being of the people. The project's baseline cost estimate and schedule will be established. Previous studies analysis eliminated several alternative plans. Thus, the focus of this study is to determine the location, length, and width of a channel plan; and determine whether additional pump capacity is justified. The City of Fort Smith chooses not to add ecological restoration or recreation features to the project.

#### **Objectives**

- a. Reduce flood damages in the May Branch Basin over the period of analysis.
- b. Increase aquatic habitat along May Branch.
- c. Reduce flood related transportation interruptions

#### **Constraints**

- a. Maintain the flood protection provided by the Fort Smith Levee and P Street Pump Station.

- b. Avoid potential contamination sites.
- c. Minimize structure and infrastructure relocations
- d. Adhere to the open space criteria for flood reduction measures on lands acquired under Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program.
- e. Limit flood damage reduction solutions with full Federal participation to downstream of the point where the 10 percent discharge is greater than 800 cubic feet per second.
- f. Avoid disturbance to wetlands.
- g. Do not permanently interrupt railroad spur service to the Kansas City Southern track immediately east of the Fort Smith Levee/Floodwall.

## **PUBLIC CONCERNS**

The public is concerned with flooding of buildings and vehicles, traffic interruptions, and safety.

## **CRITERIA**

The work shall include determination of improved conditions; addressing and resolving any problems of induced damages and discharges; determining frequency-discharge relationships for with and without project conditions and stage-discharge relationships for with and without project conditions; preparing construction and operation and maintenance cost estimates for the alternative plans; computing engineering and economic feasibility of each alternative; assessing environmental and social impacts of alternatives and the selected plan, including impacts on biological resources, socioeconomic resources, cultural resources, and recreation; determining and evaluating mitigation measures; providing a real estate supplement and a gross appraisal report; developing land use and flood control economic studies; advising Fort Smith of its responsibilities under the project cooperation agreement, preparation of a floodplain management plan, HTRW (hazardous, toxic, and radioactive waste) investigations, the preliminary development of a financing plan and assessment of financial capability, and preparing the required documentation to present the studies, findings, and recommendations.

## **TECHNICAL CRITERIA**

Comparative studies, field investigations, design, and screening level cost estimates shall be in sufficient detail to substantiate the recommended plan and the baseline estimate.

## **ECONOMIC CRITERIA**

Annual damages were computed for both the without project condition and the with alternative flood reduction plans. The existing condition damages excluded damages to structures removed from the floodplain under the FEMA Hazard Mitigation Grant

Program. Annual benefits were computed and compared with total annual costs to identify an economically feasible plan that would alleviate flooding in the study area.

## **ENVIRONMENTAL CRITERIA**

The Environmental Assessment is to comply with applicable laws, federal statutes, executive orders and memoranda.

## **PLAN FORMULATION**

Plans were formulated to achieve the objectives while avoiding the constraints. The plans were weighed and compared to determine their relative efficiency in providing the desired water management improvement objectives.

## **MANAGEMENT MEASURES**

### **Measures to Address Identified Planning Objectives**

- a. Non-Structural – Relocation of structures out of the flood plain
- b. Structural - Detention ponds, channel reconstruction, place box culverts/covered channel sections or bridges at road and railroad crossings, pump stations, tunnel construction.
- c. No Action

### **No Action Plan**

The No-Action/No Build Alternative maintains existing conditions as the future without project condition. The May Branch basin is considered 100 percent urbanized; thus, there is little opportunity for development and no increases in runoff rates are anticipated. Frequent flooding will continue to cause appreciable damage along May Branch. Conveyance systems in the lower two-thirds of the basin consist of curbs, gutters, and storm sewers that provide very limited aquatic habitat. The P Street storm sewer would serve as the major outlet for the May Branch basin. Street intersections would act as detention basins after curb and drop inlets have reached capacity, and excess runoff would flow between buildings and across low-lying lands along North P Street. Runoff following a storm event having a 10 percent chance of occurring in any given year would exceed the capacity of the storm sewer system.

The Fort Smith Levee/Floodwall with the P Street pump station would protect lower portions of the basin from high stages on the Arkansas River. The North P Street storm sewer terminates at the P Street pump station, which has a design capacity for the five-pump system of 400 cfs. The design of the pump station does not allow for gravity free flow and pump discharge simultaneously. If runoff exceeds the combined capacity of the pumps, the excess would flow into the sump area.

The sump area is located between the pump station and the railroad tracks on 4<sup>th</sup> Street (See Plate 1). The sump area is in proximity to the lower meanders of the original May Branch channel. The storm sewer surfaces in the sump and is connected by an overflow weir approximately 1,000 ft upstream of the pump station. The sump area has a limited capacity to store the May Branch runoff until the Arkansas River recedes or until the pump station can evacuate the ponded waters. The volume of storage in this area is limited in comparison to the potential volume of runoff from the drainage area.

There were two significant changes in the hydrology and hydraulics analysis since the reconnaissance study. First, the feasibility study did a forced flow analysis through the P Street Storm Drain, which increased the previously considered capacity of the drain from a 2-year event to a 10-year event. Second, the feasibility study included a detailed analysis of the coincident flooding between the Arkansas River and May Branch. The reconnaissance phase assumed a conservative estimation that the 50-, 100-, and 500-year storms would occur coincident with a 10-year recurrence Arkansas River flow. The detailed coincident flooding analysis resulted in a 5-foot drop in the computed 100-yr flood elevation in the ponding area between the railroad tracks and the levee. Because of these changes, damages were much lower than previous estimates. The coincident flooding of May Branch and the Arkansas River is discussed in the Hydrology and Hydraulics attachment to the Engineering Appendix.

The future without project condition has 72 homes and 64 businesses and industry valued at \$44.2 million subject to flooding in the 500-year floodplain. (The Economic Appendix has further details on existing condition damages.) To limit flood damages to no more than the estimated existing annual damages of \$1.5 million, Fort Smith would continue to operate and maintain the P Street pump station. It would also rehabilitate and maintain the P Street storm sewer to preserve its capability to contain up to the 10-year flood event. Benefits from all the plans are compared against the future without project condition plan.

## **PRELIMINARY PLANS**

Three plans were investigated during the reconnaissance study: detention ponds, parallel storm sewer, and relief openings through the levee and railroad tracks with a connecting channel. The overwhelming problems identified in the reconnaissance study were the inability of runoff to pass beyond the railroad embankments near 4<sup>th</sup> and P streets and the limited capacity of the 12-foot diameter outlet through the levee. Following is a discussion of the three alternatives developed in the reconnaissance study plus two additional alternatives considered:

(1) Detention basins - This plan consisted of two detention basins. One would be located near the intersection of North 32nd and L Streets (the Tiles drain inlet area) and the other at North 21st and O Streets (Martin Luther King Park). See Plates 2A through 2D for street locations. (The aerial photo is dated January 2000; some of the buildings shown no longer exist.) These basins would provide a total storage of 311 acre-feet. The flood protection offered by these detention basins was found to be negligible. No cost estimate

was developed as further analysis was deemed unwarranted. No other acceptable location for a detention pond was identified that would provide significant flood retention.

(2) Relief openings - This plan consists of the construction of three 6-foot diameter culverts through the three railroad embankments at river mile 0.672 and the placement of an additional gated outlet structure in the levee in the downstream reach. These openings would be connected with a 50-foot bottom width channel. The culverts were designed to alleviate the flooding caused by the runoff in excess of the storm sewer capacity backing into the surrounding area. The levee outlet increases the flow capacity at the levee and reduces ponding landward of the levee. This plan had a first cost of \$2,011,000 (November 1991 price level) and a benefit-to-cost ratio of 16.

The relief openings plan reduced total damages by only 51%, as the upstream three reaches had little to no reduction in damages. The existing condition damages were estimated to be \$5,900,000 and the damages reduced were estimated to be \$3,000,000 based on the hydraulic analysis used in the reconnaissance phase. Current analysis resulted in costs exceeding the benefits. This eliminated the alternative for further consideration as a stand-alone plan. However, this plan's features were used as a basis for developing the channel plans formulated during the feasibility study.

(3) Parallel storm sewer - The 1970 Mickle Associates study investigated parallel storm sewers starting at North 18 and O Streets and extending to the P Street pump station. They investigated a double 11-foot by 12-foot 6-inch reinforced concrete box with a capacity of 3,900 cubic feet per second at a cost of \$4,025,000 (1970 price level). A parallel storm sewer would have the same excavation costs, footprint, and relocation considerations as an open channel but it would also require structural concrete to form the covered channel. This plan would be more costly than an open riprapped channel and with no additional flood damage reduction benefits. Thus, no cost estimate was made and the plan was not investigated further.

(4) Nonstructural plans – Conditions changed from the reconnaissance to the feasibility phase. In 1996, a tornado destroyed businesses that were not reconstructed in the downstream portion of May Branch. As a result of the disaster caused by the tornado, FEMA provided Flood Hazard Reduction Grants to remove properties voluntarily out of the May Branch 100-yr flood plain. Nineteen property owners accepted offers by the city of Fort Smith to relocate. Thus, the acceptable nonstructural relocation measure has already been accomplished. Note that the relocated structures were excluded from the damageable property inventory. This lowered the existing condition damages from those calculated during the reconnaissance study.

Because of insufficient flood warning times, effective flood-proofing measures could not be implemented before flood damages would occur. Typically, for small basins like the May Branch basin, flooding is flashy and of short duration. Because of the short time interval before floodwaters peak, sufficiently advanced flood warnings could not be provided. Sufficient warning time is needed to implement effective measures to reduce flood damages. In addition, traffic at risk could originate outside the basin and not be

aware of any warning. The only practical warning would be signage at each road crossing warning of the danger when the crossing is underwater.

(5) Additional Pump Capacity – The changed hydrology and hydraulics analysis for the feasibility phase negated the need for additional pump capacity. See the Hydrology and Hydraulics attachment to the Engineering Appendix for further details.

## **CHANNEL ALIGNMENT ALTERNATIVES**

Following the screening of the five preliminary plans, the flood damage reduction measure to be further developed and analyzed was reconstruction of the May Branch channel with openings through the railroad tracks and levee and street crossings provided.

Channelization was considered upstream to Park Street where the May Branch channel flows into the P Street storm drain. Six downstream alignments were developed with another two upstream alignment choices (route cost), D1 (\$2,520,000) and D2 (\$2,680,000). See Plate 1 for these alignments. These alignments were all assumed to have the same flow capacity characteristics and a channel bottom width of 35 feet.

Channel quantities, land acres, (to include mitigation acres) and utilities, roads, bridges, culverts, and building relocations were cost estimated. Costs were estimated for those quantities that would be different for each alignment, i.e., quantities and costs that would be the same for each route were not estimated. Six alignments (route cost) were developed, A1 (\$10,990,000), A2 (\$10,950,000), B1 (\$11,430,000), B2 (\$10,290,000), C1 (\$10,090,000), and C2 (\$14,220,000). Their descriptions follow.

Three major construction alternatives (Alternative A, B, and C) with two variations for each were developed for the construction corridor, which extends from the Arkansas River to Park Street. See Plate 1. The limit of Federal interest is just upstream of Grand Avenue where the 10-year flow equals 800 cfs. Each of these three alternatives would extend eastward from the east bank of the Arkansas River, crossing Clayton Expressway and the Fort Smith levee generally along P Street until turning south at O Street to Grand Avenue, the limit of Federal interest to end at Park Street.

At a point near 17th and Kelly Highway, Alternative A diverges into two separate alignments, A1 and A2. Alternative B diverges into B1 and B2 at a point near the southeast corner of the sewage treatment facility. The A1 and B1 alternative paths merge near 17th Street and Kelley Highway and continue east to the vicinity of North 6th and Division streets, where the combined A1/B1 alignment merges with the combined A2/B2 alignment. Following their merger, the alignment of combined A1/B1 and A2/B2 continues east to the vicinity of 9<sup>th</sup> and North P Streets.

Alternative C2 follows a path from the Arkansas River to the vicinity of 9th and North P Street, where it too follows the same alignment as A1/B1 and A2/B2. Alternative C1 splits from C2 east of the first railroad spur going northeast to tie into A2/B2 alignment. The common alignment continues east from near 9th and North P Street to the vicinity of Greenwood and Short P Streets, where the D1 and D2 alternative alignments diverge. The D1 and D2 alternative alignments merge at 31st and M Streets, and from that point, each of

the three major alternatives follows a common route south to Park Avenue. The D1 alternative places the alignment on the north side of the Arkhola facility, while the D2 alternative follows a course on the south side of the Arkhola facility. See Plate 1.

