CHAPTER 5

TENTATIVELY SELECTED PLAN

This chapter provides further details on the Tentatively Selected Plan, as determined in the preceding chapters of this report. As shown in Chapter 4, the flood damage reduction and ecosystem restoration components of this plan are identical to the National Economic Development (NED) Plan. Pertinent data is presented for each damage center individually, and summarized on a cumulative basis. Detailed cost estimates were developed using August 2006 price levels and the 2006 Federal interest rate of 5.125% and are presented as categorized in the various MCACES accounts. Federal and non-Federal cost apportionment responsibilities are also presented.

TENTATIVELY SELECTED PLAN FEATURES

TIMBER CREEK

Flood Damage Reduction and Recreation

The Tentatively Selected Plan for Timber Creek would consist of the acquisition and removal of 81 residential structures and 90 parcels of land in the 4% ACE floodplain. The locations of these structures are located on Figure 5-1. A complete list of the addresses of the structures is located in Appendix E, Real Estate.

Permanent closure of several streets, or parts thereof, would be recommended in conjunction with this plan. The affected streets would include Hedgerow, Ascot, Benson, Timber Creek, and Foxhead.

The total cost of acquisition, demolition and disposal of these structures was estimated at approximately $7,047,000. An additional $1,823,000 would be required in relocation assistance. Therefore, the total first cost of the flood damage reduction is estimated at $8,870,000.

The Tentatively Selected Plan would combine recreation facilities on 40 acres of lands vacated for flood damage reduction purposes to form a multipurpose project. Figure 5-2 displays the recommended recreation facilities for Timber Creek. The proposed plan recommends constructing 20 picnic shelters, 8 small group shelters, 1 large group shelter, 5,300 feet of unpaved trails and 1,200 feet of paved 10 foot wide trails, 2 basketball courts, one waterborne restroom, 12,000 square feet of parking and the infrastructure associated with these facilities. The recreation facilities are explained in detail in Appendices F and G. The recreation facilities would have a total first cost of approximately $1,550,000. Since current regulations do not allow the Corps to cost share in the construction of certain recreation features, including basketball courts, these items would be 100% local sponsor expense. The costs for these items are estimated at approximately $104,000. Table 5-1 contains pertinent data for the Timber Creek Tentatively Selected Plan.

As shown in the Economic Analysis section later in this chapter, current regulations allow the costs and benefits of recreation features constructed on lands vacated by the acquisition and removal of structures to be included in the calculation of economic justification for non-structural flood damage reduction plans.

Table 5-1 **Pertinent Data** **Tentatively Selected Plan** **Timber Creek** (2006 Price Levels)	
Project Feature	**Tentatively Selected Plan**
Flood Damage Reduction	
ACE Zone Affected	4%
Total Number of Structures Removed	81
Estimated First Cost	$8,870,000
Ecosystem Restoration	
Number of Acres Acquired	16
Number of AAHU Gained	5.86
Estimated First Cost	$325,000
Recreation Features – Vacated Land:	
First cost of Recreation Features	$1,550,000
Total First Cost, All Purposes	**$10,745,000**

Ecosystem Restoration

An incremental analysis was performed to identify the most effective ecosystem restoration measure which could be implemented to best meet the environmental needs identified within the creek corridor. This analysis can be found in Appendix B under the Onion Creek Combined Ecosystem Restoration Plan.

The Tentatively Selected Plan would include the acquisition of 4 vacant parcels and use of land vacated by the flood damage reduction measure for a total of 16 acres that would be restored to riparian woodlands. This plan would include approximately 2 acres of existing grasslands, 6 acres of woodlands, and 8 acres of parklands as shown on Figure 5-3. The restoration would be accomplished by planting a mix of native species identified in Appendix B, Addendum B-3, and using the following quantities by covertype:

Grassland Conversion: 300 trees, 150 shrubs, and woodland grass forbs mix per acre
Woodland Conversion: 75 trees, 100 shrubs, and woodland grass and forbs mix per acre
Parkland/Residential Conversion: 200 trees, 250 shrubs, and woodland grass and forbs mix per acre

The first cost of the ecosystem restoration features, including real estate acquisition, restoration costs, and contingencies total approximately $325,000. These features would yield gains of 5.86 AAHU over the “No Action” Plan. The average annual cost (AAC) per AAHU would be $3,700. This area has a low AAC/AAHU because all joint land costs were allocated to flood damage reduction.

ONION CREEK FOREST/YARRABEE BEND

Flood Damage Reduction and Recreation

The Tentatively Selected Plan for this area of interest would consist of the acquisition and removal of 410 residential structures located in the 4% ACE floodplain. The locations of these structures are displayed on Figure 5-4. A complete list of these structures, by address, is located in Appendix E, Real Estate.

Permanent closure of several streets, or parts thereof, would be recommended in conjunction with this plan. The affected streets would include Antoine Circle, Catclaw Court, Dixie Drive, Firefly Drive, Foy Circle, Glow Worm Drive, Honeybee Bend, Ladybug, Little Cypress Lane, Onion Creek Crossing Court, Onion Creek Crossing Drive, Onion Creek Drive, Orleans Drive, Sand Hill Drive, Shady Cedar Drive, Springville Lane, Thatch Court, Thatch Lane, Thornhill Drive, Thornwood Court, Thornwood Drive, Vine Hill Drive, Walkingstick Lane, and Wild Onion Drive.

The total cost of acquisition, demolition and disposal of these structures was estimated at approximately $52,582,000. An additional $11,070,000 would be required in relocation assistance. Therefore, the total first cost of the flood damage reduction is estimated at $63,652,000.

The Tentatively Selected Plan would combine recreation facilities on lands vacated for flood damage reduction purposes to form a multipurpose project. Figure 5-5 displays the recommended recreation facilities for Onion Creek Forest/Yarrabee Bend. The proposed plan recommends constructing 32 picnic shelters, 32 small group shelters, 1 large group shelter, 7,860 feet of unpaved trails and 9,680 feet of paved 10 foot wide trails (including 1 footbridge), 7,400 feet of equestrian trails, 4 basketball courts, 2 tennis courts, 19 volleyball courts, one waterborne restroom, 20,000 square feet of parking and the infrastructure associated with these facilities. The recreation facilities are explained in detail in Appendices F and G. The recreation facilities would have a total first cost of approximately $4,062,000. However, since current regulations do not allow the Corps to cost share in the construction of certain recreation features, including basketball courts, tennis courts and volleyball courts, the costs for those items, estimated at $420,000, would be borne entirely by the non-Federal sponsor. Table 5-2 contains pertinent data for the Onion Creek Forest/Yarrabee Bend Tentatively Selected Plan.

Table 5-2 **Pertinent Data** **Tentatively Selected Plan** **Onion Creek Forest/Yarrabee Bend** (August 2006 Price Levels)	
Project Feature	**Tentatively Selected Plan**
Flood Damage Reduction	
ACE Zone Affected	4%
Total Number of Structures Removed	410
Estimated First Cost	$63,652,000
Ecosystem Restoration	
Number of Acres Acquired	190
Number of AAHU Gained	56.76
Estimated First Cost	$4,267,000
Recreation Features – Vacated Land:	
First cost of Recreation Features	$4,062,000
Total First Cost, All Purposes	**$71,981,000**

Ecosystem Restoration

An incremental analysis was performed to identify the most effective ecosystem restoration measure which could be implemented to best meet the environmental needs identified within the creek corridor. This analysis can be found in Appendix B under the Onion Creek Combined Ecosystem Restoration Plan.

