

RIVERSIDE OXBOW FORT WORTH, TEXAS

CHAPTER 5 RECOMMENDED PLAN

This chapter provides further details on the Recommended Plan, as determined in the preceding chapters of this report. Preliminary costs, at April 2003 prices levels, are presented, as well as federal and non-federal cost apportionment responsibilities.

NATIONAL ECOSYSTEM RESTORATION PLAN

The NER plan will restore the biological integrity of the wetland and bottomland hardwood communities through a combination of measures directed at either specific habitat types or specific problems within the existing ecosystem. Collectively, these restoration measures will help restore the ecological integrity, function, and dynamic processes of the floodplain and adjacent uplands to a less degraded, more natural condition. In identifying the NER plan, the study team evaluated the array of plans proven to be cost effective and incrementally justified as identified by the cost effectiveness and incremental analysis. The next step was to further evaluate the individual plan elements and determine whether the additional habitat unit gains warranted the additional incremental costs.

The major restoration elements of the NER plan are shown in insert. Since the proposed overall restoration plan is relatively complex, the description of specific project features has been broken down into the previously identified zones. The following paragraphs describe the restoration measures for each zone, including the number of acres for each restoration planting type in each zone for the NER plan. As noted from Chapter 4, reforestation includes planting 40 one-inch caliper containerized trees, 20 one-gallon containerized shrubs, and 150 seedlings per acre and habitat improvement measures include planting 5 one-inch caliper containerized trees, 5 one-gallon containerized shrubs and forest management techniques (selective thinning, nesting boxes, etc.) per acre.

Oxbow North. Following is a list of the various restoration activities or features included in the recommended plan for the Oxbow North zone:

- Acquisition of 104.93 acres of property
- Widening the riparian corridor to 330 feet (approximately 100 meters) by reforestation of 20 acres of grass and disturbed lands
- Habitat improvement of 20.33 acres of existing wood stands
- Replacement of the spillway in the pond north with a water control structure
- Establishing a 100-foot wide native grass buffer (36.4 acres)
- Conversion of existing grasslands with a native grassland and tree motte combination (12 acres total - 10.8 acres of grasslands with 1.2 acres of reforestation)
- Reconnect the upstream end of the oxbow to the river by removal of the earthen plug along with a maintenance bridge to span the opening (see insert, which depicts side by side cross sections of the oxbow at the upstream end with the plug removed and further downstream)
- Replace the culvert at Beach Street with a full span bridge
- Construction of an in-channel weir just upstream of the downstream confluence of the oxbow with the West Fork (see insert, which displays cross sections of the modified and oxbow channels just above the in-channel weir and the low water dam below Beach)
- Improvement of in-stream aquatic habitat by adding a series of 3 boulder cluster complexes

Figure 15 displays side-by-side cross sections of the oxbow under anticipated future with project conditions and the natural channel of the West Fork downstream of the confluence adjacent to the Gateway East zone. This section of the West Fork has never been physically modified, but has been indirectly impacted by a number of flood control projects and reservoirs located upstream, which will be the same for the oxbow once it is reconnected to the river. It is anticipated that once the oxbow is reconnected to flows at both the upstream and downstream ends and is open to flush flows from flooding events, it will return to a more natural, less degraded condition and once again begin to reflect the more natural floodplain of the West Fork.

Oxbow Center. Following is a list of the various restoration activities or features included in the recommended plan for the Oxbow Center zone:

- Acquisition of 85.1 acres of property
- Creation of a 12.3-acre wetland complex with the addition of emergent wetland plantings (7.2 acres), a water control structure, and a permanent pump station
- Conversion of existing grasslands with a native grassland and tree motte combination (71.6 acres total - 64.4 acres of grasslands with 7.2 acres of reforestation)

Oxbow South. Following is a list of the various restoration activities or features included in the recommended plan for the Oxbow South zone:

- Acquisition of 28.71 acres of property

- Reforestation of 2 acres of bottomland hardwood corridor along IH-30 and Sycamore Creek
- Habitat improvement of 7.8 acres of existing wood stands
- Establishing 0.9 acres of native grass buffer
- Conversion of existing grasslands or disturbed areas with a native grassland and tree motte combination 14.9 acres total – 13.4 acres of grasslands with 1.5 acres of reforestation)

Gateway Center. Following is a list of the various restoration activities or features included in the recommended plan for the Gateway Center zone:

- Acquisition of 27.3 acres of property
- Reforestation of 1.5 acres of bottomland hardwood riparian corridor along the south side of the oxbow from Beach Street to the oxbow’s confluence with the West Fork and along the top of the bank on the north side of the improved channel
- Habitat improvement of 9.7 acres of existing wood stands
- Establishing 3.2 acres of native grass buffer
- Conversion of existing grasslands and disturbed areas with a native grassland and tree motte combination 12.9 acres total – 11.6 acres of grasslands with 1.3 acres of reforestation

Figures for this Section

Figure 11 - NER Plan

Figure 12

Figure 13

Figure 14

Figure 15

Gateway South. Following is a list of the various restoration activities or features included in the recommended plan for the Gateway South zone:

- Acquisition of 45.93 acres of property
- Reforestation of gaps in the existing riparian corridor along the oxbow and establishment of a bottomland hardwood corridor along IH-30 from Beach Street to the eastern boundary of the zone (13.3 acres)
- Habitat improvement of 15.7 acres of existing wood stands
- Establishing 1.3 acres of native grass buffer
- Conversion of existing grasslands with a native grassland and tree motte combination (15.6 acres total - 14.0 acres of grasslands with 1.6 acres of reforestation).