**Alternative A1/A2.** Alternative A is the northernmost alternative. This alternative extends from the Arkansas River to Clayton Expressway and thence east to a location just to the southwest of Kelly Highway. Alternative alignments referred to as A1 and A2 diverge at this location. From the point located southwest of Kelly Highway, A1 follows an alignment on the north side of a feed processing plant and continues to the east to 7th Street. Alternative A2 follows an alignment on the south side of the feed processing plant, crosses Ballman Road at a location just north of North P Street, and continues east to 7th Street, where the alternatives again coincide. The combined A1/A2 alignment roughly parallels North P Street and follows a path to 13th Street, where it continues to the east along the north side of Martin Luther King Park.

Just east of Greenwood Road, Alternative A diverges into the D1 and D2 alternative alignments. The D1 alternative follows the existing May Branch channel alignment, which crosses May Avenue and continues a path along the north side of the Arkhola plant, where it turns south, crosses North O Street, and continues a southeasterly path to approximately 31st and North M Streets. The D2 alternative follows an alignment on the south side of the Arkhola plant, diverging from D1 at a location between Greenwood Avenue and May Street and merging with D1 at a location near 31st and North M Streets. From 31st and North M Streets, all alternatives follow the existing storm sewer alignment to Park Avenue.

**Alternative B1/B2.** Alternative B is a construction alternative that occupies a middle position, flanked on the north by Alternative A and on the south by Alternative C. Alternative B closely follows much of the existing alignment of the May Branch storm sewer system. Alternative B crosses Clayton Expressway at a point just south of the sewage treatment plant and follows North P Street to the east. Near the southeast corner of the treatment plant, Alternative B1 veers to the north. Just short of Kelly Highway, it turns back to the south toward the 7th Street crossing. Alternative alignment B2 roughly parallels North P Street to 7th Street, where the B1 and B2 alternatives converge. The combined B1/B2 alternative then parallels North P Street to 13th Street, where it continues to the east along the north side of Martin Luther King Park. The combined B1/B2 alternative alignment continues east to Greenwood Avenue, where it diverges into the D1 and D2 alternatives. The D1 and D2 alternatives merge at the vicinity of 31st and North M Streets, and from that location, the B alternative continues to Park Avenue.

**Alternative C1/C2.** Alternative C2 is the southernmost of the three construction alternatives. This alternative crosses Clayton Expressway and Ballman Road through the railroad yards on an alignment to the south of Alternatives A and B. From a location at approximately 7th and North P Streets, Alternative C2 follows an identical route to Alternatives A and B. Alternative C1 splits from C2 east of the first railroad spur going northeast to tie into A2/B2 alignment just upstream of the overflow weir at P Street.

**Alternative D1/D2.** Alternative D consists of two alternative alignments, D1 and D2. The D Alternative is located just east of Greenwood Road, where Alternative A diverges into the D1 and D2 alternative alignments. The D1 alternative follows the existing May Branch channel alignment, which crosses May Avenue and continues a path along the north side of the Arkhola facility, where D1 turns south, crosses North O Street, and continues a southeasterly path to the vicinity of North 31<sup>st</sup> and M Streets. The D2 Alternative follows an alignment on the south side of the Arkhola plant, diverging from D1 at a location between Greenwood Avenue and May Street and merging with D1 at a location near North 31<sup>st</sup> and M Streets. See Plate 1.

### **Comparison of Alternatives**

Each of the 12 alignment alternatives will require business and residence relocations, as follows:

- A alternatives will require 3 to 8 business and 9 residence relocations.
- B Alternatives will require 3 to 9 business and 9 residence relocations.
- C Alternatives will require 2 to 8 business and 4 to 9 residence relocations.

Each of these three alternatives would be combined with the D Alternatives to form the 12 alignment alternatives. See Table 9, Structures Potentially Affected by the Project.

A total of approximately 6 acres of wetlands were found within the overall project area; Alternative A provides the greatest wetland impacts and Alternative C provides the least wetland impacts with no acres impacted. The presence of hazardous and toxic substance sites has been identified within each of the alternative routes.

- Impacts to fish and wildlife resources would be minimal.
- Project implementation would eliminate recurrent flooding from the project area.
- With the elimination of the continued potential for flood damage, redevelopment of properties within the project area should occur.

### **Environmental Quality (EQ)**

The environmental quality account is another means of evaluating the alternatives to assist in making a plan recommendation. The EQ account is intended to display the long-term effects that the alternative plans may have on significant environmental resources. The Water Resources Council defines significant environmental resources as those components of the ecological, cultural and aesthetic environments, which, if affected by the alternative plans, could have a material bearing on the decision-making process. A comparison of the effects that the proposed plans may have on the EQ resources is shown on Table 1. The Environmental Quality comparisons were done for the alternative route plans of A, B, C, and D. The subsequently formulated plans were an optimization to judge the plan's effectiveness and efficiency.

## **Other Social Effects (OSE)**

The other social effects (OSE) account typically includes long-term community impacts in the areas of public facilities and services, recreational opportunities, transportation and traffic, man-made, and natural resources. Plans A, B, C, and D, would have very similar social effects over the no action plan. The reduced flooding would improve public health and safety. People could more easily escape from the floodwaters. Threat of flooding the sewage treatment plant is reduced. The project corridor would increase open space. The major streets and railroads would not be flooded as frequently reducing traffic interruption. Not every street would continue across the channel; thus increasing distance traveled slightly. These plans would increase aquatic habitat with the reconstruction of an open channel.

## **Formulation Criteria**

- (1) Completeness – Alignment plans A, B, and C would equally account for all necessary implementation actions.
- (2) Effectiveness – Alignment plans A, B, and C would equally alleviate the flooding and environmental restoration problems.
- (3) Efficiency – The alignment plan C1/D1 is the most cost effective.
- (4) Acceptability – Alignment C1/D1 is also the most workable for the city of Fort Smith as it has the fewest adverse environmental effects, the fewest property relocations, and costs the least.

**TABLE 1, ENVIRONMENTAL COMPARISONS OF ALTERNATIVES**

<b>Resource Area</b>	<b>No Build Alternative</b>	<b>A Alternatives</b>	<b>B Alternatives</b>	<b>C Alternatives</b>	<b>D Alternatives</b>
Land Use	No impacts	Greatest impacts to wetlands	Minor impacts to wetlands	No impacts to wetlands	No impacts to wetlands
Water Resources	No Impacts	Temporary increase in turbidity due to construction			
Biological Resources	No impacts	Minor vegetation cover losses			
Hazardous Toxic and Radioactive Waste (HTRW)	No impacts	Potential for encountering HTRW substances during construction	Potential for encountering HTRW substances during construction	Potential for encountering HTRW substances during construction	Low potential for encountering HTRW substances during construction
Air Quality	No impacts	Construction related increase in dust and emissions from vehicles	Construction related increase in dust and emissions from vehicles	Construction related increase in dust and emissions from vehicles	Construction related increase in dust and emissions from vehicles
Noise	No impacts	Construction related increase in noise			
Cultural Resources	No impacts	No impacts	No impacts	No impacts	No impacts
Socioeconomic	No impacts	Construction related temporary benefit to local community, long-term beneficial impact from reduced flooding, and minor potential for additional development.	Construction related temporary benefit to local community, long-term beneficial impact from reduced flooding, and minor potential for additional development.	Construction related temporary benefit to local community, long-term beneficial impact from reduced flooding, and minor potential for additional development.	Construction related temporary benefit to local community, long-term beneficial impact from reduced flooding, and minor potential for additional development.
Recreation	No impacts	No impacts	No impacts	No impacts	No impacts
Aesthetics	No impacts	Construction related short-term adverse impacts to visual aesthetics	Construction related short-term adverse impacts to visual aesthetics	Construction related short-term adverse impacts to visual aesthetics	Construction related short-term adverse impacts to visual aesthetics

## **Alignment Tradeoffs**

The plan alignments have few environmental impacts with most being either minor or temporary over the no build alternative. The NED objective of reducing flood damages is met with the reestablishment of a channel that also would provide some minor increase in environmental quality. Alignment C1 at the lowest differential cost of \$10,090,000 and alignment D1 at a lowest differential cost of \$2,520,000 were combined to make the chosen alignment. Route C1/D1 had the lowest cost, the least number of relocations, and the fewest environmental impacts to make it the chosen route.

## **OPTIMIZATION AND INCREMENTAL ANALYSIS**

To optimize the alternatives for the C1/D1 alignment, three channel plans were formulated; the 10-yr, 50-yr, and 100-yr plan such that generally the start of damage flooding would not occur until the named event was surpassed. All three of the plans had a gated structure at the levee with 3-10x10-foot culverts and extended upstream to Grand Avenue with a channel bottom width of 4 feet at the upstream limit. To accommodate the side drain inflow, the channel bottom elevation maintained the P Street Storm culvert elevations for all three of the plans. At Grand Avenue, the channel is about 9-feet deep; at O Street, it is 14 feet deep; at 6<sup>th</sup> Street, it is approximately 16 feet deep; and at the levee, it is around 17 feet deep.

Each plan included 4 railroad crossings over a covered channel section, 3 road bridges, and 10 sections of covered channel at street crossings. The mainline railroad track crossings over covered channel sections for the three plans were: 6-10x10- foot culvert for the 10-yr plan with the maximum channel width at 20 feet, 8-10x10-foot culvert for the 50-yr plan with a maximum channel bottom size of 30 feet, and 9-10x10 - foot culvert for the 100-year (except at the culverts, the 100-yr plan's bottom widths were the same size as for the 50-yr plan). The respective project costs were \$21,100,000, \$23,096,000 and \$23,957,000, excluding land and escalation costs at a February 2003 price level. None of these plans was economically justified.

Another four plans were formulated: C-10, C-50, C-100, and C-200 to maintain generally the 10-, 50-, 100-, and 200-year flood within channel. (Plan C-100 is shown in Plates 2A-2D.) However, these plans incorporate the flow capacity of the existing P Street Storm Drain from short L Street to the P Street pump station, Reaches 1- 3. The upstream limit of the reaches is shown in Table 3. The city will continue to operate, maintain, repair, replace, and rehabilitate the P Street Storm Drain except in Reach 4 where the drain will be replaced with open channel. This is in contrast to the previous plans that only incorporated a length of the drain from short L to 13th Streets as a collector drain and maintained the segment from the P Street overflow weir to the P Street Pump Station for use when the gated structure was closed.

This group of four plans has a culvert through the levee and the first railroad spur sized at 2-10x10-foot boxes. By maintaining a flow through P street storm drain, the culverts through the railroad are sized as 3-, 4-, 5-, & 6-10x10-foot boxes respectively for the plans

C-10, C-50, C-100 and C-200 and reduce flood heights similarly to the first group of three plans. The maximum bottom widths for the four plans are 12, 24, 24, and 26 feet respectively for the 10-, 50-, 100-, and 200-yr plans along the C1/D1 alignment. The channel depths as used for the initial three plans are maintained. Channel crossings are limited to increase channel efficiency and reduce costs. For the four plans, bridges are planned at Clayton Expressway, 6<sup>th</sup> Street, and the Arkhola plant.

The channel is concrete lined with vertical sides for 405 feet between the Arkhola plant and the hill behind in Reach Three. In the upstream most 140 feet of Reach Three and for another 1,060 feet into Reach Four, the channel is concrete lined with 2H:1V sides slopes to avoid large structure relocations. The remaining channel side slopes are 3H:1V with a 2-foot thickness of riprap of varying heights. The slope above the riprap is turfed. The five railroad crossings would go over covered channel sections, as would the four road crossings at Midland Boulevard, Greenwood Avenue, N. O Street, and Grand Ave.

See Table 2 for the economic comparison of the four plans. During the analysis of these plans, it was noted that in Reach Three the channel bank would act as a levee and offer further flood reduction benefits, which were then calculated. This consideration resulted in no damages for the 500-yr event in Reaches Three and Four for all of the plans. The channel is not considered oversized for the following reasons.