The Tentatively Selected Plan would include the acquisition of 190 acres of land, some being vacated by the flood damage reduction measure, which would be restored to riparian woodlands. This plan would include approximately 22 acres of existing grassland, 61 acres of woodland, 24 acres of residential, 63 acres of transitional woodland, 18 acres of parkland, 1 acres of utility, 1 acre of bareland as shown on Figure 5-6. The restoration would be accomplished by planting a mix of native species identified in Appendix B, Addendum B-3, and using the following quantities by covertype:

Grassland Conversion: 300 trees, 150 shrubs, and woodland grass forbs mix per acre
Woodland Conversion: 75 trees, 100 shrubs, and woodland grass and forbs mix per acre
Parkland/Residential Conversion: 200 trees, 250 shrubs, and woodland grass and forbs mix per acre
Urban/Bare Ground Conversion: 300 trees, 150 shrubs, and woodland grass forbs mix per acre
Transitional Conversion: 75 trees, 100 shrubs, and woodland grass and forbs mix per acre

The first cost of the ecosystem restoration features, including real estate acquisition, restoration costs, and contingencies would total approximately $4,267,000. These features would yield gains of 56.76 AAHU over the “No Action” Plan. The average annual cost would be approximately $289,000. The AAC per AAHU would be about $5,100. This area has a low AAC/AAHU because some of the land cost was allocated to flood damage reduction.

BEAR/ONION CONFLUENCE

Flood Damage Reduction

Upon completion of the Real Estate Gross Appraisal for the Bear/Onion Confluence Tentatively Selected Plan, it was discovered that the real estate costs were higher than originally estimated, which resulted in a lower than unity benefit-to-cost ratio. The estimated first cost of the Tentatively Selected Plan attributed to flood damage reduction for this area was $1,312,000. The average annual cost for flood damage reduction was approximately $73,000. The total average annual benefits from flood damage reduction were about $31,000 which resulted in a benefit-to-cost ratio of 0.4. Since the project is recommended to be multi-purposed, some of the project costs could be allocated to other purposes. A Separable Costs Remaining Benefits Analysis was performed to allocate cost appropriately (Table 5-3). This analysis resulted in the average annual cost of flood damage reduction being $35,000 with the same benefits listed above. The final result was a benefit-to-cost ratio of 0.89. Since this benefit-to-cost ratio was still below unity, the Bear/Onion Confluence was removed from consideration for implementation as part of the Tentatively Selected Plan.

Ecosystem Restoration

An incremental analysis was performed to identify the most effective ecosystem restoration measure which could be implemented to best meet the environmental needs identified within the creek corridor. This analysis can be found in Appendix B under the Onion Creek Combined Ecosystem Restoration Plan.

However, since the flood damage reduction portion of the project was not economically justified and would not be implemented as part of the Tentatively Selected Plan, the benefits and the acreage of ecosystem restoration would be reduced because the land that would have been bought for flood damage reduction would not be available for restoration. This reduction, coupled with the sponsor's primary desire to provide flood damage reduction benefits to its citizens, resulted in the Bear/Onion Confluence ecosystem restoration component being removed from consideration for implementation of the Tentatively Selected Plan, as well.

Table 5-3
Bear/Onion Confluence
Separable Cost Remaining Benefits Analysis
(August 2006 Prices, 5.125 % Interest Rate, 50-year Analysis)

	FDR	***ER***	***Total***
Average Annual Benefits	$31,000	6.15 AAU	$31,000+ 6.15 AAU
Single Purpose Alternative Cost	$73,000	$98,000	$171,000
Limited Benefits/Costs	$31,000	$98,000	$171,000
Separable Costs	$0	$6,000	$6,000
Remaining Benefits	$31,000	$92,000	$122,000
Percent of Total	25.2%	74.8%	
Joint Costs			$138,000
Allocated Joint Cost	$35,000	$103,000	
Total Allocation	$35,000	$109,000	$144,000
BCR or $/AAHU	0.89	$18,000	
Net Benefits	$0		

WILLIAMSON CREEK

Flood Damage Reduction and Recreation

The Tentatively Selected Plan would consist of a structural project containing channel modifications. The channel modification would consist of excavation of the immediate overbank of one side of the creek on a flat grade for a certain distance, thereby creating a benched effect, with a subsequent transition to a 3-foot horizontal to a 1-foot vertical slope to natural grade. About 15 acres of land would be excavated over approximately 8,500 linear feet of creek in the four reaches, as shown on Figure 5-7. A breakdown by reach is shown in Table 5-4.

Table 5-4
Proposed Excavation by Reach

Reach	LF of Creek	Acres of Excavation	CY of Excavation
Heartwood	1,200	2.2	10,000
Radam	1,400	2.4	8,200
Broken Bow	2,900	4.2	15,600
Bayton Loop	3,000	6.2	38,600
Total	**8,500**	**15**	**72,400**

Modifications in the Heartwood reach would consist of a 1,200-foot long improved channel, with benching on the right bank between Heartwood Drive and Congress Avenue South. The width of the bench would vary from 0' to 160'. This benching would protect houses along Heartwood Drive from flooding during less severe floods, with start of damages occurring at about the 4% ACE event.

Modifications in the Radam reach would consist of a 1,400-foot long improved channel, with benching on the right bank. The width of the benching would be from 0' to 300'. This stretch of Williamson Creek is between Radam Circle and Meadow Creek Drive. The Emerald Forest Drive bridge crosses this improved channel, but the bridge would not be modified. The improved channel would increase the flood protection for houses on both sides of Williamson Creek, with start of damages occurring at about the 4% ACE event. One house at the end of Radam Circle closest to Williamson Creek would be purchased and removed because the benching would extend right next to the structure.

Modifications in the Broken Bow reach would consist of a 2,900-foot long improved channel, with 2,000 feet of benching on the right bank and 900 feet of benching on the left bank. The benching would occur between Manchaca Road and Jones Road. The width of the benching would be from 0' to 130'. Houses along Broken Bow and Buckskin Streets would not be flooded as frequently after the excavation, with start of damages occurring at about the 1% ACE event.

Modifications in the Bayton Loop Reach would consist of a 3,000-foot long improved channel. Approximately 900 feet of the improved channel would be on the left bank and 300 feet on the right bank of Williamson Creek, upstream of the bridge at Westgate Boulevard. Downstream of the bridge, the benching would be on the right bank, and would extend for approximately 1,800 feet. The width of the benching would be from 0' to 250'. With this modification, start of damages would occur in the Bayton Loop reach at about the 10% ACE event.

The total economic first cost of the flood damage reduction project was estimated at approximately $5,845,000. Relocation assistance would be provided for one house in the Radam reach at an estimated cost of $27,000. Therefore, the total financial project cost would be about $5,872,000, as shown in Table 5-5. A recreational trail was initially included as part of the

Tentatively Selected Plan. However, as a result of public outreach and coordination with local residents, as discussed in Chapter 6 of this document, the city of Austin decided to omit the recreational trail from the Tentatively Selected Plan in this area. Since the trails do not affect the economic justification of the flood damage reduction or ecosystem restoration measures, removal of the recreation features would result in a smaller Federally Supportable Plan. Therefore, the Tentatively Selected Plan for Williamson Creek is designated as the revised Federally Supportable Plan for this area. Table 5-5 presents the pertinent data for this plan.

Table 5-5
Pertinent Data
Tentatively Selected Plan
Williamson Creek
(2006 Price Levels)

Project Feature	Tentatively Selected Plan
Flood Damage Reduction:	
ACE Zone Affected	1% - 10%
Estimated First Cost	$5,872,000
Ecosystem Restoration:	
Numbers of Acres Acquired	114
Number of AAHU Gained	43.76
Estimated First Cost	$12,059,000
Total First Cost, All Purposes	**$17,931,000**

Ecosystem Restoration

An incremental analysis was performed to identify the most effective ecosystem restoration measure which could be implemented to best meet the environmental needs identified within the creek corridor. This analysis can be found in Appendix B under the Williamson Creek Combined Structural Ecosystem Restoration Plan.