Gateway Beach. Following is a list of the various restoration activities or features included in the recommended plan for the Gateway Beach zone:

- Acquisition of 138.0 acres of property
- Habitat improvement of existing wetlands by recontouring slopes, planting emergent and forested wetland vegetation (29 acres) along with selective thinning, as needed, adding a water control structure and a permanent water supply, and removing the existing park entrance road to reestablishing the hydraulic connection between the wetland ponds and the oxbow
- Conversion of existing grasslands with a native grassland and tree motte combination (99 acres total - 89.1 acres of grasslands with 9.9 acres of reforestation)

Gateway East. Following is a list of the various restoration activities or features included in the recommended plan for the Gateway East zone:

- Acquisition of 138.72 acres of property
- Reforestation of gaps and narrow areas in the existing riparian corridor along the West Fork (7 acres)
- Habitat improvement of 97.1 acres of existing wood stands
- Creation of a 26.8-acre wetland complex, adding a water control structure, planting 10 acres of emergent wetland plants and 4 acres of moist soil plants, and adding a permanent water supply along with construction of a water control to u-shaped wetlands (old oxbow remnant)
- Establishing 3.8 acres of native grass buffer to protect riparian habitat along the West Fork
- Conversion of existing grasslands with a native grassland and tree motte combination (4.02 acres total - 3.62 acres of grasslands with 0.4 acres of reforestation)

OPERATIONS AND MAINTENANCE (O&M) ACCESS. The recommended plan also includes operations and maintenance access. This access consists of two oxbow channel access points; one located near the upstream end of the oxbow and the second located just upstream of Beach Street. The remaining O&M access consists of approximately 10,800 linear feet of cleared and stabilized dirt overlaid with a crushed aggregate surface with a width of eight feet. This access is located along the oxbow in the Oxbow North zone, around the north pond in Oxbow North, and adjacent to the wetland complex in Oxbow Center. In addition, a portion of the costs for the 8,967 linear feet of 10-foot wide concrete trail, which runs along the banks of the modified channel and along the west side of Beach Street to the north, have been apportioned to O&M access. These costs are associated with increased pavement thickness to accommodate usage by operations and maintenance vehicles during wet conditions. These access features are the minimum required to accomplish the operations and maintenance of the recommended plan features. Other components of the proposed restoration in other zones can be accessed via existing roads or trails of others and are not included as part of the recommended plan operation and maintenance access.

RECREATION. As part of the overall Clear and West Fork Interim Feasibility Study, a major effort was initiated to look at the existing recreation facilities, solicit input from local citizens and groups as to their interests in, and concerns for, the Trinity River and its tributaries and to identify future recreation needs. A section of the overall recreation master plan, called the West Fork East, encompasses the Riverside Oxbow study area. Public meetings for this segment identified an array of recreation needs and interests in the study area. They include: 1) additional trails along the Trinity River corridor and optimum linkages with existing or planned trails outside the project; 2) safe neighborhood access to the “Trinity Trails” system; 3) increased water related recreation, including canoeing and kayaking, fishing, etc.; and finally, 5) restoration and preservation of the natural resources that make the river unique.

With input from these various entities and following Corps of Engineer policy and guidance, the Riverside Oxbow study team identified recreation features to be incorporated into the NER plan. The recreation features would not detract from the ecosystem restoration objectives since there are generally being located along the perimeter, in areas that have already been disturbed and, where possible, utilize or share access designated for operations and maintenance. The recommended plan includes some recreational features that are not required solely for project construction or operations and maintenance. These features are described as strictly recreational and are cost shared at 50/50 percent between the Government and the non-Federal sponsor, per Corps guidance. Recreation access includes approximately 7,519 linear feet of equestrian trail that will be 10 foot wide, stabilized dirt covered with wood mulch in Gateway Beach; 8,967 linear feet of pedestrian trail that is 10-foot wide reinforced concrete along the improved channel in the Oxbow Center and Gateway Center (where it connects to an existing trail system) and along the west side of Beach Street from the improved channel north to the limits of the project area; and 1,396 linear feet of 8-foot wide crushed aggregate trail in the Gateway South. In addition, recreation access features include recreation access points with associated parking. One is located off of Riverside Drive just north of the river channel and west of the oxbow and would provide access to the project area near the upstream end of the oxbow channel. The access road at this location would be 710 linear feet long with an associated parking lot of 5040 square feet. The second access point is located west of Beach Street, south of

the oxbow channel and would provide access to the project area upstream of Beach Street. The access road here is 616 linear feet in length with an associated parking of 5040 square feet. In addition, there are restroom facilities at each of the parking access points.

The Tarrant Regional Water District, the city of Fort Worth, and Streams and Valleys strongly support the incorporation of the above recreational purposes and features into the recommended plan. These features are compatible with the city's Gateway Park Master Plan and the Fort Worth portion of the Trinity River Visions Master Plan. Both plans are also compatible with the recommended ecosystem restoration project and provide links to both the east and the west for trails, either existing or proposed, as part the regional Trinity Trails Plan.

The formulation of recreational features was conducted within the following framework:

- are totally ancillary, i.e. project was not formulated solely for recreation
- do not add to the project cost
- take advantage of the project's recreation potential
- are not vendible
- would not exist without the project
- are within the maximum 10% federal cost participation limit

Economic justification is based on an evaluation of competing facilities, existing and expected future use with and without the recommended plan, and unfulfilled demand. According to the Texas Parks and Wildlife Department, Texas Outdoor Recreation Plan (TORP), which identifies population, usage, and demand trends with the region, including the study area, the demand for recreation facilities, such as trails, is steadily increasing. Applying the appropriate participation rates the population of potential users, the access will be used to capacity from the time it becomes available to the public through the period of analysis.

Current standards indicate that the concrete (8,967-feet in length, 10-foot wide) and the crushed aggregate (total of 1,396-feet in length, 8-foot wide) pedestrian trails can accommodate 57,700 visitors per mile per year and 6,999 visitors per year per mile of trail for the equestrian trail. Total capacity usage for the concrete pedestrian trail is, therefore, $(57,700/5,280)$ times 8,967 equals about 98,000 visitors per year. Total capacity for the crushed aggregate trail is $(57,000/5,280)$ times 1,396 equals about 15,300 visitors per year. Total capacity usage for the equestrian trail is $(6,999/5,280)$ times 7,519 equals 10,000 visitor days per year. Total visitor days per year equal 123,300.