Firstly, any significant decrease in channel bottom width would result in out of channel flood flows. In Reach Four, four residences flooded with damages starting at the 25-year flood with plan C-10 with minimal average annual damages (less than \$100 that were rounded to zero). In Reach Three, there are 16 structures, commercial and residential of which five would be flooded by the 25-year event with plan C-10 if not for Reach Three's high bank protection.

Secondly, narrowing the channel bottom in reaches Three and Four would not reduce construction costs significantly, as most of the cost is derived from the channel's depth and side slopes. Because Reaches Three and Four have concrete lined channel sides, the side slope costs are even greater. In addition, the concrete lining limits the flexibility for modification at a reasonable cost if flood flows were found to be higher than currently calculated.

### **Trade-off Analysis**

The four plans, C-10, C-50, C-100, and C-200, are very similar in that the environmental impact is minor and temporary compared to the no action alternative. The channel reestablishment provides a minor increase in environmental quality for its 2.3-mile length. The number of structure relocations is the same for all of the plans. Plan C-10 provides for the greatest excess benefits over cost. Plan C-100 has a greater reduction in flood damages over Plan C-10. Plan C-100 maximizes the number of structures removed out of the 100-year floodplain, 127 structures are removed versus only 87 structures for Plan C-10. Plans C-100 and C-200 both maximize the reduction of non-Federal eligibility

requirements for the National Flood Insurance Program and disaster relief included in the emergency costs. The cost of Plan C-100 would be less than that of Plan C-200. Because Plan C-100 has no greater benefits than Plan C-10 for Reaches Three and Four, another plan was formulated. For Reaches One and Two, Plan C-100 features would be combined with the features of Plan C-10 for Reaches Three and Four. This plan, C-100/C-10, has the same benefits as Plan C-100 but at a lower cost.

See Table 3 for an incremental analysis of the benefits versus costs by reach for the Combination Plan C-100/C-10. The three upstream reaches are economically justified compared to their costs. Reach One, which includes the gated structure through the Fort Smith Levee to evacuate the flood flow to the Arkansas River and the openings through the railroad tracks to pass the upstream flood flows into the sump area, is not incrementally justified based on the benefits for properties in the reach. The features in this reach are nearly half the project cost at \$10.4 million. However, the plan features in Reach One are necessary to provide the flood reduction benefits for the upper reaches. The gated structure allows for gravity flow out of the sump area and the gates can be shut to preserve the flood protection provided by the Fort Smith Levee.

If there was no additional opening through the levee, floodwaters would quickly pond up until they backed up and over the mainline railroad tracks, threatening industry and the sewage treatment plant not currently in the 500-year floodplain. The 500-year floodplain is shown on Plates 3A-3D for existing conditions and Plans C-10 and C-100/C-10. In addition, as Reach One has approximately \$1,000,000 more in single event damages for the 500-year event than either Reach Two or Three, its average annual damages would be greatly increased with induced flooding from upstream channelization. The benefits from the channel work in Reach Two would be reduced. If Reach One and Two were combined into one reach, that reach would not be economically justified. If the combined reach were not constructed, the work for Reach Three would be ineffective. Thus, the features of Reach One makes the C-10, C-50, C-100, and C-200 plans complete and effective while preserving the flood protection provided by the Fort Smith Levee.

**TABLE 2, NATIONAL ECONOMIC DEVELOPMENT ACCOUNT**

<b>Plan Comparisons</b>				
	Plan C-10, NED	Plan C-50	Plan C-100	Plan C-200
Interest Rate, %	5.125	5.125	5.125	5.125
Construction Period, years	3.4	3.8	3.8	3.9
Period of Economic Analysis, years	50	50	50	50
<b>Annualized Benefits:</b>				
Flood damage	\$ 1,152,900	\$ 1,161,300	\$ 1,164,200	\$ 1,164,300
Emergency, Non Phys,& Utility	222,200	228,100	229,500	229,500
Auto damages	49,500	50,000	50,400	50,500
Flood Insurance	8,700	12,700	12,900	12,900
P St Sewer repair savings	11,100	11,100	11,100	11,100
Total Annualized Benefits	\$1,444,400	\$1,463,400	\$1,468,100	\$1,468,300
<b>Construction Costs:</b>				
Project Construction Cost	\$ 19,725,800	\$21,058,400	\$21,482,600	\$21,963,900
Interest During Construction	1,730,200	2,084,300	2,126,300	2,236,300
Total Investment Costs	\$ 21,456,000	\$23,142,700	\$23,608,900	\$24,200,200
<b>Annualized Costs:</b>				
Interest	\$ 1,099,500	\$ 1,186,100	\$ 1,210,000	\$ 1,240,300
Amortization	98,500	106,200	108,300	111,000
OMRR&R	47,000	55,500	56,600	56,800
Total Annualized Costs	\$ 1,245,100	\$ 1,347,800	\$ 1,374,900	\$ 1,408,100
Excess Benefits over Cost	\$199,400	\$115,600	\$93,200	\$60,200
Benefit/Cost Ratio	1.16	1.09	1.07	1.04

Project cost includes \$5,000 for wing walls at the upstream end of Reach 4 to make the limit of Federal interest plan complete.

<b>TABLE 3, LOCALLY PREFERRED PLAN (LPP), PLAN C-100/C-10 ECONOMIC ANALYSIS BY REACH</b>					
(Interest Rate, 5.125 %)					
Reach	Reach 1	Reach 2	Reach 3	Reach 4	Reaches 1 – 4
Upstream Limit	7 <sup>th</sup> Street	Midland Ave	Short L St	Grand Avenue	Total
<b>Annualized Benefits:</b>					
Flood damage	\$ 97,900	\$ 341,200	\$ 467,300	\$ 257,800	\$1,164,200
Emergency, Non Phys, & Utility	22,000	68,300	76,300	62,900	229,500
Auto damages	3,700	13,400	11,200	22,100	50,400
Flood Insurance	2,900	3,700	2,100	4,200	12,900
P St Sewer repair savings	0	0	0	11,100	11,100
Total Annualized Benefits	\$ 126,500	\$ 426,600	\$ 556,900	\$ 358,100	\$1,468,100
<b>Construction Costs:</b>					
Project Construction Costs	\$10,412,100	\$4,077,500	3,752,200	2,894,600	\$21,136,400
Interest During Construction	1,030,600	403,600	371,400	286,500	2,092,100
Total Investment Cost	\$ 11,442,700	\$4,481,100	\$4,123,600	\$3,181,100	\$23,228,500
<b>Annualized Costs:</b>					
Interest	586,400	229,700	211,300	163,000	1,190,500
Amortization	52,800	20,600	18,900	14,600	106,600
OMRR&R	27,500	8,000	12,000	8,000	55,500
Total Annualized Costs	\$666,400	\$258,300	\$242,200	\$185,600	\$1,352,600
Excess Benefits over Cost	(\$539,900)	\$168,300	\$314,700	\$172,500	\$115,500
Benefit/Cost Ratio	0.19	1.7	2.3	1.9	1.09

## RISK AND UNCERTAINTY

Sensitivity to the stage on May Branch with the stage on the Arkansas River was addressed with the conduct of a detailed coincident flooding analysis. That analysis can be found in the Hydrology and Hydraulics Report of the Engineering Appendix.

Uncertainties in discharge-exceedance probability, stage-discharge, and stage-damage functions incorporate uncertainty into the economic analysis. An Office of Management and Budget Approved Survey was conducted on the structures in the study area. This reduces uncertainties with the stage-damage functions, the value of property in the flood plain, and damages computed. A risk analysis was conducted to quantify the degree of reliability of the estimated benefits and costs. The risk analysis defined the effectiveness

of the alternative plans. See the Economic Appendix for the annualized damages reduced and distributed for Plan C-10 and for Plan C-100/C-10. Also included in the economic appendix are the annual exceedance probabilities for Plans C-10, C-50, C-100, and C-200 for reaches 1 through 4. Plan C-100/C-10 probabilities would be the 100-yr plan for reaches 1 and 2 and the 10-yr plan for reaches 3 and 4.

To reduce residual risk, the channel plans design includes guardrails on road crossings to avoid vehicles being washed into the channel. Fencing is planned at the vertical wall channel section. The channels have little risk of structural failure for any plan. A flood plain management plan will be developed for the project constructed and it will include advising the public of the residual risk.

Plans C-100, C-100/C-10, and C-200 would have a minimal and an infrequent amount of overbank flow and overtopping of crossings. Plans C-10 and C-50 would have deeper and more frequent flooding at the channel crossings. Plan C-10 would actually increase the chance of loss of life over that of the existing conditions. All the improvement plans create a deep open channel to carry the flood flows. Plan C-10 would have an increased chance of automobiles or pedestrians being swept into the deeper floodwaters within the channel compared to the existing shallow overland flooding.

For example, at the 6<sup>th</sup> Street Crossing in Reach 1, the new open channel would be 15 feet deep. With Plan C-10, floods greater than the 50-year event would overtop the bridge up to 1.5 feet deep (.9 feet deep for the 100-yr flood). With Plan C-100/C-10, only floods greater than the 200-yr event (1.3 feet deep for the 500-yr flood) would overtop the 6<sup>th</sup> Street Bridge. The depth of flooding for the existing 100-yr flood at this location would be around 3 feet deep (2 feet deep for the 50-yr event).

## **PLAN SELECTION**

The following designations are made in the selection process (for reaches 1-4):

**a. Designation of the NED Plan.** Plan C-10 is the plan that maximizes net national economic benefits with \$119,400 in excess benefits over cost. This plan is designated as the NED Plan.

**b. Designation of the Locally Preferred Plan (LPP).** Plan C-100/C-10 with \$115,500 in excess benefits over cost is the plan that, in the opinion of the sponsor, best meets the needs of the local community. The designation is based on the following considerations. At little extra cost (a reasonable incremental cost of \$1,410,600, which is a 7.2 percent increase over the NED plan), the LPP provides greater flood reduction benefits, reduces the risk of providing a level of flood damage reduction, and removes the maximum number of structures out of the floodplain. It removes 127 structures out of the 100-yr floodplain over the 87 structures for the NED plan, an additional 40 structures, which is a 46 percent increase. The LPP gives a greater reduction in non-Federal eligibility requirements for the National Flood Insurance Program and reduces the estimated subsidized requirements for flood losses including disaster relief included in the

emergency cost calculations than would the NED plan. The LPP reaps the maximum benefits for flood insurance and emergency costs.

The LPP also gives greater assurance that the City’s sewer plant located in Reach 1 is protected from floodwater infiltration. Less overtopping of roads would occur with the LPP than the NED plan. With the LPP, there would be reduced potential for vehicles to be washed into a flooded deep open channel. The LPP’s infrequent overtopping as compared to the NED plan would reduce the risk to life. Plate 4 is a schematic of the LPP versus NED Plan by reach as presented to the ASA(CW) for the waiver request approval.

**c. Designation of the Selected Plan.** Plan C-100/C10, the LPP, is designated as the selected plan because it removes the maximum number of structures from the floodplain while remaining economically feasible. On October 27, 2005, the Assistant Secretary of the Army (Civil Works) granted an exception to allow the recommendation of the LPP and to allow full Federal participation in cost sharing reaches 1 through 4 and that reaches 5 and 6 of the LPP would be constructed at 100-percent non-Federal expense. A copy of the letter is in Appendix A, Section A. See the following table for a comparison by reach of the costs and benefits for the NED plan and the LPP.

Item	Reaches				
	Reach 1	Reach 2	Reach 3	Reach 4	1 – 4
LPP First Cost	\$10,412,100	\$4,077,500	\$3,752,200	\$2,849,600	\$21,136,400
NED First Cost	<u>9,444,200</u>	<u>\$3,785,600</u>	<u>\$366,200</u>	<u>\$2,828,800</u>	<u>\$19,725,800</u>
Cost difference	\$967,900	\$291,900	\$85,000	\$65,800	\$1,410,600
Cost percentage	10%	7.7%	2.3%	2.2%	7.2%
LPP Total Average					
Annual Benefits:	\$126,500	\$426,600	\$556,900	\$358,100	\$1,468,100
C-10 Total Average					
Annual Benefits:	<u>\$118,500</u>	<u>\$411,000</u>	<u>\$556,900</u>	<u>\$358,100</u>	<u>\$1,444,400</u>
Benefit difference	\$8,000	\$15,600	\$0	\$0	\$23,700
Benefit percentage	6.8%	3.8%	-	-	1.6%

Note that Reaches 3 and 4 have a higher cost for the LPP over the NED plan. Those costs result from a change in overhead calculations from combining the two plans. No features were added in these two reaches over the NED plan. Also, the benefits by reach for the LPP were those from the reach analysis for the plans from which the LPP was derived. Therefore, the benefits for Reach 1 may be somewhat understated.