The Tentatively Selected Plan would include the acquisition of approximately 114 acres of land, which would be restored to riparian woodlands. This plan would include approximately 8 acres of grassland, 69 acres of woodland, 5 acres of residential, and 32 acres of parkland as shown on Figure 5-8. The restoration would be accomplished by planting a mix of native species identified in Appendix B, Addendum B-3 and using the following quantities by covertype:

Grassland Conversion: 300 trees, 150 shrubs, and woodland grass forbs mix per acre
Woodland Conversion: 75 trees, 100 shrubs, and woodland grass and forbs mix per acre
Parkland/Residential Conversion: 200 trees, 250 shrubs, and woodland grass and forbs mix per acre

The first cost of the ecosystem restoration features, including real estate acquisition, restoration costs, and contingencies total approximately $12,059,000. These features would yield gains of 43.76 AAHU over the “No Action” Plan. The average annual cost would be approximately $703,000, which would make the AAC/AAHU about $16,000. This cost is substantially higher than originally estimated due to extremely high land values within the area of interest, as determined by the Real Estate Gross Appraisal. The AAC/AAHU is also higher than the restoration plans in the Onion Creek area due to the recommendation of a structural flood damage reduction plan for Williamson Creek, which does not allow the opportunity to allocate land acquisition costs between the project purposes.

SUMMARY

As shown in Table 5-6, the total cost for the cumulative Tentatively Selected Plan for all areas within the Onion and Williamson Creek watershed would be approximately $100,491,000.

The total cost of acquisition, demolition, disposal, and construction of the benches in both plans would be $65,474,000. An additional $12,920,000 would be required in relocation assistance. Therefore, the total first cost for flood damage reduction is estimated at $78,394,000.

The recreation facilities in the Tentatively Selected Plan would have a total first cost of approximately $5,612,000, which includes approximately $524,000 for features to be constructed at 100% non-Federal expense.

The first cost of the ecosystem restoration features, including real estate acquisition, restoration costs, and contingencies would total approximately $16,651,000. These features would yield gains of 106.38 AAHU over the "No Action" Plan. The average annual cost would be approximately $1,014,000, which would make the AAC/AAHU about $9,500.

Table 5-6
Pertinent Data
Total Tentatively Selected Plan

Project Feature	Tentatively Selected Plan
Flood Damage Reduction	
Total Number of Structures in Buyout	491
Estimated First Cost	$78,394,000
Ecosystem Restoration	
Number of Acres Acquired	320
Number of AAHU Gained	106.38
Estimated First Cost	$16,651,000
Recreation Features – Vacated Land:	
First cost of Recreation Features	$5,612,000
Total First Cost, All Purposes	**$100,657,000**

IMPORTANCE OF RESTORATION PLAN OUTPUTS

The significance of the recommended habitat restoration can be described in a number of ways including technical recognition (importance based on scientific knowledge or judgment of critical resource characteristics) in terms of scarcity, representativeness, status and trends, connectivity, critical habitat, and biodiversity; institutional recognition (importance of environmental resource is acknowledged in laws, adopted plans, and other policy statements of public agencies); or public recognition (segment of general public recognizes the importance of the environmental resource).

In addition, the Corps assesses additional information on restoration projects for budgetary processes and ranking of importance of the outputs. These criteria are similar in nature and some are discussed at length included in the discussions of the three significance criteria above; however there are five budget criteria. These criteria include scarcity, connectivity, special status species, plan recognition, and self-sustaining. The scarcity criterion relates habitat to how nationally scarce the habitat is and if it is becoming scarcer as demonstrated by a Federal, regional, or state/Tribal report; or general scientific agreement as documented by professional publications/societies. Connectivity relates to habitat which makes a significant connection between existing habitat areas in a corridor or larger landscape contributing to reduction of population isolation, larger ranges, and population movement recognized by or demonstrated by community or species models. The special status species criterion requires that a restoration effort provide significant contribution to some key life requisite of a species. Plan recognition emphasizes restoration efforts that contribute to watershed or basin plans. The highest scores for this criterion are given to ecosystem restoration studies that contribute to a multi-agency comprehensive watershed plan developed in support of Federal priorities as demonstrated in laws or specifically authorized programs such as a recovery plan for an endangered species. The self-sustaining criterion emphasizes the restoration of a self-sustaining ecosystem consisting of natural processes. A ratio of average annual Operation and Maintenance costs to the average annual total project cost will be used as justification.

TECHNICAL RECOGNITION

From a technical recognition perspective, the recommended habitat is significant because it addresses habitat scarcity and diversity. Nationally, the loss of aquatic and riparian habitats is widely recognized. Freshwater animal species are disappearing five times faster than terrestrial animals, due (in part) to the widespread physical alteration of rivers (Ricciardi and Rasmussen 1999; NPS 2003). Of 860,000 river miles within the United States, approximately 24 percent have been impacted by channelization, impoundment, or navigation. The USFWS estimates 70-percent of the riparian habitats nationwide have been lost or altered, and 50-percent of all listed threatened or endangered species depend on rivers and streams for their continued existence. In some geographic areas, loss of natural riparian vegetation is as much as 95 percent – indicating that riparian areas are some of the most severely altered landscapes in the country (NRCS 2002). The National Research Council (NRC) has stated that restoration of riparian functions along America's water bodies should be a national goal (NRC 2002). Urban riparian buffers are the framework for healthy streams and water quality and provide greenways that improve the quality of life for citizens (Okay 2000).

Riparian forests, including bottomland hardwood forests, especially those occurring in the south, were designated as a nationally threatened ecosystem. There has been an 84% decline in riparian forests on a national scale since early settlement (Noss et al., 1995). The bottomland hardwood ecosystem in Texas prior to European settlement once extended over 6.5 million hectares; it is estimated that less than 40% of this original extent still remains (Frye, 1986), with only a few small and isolated patches of old growth scattered amongst the floodplains of the

eastern third of the state. Losses of intact bottomland hardwoods in the past 50 years have at times been greater than 120,000 ha per year (Barry and Knoll, 1999). For the most part, factors such as urbanization, channelization, timber harvest, agriculture, and the introduction of exotic species have all contributed to the degradation and declining trend of riparian forests. Classification of the habitat types within the study area indicates that only 18 percent of the area is deciduous forest habitat in Onion Creek and 10 percent is deciduous forest in Williamson Creek, which constitutes most of the riparian woodland species. This number is very low considering that the study area the entire Onion and Williamson Creek Watersheds. Specific measures such as riparian woodland development could directly serve to increase the acreage and improve the health of the riparian forest habitat located within the study area

Within the State of Texas, based on analysis of more than 21,000 plant and animal species, The Nature Conservancy's (TNC) Ranking America's Biodiversity (TNC 2002) within the 50 states and the District of Columbia show four states as having exceptional levels of biodiversity, with Texas ranked 2nd overall, but ranked 1st for diversity of birds and reptiles. Unfortunately, Texas ranks 4th in the number of extinctions, and is ranked 11th overall for species at risk. Following is a listing of Texas rankings (out of 51) for the percentage of species at risk. Those listings in bold type are significant to the recommended ecosystem restoration of Onion Creek.

Bird Diversity at Risk	**6th**
Amphibian Diversity at Risk	7th
Freshwater Fish Diversity at Risk	8th
Mammal Diversity at Risk	9th
Reptile Diversity at Risk	9th
Vascular Plant Diversity at Risk	**11th**

The national and state trend for habitat loss is evident in the Austin area. The Onion Creek Watershed has an estimated 6.6 impervious cover and is expected to grow to 18.1 percent. Williamson Creek is even more built out with impervious cover estimated at 21 percent and future at 31 percent. Further, the introduction of exotic plant and animal species has had a substantial effect on riparian areas, leading to displacement of native species and the subsequent alteration of ecosystem properties (NRC 2002). Problematic non-native woody and herbaceous plant species are found throughout the project area. Local elimination of these species has been recommended by the USFWS and TPWD. This trend in the loss of habitat and species is expected to continue unless proactive restoration measures are taken. The state of Texas is projected to have a 59.8 percent increase in population by 2030. Between 2000 and 2030 the Travis County population is projected to grow up to 58.6 percent. Of all the attributes of natural land in central Texas, wildlife habitat is the most endangered by human growth pressures.