Point values are assigned based on selective criteria applicable to the proposed trail. The criteria and assigned points are as follows:

- Recreational experience - 16 points
 - Availability of opportunity - 3 points
 - Carrying capacity - 8 points
 - Accessibility - 18 points
 - Environmental quality - 10 points
- 55 points

The current unit day value (general recreation) for Fiscal Year 2003 is \$6.53 for 55 points. Applying this value to 123,300 visitor-days per year results in a benefit of approximately \$805,100 per year. Any project features that serves a purely recreational purpose will be assigned solely to recreation. Project features required for project construction, operations, or maintenance will have their costs apportioned to ecosystem restoration. Table 17 displays the costs associated with the recreational features and a summary of their expected annual costs and benefits.

Table 17
Economic Justification of Recreational Feature Costs
(Based on October 2002 Price Levels, 5.875 interest rate)

Recreation First Costs ¹	Annual Cost	Annual Benefit	Benefit-Cost Ratio
\$997,000	\$79,000	\$805,100	10.0

*From MCACES.

LOCALLY PREFERRED PLAN (LLP)

At the request of the local sponsor, and with input from the various other entities, the study team was asked to evaluate an alternative to the NER plan that would be a buy up from the NER plan, incorporating additional recreation and restoration features of interest to the local citizens. The local sponsor understands that these additional features are outside the scope of USACE policy and guidance for potential cost sharing and realizes that these added features would have to be funded solely from non-federal funds.

The additional features included within this locally preferred alternative include relocation of the entrance to Gateway Park to include a new access road and bridge over the oxbow channel in the Gateway Center zone and three observation decks. The local sponsor decided to include acquisition of a 112.04-acre portion of the Tandy zone (all the lands east of Ben Street), and restore the native prairie grasslands by removing eastern red cedar, mesquite, and other woody invasive species; clear the invading exotic species from bottomland hardwood understory and replant with native understory vegetation, and construct perimeter fencing to limit access from off road vehicle use and protect resources in the zone. In addition, there would be a parking lot added and approximately 7,700 linear feet of crushed aggregate trail for pedestrian usage. At the request of the local sponsor in a letter dated April 10, 2003, this plan is the “Locally Preferred Plan.” Figure 16 provides a display of the LPP.

Without the recreation features discussed above, those in Tandy and the new Gateway Park entrance road and bridge, along with the observation decks, this LPP replicates the “best buy” combination Plan 9 as identified in Table 15 in Chapter 4. In fact, Plan 9 was the ranked next highest to the NER plan in incremental cost per output. The restoration proposed for the LPP will increase average annual habitat unit gains in the project area by 74.44 over the NER plan. Working in conjunction with the local sponsor, this LPP has been selected as the recommended plan for the Riverside Oxbow, Trinity River, Fort Worth, Texas project.

Figure 16

ENVIRONMENTAL EFFECTS OF THE RECOMMENDED PLAN

General description. The basis of the plan formulation planning objectives for the Riverside Oxbow study was to restore ecosystem values through modification of existing resource features in the area. Following design of the restoration alternatives, minor recreational components that do not reduce restoration benefits were evaluated and added into the National Ecosystem Restoration plan. If the ecosystem restoration project is not built it is expected that a less environmentally sensitive use of the area would occur. More mowing, less management of invading non-native trees and shrubs in the riparian zone and the continued fragmentation of riparian resources caused by the Beach Street bridge would reduce fish and wildlife resources of the area during the study period. The project sponsor has developed a locally preferred plan that is based upon the NER but would also include additional restoration located within the Tandy Hills area south of IH-30. Increasing the size of the entire ecosystem restoration area would be expected to increase habitat benefits for the riparian ecosystem and provide an example of upland management that could prompt land owners, public and private, to consider removal of non-native vegetation from open areas upstream of the study area. Should that happen, resources of the Upper Trinity River basin would be further improved. It is also anticipated that the LPP would provide some, but currently non-quantifiable reduction in maintenance costs in the NER area due to anticipated future reduction of non-native invading plant species and reduced sedimentation within the aquatic components of the project.

Land Use. The study area includes undeveloped private lands and publicly owned properties. There currently is low demand for business development along the private lands and therefore implementation of the restoration plan would have minimal negative impact on future land use. Land use on the ecosystem restoration areas would remain essentially the same as currently conducted however; placing the entire area in public ownership and management for restoration and improvement of ecosystem values would provide a positive environmental benefit.

Hydrology and Hydraulics. Ecosystem restoration activities as proposed in the NER would increase wooded vegetation thereby slowing floodwaters and affecting valley storage in the study area. The NER plan incorporates hydraulic mitigation consisting of excavation of floodplain material near the south shoreline of the existing channelized segment of the West Fork. With the mitigation, the plan meets the criteria of the Environmental Impact Statement and Record of Decision (ROD) in 1988. Meeting these criteria minimize the cumulative hydraulic and hydrologic impacts of the project to the Upper Trinity River Basin. No significant impacts to hydrology or hydraulics would occur from implementation of the project.

Water Quality

The recommended plan involves increasing the amount of existing forest in the study area through the conversion of grass and shrub lands to forest. It also calls for the demolition and removal of the Beach Street bridge over the oxbow. Initially, construction and planting of vegetation could temporarily result in a slight increase in the suspended sediment load in the study area from stormwater runoff across newly vegetated areas. In addition, activities associated with the construction of the linear hiking trail and pedestrian bridge crossings could increase the sediment load on a temporary basis. The reconstructed bridge would span the stream channel and is not expected to cause any lasting adverse impacts on the water quality of the study area.