## DESCRIPTION OF THE SELECTED PLAN

### Plan Components

The LPP, as the selected channel plan, would extend for 2.25 miles from the Arkansas River upstream to Grand Avenue. An extension of the channel to include reaches 5 and 6 would add 0.5 miles that would terminate at Park Street. From just upstream of O Street to the Fort Smith Levee, the channel would augment the flow capacity of the P Street Storm

Sewer. The culvert through the levee at the gated structure and the first railroad spur is sized at 2-10x10-foot boxes. The culverts through the remaining four railroad tracks are 5-10x10-foot boxes. The maximum bottom width for the LPP is 24 feet along the C1/D1 alignment and the minimum width is four feet for the upstream most 0.5 miles. The channel is trapezoidal with three horizontal to one vertical side slopes and riprapped except for the vertical concrete wall behind the Arkhola plant and a 1,500-foot length downstream of Grand Avenue where the channel has a 2H:1V side slope and is concrete lined to avoid buildings in the area.

Bridges are included at Clayton Expressway, 6<sup>th</sup> Street, and the Arkhola plant. Covered channel sections (box culverts) would be used at the four road crossings: Midland Blvd (3-8x12-feet) (C-10, 2-8x12-feet), Greenwood Ave (2-8x8-feet), N. O Street (2-8x10-feet), Grand Ave (3-6x6-feet). The channel extension into reaches 5 and 6, would use box culverts at Kinkead and Park Aves (2-6x6-feet). See the Engineering Appendix and Hydraulics report for descriptions, drawings, typical sections, design, cost, construction, and operation and maintenance considerations. (Difference in size for Plan C-10 from the LPP were shown in parentheses above.)

### **Real Estate Requirements**

The number of acres necessary for project construction for plan C-10 is 36.9 acres with a total estimated lands and damage cost of \$3,140,000. The number of acres necessary for project construction for plan C-100/C-10 is 47.8 acres with an estimated cost of \$3,277,600 including relocation assistance costs at a March 2004 price level. These acres exclude property acquired through previous Federal programs. A 25-foot construction easement along each bank will be acquired except where structures encroach on the channel. The channel alignment upstream of Ballman Road generally follows on the Union Pacific Railroad right-of-way. The railroad by letter dated October 10, 2002, stated that its fee-owned acres were available for purchase and that it could offer a Disclaimer for its "easement" only property. None of the property to be acquired is contaminated with hazardous waste. See the Real Estate Plan for further details.

### **Locally Preferred Plan Channel Extension Reaches 5 and 6**

The city prefers to extend the channel to reaches 5 and 6, which are upstream of the limits of Federal interest. This would extend from Grand Ave. to Park Street. The work would assist in containing the flood flows within channel to reduce downstream flooding. This is estimated to cost \$4,326,700 including land costs of \$1,905,000 at 100-percent non-Federal expense. The channel extension is part of the with project condition Locally Preferred Plan. However, to make the limit of Federal interest plan complete in itself, a transition feature from the downstream cutoff of the P street storm sewer to the channel was added. Wing walls with an estimated cost of \$5,000 were added to the LPP as a project cost and the costs of the wing walls were subtracted from the channel extension cost for the purpose of cost sharing.

## **Economic Summary**

The estimated project construction costs and OMRR&R costs have been developed using the Corps MCACES cost estimating system. These costs, along with annualized costs, annualized benefits, net economic benefits and the benefits-to-cost ratios are shown on Tables 2 and Table 3 for the LPP. These values are based on March 2004 price levels, an interest rate of 5.125% and a 50-year period of economic analysis, and a 3.8-year construction period. The selected plan, C-100/C-10, has an investment cost of \$23,228,500; an annual cost of \$1,352,600; annual benefits of \$1,468,100; excess benefits to cost of \$115,500; and a benefit to cost ratio of 1.09. At an interest rate of 7%, the LPP is not economically justified with a benefit to cost ratio of 0.82 to 1 and excess costs over benefits of \$330,200.

Note that the P Street Storm Sewer will continue to function with or without project. Thus, its maintenance and rehabilitation costs are not included in the project costs. The City of Fort Smith will repair the storm sewer prior to or in conjunction with project construction and continue to maintain it at City cost. See the attached letter from the City dated October 5, 2005 in Appendix A, Section A. However, a benefit of \$11,100 for not having to repair the storm drain in Reach 4 was included in the economic evaluation. In that reach, the storm drain will be replaced by the channel modification.

## **Ecosystem Restoration Benefits**

Although not estimated, there would be some minor increase in aquatic habitat due to reestablishing an open channel for 2.8 miles.

## **IMPLEMENTATION REQUIREMENTS**

### **Institutional Requirements**

Compliance with environmental statute and policy is shown on Table 4.

The schedule for project implementation assumes authorization in the proposed Water Resources Development Act of 2006. After project authorization, the project would be eligible for construction funding. The project would be considered for inclusion in the President's budget based on: national priorities, magnitude of the Federal commitment, economic and environmental feasibility, level of local support, willingness of the non-Federal sponsor to find its share of the project cost, and the budget constraints that may exist at the time of funding.

**TABLE 4, ENVIRONMENTAL STATUTE AND POLICY COMPLIANCE**

<b>Item</b>	<b>Compliance</b>
<b><u>Federal Statutes</u></b>	
Archaeological and Historic Preservation Act, as amended, 16 U.S.C. 469, et. Seq.	Full Compliance
Clean Air Act of 1977, as amended, 42 U.S.C. 7609, et. seq.	Full Compliance
Clean Water Act, as amended, (Federal Water Pollution Control Act) 33 U.S.C. 1251, et. seq.	Partial Compliance
Coastal Zone Management Act, 16 U.S.C. 1451, et. seq.	N/A
Endangered Species Act, 16 U.S.C. 1531, et. seq.	Full Compliance
Estuary Protection Act, 16 U.S.C. 1221, et. seq.	N/A
Federal Water Project Recreation Act, 16 U.S.C. 460-12, 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. 460/-460/-11, et. seq.	N/A
Marine Protection, Research and Sanctuary Act, 33 U.S.C. 1401, et. seq.	N/A
National Environmental Policy Act, 42 U.S.C. 4321, et. seq.	Partial Compliance
National Historic Preservation Act, 16 U.S.C. 470a, et. seq.	Full Compliance
Rivers and Harbor Act, 33 U.S.C. 401, et. seq.	Full Compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et. seq.	N/A
Wild and Scenic Rivers Act, 16 U.S.C. 1271, et. seq.	Full Compliance
<b><u>Executive Orders, Memorandums, etc.</u></b>	
Executive Order 11988, Floodplain Management, May 24, 1977 (42 CFR 26951; May 25, 1977)	Full Compliance
Executive Order 11990, Protection of Wetlands, May 24, 1977 (42 CFR 26961; May 25, 1977)	Full Compliance
Council on Environmental Quality Memorandum of August 11, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act.	Full Compliance
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations.	Full Compliance
<b><u>State and Local Policies</u></b>	
NPDES	Partial Compliance
Arkansas Water Quality Certification – Section 401	Partial Compliance

Note: The compliance categories used in this table were assigned based on the following definitions:

- a. Full Compliance – All requirements of the statute, executive order, or other policy and related regulations have been met for this stage of planning.
- b. Partial Compliance – Some requirements of the statute, executive order, or other policy and regulations remain to be met but if applicable will be met before construction commences (i.e. 404 permits).
- c. Noncompliance – None of the requirements have been met for this stage of planning.
- d. Not Applicable – Statute, executive order, or other policy not applicable.

Once Congress appropriates Federal construction funds, the Corps and the non-Federal sponsor would enter into a Project Cooperation Agreement (PCA). This PCA would define the Federal and non-Federal responsibilities for implementing, operating and maintaining the project.

Following the signing of the PCA and the design approval, the Corps would officially request the sponsor to acquire the necessary real estate. The advertisement of the construction contract would follow the certification of the real estate acquisition and right-of-entry. The final acceptance and transfer of the project to the non-Federal sponsor would follow the delivery of an Operation and Maintenance Manual and as-built drawings.

Table 5 is the study/project schedule that assumes timely funding. Table 6 shows the cost apportionment for the LPP at a March 2004 price level. Table 7 displays the cost apportionment for the LPP at an October 2005 price level.

**TABLE 5, SCHEDULE**

<b>Milestone</b>	<b>Date</b>
Reconnaissance Report Approval	August 1993
Feasibility Cost Sharing Agreement Signed	November 1998
Final Feasibility Report	October 2006
Authorized Project	November 2006
Project Cooperation Agreement Signed	April 2007
Design Approved	December 2008
Real Estate Acquired	December 2009
Advertise Construction	March 2010
Construction Complete	December 2014

**TABLE 6, LPP COST APPORTIONMENT  
March 2004 Price Level**

REACHES 1 - 4	FEDERAL	NON-FEDERAL	TOTAL
Lands and Damages	\$ 137,000	\$ 3,140,600	\$ 3,277,600
Structures		2,639,300	2,639,300
Roads	759,100	1,261,200	2,020,300
Railroads	2,410,400	334,500	2,744,900
Channel	7,611,900	-	7,611,900
Control Structure	542,600	-	542,600
Subtotal Constr. Costs	11,324,000	4,235,000	15,559,000
E&D	1,096,200	409,900	1,506,100
S&A	986,500	369,000	1,355,500
Subtotal	13,543,700	8,154,500	21,698,200
5% Cash	(1,084,900)	1,084,900	-
Subtotal	\$ 12,458,800	\$ 9,239,400	\$ 21,698,200
Adjustments	-	-	-
Subtotal	\$ 12,458,800	\$ 9,239,400	\$ 21,698,200
Percent of First Cost	57%	43%	100%
REACHES 5 & 6	FEDERAL	NON-FEDERAL	TOTAL
Lands and Damages	-	\$ 1,905,000	\$ 1,905,000
Construction	-	\$ 2,421,700	\$ 2,421,700
Total, Channel Extension, R - 5 & 6	-	\$4,326,700	\$ 4,326,700
	FEDERAL	NON-FEDERAL	TOTAL
TOTAL FIRST COST	\$ 12,458,800	\$ 13,566,100	\$ 26,024,900
Percent of Total	48%	52%	100%

With full Federal participation in the LPP cost sharing for reaches 1 – 4. Land costs include relocation assistance costs. Extension channel cost, reaches 5&6, is reduced by \$5K and reaches 1-4 cost is increased by \$5K for the cost of the wing walls. Federal cost shown for roads and railroads is the cost of covered channel sections at crossings.

**TABLE 7, LPP COST APPORTIONMENT**  
October 2005 Price Level

REACHES 1 - 4	FEDERAL	NON-FEDERAL	TOTAL
Lands and Damages	\$ 144,700	\$ 3,296,700	\$ 3,441,400
Structure & Utility Relocations	-	3,019,100	3,019,100
Roads	854,100	1,476,800	2,330,900
Railroads	2,732,100	447,500	3,179,600
Channels	8,978,100	-	8,978,100
Floodway Control Structure	572,000	-	572,000
Subtotal, Construction	13,136,300	4,943,400	18,079,700
E&D	1,484,200	558,500	2,042,700
S&A	1,336,300	502,900	1,839,200
Subtotal	16,101,500	9,301,500	25,403,000
5% Cash	(1,270,200)	1,270,200	-
Total First Cost Reaches 1- 4	\$ 14,831,300	\$ 10,571,700	\$ 25,403,000
Percent of First Cost	58%	42%	100%
REACHES 5 & 6	FEDERAL	NON-FEDERAL	TOTAL
Lands and Damages	\$ -	\$ 2,000,000	\$ 2,000,000
Relocations	-	880,700	880,700
Roads	-	292,500	292,500
Channels	-	1,190,500	1,190,500
E&D	-	378,100	378,100
S&A	-	340,400	340,400
Total	\$ -	\$ 5,082,200	\$ 5,082,200
Percent of Cost	0%	100%	100%
Total First Cost	\$ 14,831,300	\$ 15,653,900	\$ 30,485,200
Percent of Total	49%	51%	100%

Extension channel cost, reaches 5&6, is reduced by \$5K and reaches 1-4 cost is increased by \$5K for the cost of the wing walls.