Migratory birds are of great ecological value and contribute immensely to biological diversity. Travis County provides essential feeding and resting habitat for migratory bird species and is in the "central-flyway" for migrating birds. Over 300 species of birds are listed as Nearctic-Neotropical migrants in North America, and over 98% of those have been recorded in Texas. Meaning of the more than 600 species of birds documented in Texas, 54% of them are neotropical species which depend on Texas to provide habitat for nesting or migration, and many of those are dependent on south central Texas riparian areas specifically (Appendix B, Enclosure 4). Neotropical migratory birds have been declining in numbers for several decades. Initially, the focus of conservation for this important group of birds was focused on breeding habitat and wintering grounds; however, recently it has been recognized that the loss, fragmentation, and degradation of stop-over habitat is potentially the greatest threat to the survival and conservation of neotropical birds (Smithsonian Migratory Bird Center). In arid areas of the United States, stop-over sites are restricted to small defined habitats along shelter belts, hedgerows, desert oases and riparian corridors. The riparian corridors of central Texas provide an opportunity for the birds to replenish fat reserves, provide shelter from predators and water for re-hydration prior to

continuing, what is for most neotropicals, a trip of over 1000 miles one-way. During the fall migration, the Austin area is located towards the end of the long flight, and therefore, provides the vital link between having enough fat reserves to complete the trip or perish.

Desirable habitat for migratory waterfowl and neotropical migrants is limited in the Austin area. However, the project area is centrally located around areas where migratory birds are heavily concentrated, Hornsby Bend Wastewater Treatment Plant and McKinney Falls State Park, as well as the Williamson and Onion Creek Greenbelts. Hornsby Bend is the most popular birding area in the city of Austin and has a bird list of over 370 species (Personal Communications with Kevin Anderson 2006). Over 224 species of birds have been documented at McKinney Falls State Park (Kutac and Caran 1994). These areas have recorded a large number of neotropical migrant species and represents the other heavily birded locations in Travis County. The Onion Creek Project, centrally located around these two preferred migratory bird habitats, would increase the amount of highly used, but scarce habitat along a proven migratory bird stop-over corridor.

The Barton Springs salamander was listed by the U.S. Fish and Wildlife Service as an endangered species in 1997 primarily due to threats from degradation of water quality and quantity as a result of urban expansion over the watershed. According to the Barton Springs Salamander Recovery Plan, improving water quality and quantity to Barton Springs is of high importance for this listed species. Since it is well documented that expanding the riparian zone improves water quality by reducing scour and erosion and sediment transport and acting as a buffer zone to filter pollutants and some of the projects would be above or in the recharge zone, habitat for the Barton Springs salamander would be improved. However, these benefits cannot be quantified without significant groundwater studies. Projects that improve water quality or allow for more water to infiltrate the ground and are located in the contributing zone or recharge zone would all benefit the Barton Springs salamander and all species located within the Barton Springs.

The identified plan makes a significant contribution to a larger watershed conservation and restoration effort being implemented by the City of Austin, City of Sunset Valley, and Travis County. The above entities have made commitments to improving habitat across the entire Onion Creek and Colorado River Watersheds. The following is a brief listing for some of the recent, current, ongoing, and future projects for the watershed.

1) Lower Colorado River Basin Study: This ongoing study, of which the Onion Creek Study is a part of, identified ecosystem restoration measures that the Federal government could possibly participate in as part of a lower Colorado River basin watershed scale plan. The Lower Colorado River Authority, City of Austin, City of Sunset Valley, Travis County, Texas Parks and Wildlife, and U.S. Fish and Wildlife Service all participate in public workshops to develop restoration measures.

2) Austin Areas Lakes Ecosystem Restoration Study -- partnership study between the City of Austin and the Corps to identify ecosystem restoration opportunities within Town Lake and Lake Austin to restore aquatic habitat within and around the two lakes.

3) City of Austin's parks program: has already spent many millions of dollars to buy and preserve the riparian zone of Onion and Williamson Creeks.

4) City of Austin's Barton Springs Clean Drinking Water May 1998 Proposition 2: Provides for funding to purchase lands located in the Edwards Aquifer recharge zone, including creeks, to prevent future imperious cover and for wildlife habitat. Approximately 10,053 acres have already been purchased in fee simple or conservation easement in Onion Creek. Some of the major purchases include the Rutherford Ranch (1739 Acres), Hays County Ranch (1325 acres), Nester (510), Ashmun (862 acres), and (Storm (1251 acres).

The restored habitat along Onion and Williamson Creeks from the identified plan would contribute to and benefit from the goals of the various projects listed above. As part of the larger watershed plan, the identified restoration project provides significant watershed level outputs that will contribute to sustainability, connectivity, biodiversity, and completeness of the ecosystem.

INSTITUTIONAL RECOGNITION

The importance of migratory non-game birds to the nation is embodied in numerous laws, executive orders, and partnerships. The Fish and Wildlife Conservation Act demonstrates the Federal commitment to conservation of non-game species. Amendments to the Act adopted in 1988 and 1989 direct the Secretary to undertake activities to research and conserve migratory non-game birds. Executive Order 13112 directs Federal agencies to promote the conservation of migratory bird populations, including restoring and enhancing habitat. The Birds of Conservation Concern is a list maintained by the USFWS. The list helps fulfill a primary goal of the USFWS to conserve avian diversity in North America. Additionally, the USFWS' Migratory Bird Plan is a draft strategic plan to strengthen and guide the agency's Migratory Bird Program. The proposed ecosystem restoration would contribute directly to the U.S. Fish and Wildlife Service Migratory Bird Program goals to protect, conserve, and restore migratory bird habitats to ensure long-term sustainability of all migratory bird populations. Rangewide protection, restoration and enhancement of riparian and aquatic habitats and landscapes are crucial to maintain and conserve migratory birds. The USFWS has divided North America into 37 regions known as Bird Conservation Regions (BCRs). It was determined that the project area for this study lies within BCR 20 (Edwards Plateau). According to the list, there are twenty-one species (Table 5-7**)** in BCR 20 that are likely to become candidates for listing under the Endangered Species Act of 1973 without additional conservation actions. Of those 21 species, ten are known to occur in the riparian and floodplain habitats associated with the Onion Creek watershed. Included amongst these ten species are seven species that are of national concern due to their downward population status trends (USFWS 2002).

The ecosystem restoration measures identified for possible alternative selection, including riparian woodland conversion could serve to improve the riparian and floodplain habitats within the study area. This could benefit those species listed within in the BCC 2002 and known to occur in the Onion Creek watershed. Based on this information, it is clearly evident that ecosystem outputs gained from the proposed alternatives are significant at the institutional level.

The Department of Defense has signed a Memorandum of Understanding with Partners in Flight, a cooperative effort involving partnerships among federal, state, and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. A major focus of Partners in Fight is for the conservation of neotropical migrants.

Table 5-7
Species Listed in Bird Conservation Region 20 according to USFWS Birds of Conservation Concern 2002, those Known to Occur in Onion Creek Riparian Habitats, and those of National Concern

Species	Species Known to Occur in Onion Creek Riparian Areas	Species of National Concern
Bell's Vireo*	X	X
Buff-breasted Sandpiper		
Cassin's Sparrow		
Chestnut-collared Longspur		
Elf Owl		
Field Sparrow		
Gray Vireo		
Harris's Sparrow		
Kentucky Warbler	X	X
Ladder-backed Woodpecker	X	
Le Conte's Sparrow	X	X
Loggerhead Shrike*	X	X
McCown's Longspur		
Mountain Plover		
Orchard Oriole	X	
Painted Bunting*	X	X
Peregrine Falcon	X	X
Prothonotary Warbler	X	X
Rufous-crowned Sparrow	X	
Sprague's Pipit		
Varied Bunting		

* Note - species that met the rigorous criteria for statistically significant (P< or= 0.1, N>or =100), long-term (1966-2000) populations declines of > or = to 2.5 percent annually, both in the United States and survey-wide, using breeding bird survey data.