Numerous studies have addressed the buffering effects of vegetation. Iowa State University research shows that buffer strips are capable of removing more than 70 percent of the sediment from runoff flowing from slopes with grades as high as 12 percent. By slowing runoff, buffers give water time enough to soak into the soil, thereby reducing runoff volume. The vegetation then acts as a filter, removing sediments, heavy metals and hydrocarbons. Over time, the features of the recommended plan would be expected to be self-sustaining with respect to achieved improvements in water quality.

Implementation of the plan would have short-term negative impacts because of the demolition, reconstruction and vegetation management activities. The long-term effects of the buffering and filtering of vegetation as a result of restoration activities would offset any short-term negative impacts. There would be no significant adverse impacts to the water quality of the West Fork of the Trinity River from implementation of the plan, except on a temporary basis, and the restoration activities would positively impact water quality in the long-term.

Air Quality. One parameter to be potentially effected by the future conditions with the recommended project plan would be air quality. Implementation of the recommended plan entails increasing existing forest acreage by converting grasslands to forest.

The proposed increase to the size of the forest in the project area would add additional air pollutant removal capabilities to the existing forest and improve the quality of air. A computer model developed by the United States Department of Agriculture's (Urban Forest Effects [UFORE]) has been used to describe the effects which trees have on the removal of the five gaseous criteria pollutants in the Johnson Creek and Dallas Floodway

Extension study areas. Although this modeling effort was not conducted for the Riverside Oxbow, the past research has established that healthy riparian forest and grasslands have the capability to remove air pollutants.

No significant adverse impacts to air quality would occur from implementation of the LPP or NER Plan, rather, either should help to improve air quality in the area.

Terrestrial Resources.

Vegetation. Since the project, as proposed, is an ecosystem restoration plan including acquisition, preservation and management bottomland hardwoods and grass and shrubs lands for ecosystem restoration and passive recreational features such as a linear hiking trail and parking, picnic and facilities development, the overall environmental effects are expected to be positive.

The recommended plan would utilize the qualities of the existing topography and soils to develop additional forested habitat. Reforestation would be accomplished through forestry techniques for the trees, shrubs and seedlings, which would cause minimal disturbance to the soil. Disturbance to the existing habitat from the construction of recreation features would be kept to the minimal amount and size of disturbance possible. Safeguards to reduce soil erosion would be implemented as need during the construction of the recreational features and during the demolition and removal of structures in the evacuation/buyout area. The disturbed soils along the construction sites and in the buyout areas would be stabilized with native vegetation.

No significant adverse impacts to soils would occur from implementation of the plan and overall, would significantly increase the quality, size and continuity of the riparian bottomland forest in the project area, even when taking into consideration the provision of the recreational elements.

Wildlife Resources. The Riverside Oxbow lies within a highly developed metropolitan area that has been highly impacted by human activities. Generally the wildlife species found there are typical of those found in highly urbanized areas. The numbers and species of wildlife found in the area can be directly attributed to the habitat available for nesting, foraging, shelter, reproduction and rearing of offspring. Any improvements to the quality of the existing habitat or increases in the quantity of habitat would have positive effects on wildlife numbers and species.

Demolition and construction activities associated with the reconstruction of the Beach Street bridge, construction of wetlands and restoration of riparian forests within the project area and minor recreational trail access and subsequent activities associated with maintenance of ecosystem restoration and recreational features are expected to have insignificant short term negative impact on existing wildlife species. The acquisition of lands for ecosystem restoration and the increases in habitat quality and quantity are expected to positively impact the wildlife resources, especially neotropical songbirds, small mammals, fish that require local seasonal migration, amphibians and reptiles. Although not considered in the benefits at this time, the bridge replacement design will consider the potential for adding roosting habitat for bats and swallows. The

grassland/wetland/riparian complex that would result from the ecosystem restoration would provide an abundance of food, primarily small hovering insects that would be ideal prey. Currently little to no roosting habit occurs for bats and swallows in the study area.

No significant adverse impacts to wildlife resources would occur from implementation of the plan and it would significantly increase the quality and quantity of habitat in the project area. No environmental mitigation is needed for any aspect of the NER or LPP.

Aquatic Resources. Demolition and removal of the Beach Street bridge culvert coupled with restoration of continuous flow through the oxbow vegetation would significantly improve the quality of aquatic habitat in the Riverside Oxbow and contribute to improvements within the West Fork downstream of the confluence of the oxbow. The oxbow would also provide a beneficial low velocity hiding area for fisheries resources during West Fork during flooding events.

Development of forested areas around and over the stream would provide shade to help maintain water temperatures within optimum ranges for growth and development of aquatic organisms. More trees and vegetation within the riparian zone plus the native grass buffer along the wooded riparian area of the oxbow would improve the ability of corridor to provide buffering against environmental pollutants in stormwater runoff and balance the input of organic nutrients to the oxbow and ultimately the West Fork. Permanent aquatic resources of the Riverside Oxbow, aquatic resources of the ponded areas, and deeper pools of the proposed emergent wetlands would provide refugia during drought and intentional wetland management activities and would support a high diversity and resilient aquatic biota. Aquatic biota such as largemouth and spotted bass, white bass, bluegill, crappie, channel catfish, shiners, darters, zooplankton, aquatic insects, mussels, and various species of snails could ultimately inhabit the study area.

Implementation of the plan might also cause minor short-term negative impacts to the aquatic resources in the study area during the demolition and construction phase of the project until channel conditions stabilize. However, in the long run, because of the buffering and shading effects of vegetation along the riparian zone, the long-term impacts are expected to be positive.