With full Federal participation in the LPP cost sharing for reaches 1 – 4.

Land costs include relocation assistance costs.

Federal cost shown for roads and railroads is the cost of covered channel sections at crossings.

## **Permits**

A National Pollutant Discharge Elimination System (NPDES) permit from ADEQ will be acquired prior to construction. Requirements for Section 404 of the Clean Water Act of 1972, as amended, and Section 10 of the Rivers and Harbors Act of 1899, as amended, will be met prior to any construction activity.

## **Views Of Non-Federal Sponsor/Financial Capability**

The City of Fort Smith supports the project and is prepared to provide its items of local cooperation. Fort Smith has a one-cent sales tax, Capital Improvements Program, dedicated to streets, bridges and drainage improvements. The revenue generated from this tax is currently over \$15 million per year. The City's five-year capital improvements program approved in October 2005 budgeted \$100,000 for the year 2006, \$1.0 million for 2007, \$1.0 million for 2008, \$6.0 million in 2009, and \$6.0 million for 2010 for the May Branch project. With the updating of Fort Smith's five-year work plan in October of 2005, it is expected that the City will continue to budget funds for the May Branch Flood Damage Reduction Project. The sponsor will pursue obtaining full Federal participation in the railroad relocations.

## **AFFECTED ENVIRONMENT**

The major characteristics of the study area's natural and human resources are provided to promote a general understanding of the area. Existing and without project conditions of each resource is described in terms of its location, quantity, quality, and significance.

## **REGIONAL SETTING OF PROJECT**

Fort Smith is the county seat and largest city in Sebastian County in addition to being the second largest city in Arkansas. Fort Smith is located in one of the fastest growing corridors of the state. Fort Smith is the chief trading center for west central Arkansas and east central Oklahoma, and in 2000, it had a population of approximately 80,268. Most residents of Sebastian County work in industries or supporting businesses within the Fort Smith area (Cox *et. al.*, 1975).

Fort Smith was built on the site of two frontier forts, established in 1817 and 1838. Thomas Nuttall, an English naturalist and explorer, visited western Arkansas and eastern Oklahoma in 1819 and was one of the first visitors to record observations in the Fort Smith area (Nuttall, 1821). He probably was the area's first explorer having extensive training and experience in various natural history fields, and he recorded detailed information on historical and natural history features of the Fort Smith area.

Economic and social opportunities in Fort Smith have served to attract new residents, many of which represent ethnic minorities. The proximity of Fort Smith to the former Indian Territory has made it a home for Native Americans since frontier days. In addition, a community of African-Americans has called Fort Smith home since frontier days.

Nearby Fort Chaffee served as a relocation center for refugees from Southeast Asia in 1975 and again in 1980-82 for Cuban refugees. More recently, Fort Smith has experienced a growth in Hispanic residents from Mexico and Latin America as part of a general increase in Hispanic residents in western Arkansas. Table 8 provides information on ethnic composition of Fort Smith.

**TABLE 8, ETHNIC COMPOSITION OF FORT SMITH FOR 2000**

<b>2000 Population Statistics</b>		
<b>Race</b>	<b>Population</b>	<b>% of Population</b>
White	61,798	76.9%
Black	6,943	8.6%
All others	11,527	14.3%
<b>TOTALS</b>	<b>80,268</b>	<b>100%</b>

**INFRASTRUCTURE AND LAND USE**

The project area is 100 percent urbanized and has an extensive infrastructure associated with areas of high-density housing, low-density housing, commercial areas, and industrial areas. Much of that infrastructure is shown on the project area maps. Much of the project area is parallel to and close to the bed of a former railroad track, which extends from an area located several blocks south of Creekmore Park (i.e., south of Rogers Avenue, north to an area several blocks northwest of Martin Luther King Park). Several railroad tracks in current operation are located in the western portions of the project area including the Missouri Pacific, Union Pacific, Arkansas-Missouri, Kansas City Southern, and Fort Smith Railroads.

Numerous utilities, i.e., gas, water, sewer, telephone, and electric transmission lines, permeate the project area. The Burlington Northern Railroad and commercial airline carriers also serve the City. Fort Smith is served by US Highways 64, 71, and 271; Arkansas State Highways 10, 22, 45, 59, and 255; and Interstate Highways 40 and 540. Highways 64, 255, and 22 are within the study area.

**100-Year Floodplains**

Most of the project area is mapped as occurring within a Federal Emergency Management Agency (FEMA) 100-year floodplain. May Branch, a tributary to the Arkansas River,

which now flows through an underground storm sewer system, was originally a small intermittent stream. The Government Land Office (GLO) survey plat of 1827, for the upper portions of May Branch labels its channel as, “Dry Rocky”.

The May Branch basin is 100 percent urbanized and includes areas of high-density housing, low-density housing, commercial areas, and industrial areas. Historically, May Branch has suffered numerous flood events due to increased urbanization, high river levels, insufficient storm sewer capacity, limited pump volume, and an undersized levee outlet.

## **Wetlands**

Wetlands having a potential to be regulated by the US Army Corps of Engineers under Section 404 of the Clean Water Act are of limited occurrence in the project area. Because of the highly urbanized environment of the project area, any wetland areas of major size that were present prior to development have been either destroyed, reduced in size, or highly impacted.

Remaining wetlands are of two palustrine types: (1) forested wetlands, and (2) emergent wetlands. Dominant species of forested wetlands largely include the same bottomland hardwood species that dominate any forested tract remaining in the project area: willow oak, water oak, pecan, silver maple, sugarberry, and American elm. Understories of forested wetlands are dominated by red mulberry, white mulberry, box elder, and privet hedge. The fall aspect of emergent wetlands, during periods of low water, is dominated by smartweeds (*Polygonum* spp.), curly dock (*Rumex crispus*), and giant ragweed (*Ambrosia trifida*).

## **Water Quality**

No information was found regarding groundwater resources in the specific project area. Cordova (1963), however, provides a general discussion of groundwater resources for the Arkansas River Valley and includes well data of the region. Cordova concludes that dissolved solids generally is less than 500 ppm and only 11% of the water samples analyzed contained more than four ppm of iron. Groundwater and surface water samples were taken along the proposed channel alignments, which traverse the industrial area of Fort Smith. The water samples were analyzed for contaminants, which could have originated from the industries in the area. The analyses showed that suspected contamination exists. However, for the proposed route C1/D1, contamination is minimal, and the Arkansas Department of Environmental Quality did not object to the project. See the HTRW report in the Engineering Appendix for details.

May Branch drains into the Arkansas River. There is an abundance of available water quality data that was collected on the Arkansas River at nearby Van Buren by the Arkansas Department of Environmental Quality. Waters in the Arkansas River are known to have notably elevated levels of dissolved solids, particularly sodium chloride.

## **Air Quality**

The Clean Air Act of 1977, as amended requires Federal facilities to comply with all Federal, state, interstate, and local requirements regarding the control and abatement of air pollution in the same manner as any nongovernmental entity, including any requirement for permits. No particular Federal requirements are involved that are not already incorporated into Arkansas State law. According to the Arkansas Department of Environmental Quality (ADEQ), the entire state of Arkansas is in compliance with all EPA ambient air quality standards. Only ozone concentrations occasionally approach the limit of the standard. The "Conformity Rule" of the Clean Air Act of 1977, as amended (CAA) states that all Federal actions must conform to appropriate State Implementation Plans (SIPs). This rule took effect on January 31, 1994, and at present applies only to Federal actions in non-attainment areas (those not meeting the National Ambient Air Quality Standards for the criteria pollutants in the CAA). The state of Arkansas including the project area is considered an "attainment area" and is therefore exempt from the "Conformity Rule" of the CAA.

## **Noise**

The project area is 100 percent urbanized with a mix of residential, commercial, and industrial sites that also includes a railroad yard. Noise includes locomotive traffic from the rail lines and vehicular traffic on the several major street arteries that cross the project area.

## **NATURAL ENVIRONMENT**

### **Physiography and Topography**

Fort Smith is located in the Arkansas River Valley province, which lies between the Boston Mountains to the north and the Ouachita Mountains to the south (Croneis, 1930). The Arkansas River flows along the north edge of the city and its flow is regulated by a series of major flood control impoundments and by locks and dams that form navigable pools both upstream and downstream from Fort Smith. Several tributaries enter the Arkansas River floodplain and flow into the river in the Fort Smith area. Poteau River, Mill Creek, Massard Creek, and Little Vache Grasse Creek enter the Arkansas River from the south, and Lee Creek and Flat Rock Creek enter from the north.

### **Plant Communities and Wildlife Habitat**

Much of Fort Smith and its surrounding area occupy sites river terrace prairies that were originally characterized by tall grass prairie vegetation (Nuttall, 1821; Armstrong, 1941; Armstrong and Moore, 1957). However, most of these prairies have been destroyed or, in the absence of fire, have experienced natural ecological succession toward a deciduous forest type (Sealander, 1979). The 1827 GLO survey plats for the Project area provide solid evidence that portions of May Branch originally passed through an upland prairie called Garrison Prairie. Massard Prairie, one of the largest of numerous river terrace

prairies in the area, was located within two miles of May Branch headwaters. Forested floodplain plant communities instead of prairie vegetation probably characterized those portions of the project area closest to the Arkansas River.

Today, very little “natural” forest cover remains in areas to the east of Clayton Expressway. Remaining forested tracts in that portion of the project area have been severely impacted, primarily as a result of urbanization, and largely consist of scattered patches of immature forest cover, on which willow oak (*Quercus phellos*), water oak (*Q. nigra*), pecan (*Carya illinoensis*), silver maple (*Acer saccharinum*), sugarberry (*Celtis laevigata*), and American elm (*Ulmus americana*) are important species. In most instances, these immature forests are characterized by dense understories, in which numerous weedy species occur. Common understory species include red mulberry (*Morus rubra*), white mulberry (*Morus alba*), box elder (*Acer negundo*), and privet hedge (*Ligustrum sinense*). Soapberry (*Sapindus drummondii*) is of local occurrence at the edges of wooded parcels.

Young natural levees along the Arkansas River largely consist of deep sands that are characterized by a largely herbaceous vegetation cover. These habitats are characterized by the presence of deep sands, which are low in natural fertility. Species diversity is limited, and dominants include numerous grasses, including Johnson grass and love grasses (*Eragrostis* spp.), sandspur (*Cenchrus* spp.), cottonweed (*Froelichia* spp.), and evening primrose (*Oenothera biennis*). Woody vines are important species on these young sandy habitats, and dominants include trumpet creeper (*Campsis radicans*) and dewberry (*Rubus trivialis*). Scattered clumps of Chickasaw plum (*Prunus angustifolia*) and roughleaf dogwood (*Cornus drummondii*) provide very limited amounts of woody cover. These natural levees near the project area have experienced considerable disturbance, i.e., construction of roads, ditches, and levees.

Older natural levees on the banks of the Arkansas River, which are characterized by the presence of deep sands, support scattered small stands of mature cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), sandbar willow (*Salix exigua*), and black willow (*Salix nigra*). A few very small and scattered depressions having clayey sediments at the surface support silver maple and pecan, in addition to cottonwood, sycamore, and willow.

The entire project area represents a highly urbanized environment, and many parcels within the area are characterized by little or no maintenance, i.e., no mowing or bush hogging. The general area located between Midland Boulevard and Clayton Expressway, in particular, includes numerous vacant lots characterized by the presence of large expanses of weedy vegetation. The fall aspect of these areas is dominated by giant ragweed (*Ambrosia trifida*), Johnson grass (*Sorghum halepense*), Bermuda grass (*Cynodon dactylon*), and other weedy species. Dense patches of privet hedge are common throughout the area. Poorly maintained ditches that parallel street and railroad rights-of-way typically support immature stands of black willow and/or sandbar willow.