The United States has recognized the critical importance of this shared resource by ratifying international, bilateral conventions for the conservation of migratory birds. These migratory bird conventions impose substantive obligations on the U.S. for the conservation of migratory birds and their habitats, and through the Migratory Bird Treaty Act, the U.S. has implemented these migratory bird conventions with respect to the U.S. The Migratory Bird Treaty Act prohibits the taking, possessing, importing/exporting, selling, and transporting of any listed migratory bird, its parts, nest, or eggs. Included in the protection provided by this act is all North American diurnal birds of prey, except bald and golden eagles. The North American Waterfowl Management Plan (USFWS 1998), signed by the United States, Canada, and Mexico, lists wetlands, aquatic systems, grasslands, forests, and riparian areas as habitats critical to waterfowl. Between 1986 and 1997 over $1.5 billion was invested to secure, protect, restore, enhance and manage waterfowl priority landscapes in North America. Thirty-six Important Waterfowl Habitat Areas have been identified by the USFWS, three of which are represented within Texas, and include east Texas, the gulf coast, and the playa lakes region. Central Texas provides a critical link between the three priority waterfowl habitat areas. The USFWS states that conservation efforts should include national and regional planning for both migratory and endemic waterfowl species. Wood ducks, specifically mentioned in the North American Waterfowl Management Plan, are resident within the project area.

The city of Austin has established local institutional significance by adopting zoning ordinances requiring setbacks of 50-300 feet (Depending on the area) of the riparian buffer next

to a creek be left intact and not altered. The ordinance illustrates that the City of Austin acknowledges that riverine ecosystems are valuable enough to preserve and protect. However, the ordinance has been in place a relatively short time; previous degradation has left the riparian ecosystems in a less than desirable state.

PUBLIC RECOGNITION

In addition to the Tentatively Selected Plan significance to scarce habitats, migratory birds, endangered species, and institutional recognition, significant public recognition and tangible support are demonstrated in the importance of implementing the Tentatively Selected Plan. The riparian corridors within the city of Austin are publicly recognized as being significant resources. This is during public meetings attended by residents in the area, publicly stating that they do not want their creeks destroyed. In addition, the city has purchased a vast amount of land consisting of creeks and rivers and for the purposes of establishing greenbelts and parks. This was done by bond election, which further supports the citizens desire to protect these resources. In addition to riparian areas, the city has also purchased thousands of acres in the contributing zone of the Edwards Aquifer for the sole purpose of restricting impervious cover and improving water quality in the Edwards Aquifer and Onion Creek.

Because Onion and Williamson Creeks contribute to the recharge of the Barton Springs/Edwards Aquifer, there have been several non-profit citizen based organizations that have developed in the Austin Area with missions to save and protect the unique habitat and aesthetic values that the Texas Hill Country has to offer. These groups include the Hill Country Conservancy and the Save our Springs Association.

The Hill Country Conservancy’s mission is to ensure a healthy environment and economy in the Barton Springs Edwards Aquifer region by preserving open space and the rural heritage of the Texas Hill Country. Their goal is to conserve at least 50,000 acres of land, focusing on scenic vistas, providing recreational opportunities, protecting water quality and quantity, and preserving the area's rural heritage. If this goal is accomplished, the area's economic vitality will also be ensured because the Hill Country's vast open spaces and natural beauty are a primary reason people choose to live and work there. Separate studies published by Texas A&M University and the Greater Austin Chamber of Commerce reached the same conclusion: the region's future economic growth and prosperity are inextricably tied to the preservation of its natural environment. The Hill Country Conservancy seeks the advice of and works with landowners, conservation buyers and sellers, the real estate and business communities, and numerous agencies of local, state and federal governments. Together, they craft cutting-edge solutions to the complex challenges of preserving the economy and the environment.

The Save Our Springs Alliance’s mission is to protect the Edwards Aquifer, its springs and contributing streams, and the natural and cultural heritage of its Hill Country watersheds, with special emphasis on the Barton Springs Edwards Aquifer. This is a very active environmental group in the Austin area that supports riparian restoration and protection.

Regarding sustainability and the relatively low maintenance costs, the Tentatively Selected Plan achieves both. Once the restoration measures are in place ecological succession would take over. The restoration project would require very little routine maintenance except for invasive species removal and occasional thinning of understory.

ENVIRONMENTAL EFFECTS OF THE TENTATIVELY SELECTED PLAN

LAND USE

Existing developed residential areas, undeveloped private property, and city-owned properties constitute a majority of the existing land use in the study area. Development of the Tentatively Selected Plan in the Timber Creek and Onion Creek Forest/Yarrabee Bend areas would convert the developed residential areas into a park setting. Land use on the areas proposed for ecosystem restoration would remain essentially the same, but the areas would be put in public ownership (if not already owned), and would be managed for restoration and improvement of environmental values.

Development of the Tentatively Selected Plan for Williamson Creek would keep the land use the same in the Broken Bow reach, but the Heartwood, Radam, and Bayton Loop reaches would be put in public ownership and managed as a flood control project, with environmental quality features implemented to remain like a park setting. Land use on the areas proposed for ecosystem restoration and mitigation would remain essentially the same, but the areas would be put in public ownership (if not already owned), and managed for restoration and improvement of environmental values.

GEOLOGY AND SOILS

The Tentatively Selected Plan would not affect geology in Onion or Williamson Creek. The Tentatively Selected Plan for Timber Creek, Onion Creek Forest/Yarrabee Bend, and Bear/Onion Confluence would involve removal of houses with only minor disturbances to soils in the footprint of the houses. Most of these soils have already been disturbed from construction of the residences. In addition, minor grading activities would occur during installation of recreation and ecosystem restoration features. Best management practices would be implemented to reduce the temporary erosion impacts during construction. After the areas are vegetated, no additional impacts to soils would occur.

The Tentatively Selected Plan for Williamson Creek would include excavation of the immediate overbank on one side of the side creek for approximately 8,500 feet of creek and on 15 acres of land. Based on more detailed design efforts, the excavation would require approximately 72,180 cubic yards of materials to be removed. The areas would be re-vegetated with either composted mulch or sod and trees would be placed back in the benched areas on 40 foot centers. Sedimentation and erosion would occur during rainfall events that occur during construction and before vegetation is reestablished on the benches. A Storm Water Pollution Prevention Plan would be implemented using best management practices before construction would commence to minimize the temporary impacts to soils during construction. The resulting disturbance would not result in any significant impact to soils.

HYDROLOGY

Implementation of the Tentatively Selected Plan in the Timber Creek and Onion Creek Forest/Yarrabee Bend areas of interest would only involve removal of structures in the floodplain and would not include any type of modification to channel valley storage. While there may be minor changes in roughness within the floodplain due to the removal of houses and planting of vegetation, the impacts would be minor.

Implementation of the Tentatively Selected Plan for Williamson Creek would affect channel velocity and discharge in every reach. Table A-13 of the Hydrology and Hydraulic Section of Appendix G shows the channel velocity and discharges with and without the proposed project. In most cases, the channel velocity is reduced or slightly increased by the channel modifications, and the discharges are increased. The instances where the channel velocity is increased are due to more flow within the confines of the enlarged channel. Overall, the velocities are increased in the upper reaches around Bayton Loop and Broken Bow and are reduced in the Radam and Heartwood reaches. As the channel design is refined in the Preconstruction, Engineering and Design Phase, the velocity profiles within the channel reaches will be evaluated with respect to possible erosion protection measures and minor alteration of the channel geometry.

AIR QUALITY

The Tentatively Selected Plan would have temporary impacts to air quality from the construction related to removal of existing residential structures and the development of project recreational and environmental features. The impacts would primarily be generation of dust and emissions from construction equipment. These impacts would be minor and temporary in nature; therefore, the Tentatively Selected Plan would not have significant impacts to air quality.

BIOLOGICAL RESOURCES

Riparian Vegetation

Since the Tentatively Selected Plan, as proposed for the Timber Creek and Onion Creek Forest/Yarrabee Bend areas, would consist of non-structural buyouts and partial evacuation of the floodplain, combined with recreation and ecosystem restoration features, the overall project impact in these areas would be positive. Approximately 140 acres of land, in addition to the ecosystem restoration areas, would be removed from residential development and would be turned into a park setting in Timber Creek (40 acres) and Onion Creek Forest (100 acres)/Yarrabee Bend areas, which would have overall benefits to riparian vegetation in Onion Creek. Table 5-8 displays the existing vegetation within the ecosystem restoration areas in Onion Creek. After the project is constructed, the total acreage (approximately 206.1 acres) in the ecosystem restoration areas would be converted or restored to riparian woodlands. This vegetation would serve as a buffer zone that would improve water quality for the aquatic environment; provide fish and wildlife habitat; help attenuate flooding; and, return the quality and quantity of the entire aquatic ecosystem to a healthier state.