No significant adverse impacts to aquatic resources would occur from implementation of the plan and over time the project would result in significantly increased quality of aquatic habitat in the project area

Wetlands. Within the project area, 15.1 acres of vegetated emergent wetlands were identified. The wetlands identified are in remnant depressions caused by disturbances related to implementation of the previous West Fork channelization within the drying beds of the abandoned wastewater treatment plant in the existing Gateway Park. Some additional wetland vegetation was observed along the banks of the existing West Fork of the Trinity River channel. A gravel pit and associated wetlands complex in the Gateway Beach zone are currently the most active from a wildlife utilization perspective. The project as proposed would modify the drying beds, enlarge a small ephemeral wetland in the Oxbow Central area provide hydraulic stabilization at an existing pond in Oxbow North zone and provide grading and dependable water supply for wetlands in the Gateway Beach zone. Modifications at these sites would improve the quality of the existing

wetlands through enlargement and through operation and management. Following project implementation there would be a complex of wetlands, including deeper water refugia and riparian fringe. Wetlands would comprise 56.5 acres of the 69.6- acre wetland complex.

General Aesthetics.

Noise. Sound levels within the Riverside Oxbow study area are typical of those found in urban neighborhoods within the Dallas-Fort Worth Metroplex. Noise levels in the area would be expected to increase for a short time while demolition and construction activities are ongoing as a result of the added noise of heavy equipment and workers in the area. However, over the long run increasing the amount of forest in the area along the Riverside Oxbow corridor should buffer the sounds of traffic and general noise to and from the area.

Light. The only lighting proposed for the recommended plan would be located in the parking lots at the access areas. The lighting would be to provide security only and would be of a low light type mounted high with cut-offs to prevent stray light from impacting adjacent residential areas. Therefore, there would be no significant adverse impacts caused by lighting requirements for the proposed project with either plan. Projects proposed by others might cause additional lighting impacts, however, lighting affecting the area would be required to be directional thereby minimizing any affects to ecosystem restoration benefits.

Traffic Patterns. There would be temporary impacts to traffic patterns caused by the reconstruction of Beach Street Bridge. There would be no significant adverse impacts on local traffic patterns with implementation of other measures of either the LPP or NER plans. Motorized vehicles would be restricted to the streets leading to the parking lots and access points. Efforts to notify the public of the temporary disruption of traffic flow across this area and to alert the public to alternative travel means will be conducted to minimize public inconvenience.

Sustainability. Ecosystem restoration features proposed would facilitate long-term sustainability of resources with minimal exterior inputs. Some additional maintenance would be required during establishment of vegetation and riddance of nuisance invaders, however, the overall plan would ultimately result in a mature riparian ecosystem that is stable needing less maintenance that would be required to maintain other land uses. The emergent wetlands proposed would require a higher rate of maintenance due to the need to provide an artificial watering regime to optimize habitat benefits. Due to the overall management of the Upper Trinity River system that has produced tremendous economic benefits to the public by reducing flood damages, no other means other than pumping appear feasible for restoring the emergent wetlands. The incremental analysis conducted during this study support the wetland restoration, due the high quality and diversity these features would provide.

STATUS OF ENVIRONMENTAL COMPLIANCE

Section 404 - Clean Water Act. The proposed project has been reviewed in accordance with Section 404 of the Clean Water Act. The recommended plan is primarily an ecosystem restoration plan with associated minor recreational trail development. The proposed project meets the terms and conditions of nationwide permit 27 for Stream and Wetland Restoration Activities. The State of Texas has reviewed and provided water quality certification for nationwide permit 27, and no further evaluation of Section 404 of the Clean Water Act is necessary.

Section 10 of Rivers and Harbors Act. Navigability extends up the West Fork of the Trinity River to Riverside Drive. Therefore the project has been reviewed for compliance with Section 10. Stream flow diversion from the impounded section of the channelized West Fork would be diverted for stream restoration within Riverside Oxbow. During low flow events the diversion would be approximately 2 to 3 cubic feet per second or approximately 25% of the flow in the West Fork during those events. However, because of the existing dam structure below Beach Street on the channelized segment, no modification to depths or navigability would result. The proposed restoration activities would not affect navigability and therefore the project is in compliance with Section 10.

Executive Order 11988 - Flood Plain Management. In addition to Section 404, Executive Order 11988, Floodplain Management, was considered during the development of the proposed project. There are no practical alternatives to achieve the project purposes of ecosystem restoration and recreation trail development without placing fill within the floodplain. Material removed from the project area requiring disposal, as part of the plan, would be placed in approved landfills for the types of materials involved. The proposed fill actions would not result in adverse environmental impacts and further, floodplain fill for recreational trail and ecosystem restoration would not directly or indirectly induce additional development in the floodplain and would therefore be in compliance with Executive Order 11988.

Executive Order 11990 - Protection of Wetlands. Executive Order 11990, Protection of Wetlands was considered during the development of the proposed project. The proposed project would increase the size and quality of wetlands in the area without adversely impact existing wetland areas so the project is in compliance with Executive Order 11990.

Construction Storm Water. The Texas Pollutant Discharge Elimination System (TPDES) program as of March 5 2,003 implements the National Pollutant Discharge Elimination System. The TPDES Construction General Permit is administered by TCEQ for two different phases of construction based upon size of the disturbance. The project as proposed will likely cause disturbance to more than one acre of soils, and prior to commencement of construction a stormwater pollution prevention plan will be developed a Notice of Intent will be submitted to the TCEQ, followed by submittal of a Notice of Termination once the construction site has reached final stabilization.

Threatened and Endangered Species. The U.S. Fish and Wildlife Service has reviewed the proposed project and provided concurrence that the proposed the project is not likely to adversely affect threatened or endangered species. Prior to construction a review would be conducted to determine if additional new species or impact information become available sufficient to warrant further consultation.

Environmental Justice. Implementation of the proposed project would not cause any adverse impacts to the economically depressed or minority areas adjacent to the study area. The project would improve existing environmental conditions that could enhance the values of adjacent lands. Other than the temporary impacts attributable to impaired traffic flow associated with the Beach Street bridge removal, no impacts to residents adjacent to the area should occur. The project is compliance with the Executive Order on Environmental Justice.