## **Wildlife Species**

The potential for the occurrence of several small game wildlife species exists between the levee and the Arkansas River on the very eastern edge of the project area. The natural levees on the banks of the Arkansas River potentially support the Eastern cottontail (*Sylvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), and other small rodents. Eastern white-tailed deer (*Odocoileus virginianus*) also frequents the levees, although the carrying capacity for deer on these sandy habitats is low due to low cover values and poor forage values provided by the sparse vegetation cover.

Urban residential and commercial areas with limited forest cover, in the portion of the project area on the east side of Clayton Expressway, may provide limited habitat for the Virginia opossum, raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). Some beaver (*Castor canadensis*) activity was observed within small-impounded areas near the sewage treatment plant and an auto salvage yard. Scattered patches of immature forest cover and vacant lots throughout the project area as well as heavy human activity provides for marginal habitat quality throughout the project area.

Fishery habitat quality within May Branch is very low due to the urbanized setting of the project area and prior channelization of the largely intermittent stream channel. Most of the downstream portion of the channel is contained within a covered storm sewer, although limited fisheries habitat remains in the open ditch between Clayton Expressway and the Arkansas River.

## **Threatened and Endangered Species**

Appendix A, Section A, provides a letter from US Fish and Wildlife Service (USFWS), dated August 3, 1999, in which USFWS indicates there are no federally listed threatened and endangered species having a potential for impacts within the project area. Appendix A, Section A, also includes a 2004 response from USFWS.

A request was made to Arkansas Natural Heritage Commission (ANHC) for a search of its computerized database of elements of special concern, *i.e.*, plant and animal species and other natural features tracked by ANHC, to determine the existence of records within the project area. Appendix A, Section A, provides a letter from ANHC, dated August 12, 1999, in which the agency indicates the absence of element occurrences within the project area. Examination of the ANHC Annual Report for 2004 has shown that there have been no additional plant and animal species added to the list for tracking in Sebastian County since 1999.

## **Geology**

Fort Smith is located on the southern flank of the McAlester Basin, in the Arkansas Valley section of the Ouachita physiographic province. There is a bluff line adjacent to the north side of Alternative No. A1 and a bluff line behind the Arkhola facility near the intersection of North O Street and May Avenue. Three geologic formations, which are all

Pennsylvanian age, crop out in the area. In ascending order, the formations are the Hartshorne sandstone, the Spadra shale and the Fort Smith formation, which consists of sandstone and sandy shale. Faulting is present in the area as is folding of the beds. These features increase in intensity southward. Groundwater generally follows the surface contours and may be found in small to moderate amounts in the residual and alluvial materials in the area. A layer of residual soil ranging up to 14 feet in thickness mantles the area. Alluvial materials of varying thicknesses can be expected along the major drainages with the area northwest of the railroad tracks in the Quaternary age alluvium of the Arkansas River.

## **Soils**

The major soils occurring in the urbanized project area belong to the Crevasse, Leadvale, Muskogee and Severn series, which represent a range from moderately well drained to excessively drained soils (Soil Conservation Service, 1975). Crevasse series soils are found on young natural levees along the Arkansas River, and Severn series soils typically are found on natural levees of slightly greater age along the river. Muskogee series soils occur on high terraces along the river. Leadvale series soils are found on colluvial foot slopes and stream terraces on broad valleys. Crevasse and Severn soils occur on level to nearly level surfaces, and Muskogee and Leadvale soils occur on gently sloping surfaces. The Leadvale series and Muskogee series are characterized as moderately well drained; the Severn series is well drained; and the Crevasse series is excessively drained. Although none of these soil series is classified as hydric, the Crevasse, Leadvale, Muskogee, and Severn map units each has a potential to contain hydric inclusions, which typically occur in depressions (Natural Resources Conservation Service, 1999).

## **PRIME FARMLAND**

The project area is 100 percent urbanized, and there are no areas under agricultural production or potential production. Consequently, the project area contains no areas of prime farmland.

## **CULTURAL ENVIRONMENT**

No recorded archaeological sites and no sites or properties currently listed on the National Register are known to occur within the proposed project corridor. Cultural resources issues have been addressed by US Army Corps of Engineers, Little Rock District.

## **SOCIAL-ECONOMIC RESOURCES**

Land use classification categories along the project route are commercial, industrial, and residential. The project area is 100 percent urbanized with minimal vacant land available for new development. Appendix A, Section B, provides socioeconomic data for the Fort Smith area based on 1990 and 2000 census data.

## **HAZARDOUS, TOXIC, and RADIOACTIVE WASTE (HTRW) ISSUES**

A manual search of Arkansas Department of Environmental Quality (ADEQ) records was made to determine the presence of any known HTRW contamination in the project area. Areas of potential contamination within the project area include the following: an inactive landfill and associated automobile salvage yard, a former protein reclamation facility, and a former mirror production facility. In addition, it is known that several small furniture manufacturing facilities were located in proximity to the project area many years ago.

## **ENVIRONMENTAL CONSEQUENCES**

### **PURPOSE OF ENVIRONMENTAL OVERVIEW**

Prior to agency approval of a proposed project involving Federal funds, it is necessary to identify and consider any significant environmental impacts having the potential to restrict or prevent the project. A number of different local, state, and federal agencies have responsibility for preservation or conservation of the nation's natural resources, mitigation of detrimental effects of environmental change, and prevention of environmental damage.

### **EFFECTS ON SIGNIFICANT RESOURCES**

#### **Flood Plains**

The current May Branch system, i.e., the no action alternative, is too small to meet the drainage requirements under flood conditions and its confined underground infrastructure simply cannot meet flood condition requirements.

Each of the major design alternatives is located within a currently designated Federal Emergency Management Agency (FEMA) 100-year floodplain. The completed project will have an overall beneficial impact by effecting local reductions in the extent of the 100-year floodplain and probably also in the 100-year floodway. The proposed open channel construction alternatives will be much more effective in collecting, conveying, and dissipating floodwaters than the largely underground system now in use.

#### **Wetlands and Other Waters of the United States**

A delineation of wetlands subject to potential Corps jurisdiction under Section 404 of the Clean Water Act was conducted throughout the proposed project corridor, including all potential alternative routes. The total amount of wetland acreage found within the entire project area is relatively small, approximately 6 acres.

The project alternatives collectively have a potential to impact several unnamed tributary channels that represent potential "waters of the US" subject to regulation by the Corps under Section 404. Table 1 provides comparative impacts to wetlands from construction activities on each of the alternative routes.

The project alternatives have a potential to impact a range of approximately 0.2 to 2.0 acres of other waters of the US, i.e., channels of ephemeral and intermittent stream channels having a potential for Corps jurisdiction under Section 404. Project alternatives A and B have a potential to impact a range of approximately 0.5 to 6.0 acres of wetlands. Project alternative C will not impact wetlands in the project area. Alternative A has the potential to impact the greatest amount of wetlands, while Alternative B appears to have a potential for impacting a smaller amount of wetlands. These wetlands generally occupy a landscape position that is characterized by extremely poor drainage potential because of surrounding elevation and infrastructure constraints. These wetlands are generally confined on the north by a bluff line, on the south by an area of higher elevation resulting from past fill deposition, and on the west by a combination of railroad tracks and levee. All three alternatives cross a sump area, which is located in the lower meanders of the original May Branch channel.

### **Water Quality**

None of the proposed project alignments would result in significantly adverse impacts on water quality. Measures will be implemented during construction to reduce the amount of sediment entering the Arkansas River, which supports high value aquatic resources. Increased sediment input, if it were allowed to occur, would have a potential to affect respiration of fishes and aquatic larvae as well as interfere with photosynthesis of phytoplankton. Implementation of good sediment control measures will prevent adverse impacts. In addition, all disturbed areas will be seeded to establish a vegetative cover to minimize erosion and run-off. A Section 404(b)(1) Evaluation is included in Appendix A, Section C.

### **Air Quality**

There would be a temporary degradation in air quality as a result of dust and emissions resulting from construction activities. Dust control shall be performed as construction proceeds and whenever a dust nuisance or hazard occurs. The construction period for the proposed project is estimated at approximately four years. Diesel locomotives already pass through portions of the project area and release pollutants, and the project corridor is crossed by several major street arteries that carry heavy vehicular traffic during rush hour periods.

### **Section 176(c) of Clean Air Act General Conformity Rule Review**

The proposed action has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined that the proposed activities will not exceed *de minimis* levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the Corps continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons, a conformity determination is not required.

## **Noise**

Construction activities associated with the project development would temporarily increase noise levels in the surrounding area. Noise produced during construction would originate from heavy construction equipment and increased vehicular traffic to and from the construction site. The Contractor will be required to comply with Federal, State and local requirements for noise control of his vehicles and equipment. There will be room at top bank in most areas for a construction easement before the equipment would then move to a city street. The staging area would be in the industrial area between the railroad tracks and the levee. These temporary noise impacts would cease when construction is complete.

## **General Environmental Protection Measures**

During construction, the contractor will be required to inspect all environment protection operations for compliance with contract requirements, perform all tests as required, and maintain records of his quality control for all operations, including but not limited to the following: (1) compliance with all Federal, State, and local pollution control regulations; (2) monitoring and surveillance procedures; (3) handling, storage, use, and disposal of petroleum products, chemicals, and toxic materials; (4) solid and liquid waste disposal; (5) noise control and dust control; and (6) disposal of construction materials and other debris.

## **FISH AND WILDLIFE AND OTHER BIOTA**

US Fish and Wildlife Service prepared a Fish and Wildlife Coordination Act report that is included as Appendix A, Section D. The report indicates minimal impacts on wildlife and other biota from the construction of the proposed project. Reconstructing the open channel will provide minimal aquatic habitat improvement.

## **THREATENED AND ENDANGERED SPECIES**

The US Fish and Wildlife Service and Arkansas Game and Fish Commission have each provided letters that indicate there are no Federal or state listed threatened and endangered (T&E) or candidate species issues of concern within the project area. In addition, Arkansas Natural Heritage Commission has provided a letter, which indicates that there are no elements of special concern, *i.e.*, rare plants and animals, outstanding natural communities, natural or scenic rivers, or other elements of special concern, within the project area. See Appendix A, Section A.

## **CULTURAL RESOURCES**

The undertaking will have no significant effects on historical properties.

## **SOCIOECONOMICS/ENVIRONMENTAL JUSTICE**

Executive Order No. 12898, “Federal Actions to Address Environmental Justice in Minority and Low-Income Populations,” was issued by President William J. Clinton in 1994. It requires individual federal agencies to develop approaches to address environmental justice concerns in agency programs, policies, and procedures. A primary purpose of Executive Order 12898 was to ensure that federal agencies address human health and environmental conditions in minority communities and low-income communities. The order requires federal agencies to develop strategies to address environmental justice concerns within the context of agency operations. Executive Order 12898 was accompanied by a Presidential memorandum, which stresses that existing laws, e.g., National Environmental Policy Act (NEPA) as promulgated by the Council on Environmental Quality (CEQ), should provide opportunities for federal agencies to consider environmental hazards in minority communities and low-income communities.

EPA released a document in April 1995 titled “Environmental Justice Strategy: Executive Order 12898”, which defines the approaches by which EPA will promote environmental justice. This document ensures that disproportionately high and adverse human health or environmental effects on minority communities and low-income communities, which are referred to as Environmental Justice Communities Of Concern (EJCOC), are identified and addressed.

The project area encompasses a mixture of residential neighborhoods, commercial and industrial areas, and municipal areas such as a sewage treatment facility and a city park. Residential neighborhoods in the more southern portions of the project area do not represent minority and low-income communities. Some of the residential neighborhoods in the more central portions of the project area, however, represent minority and low-income communities that might be expected to have a potential for the presence of environmental justice issues. The absence of a flood control project within the May Branch corridor has historically provided adverse impacts to these minority and low-income communities. A primary purpose of the May Branch project is to improve the environment for the majority of residents living in these minority and low-income communities. The number of residences affected by the project is relatively small and limited to those occupying a location that is within the project corridor.

At the present time, neighborhoods located along the May Branch project corridor experience flooding of their homes and/or personal property on a regular and continuing basis. Implementation of the no action alternative would allow for continued flooding. The Implementation of the action alternative, however, will provide a flood-free environment for the majority of the residents of these neighborhoods, including the minority and low-income communities in the more central portions of the project corridor. Very few vacant lots are present within the project corridor, but it is possible that residents may replace some of their existing substandard structures after flooding is eliminated.