Table 5-8 Acres of Vegetation on Onion Creek to be Restored as Riparian Woodlands			
Vegetation Type	**Timber Creek**	**OCF/YB**	**Total**
Grasslands	2.3	22.7	25
Woodlands	0.0	60.6	60.6
Residential	6.0	23.7	29
Transitional	0.0	62.9	62.9
Parklands	7.7	18.0	25.7
Utility	0.0	1.5	1.5
Bareland	0.0	0.7	0.7
Total	**16**	**190.1**	**206.1**

Table 5-9 displays the total acreage of the ecosystem restoration areas in Williamson Creek, including the standalone ecosystem restoration areas. Like in Onion Creek, these vegetation types would be converted or restored to riparian woodlands and would help serve the same important functions for the aquatic environment. After construction, there would be a total of approximately 113.7 acres of riparian woodlands restored.

Table 5-9 Acres of Vegetation on Williamson Creek to be Restored as Riparian Woodlands					
Vegetation Type	**Heartwood**	**Radam**	**Broken Bow**	**Bayton Loop**	**Total**
Grasslands	0.0	2.3	0.0	5.6	**7.9**
Woodlands	5.0	7.7	0.0	56.4	**69.1**
Urban	0.5	2.6	0.0	1.4	**4.5**
Parkland	7.5	17.1	0.0	7.6	**32.2**
Total	**13**	**29.7**	**0.0**	**71.0**	**113.7**

Table 5-10 displays the impacts to vegetation that would occur from implementation of the flood damage reduction portion of the Tentatively Selected Plan. Approximately 15 total acres of vegetation would be affected that would require mitigation as described in the Mitigation section later in this chapter.

Table 5-10 Acres of Impacted Vegetation on Williamson Creek from Implementation of the Tentatively Selected Plan					
Vegetation Type	**Heartwood**	**Radam**	**Broken Bow**	**Bayton Loop**	**Total**
Grassland	0.0	0.0	0.0	0.5	**.5**
Woodland	1.4	0.0	0.9	5.7	**8.0**
Parkland	0.8	2.4	3.3	0.0	**6.5**
Total	**2.2**	**2.4**	**4.2**	**6.2**	**15**

Approximately 1.8 and 1.38 acres of Other Significant Woodlands would be impacted in Radam and Broken Bow areas of interest, respectively. Approximately 4.27 and 2.12 acres of Priority Woodlands would be impacted in Bayton Loop and Heartwood, respectively.

Combined, the Tentatively Selected Plan would restore approximately 320 acres of riparian woodland vegetation using the species identified in Appendix B, Addendum B-3. The Recommended Plan would impact about 15 acres of riparian woodlands, of which 3.16 are

classified as Other Significant Woodlands and 6.39 are classified as Priority Woodlands. No significant impacts to vegetation would occur because the vegetation impacted from implementation of the flood damage reduction project would be fully mitigated.

Wildlife Resources

As previously noted, Onion and Williamson Creeks provide for a diversity of wildlife resources. The proposed project would have an overall benefit for wildlife resources, although there would be impacts as a result of the overbank benching on Williamson Creek. The U.S. Fish and Wildlife Service's Habitat Evaluation Procedure (HEP) was performed to determine impacts as a result of the flood damage reduction project and benefits from the ecosystem restoration features for wildlife resources. The HEP analysis is described in detail in Appendix B. However, a summary of the future with and without project average annual habitat unit values by area of interest are displayed in Table 5-11.

Table 5-11
Future With and Without Project AAHU's for
The Tentatively Selected Plan

Habitat Types	Future W/O AAHU's	Future With AAHU's	Difference Between With and W/O
Riparian Woodlands Timber Creek – ER	6.98	12.84	5.86
Riparian Woodlands OCF/YB - ER	99.38	156.14	56.76
Total Onion Creek – ER	***106.36***	***168.98***	***62.62***
Riparian Woodlands Heartwood - ER	3.43	9.76	6.33
Riparian Woodlands Radam – ER	6.96	22.31	15.35
Riparian Woodlands Bayton Loop – ER	36.68	58.76	22.08
Total Williamson Creek – ER	***47.07***	***90.83***	***43.76***
Total Tentatively Selected Plan – ER	**153.43**	**259.81**	**106.38**
Riparian Woodlands Heartwood - FDR	0.69	0	-0.69*
Riparian Woodlands Radam – FDR	0.46	0	-0.46*
Riparian Woodlands Broken Bow – FDR	1.31	0	-1.31*
Riparian Woodlands Bayton Loop – FDR	3.56	0	-3.56*
Total Tentatively Selected Plan – FDR	**6.02**	**0**	**-6.02**

NOTE: ER = Ecosystem Restoration; FDR = Flood Damage Reduction
* These negative differences are losses and would result in required mitigation.

Approximately 17.98 average annual habitat units of grasslands and 12.51 average annual habitat units of residential lands would be converted or restored to riparian woodlands in Onion Creek. These areas in combination with the restoration of the parklands, transitional woodlands and woodlands would produce a total gain of approximately 62.62 AAHU of riparian woodlands compared to the No Action alternative, and would support a diversity of wildlife resources, especially neotropical migrants, along Onion Creek.

The flood damage reduction project on Williamson Creek would impact approximately 6.02 AAHU of riparian woodlands. The parkland and woodland habitat units were added together to count as one value for riparian woodlands since the parkland values were normalized to woodland values. These habitat units would require mitigation, which is addressed in the Mitigation section later in this chapter. Approximately 4.5 AAHU of grasslands would be converted or restored to riparian woodlands as a result of the restoration measures in Williamson Creek. These areas, in combination with the restoration of the parklands and woodlands, would produce a total gain of approximately 43.76 AAHU of riparian woodlands compared to the No Action alternative, and would support a diversity of wildlife resources, especially neotropical migrants, for Williamson Creek.

Overall, the Tentatively Selected Plan for the entire study area, after implementation of required mitigation, would have a net benefit of approximately 106.38 AAHU of riparian woodlands when compared to the future without-project conditions.

The construction activities would temporarily displace or harass resident species within the immediate vicinity of the construction area, but after the proposed project is completed, the species would be expected to return and use the restored habitat. In addition, the proposed project would provide additional wildlife benefits above and beyond the ecosystem restoration features by removing residential structures from the floodplain and converting the vacated land to a park setting. Although these benefits were not quantified, the project would result in approximately 140 additional acres of residential lands being converted to parks. With the recommended ecosystem restoration and appropriate mitigation, the Tentatively Selected Plan would have a net benefit to fish and wildlife habitat; therefore, no significant impacts to fish and wildlife habitat would occur from implementation of the Tentatively Selected Plan.

Threatened and Endangered Species

Barton Springs Salamander

As mentioned in Chapter 2, the Barton Springs salamander is found only in the Barton Springs in Austin, Texas. The main threat to the Barton Springs salamander is degradation of the quality and quantity of water being recharged into the Barton Springs Segment of the Edwards Aquifer. All of the proposed overbank excavations are below the recharge zone except the Bayton Loop Reach, which is at the very downstream limit of the recharge zone. Work being conducted in this reach would not adversely affect the quality of water that is being recharged into the aquifer because work would be concentrated in the overbank area and not in the waterway itself. Best management practices would be utilized to limit storm water discharges and impacts during and after construction until the vegetation is established. The proposed project would not likely adversely affect the Barton Springs salamander.

Black-capped Vireo

The project would not affect the Black-capped Vireo, since no habitat for the Black-capped Vireo exists in the immediate vicinity of the proposed project.

Golden-cheeked Warbler

The project would not affect the Golden-cheeked Warbler, since no habitat for the Golden-cheeked Warbler exists in the immediate vicinity of the proposed project.