Cultural Resources. Cultural resources compliance issues for the Riverside Oxbow study have been addressed through consultation with the Texas State Historic Preservation Office (SHPO) in accordance with Section 106 of the National Historic Preservation Act. On site investigations (Cultural Resources Assessment of Riverside Oxbow Environmental Restoration, Fort Worth, Tarrant County, Texas) resulted in the identification of historic archeological properties that could be impacted by excavation of the proposed return channel from the Oxbow Central Zone wetlands. As a result of that finding, the channel's alignment was modified to avoid those historic properties. The SHPO has tentatively concurred with the Corps' proposal to survey the modified alignment prior to construction so that final adjustments can be made as required to avoid any undiscovered historic properties. Correspondence related to the Cultural Resources consultation is located within the correspondence section of the Feasibility Report.

Cumulative Impacts. The Corps of Engineers has conducted a Programmatic Environmental Impact assessment (PEIS, 2000) that addresses cumulative impacts of Corps of Engineers proposed activities associated with the Upper Trinity River Basin. That document identified concern related to the continued loss of riparian or bottomland forests and wetlands within the study area. The NER and the LPP would not result in adverse cumulative impacts to the resources identified as important in the PEIS. The project would provide improvement to those resources. The hydraulic and hydrologic impacts would be mitigated as identified in the plan and therefore would also be in compliance with criteria identified during a previous Programmatic EIS for the Corps Regulatory program. Therefore the NER and LPP would not cause negative cumulative impacts to resources of significance as identified during this and past studies.

ECONOMIC ANALYSIS

First Costs. The first costs included lands and damages, utility relocation, dams, channels and canals, fish and wildlife facilities, roads and bridges, planning, engineering, and design costs, and project management. Table 18 displays the summary of the estimated first costs for the NER and LPP/Recommended plans. These costs are based on detailed design and final cost estimating as incorporated in MCACES documents (see Appendix J, Cost Estimating). Real estate costs are based on the Real Estate Plan that was completed in October 2002 (Appendix E).

Table 18
Summary of First Costs
NER and LPP Plans
(October 2002 price level)

Work Item	NER Plan	Locally Preferred Plan
Lands and Damages ⁽¹⁾	\$3,306,000	\$6,178,000
Utility Relocations	\$788,000	\$788,000
Dams	\$144,000	\$144,000
Channels and Canals	\$589,000	\$589,000
Fish and Wildlife Facilities	\$5,188,000	\$5,378,000
Roads and Bridges ⁽²⁾	\$1,382,000	\$5,218,000
Recreation Facilities ⁽³⁾	\$1,224,000	\$1,356,000
Planning, Engineering, and Design ⁽⁴⁾	\$792,000	\$1,195,000
Construction Management ⁽⁵⁾	\$939,000	\$1,352,000
Total First Cost	\$14,352,000	\$22,198,000

⁽¹⁾ For the Locally Preferred Plan, \$14,000 of land and damage cost is assigned to recreation – see Table 15 cost apportionment.

⁽²⁾ For the Locally Preferred Plan (LPP), the cost of this item includes Gateway access (\$476,000) and Park Road Bridge (\$3,304,000) – both assigned to recreation; and \$56,000 for observation decks was assigned to restoration. All these items are cost shared at 100% local cost. (see Table 15)

⁽³⁾ For both the NER and LPP, \$381,000 was assigned to restoration for the upgrade of the recreation trail to allow vehicular access for operation and maintenance. The LPP also includes \$132,000 for the soft trail (\$83,500) and parking (\$48,500) in Tandy Hills – see Tables 14 and 15 for a summary of the cost apportionment.

⁽⁴⁾ For the NER plan, \$92,000 is apportioned to utility relocations, \$631,000 to restoration, and \$69,000 to recreation. For the LPP, \$92,000 is apportioned to utility relocations, \$472,000 for recreation (\$69,000 to trails and \$403,000 for access and bridge relocation), \$631,000 to restoration – see Tables 14 and 15 for a summary of the cost apportionment.

⁽⁵⁾ For the NER plan \$79,000 is apportioned to utility relocations, \$775,000 to restoration, and \$85,000 to recreation. For the LPP, \$79,000 is apportioned to utility relocations, \$796,000 to restoration, and \$477,000 to recreation – see Tables 14 and 15 for a summary of the cost apportionment.

Table 19 displays the equivalent annual costs and benefits of the NER plan for both restoration and recreation components.

Table 19
Equivalent Annual Costs and Benefits - NER Plan
(October 2002 price level, 50-Year Period Analysis, 5.875% Discount Rate)

Costs and Benefits	Restoration	Recreation	TOTALS
First Costs:			
First Costs	\$13,355,000	\$997,000	\$14,352,000.00
Interest During Construction	\$1,212,000	\$29,000	\$1,241,000.00
Total Investment Cost	\$14,567,000	\$1,026,000	\$15,593,000.00
Annual Costs:			
Interest and Amortization of Initial Investment	\$908,100	\$64,000	\$972,100.00
OMRR&R (average)	\$61,000	\$15,000	\$76,000.00
Total Average Annual Cost	\$969,100	\$79,000	\$1,048,100.00
Annual Restoration Benefits:			
Recreation		\$805,100	
As Average Annual Habitat Units	421.45		
Recreation Benefit Cost Ratio	10		

Tables 20 and 21 display the Federal and non-Federal cost apportionments for the NER and LPP/Recommended plans, respectively.

Table 20
Cost Apportionment - NER Plan (October 2002 price level)

Item	Restoration Costs	Recreation Costs	Total Cost
First Costs	\$13,355,000	\$997,000	\$14,352,000
Federal Share	\$8,680,000	\$498,500	\$9,178,500
Non-Federal Share	\$4,675,000	\$498,500	\$5,173,500
Non-Federal Share Summary:			
Lands and Damages	\$3,306,000	\$0	\$3,306,000
Utility Relocations ⁽¹⁾	\$959,000	\$0	\$959,000
Cash Payment	\$410,000	\$498,500	\$908,500
Total Non-Federal Share	\$4,675,500	\$498,500	\$5,173,500

⁽¹⁾ Includes \$788,000 for construction, and \$171,000 in engineering, design, supervision, and administration.