Flood losses serve to drain government and community resources, and that affects all taxpayers. The relatively small number of residence relocations in the minority and low-

income communities associated with the May Branch flood reduction project is the most cost-effective method of addressing the risk of flood damages to these residents. At the same time, the May Branch project will reduce flooding and improve the environment for other residents of these minority and low-income communities outside the footprint of the channel alignment.

## **RELOCATION IMPACTS**

A total of 39 structures have been identified within all of the alternative alignment corridors as having a potential for relocation. See Table 9. Of these 39 structures, 12 structures represent residences (Three structures appear to be vacant.). Of the remaining 27 structures, all appear to have some relationship to business operation. Four of these structures are vacant businesses and seven appear to be storage buildings or other outbuildings with a direct relationship to business operations.

### **Residences Affected**

Within all alternatives, 12 are single-family residences; 9 single-family residences are occupied and 3 single-family residences appear to be vacant. Therefore, only 9 occupied single-family residences, have a potential for relocation. Eight of the 12 structures (two of which are vacant residences) occur between 9th Street and Greenwood Avenue, a portion of the corridor that is common to all routes. Three of the remaining residences are between 6th and 9th streets. Another residence is vacant and occurs south of O Street and south of the Arkhola plant along corridor D2.

Table 9 shows the number of single-family residences that will be affected by each alternative alignment. Depending on whether the D1 or D2 alternative is chosen, Alignments A, B, and C1 would affect 11 or 12 residences. Alignment C2 would affect the least number of residences at either 6 or 7 residences.

### **Businesses Affected**

A total of 16 active business or business-related structures occur within the path or immediately adjacent to all the alternative corridors. These businesses have 4 additional structures that are vacant or in dilapidated condition; 7 structures represent currently used outbuildings associated with businesses within or near the proposed alignments. The majority of the businesses occur along alignments routes C2 and D2. Table 9 shows the number of business that will be affected by each alternative alignment. Alignments A and B would affect 6 to 13 structures, while Alignment C will affect 4 to 18 business structures with Alignment C1/D1 affecting the least number, 4, of business structures.

**TABLE 9, STRUCTURES POTENTIALLY AFFECTED BY THE PROJECT**

Route Alternative	Structures Impacted					
	Commercial			Residential		Total
	Active	Shed	Vacant	Active	Vacant	
A1 w/ D1	3	0	3	9	2	17
A1 w/ D2	8	2	2	9	3	24
A2 w/D1	3	0	3	9	2	17
A2 w/ D2	8	2	2	9	3	24
B1 w/D1	3	0	3	9	2	17
B1 w/ D2	8	2	2	9	3	24
B2 w/ D1	4	0	3	9	2	18
B2 w/ D2	9	2	2	9	3	25
C1 w/ D1	2	0	2	9	2	15
C1 w/ D2	7	2	1	9	3	22
C2 w/ D1	3	5	4	4	2	18
C2 w/ D2	8	7	3	4	3	25
Total	16	7	4	9	3	39

**ADDITIONAL INFRASTRUCTURE**

Each of the three project alternatives crosses a complex of active railroad tracks in the area immediately west of Midland Boulevard. These railroad tracks provide through rail service as well as playing an important role to local small business and industrial facilities in the area by way of small spur lines. It is anticipated that the project will require construction of new bridges at three road crossings, covered channel sections at six road crossings, covered channel sections at three main line and two spur railroad crossings, and a gated structure at the Fort Smith Levee/Floodwall. Utility lines including gas, water,

sewer, telephone, and electric transmission lines, are closely related to streets and roadways within the project area. Relocation of utility lines would be required.

## **HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE ISSUES**

A HTRW investigation was conducted for areas affected by the construction alternatives. Subsurface explorations were performed to assist in determining the most feasible channel layout. No significant HTRW concerns were identified in the proposed channel location although each of the three construction alternatives had at least some potential for encountering hazardous wastes. All the alternatives cross the railroad tracks. Alternative A crosses an inactive landfill and automobile salvage yard. Alternative B passes through a former protein reclamation facility, but most of that site has been cleaned up recently. Alternative C passes near a former mirror plant that once dumped waste into an existing channel. See the HTRW section of the Engineering Appendix.

## **Right-of-Way Acquisition Considerations**

Before any property is acquired for Project purposes, an initial site assessment will be performed for the presence of any hazardous or regulated materials. This assessment will determine if any substantial contamination exists. If substantial contamination is identified, the current landowner will be required to remediate the site in conformance with EPA regulations prior to acquisition. Asbestos, which is friable or could be rendered friable during structure demolition, should be remediated prior to demolition of a structure if it exists in the building. Potential problems could include asbestos-containing materials, leaking underground storage tanks and other petroleum related products, and other unknown hazardous wastes (contained or uncontained) from past industrial operations and waste disposal practices. The preliminary assessment of the proposed route found no hazardous materials of concern. See the HTRW section of the Engineering Appendix.

## **PUBLIC RECREATION SITES**

The only public recreation site within the project area is Martin Luther King Park. The park is a part of the City's public park system. All of the channel alignment alternatives are located on the north side of Martin Luther King Park. The proposed channel would convert some of the parkland from a flat activity area into channel bank and bottom.

Construction activities would cause temporary interruptions to recreational activities in the park due to the presence of heavy equipment; a probable lay down area for construction materials, and actual construction of the drainage project. These impacts will possibly have a greater impact on those park areas designated for toddler activities than for those of older children and adults.

## **PRIME FARMLAND**

The entire project route is located within the city limits of Fort Smith, and there are no prime farmland sites within the Project area. The Federal Register dated July 5, 1984

addresses the Farmland Protection Policy Act (FPPA), Subtitle 1 of Title XV of the Agriculture Food Act of 1981, Public Law 97-98. The FPPA Final Rule specifies that any prime farmland, which a state or local government has designated through zoning or planning for commercial, industrial, or residential use, will not be covered by the Act. This is because the farmland will be defined to be “committed to urban development” and thus outside the Act’s definition of prime farmland (Federal Register, Volume 49 No. 130, p. 27717).

## **LAND USE**

### **Direct Impacts**

Direct impacts are those that result from right-of-way acquisition, construction, operation, and maintenance of the proposed flood reduction project. The conversion of land from its existing use to an open ground channel will constitute the primary direct impacts of this project. A total of 4 to 18 business relocations and 6 to 12 residential locations could be affected by the project, depending on the chosen alternative route. The tentatively selected route C1/D1 would affect 15 structures.

### **Secondary and Cumulative Impacts**

Secondary impacts are generally defined as land use changes that occur because of modifications in access or proximity of the facility. Cumulative impacts are defined as those impacts that “result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions (Bank, 1992). Foreseeable actions are usually defined as those for which plans exist. No Federal or private actions for major developments in proximity to the proposed project have been made public.

Secondary development that could occur because of the proposed project has a potential to affect daily lives of project area residents. Development of the project has a potential to cause conversion of undeveloped properties to residential areas and other land uses, new area businesses, increased employment opportunities, increased population, and increased demands for utilities and social services. Growth in residential areas would also increase the demand for consumer services, including retail, banking, medical, and recreational. However, the area is already urbanized and the proposed project is not expected to change the local planning environment. In addition, any new development would be restricted from the properties acquired by the FEMA Flood Hazard Grant Program. Those properties must remain as “open space.”

Because the project has a potential to alleviate problems of severe local flooding, project area changes may occur. In the elimination of severe flooding, for example, one might expect redevelopment activities that would result in a replacement of substandard project area housing with housing of higher quality. Similarly, some businesses would possibly replace older structures with new or remodeled structures.

The May Branch channel has been previously altered by railroad construction and channelization related to drainage and flood control. Nothing has been left along the original course of May Branch which could be considered natural. Heavy human activity and prior development of the area has resulted in scattered patches of immature forest habitat. Fishery habitat quality is virtually nonexistent due to the urbanized setting of the project area and prior channelization and tunneling of the largely intermittent stream channel. Any future development in the area related to the proposed project is unlikely to contribute to further environmental degradation of the area. The reestablishment of an open channel could provide a minor increase in aquatic habitat.

## **UTILITY RELOCATIONS**

Utility relocations would be required to facilitate construction of the Project. See the Engineering Appendix for details.

## **PUBLIC INVOLVEMENT, REVIEW AND CONSULTATION**

### **PUBLIC INVOLVEMENT PROGRAM**

A public notice was made in Fort Smith for the public review period. The draft report and environmental assessment were made available at the city offices, Engineering Department, and a copy was provided to the Reference Desk, Main Library, 3201 Rogers Avenue, Fort Smith, Arkansas 72901.

### **PUBLIC VIEWS AND RESPONSES**

Pursuant to 40 CFR 1501.4(e)(2) and ER 200-2-2 Procedures for Implementing NEPA, the draft EA and draft FONSI was circulated to interested agencies and the public for a minimum 30 calendar day review period. The public review period began on July 28, 2006, and ended on September 6, 2006. The following agencies responded during the comment period:

State Agencies: Arkansas Department of Environmental Quality, Arkansas Department of Health, Arkansas Forestry Commission, Arkansas Geological Commission, Arkansas Game and Fish Commission, Arkansas Natural Resources Commission, and the Arkansas State Clearinghouse.

Federal Agencies: U.S. Department of Agriculture/Natural Resources Conservation Service, U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service.

All comments were in support of the proposed action and there were no negative comments received. Any recommendations included in the comments received were evaluated and, if practical, were incorporated into the proposed action. A complete list of public comments is in Appendix A, Section A, Agency Correspondence.

## RECOMMENDATIONS

I have considered all significant aspects in the overall public interest. The aspects considered included environmental, social, and economic effects; and engineering feasibility.

I recommend that improvements for flood control for the May Branch, Fort Smith, Arkansas, project be authorized for implementation with such modifications thereof as in the discretion of the Commander, HQUSACE, may be advisable. I recommended the Locally Preferred Plan to construct a channel that would extend for 2.77 miles from the Arkansas River upstream to Park Avenue. There would be covered channel sections at road and railroad crossings plus three road bridges and a gated structure through the Fort Smith Levee.

The plan is estimated to cost \$30,485,200 at an October 2005 price level. Reaches 1 through 4 would cost \$25,403,000 and reaches 5 and 6 would be an additional cost of \$5,082,200 at 100-percent non-Federal expense. The estimated annual OMRR&R cost is \$55,500. The Federal portion of the estimated project cost is \$14,831,300 and the estimated cost to the city of Fort Smith, Arkansas, the non-Federal sponsor, is \$15,653,900.

My recommendation is subject to cost sharing, financing, and other applicable requirements of Federal and State laws and policies, including Public Law 99-662, the Water Resources Development Act of 1986, as amended, and in accordance with the following required items of cooperation that the non-Federal sponsor shall, prior to project implementation, agree to perform:

a. Provide a minimum of 35 percent but not to exceed 50 percent of total project costs allocated to reaches 1 through 4 of the project, as further specified below:

(1) Enter into an agreement which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;

(2) Provide, during construction, any additional funds needed to cover the non-Federal share of design costs allocated to reaches 1 through 4;

(3) Provide, during construction, a cash contribution equal to 5 percent of total project costs allocated to reaches 1 through 4;

(4) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, and maintenance of reaches 1 through 4;

(5) Provide or pay to the Government the cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and

stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, and maintenance of reaches 1 through 4; and

(6) Provide, during construction, any additional costs as necessary to make its total contribution equal to at least 35 percent of total project costs allocated to reaches 1 through 4.

b. Provide 100 percent of total project costs allocated to reaches 5 and 6 of the project, as further specified below:

(1) Enter into an agreement which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;

(2) Provide, during construction, any additional funds needed to cover 100 percent of design costs allocated to reaches 5 and 6;

(3) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, and maintenance of reaches 5 and 6;

(4) Provide or pay to the Government the cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, and maintenance of reaches 5 and 6; and

(5) Provide, during construction, any additional costs as necessary to make its total contribution equal to 100 percent of total project costs allocated to reaches 5 and 6.

c. Give the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the non-Federal sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project.

d. Assume responsibility for operating, maintaining, replacing, repairing, and rehabilitating (OMRR&R) the project or completed functional portions of the project, including mitigation features, without cost to the Government, in a manner compatible with the project's authorized purpose and in accordance with applicable Federal and State laws and specific directions prescribed by the Government in the OMRR&R manual and any subsequent amendments thereto.

e. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal interest has entered into a written agreement to furnish its required cooperation for

the project or separable element.

f. Hold and save the United States free from all damages arising for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors.

g. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments in 32 CFR Section 33.20.

h. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government.

i. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project.

j. Agree that, as between the Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and, to the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the project in a manner that will not cause liability to arise under CERCLA.

k. Prevent obstructions of or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) which might reduce the level of protection it affords, or hinder its operation and maintenance, or interfere with its proper functioning, such as any new development on project lands or the addition of facilities which would degrade the benefits of the project.

l. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

m. Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)).

n. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing a Project Cooperation Agreement. The plan shall be designed to reduce the impacts of future flood events in the project area, including but not limited to, addressing those measures to be undertaken by non-Federal interests to preserve the level of flood protection provided by the project. As required by Section 402, implement the plan not later than one year after completion of the construction of the project. Provide an information copy of the plan to the Government upon its preparation.

o. Provide the non-Federal share of that portion of the costs of archeological data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement.

p. Participate in and comply with applicable Federal floodplain management and flood insurance programs.

q. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project.

r. Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized.