Whooping Crane

The project would not affect the Whooping Crane, since no habitat for the Whooping Crane exists in the immediate vicinity of the proposed project.

Austin Blind Salamander

As mentioned in Chapter 2, the Austin blind salamander is found only in the Barton Springs in Austin, Texas. The main threat to the Austin blind salamander is degradation of the quality and quantity of water being recharged into the Barton Springs Segment of the Edwards Aquifer. All of the proposed overbank excavations are below the recharge zone except the Bayton Loop Reach, which is at the very downstream limit of the recharge zone. Work being conducted in this reach would not adversely affect the quality of water that is being recharged into the aquifer because

work would be concentrated in the overbank area and not in the waterway itself. Best management practices would be utilized to limit storm water discharges and impacts during and after construction until the vegetation is established. The proposed project would not likely adversely affect the Austin blind salamander.

AQUATIC RESOURCES

Aquatic Habitat

The Tentatively Selected Plan would remove residential structures from the floodplain and restore the area to riparian woodlands and parks. Approximately 206 and 1114 acres of riparian woodlands would be restored in Onion Creek and Williamson Creek, respectively. Removing residential structures and restoring a riparian buffer allows the floodplain to function as a healthier aquatic ecosystem. Riparian woodlands are essential to the overall heath of the aquatic habitat. They provide shading, help stabilize stream banks with complex root systems, provide filtering functions, and provide organics for aquatic organisms.

Riparian woodlands provide shade to the aquatic habitat. Shade helps maintain lower water temperatures, especially in shallow or intermittent streams. Lower water temperatures help keep harmful algae blooms down and help keep dissolved oxygen levels higher to support better habitat for aquatic life. Without the proper shade temperatures rise and dissolved oxygen levels drop. In addition, during spawning season when water levels are higher, riparian areas serves as spawning and rearing habitat for aquatic organisms.

Riparian woodlands help stabilize stream banks and help prevent erosion. Without riparian vegetation, especially mature trees, streams can become unstable and erosion follows. Erosion results in an increase in suspended solids, which results in higher turbidity levels, which results in suffocation in some microorganisms and decreased light penetration, which results in less aquatic plant growth. The root systems of trees immediately adjacent to the water provide diversity in aquatic structure. Overall, riparian vegetation helps keep the system stable, which improves aquatic habitat.

Riparian woodlands provide extremely important filtering functions that help improve aquatic habitat by improving the water quality. Riparian woodlands serve as buffer zones between business and residences and help filter nutrients that can be harmful to aquatic life. These nutrients generally include but are not limited to phosphorus and nitrogen from lawn fertilizers, petroleum products from gasoline engines, and other chemicals such as pesticides. d fertilizers and pesticides.

Finally, another important function of riparian woodlands is the important allocthonous materials (including detritus) that they provide to the aquatic habitat and organisms. Because the reproductive cycle of many insects require woody plant communities, the riparian woodland serves as an important contributor to the food base of the aquatic system. A fully functioning aquatic ecosystem must include those species which derive their existence both on land and water (i.e. ducks, egrets, certain hawks, Neo-tropicals, small mammals, herptefauna, etc.) These species require both a functioning water component and wooded riparian component. Without both, such species habitat requirements are not fulfilled and their important contributions are absent from the aquatic cycle. The contributions these species make are many and varied, but some of the most important include facilitating detritus inputs and availability and population control through foraging.

As described in Chapter 2, a few aquatic plants occur in Williamson Creek but are concentrated in the Broken Bow reach where the creek has perennial pools from spring flows

dammed by a gravel bar and a man-made dam. Since the proposed project would leave the baseflow channel intact and excavate the overbank on only one side of the creek, long term impacts would not occur to aquatic vegetation. The flood damage reduction portion of the Tentatively Selected Plan would affect approximately 8,500 feet of stream and approximately 15 acres of adjacent riparian woodlands.

Implementation of the Tentatively Selected Plan would result in short term impacts in the form of increased turbidity, as a result of an increase in total suspended solids, of the water adjacent to and downstream of the construction site if rain events were to occur during construction and before vegetation was reestablished on the disturbed area, and from spillage of fill from construction equipment. Increases in turbidity would affect aquatic vegetation and habitat by reducing light penetration through the water column. The impacts would be temporary until vegetation is reestablished on the benches, and would be minimized by implementing best management practices (BMPs) during construction.

Long term impacts to the aquatic habitat might occur from changes in sediment continuity of the creek from modifications of the floodplain and resulting changes in discharges and channel velocities. A sediment transport model would be developed during the Preconstruction, Engineering and Design Phase to refine the design and make modifications to the proposed plan reduce these unavoidable impacts to the extent practical, and to make the project as environmentally friendly as possible while maintaining the project benefits. Modifications that could be incorporated if the sediment transport indicates sediment continuity problems would exist include establishing buffer zones, adjusting baseflow channel widths, varying depths of excavations, etc. In addition, impacts to the aquatic habitat would occur from removal of the adjacent riparian vegetation, resulting in increased water temperatures from lack of shading. These impacts would be reduced by limiting the construction to one side of the creek and restoring the vegetation to native species in those areas; however, there would still be impacts to the aquatics by removing the vegetation on one side. These impacts would be further reduced by replanting trees on the benched area on 40-foot centers. The impacts to creeks would be mitigated by planting riparian woodlands along another segment of Williamson Creek as discussed in the Mitigation section of this chapter.

In addition to the flood damage reduction measure on Williamson Creek, the Tentatively Selected Plan would restore riparian woodlands on approximately 16,000 feet of creek on Williamson Creek and its tributaries.

Section 404 of the Clean Water Act requirements are discussed under the Environmental Compliance Section and the 404 (b)(1) analysis is included in Appendix B.

WATER QUALITY

As mentioned earlier, approximately 8,500 feet of stream and 15 acres of riparian woodlands would be affected on Williamson Creek as a result of implementation of the Tentatively Selected Plan. The Tentatively Selected Plan would include excavation of the immediate overbank adjacent to the creek, but would reduce impacts to the aquatics by leaving the baseflow channel intact.

Implementation of the Tentatively Selected Plan would result in the short term impacts in the form of increased turbidity, as a result of increase in total suspended solids, of the water adjacent to and downstream of the construction site if rain events were to occur during construction and before vegetation was reestablished on the disturbed area, and from spillage from construction equipment. Increases in turbidity would affect aquatic vegetation and habitat by reducing light penetration through the water column. Adherence to proper storm water management engineering practices, applicable regulations, codes, and permit would reduce

storm water- related impacts. The impacts would be temporary and would only be expected to last through the construction term and until vegetation is reestablished.

Every construction project poses potential contamination risk from incidental petroleum leaks or chemical spills. Through the use of best management practices such as proper storage, handling and emergency preparedness, the risk of such contamination would be substantially diminished. A Spill Prevention Plan prepared specifically for this proposed project would be prepared and followed during the construction of the Tentatively Selected Plan.

In addition, impacts to the aquatic habitat would occur from removal of the adjacent riparian vegetation resulting in increased water temperatures from lack of shading. These impacts would be reduced by limiting the construction to one side of the creek and restoring the vegetation to native species in those areas; however, there would still be impacts to the aquatics by removing the vegetation on one side. These impacts would be further reduced by replanting trees on the benched area on 40-foot centers.

The proposed ecosystem restoration measures would restore riparian vegetation on approximately 16,000 linear feet of stream and would provide water quality benefits to the overall aquatics on Onion and Williamson Creek by acting as a buffer zone. These buffer zones would reduce impacts to water quality as a result of residential fertilizers and pesticides. In addition, they would provide shading for the creek, which would lower temperatures levels of the creek. There would not be any significant impacts to water quality as a result of implementation of the Tentatively Selected Plan.

GROUND WATER

The ecosystem restoration measures on Williamson or Onion would not adversely affect ground water. There would be a very minor beneficial impact due to the filtering effects of riparian buffer zones that would be established. However, these would be insignificant benefits.