Table 21
Cost Apportionment - Locally Preferred/Recommended Plan
(October 2002 price level)

Item	Restoration Costs	Recreation Costs	Total Cost
First Costs	\$16,480,000	\$5,718,000	\$22,198,000
Federal Share	\$8,680,000	\$498,500	\$9,178,500
Non-Federal Share	\$7,800,000	\$5,219,500	\$13,019,500
Non-Federal Share Summary:			
Lands and Damages	\$6,164,000	\$14,000	\$6,178,000
Utility Relocations ⁽¹⁾	\$959,000	\$0	\$959,000
Access and Bridge Relocation ⁽²⁾	\$0	\$4,660,000	\$4,660,000
Cash Payment	\$677,000	\$545,500	\$1,222,500
Total Non-Federal Share	\$7,800,000	\$5,219,500	\$13,019,500

⁽¹⁾ Includes \$788,000 for construction, and \$171,000 for engineering, design, supervision, and administration.

⁽²⁾ Includes \$3,780,000 for construction, and \$880,000 in engineering, design, supervision, and administration

OPERATIONS, MAINTENANCE, REPAIR, REHABILITATION AND REPLACEMENT

The Federal Government and Tarrant Region Water District (TRWD) will enter into a project cooperation agreement (PCA) under which TRWD would accept the project following completion of construction and ensure operation, maintenance, repair, rehabilitation, and replacement (OMRR&R), in accordance with Federal regulations. The major items involved include maintaining restoration areas (native grassland buffer, native grasslands/tree mottes, reforestation plots, and wetlands), maintain the oxbow channel, including the plug opening, the Beach Street bridge, and the in-channel weir, and maintenance of the access trails, both concrete and crushed aggregate, as well as the parking lots and restroom facilities. An operations and maintenance manual would be prepared by the Fort Worth District after completion of the project, and periodic inspections would be conducted to ensure that all required maintenance is being performed. Table 22 summarizes the OMRR&R costs.

Table 22
Breakdown of OMRR&R Costs
(October 2002 Price Levels)

Ecosystem Restoration:	
Wetland maintenance	\$12,500
Water Supply	\$12,500
Riparian Forest/stringers	\$18,000
Native Grassland	\$10,000
Oxbow Channel maintenance	\$16,000
Access	\$3500
Total— Ecosystem Restoration	\$72,500
Recreation	
Access	\$4,000
Observation Decks	\$2,000
Parking Lot	\$1,000
Restroom	\$8,000
Total—Recreation	\$15,000
Total OMRR&R	\$87,500

NON-FEDERAL RESPONSIBILITES

Prior to commencement of construction, local interests must agree to meet the requirements for non-Federal responsibilities, as summarized below and in future legal documents. The final non-Federal responsibilities will be detailed in the PCA. In addition, a Reconstruction Engineering and Design (PED) will be executed for the project prior to preparation of plans and specifications.

a. Provide 35 percent of the separable project costs allocated to environmental restoration and 50 percent of the separable project costs allocated to recreation, as further specified below:

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

(2) Provide, during construction, any additional funds needed to cover the non-federal share of design costs.

(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 the project.

(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 the project.

(5) Provide, during construction, any additional costs as necessary to make its total contribution equal to 35 percent of the separable project costs allocated to environmental restoration and 50 percent of the separable project costs allocated to recreation.

b. Provide 100 percent of the costs of construction of the locally preferred plan (LPP), which are in excess of the costs of construction of the national ecosystem restoration (NER) plan.

c. Provide 100 percent of the cost of all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas for the LPP, and perform or assure the performance of all relocations determined by the Federal Government, after consultation with the city, to be necessary for the construction, operation, and maintenance of the LPP.

d. For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, including mitigation features, at no cost to the Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and any specific directions prescribed by the Government in the OMRR&R manual and any subsequent amendments thereto.

e. Give the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local 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.

f. 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 sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.

g. Hold and save the Government 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 Government or the Government's contractors.

h. 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.

i. 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 USC 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.

j. 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.

k. To the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the project and otherwise perform its obligations in a manner that will not cause liability to arise under CERCLA.

l. Prevent future encroachments on project lands, easements, and rights-of-way, which might interfere with the proper functioning of the project.

m. 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.

n. 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."

o. Provide the non-Federal share of that portion of the costs of mitigation and 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 cost sharing provisions of the project cooperation agreement;

p. 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.

q. Provide and maintain necessary access roads, parking areas, and other public use facilities, open and available to all on equal terms.

r. Obtain all necessary water rights for the operation of the project.

FINANCIAL ANALYSIS

Financial Commitment. Table 23 displays a summary of the total financial obligation of the non-Federal sponsor(s) over the life of the project. The total financial obligation of the non-Federal partner(s) during project implementation is estimated at \$9,240,500; the annual non-Federal obligation for operation, maintenance, repair, rehabilitation, and replacement is estimated at \$76,000 at the current price level. Table 24 displays their financial obligation by fiscal year.

Table 23
Summary of Non-Federal Sponsor Financial Obligation

Total Project Cost – Recommended Plan	\$ 22,198,000
Total Federal Share	\$ 9,178,500
Total Non-Federal Share:	
Total Lands and Damages	\$ 6,178,000
Net Lands Currently Owned / Donated ⁽¹⁾	<u>\$ (3,779,000)</u>
Financial Cost of Land to be Acquired	\$ 2,399,000
Relocations	\$ 5,619,000
Cash	<u>\$ 1,222,500</u>
Total Financial Obligation (Implementation)	\$ 9,240,500
Total Annual OMRR&R ⁽²⁾	\$ 76,000

⁽¹⁾ Land currently owned by TRWD and donated by the city of Fort Worth.