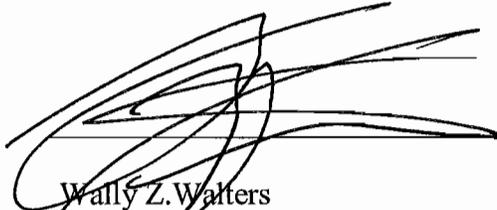
s. Inform affected interests, at least annually, regarding the extent of the protection afforded by the project.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil

Works construction program nor the perspective of higher review levels within the Executive Branch.

Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Date: 20 Sept 2006



Wally Z. Walters  
Colonel, US Army  
District Engineer

## FINDING OF NO SIGNIFICANT IMPACT

**NAME OF PROPOSED ACTION:** May Branch, Fort Smith, Arkansas.

**PURPOSE AND NEED FOR THE PROPOSED ACTION.** The Little Rock District, U.S. Army Corps of Engineers proposes to reduce flood damages along May Branch in Fort Smith, Arkansas. The need for additional channel capacity or some other type of flood reduction measures along May Branch has been evident since the construction of the Fort Smith Levee and Floodwall including the P Street Pump Station in 1951.

**ALTERNATIVES.** The following alternatives were evaluated in detail in the attached Environmental Assessment (EA):

Alternative Alignments: A1, A2, B1, B2, C1, C2, D1, and D2. Six downstream and two upstream alignments were developed (route cost shown in parenthesis). The upstream and downstream alignments were combined to make 12 alternatives. Upstream alignments were D1 (\$2,520,000) and D2 (\$2,680,000). Downstream, the six alignments were A1 (\$10,990,000), A2 (\$10,950,000), B1 (\$11,430,000), B2 (\$10,290,000), C1 (\$10,090,000), and C2 (\$14,220,000). All 12 alignments were assumed to have the same flow capacity characteristics and channel bottom widths. Costs were estimated for those quantities that would be different for each alignment. Thus, the 12 alignments would equally alleviate the flooding problems with the reestablishment of a channel that also would provide some minor increase in environmental quality. All the plan alignments have few environmental impacts with most being either minor or temporary over the no build alternative. Alignment C1 at the lowest differential cost of \$10,090,000 and alignment D1 at a lowest differential cost of \$2,520,000 were combined to make the chosen alignment.

Route C1/D1 had the lowest cost, the least number of relocations, and the fewest environmental impacts to make it the chosen route. The C1/D1 alignment extends from the Arkansas River to Clayton Expressway through the Fort Smith Levee and thence north and east to roughly parallel North P Street following a path to 13th Street. It continues to the east along the north side of Martin Luther King Park, crosses May Avenue, and continues along the north side of the Arkhola plant, where it turns south. It crosses North O Street and continues a southward path following the existing storm sewer alignment to Park Avenue.

Alternative Channel Widths: C-10, C-50, C-100, C-200, and C-10/C-100: To optimize channel width sizing, additional plans were formulated using the C1/D1 alignment. The final plans were formulated: C-10, C-50, C-100, and C-200 to maintain generally the 10-, 50-, 100-, and 200-year flood within channel. These plans incorporated the flow capacity of the existing P Street Storm Drain from Short L Street to the P Street pump station. Each of these plans was economically justified. The recommended plan is a combination plan using the C-100 sizing for the first two downstream reaches that extend upstream to Midland Avenue. The upstream reaches assumed the Plan C-10 sizing upstream to Park Avenue.

Plan C-100/C-10's culvert through the levee and the first railroad spur are sized at 2-10x10-foot boxes. The culverts through the next set of railroad lines are five 10x10-foot boxes. The channel has a maximum bottom width of 24 at its downstream end. The channel depths are 9 feet at Grand; at O Street, it is 14 feet deep; at 6<sup>th</sup> Street, it is approximately 16 feet deep; and at the levee, it is around 17 feet deep. Bridges are planned at Clayton Expressway, 6<sup>th</sup> Street, and the Arkhola plant. The channel is concrete lined with vertical sides for 405 feet between the Arkhola plant and the hill behind in Reach Three. In the upstream most 140 feet of Reach Three and for another 1,060 feet into Reach Four, the channel is concrete lined with 2H: 1V sides slopes. The remaining channel side slopes are 3H: 1V with 2 feet of riprap of varying heights. The slope above the riprap is turfed. The five railroad crossings would use culverts, as would the six road crossings at Midland Blvd, Greenwood Ave, N. O Street, Grand Ave, Kinkead Ave, and Park Ave.

No Action: Under this alternative, frequent flooding will continue to cause appreciable damage along May Branch. Street intersections would act as detention basins after curb and drop inlets have reached capacity, and excess runoff would flow between buildings and across low-lying lands along North P Street. A storm event greater than a 10-year event would exceed the capacity of the storm sewer system. The Fort Smith Levee/Floodwall with the P Street pump station would protect lower portions of the basin from high stages on the Arkansas River. When runoff exceeds the pumps' capacity, the excess could overflow the limited capacity of the sump area.

During the planning process, an array of alternatives was considered. Some of these alternatives were eliminated for further consideration. These included nonstructural measures such as flood proofing measures and relocations. Because of insufficient flood warning times, flood-proofing measures would not be practicable. The acceptable nonstructural measure has already been accomplished by the city and the Federal Emergency Management Agency; thus, this alternative was not pursued further.

Structural measures initially considered early in the process included detention ponds, parallel storm sewer, additional pump capacity, and relief openings through the levee and railroad tracks with a connecting channel. The flood protection offered by the detention basins was found to be negligible and the plan was not considered further. The parallel storm sewer would be more costly than an open channel and was not considered further. The changed hydrology and hydraulics analysis for the feasibility phase negated the need for additional pump capacity. The concept for the relief-opening plan was the basis for the channel plans formulated.

#### **ANTICIPATED ENVIRONMENTAL IMPACTS:**

Consideration of the effects disclosed in the EA, and a finding that they are not significant, is necessary in order to prepare a FONSI. This determination of significance is required by 40 CFR 1508.13. Additionally, 40 CFR 1508.27 defines significance as it relates to consideration of environmental effects of a direct, indirect or cumulative nature.

Criteria that must be considered in making this finding are addressed below, in terms of both context and intensity. The significance of both short and long-term effects must be viewed in several contexts: society as a whole (human, national); the affected region; the affected interests; and the locality. The context for this determination is primarily local, as shown in Figure 1 of the EA. The context for this action is not highly significant geographically, nor is it controversial in any significant way. Consideration of intensity refers to the magnitude and intensity of impact, where impacts may be both beneficial and adverse. Within this context, the magnitude and intensity of impacts resulting from this decision are not significant. The determination for each impact topic is listed below.

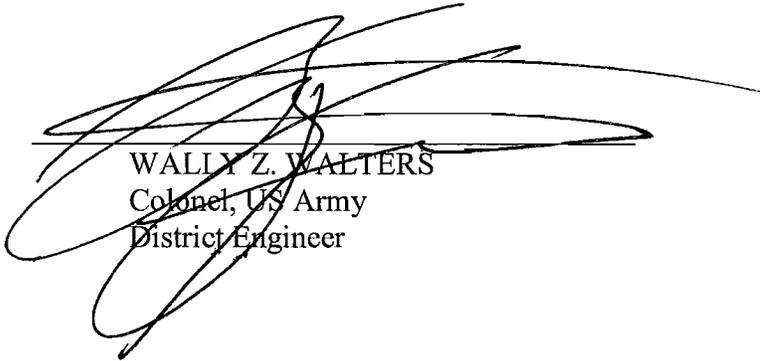
1. **The degree to which the action results in both beneficial and adverse effects. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.** The EA indicates that the Proposed Action would have beneficial effects such as reduction in flood damages and a minimal increase in environmental quality as compared to the No Action alternative that would have no impacts. There would be adverse construction activity related effects from implementation of Alternative C1/D1, alignment and C-100/C-10, channel width, (Proposed Action) or all the other alignment and channel width alternatives but these would be minor in intensity and construction related only. The Proposed Action will have the least number of building relocations, 15. The other 11 Alternative alignments combinations have building relocations that range in number from 17 to 25.
2. **The degree to which the action affects public health or safety.** The Proposed Action will protect public health by alleviating flooding problems by construction of a channel. No adverse effects to public health or safety will result from the Proposed Action. Under existing conditions, no hazardous materials are identified on the project site. Implementing the Proposed Action would not create hazardous conditions affecting public health or safety.
3. **The degree to which the action affects unique characteristics of the potentially affected area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.** No such unique characteristics or resources have been identified in the project area of the Proposed Action. Alternative Routes A1 and A2 would disturb up to 6 acres of wetlands. Alternative Routes B1, B2, C1, C2, D1, and D2 would disturb no acres of wetlands.
4. **The degree to which effects on the quality of the human environment are likely to be highly controversial.** The project will benefit the public therefore the Little Rock District, Corps of Engineers does not regard this activity as controversial, and the public response to the EA was favorable.

5. **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.** The Proposed Action has a low degree of uncertainty involving the impacts of this action. The reestablishment of an open channel will engender short-term construction related impacts. It will alleviate flood damages and minimally improve biological processes in the longer term.
6. **The degree to which the action may establish a precedent for future actions with significant impacts.** The action is unlikely to cause future actions with significant impacts. The flood plain is considered to be fully developed and the open areas created with the FEMA buyout of flooded properties preclude any development not compatible as an open area.
7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.** Cumulative effects analyses for the physical and biological resources that would potentially be affected are present in the EA. Cumulative effects on these resources focus on disturbed soils and habitat relating to construction activities involved in the Proposed Action. The Proposed Action would not result in any cumulative impacts concerning any reasonably foreseeable action in the project area.
8. **The degree to which the action may adversely affect items listed or eligible for listing in the National Register of Historic Places, or other significant scientific, cultural or historic resources.** No significant impacts would occur with the Proposed Action or any of the other Alternatives.
9. **The degree to which the action may adversely affect an endangered or threatened species or its critical habitat.** No endangered or threatened species are in the project area.
10. **Whether the action threatens a violation of Federal, State or local law or requirements imposed for the protection of the environment.** No such violations will occur. Permits from other jurisdictional agencies such as NPDES permits from the Arkansas Department of Environmental Quality are necessary and will be obtained prior to any construction activities. Continued coordination with regulatory agencies will be ongoing to ensure compliance with all Federal, state, regional, and local regulations and guidelines

**CONCLUSIONS:**

The impacts identified in the prepared EA have been thoroughly discussed and assessed. No impacts identified in the EA would cause any significant adverse effects to the human environment. Therefore, due to the analysis presented in the EA and comments received from a 30-day public review period that began on July 28, 2006, and ended on September 6, 2006, it is my decision that the preparation of an Environmental Impact Statement (EIS) as required by the National Environmental Policy Act (NEPA) is unwarranted and a "Finding of No Significant Impact" (FONSI) is appropriate. The signing of this document indicates the Corps final decision of the proposed action as it relates to NEPA. The EA and FONSI will be held on file in the Planning and Environmental Office for future reference. Consultation with regulatory agencies will be ongoing to ensure compliance with all Federal, state, regional and local regulations and guidelines.

20 Sept 2006  
Date



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