⁽²⁾ Operation, maintenance, repair, rehabilitation, and replacement

Table 24
Schedule of Federal and Non-Federal Expenditures

	Federal <u>Cash</u>	<u>Cash</u>	Non-Federal <u>Lands/Relocations</u>	<u>Total</u>
Implementation				
FY 2003	\$ 300,000	\$ 100,000	\$ 0	\$100,000
FY 2004	\$ 1,350,000	\$ 395,000	\$ 1,500,000	\$1,895,000
FY 2005	\$ 2,000,000	\$ 0	\$ 3,400,000	\$3,400,000
FY 2006	\$ 2,000,000	\$ 240,000	\$ 3,118,000	\$3,358,000
FY 2007	\$ 2,000,000	\$ 240,000	\$ 0	\$240,000
FY 2008	<u>\$ 1,528,500</u>	<u>\$ 247,500</u>	<u>\$ 0</u>	<u>\$247,500</u>
Total	\$ 9,178,500	\$ 1,222,500	\$ 8,018,000	\$9,240,500

Statement of Financial Capability. The statement of financial capability is based on information provided by the Tarrant Regional Water District (TRWD), and is a description of its capability to meet its financial obligations for the recommended plan. The TRWD is a political subdivision of the State of Texas formed in 1924 with the purpose of water supply and flood control. One of the largest raw water suppliers in the state, TRWD serves over 30 wholesale customers (over 1.5 million users), including Fort Worth, Arlington, Mansfield, and the Trinity River Authority of Texas. TRWD owns and maintains four reservoirs and utilizes three others for terminal storage, and also maintains the Fort Worth Floodway - Floodway Levee System. In addition, TRWD is involved in reclamation and construction of facilities, and has power of eminent domain, the right to sue to protect water rights, the right to transfer water rights, developing hydroelectric projects, and selling of hydroelectric rights. Cooperation with other governmental entities is permitted. Contributions by others can be tax revenue or bond proceeds.

TRWD had General Fund and Capital Projects Fund assets and other debits totaling \$19,847,000 and \$15,882,000 for fiscal years (FY) 2001 and 2002 (ending September 30), respectively. These assets are comprised of government fund types (general and capital projects) as well as general fixed assets. Total liabilities for the same time periods were \$2,309,000 and \$1,827,000, respectively.

Within the government fund types TRWD had total revenues (from the sale of water, property taxes, land lease rentals, oil and gas royalties, sale of rock and gravel, and investment income) of \$27,213,000 and \$7,312,000, compared to expenditures of \$9,275,000 and \$14,049,000 in FY 2001 and 2002, respectively. When taking into account non-operating revenues and expenses, and retained earnings/fund balance at the beginning of the year, the retained earnings/fund balances for FY 2001 and FY2002 were \$17,475,000 and \$14,055,000, respectively.

Financing Plan. The financing plan describes TRWD capabilities to meet its financial obligation for the recommended plan. According to TRWD, they plan to fund their portion of the recommended plan including real estate acquisitions and a cash payment using funds available from their general and capital projects funds. Together, the amount of cash and cash equivalents total \$12,235,330,000 and \$13,136,000 in FY 2001 and 2002, respectively. TWRD is currently developing their FY 04 and beyond budgets to satisfy their financial obligation for project implementation. TRWD will annually budget and fund their operation, maintenance, repair, rehabilitation, and replacement from their general fund. The financing plan does not require the passage of a future bond election.

Assessment of Financial Capability. Based on the above review of TRWD's financial capabilities and proposed financing plan, it is reasonable to expect that TRWD has ample resources available to satisfy the non-Federal financial obligation of the recommended plan. Their balance sheet demonstrates significant assets in excess of liabilities, and their anticipated cash flow and available cash balances are more than sufficient to satisfy their financial obligations.

PUBLIC INVOLEMENT

Purpose of Program. This feasibility study focused on the development of a feasible, environmentally acceptable, publically supportable ecosystem restoration plan. Numerous meetings and conversations have been held with various entities and interested citizens to share the latest possible information and to focus this study toward investigating the most viable solutions. In addition, various public workshops/meetings were held in the study area for the citizens to give input into the problems and possible solutions, as stipulated by Public Law 99-662 and Public Law 104-303.

Participants. Study participants worked closely over a seventeen-month period in an effort to inform and involve interested citizens in the study area. The entities involved in this effort include the Fort Worth District (Corps of Engineers), city of Fort Worth, Tarrant Regional Water District, Streams and Valleys, Inc., the U.S. Fish and Wildlife Service, and Texas Parks and Wildlife Department (TPWD). Additionally, TRWD consultants, GideonToal, have participated in many of the meetings. The staff and representatives of these entities have work diligently to answer citizen questions and concerns.

Public Workshops. As part of the Trinity River Vision Master Plan work efforts, a series of over 58 public meetings were held with local citizens and local interest groups about the future of the Trinity River and its major tributaries in Fort Worth, Texas. Two public meetings were held specifically with local citizens interested in the river segment including the Riverside Oxbow area. The sign-in sheets and the minutes of those meetings are included in Appendix L, Public Review/Involvement. In addition, in approximately the same time frame as the Riverside Oxbow study, the Parks and Community Services Department of the city of Fort Worth was holding a series of public meetings with citizens interested in updating a Master Plan for the Gateway Park area. Both of these on-going public participation venues offered us the opportunity to seek public input on citizens in regards to the Riverside Oxbow project.

Public Review. The Notice of Availability of the draft report and integrated environmental assessment (EA) was mailed on April 14, 2003, to approximately 25 agencies and individuals who had indicated an interest in receiving and reviewing the document. Comments received during the 30-day public comment period, and respective responses will be included in Appendix K.