All of the proposed overbank excavations in Williamson Creek are below the recharge zone except the Bayton Loop Reach, which is at the very downstream limit of the recharge zone. Work being conducted in this reach would not adversely affect the quality of water that is being recharged into the aquifer because work would be concentrated in the overbank area and not in the waterway itself. Best management practices to limit storm water discharges and impacts during and after construction until the vegetation is established. Groundwater would not be adversely affected by the Tentatively Selected Plan.

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

Literature reviews and site assessments indicate that there is only one property that contains the potential for hazardous, toxic or radioactive wastes (HTRW) in the immediate vicinity of the Timber Creek, Onion Creek Forest/Yarrabee Bend, and Williamson Creek areas of interest. This property is located at 4604 Hedgerow Place within the Timber Creek area. Travis County has purchased this parcel and business and removed the structure, and no HTRW were found during the process. It is likely that some of these residential structures that would be removed as part of the Tentatively Selected Plan would contain materials for which special handling and disposal would be required. These materials include asbestos-containing materials (ACM), polychlorinated biphenlyls (PCB), mercury, chlorinated fluorocarbons (CFC), and miscellaneous wastes such as pesticides, paints, solvents, and used oils. Furthermore, although debris from the demolition of residential structures which had previously received applications of lead-based paint (LBP) is exempt from the definition of hazardous wastes, the contractor would be required to perform a lead exposure assessment prior to demolition to ensure workers are properly protected. An assessment of HTRW would have to be performed for every structure before construction could commence. However, the City of Austin has recently purchased several

structures in the neighborhood, and little-to-no materials requiring special handling were found. Since there are no identified environmental sites in the areas of interest, there would be no significant impacts as a result of implementation of the Tentatively Selected Plan.

CULTURAL RESOURCES

No cultural resources were observed at the Timber Creek or Onion Creek/Yarrabee Bend project areas. The Corps has determined that no Historic Properties will be affected by the planned construction in those locations. In addition, no standing structures within these three project areas are eligible for listing on the National Register of Historic Places. Consultation is underway with the SHPO for concurrence for this determination.

The Corps has initiated consultation with the Texas SHPO and with Native American Indian tribes culturally affiliated with the region as per 36 CFR Part 800.3. Cultural resources surveys and inventory investigations designed to meet the requirements of Section 106 of the NHPA have been completed at The Timber Creek and Onion Creek/Yarrabee Bend project areas. Deep backhoe trenching would be carried out at the Williamson Creek project areas during the Preconstruction, Engineering and Design Phase of the study and the results of that investigation would be coordinated with the SHPO. Based on the archival research conducted during Phase 1 of this study and the shovel testing conducted in June 2006, and in accordance with 36 CFR part 800.5, we have determined that are no Historic Properties located within the Timber Creek and Onion Creek/Yarrabee Bend areas that would be adversely affected by the currently proposed project.

Although no cultural resources are known to be present within the project areas, unanticipated subsurface deposits are possible at any undertaking that disturbs the ground surface. Evidence of subsurface deposits may be in the form of artifacts (lithics, ceramics, bone, metal, and glass), charcoal, stained soil, or burned rocks. If previously unknown cultural resources are exposed by construction activities associated with the proposed project, work would stop in the immediate vicinity, the resources would be protected and the Texas SHPO would be notified within 24 hours of the discovery. If in consultation with the SHPO it is determined that the resource is significant and cannot be avoided by construction, then an archaeological data recovery plan would be prepared in consultation with the SHPO and would be implemented before construction in that area is allowed to resume.

If unmarked human burials are discovered during construction, work would stop in the immediate vicinity, the remains would be protected, and the local low enforcement agency and the SHPO would be notified as soon as possible. The location of the unmarked human burial would be documented and provisions of the Native American Grave Protection and Repatriation Act (NAGPRA) would be implemented, including consultations with Native American Tribes.

OTHER SOCIAL EFFECTS

Public Health and Safety

There would be benefits to public heath and safety as a result of implementing the Tentatively Selected Plan. Over 490 structures would be removed out of the floodplain on Onion Creek. In addition, a majority of structures located in the floodplain on Williamson Creek would receive flood damage reduction benefits as a result of the Tentatively Selected Plan. This plan would reduce the chance of loss of life by removing people from the flood plain or reducing their risk of flooding, especially since both of these creeks are extremely flashy and provide little warning time for people to evacuate from their residences. The proposed project would result in no adverse impacts to public health and safety.

Public Services

There would be a benefit to public services as a result of implementing the Tentatively Selected Plan by reducing the risk of flooding and removing structures from the flood plain, it reduces the demand on rescue services during flooding events. No significant adverse impacts would occur to public services as a result of implementation of the Tentatively Selected Plan.

Recreation and Public Access

The Tentatively Selected Plan would provide an approximate 40-acre public recreational facility at Timber Creek and a 100-acre facility at Onion Creek Forest/Yarrabee Bend, thereby relieving demand on existing recreational facilities and providing additional recreation and public access to the citizens of Travis County and the City of Austin. The proposed ecosystem restoration in Onion Creek Forest/Yarrabee Bend would occur within some city owned park lands. These lands could still be used as parks; however, there would be restriction on the use since in order to function as wildlife habitat, the vegetation would have to be maintained as forest habitat, which would limit some activities. The recreation plans for Timber Creek and Onion Creek Forest/Yarrabee Bend are shown on figures 5-2 and 5-3, respectively.

Similar to Onion Creek Forest/Yarrabee Bend, the Tentatively Selected Plan for Williamson Creek would involve implementing restoration on city greenbelts. No additional recreation would be provided on Williamson Creek as a part of the Tentatively Selected Plan. In addition, approximately 1 acre of the flood damage reduction project would be on city parkland. Since the city is responsible for provided all project lands, a Chapter 26 public hearing as required by Chapter 26 of the Parks and Wildlife State Code would more than likely be required. The city would be responsible for conducting this meeting.

Traffic

Implementation of the proposed project would not include relocation of roads or bridges used for through traffic and, as such, would only involve temporary impacts to traffic during the construction phase. These impacts would be mainly in the form of dump truck traffic hauling debris and excavation materials. After construction, traffic would be reduced in the Timber Creek and Onion Creek Forest/Yarrabee Bend areas by reducing the number of residences in the area. However, traffic would be reintroduced in the area as a result of the recreational facilities being added as part of the project. After construction, traffic would return to normal in Williamson Creek. Since all impacts are considered to be temporary and do not include major road work, there would be no significant impacts to traffic as a result of implementation of the Tentatively Selected Plan.

Noise

For on-site construction workers, the permissible exposure limits (PEL) and requirements for noise control are an 8-hour time-weighted average exposure level (TWA) of 90 dBA with a 5-dB exchange rate between allowable duration and noise level. Engineering or administrative controls are required to be implemented above this level, and hearing protection devices (HPDs) must be issued and worn when exposures exceed the PEL. Regulations require hearing conservation programs (HCPs) for overexposed workers. The Occupational Health and Safety Administration's Construction Regulation 1926.101 mandates the use of hearing protection above the PEL and requires insert devices to be fitted or determined individually by ''competent persons" (Suter 2002). Table 5-12 provides a summary of noise exposure levels experienced by heavy equipment operators. Heavy equipment such as backhoes, front-end loaders, and cement and dump trucks would cause short-term, localized, insignificant increases in noise levels. These short-term increases are not expected to substantially affect adjacent noise sensitive receptors or

wildlife areas. Construction activities would increase noise levels temporarily at locations immediately adjacent to the project area, but would be attenuated by distance, topography, and vegetation. Noise levels created by construction equipment would vary greatly depending on factors such as the type of equipment, the specific model, the operation being performed, and the condition of the equipment. The equivalent sound level of the construction activity also depends on the fraction of time that the equipment is operated over the time period of the construction. Construction would occur only during daylight hours, thus reducing the daylight noise levels and the chances of causing annoyances. The use of BMPs such as keeping equipment in good operating condition, proper training, and providing appropriate health and safety equipment will minimize the potential noise impacts associated with the proposed action.

Table 5-12
Average Daily Noise Exposure Levels (8-hour TWA)
of Heavy Equipment Operators and Associated Laborers in dBA

Operator or Task	Mean TWA	SD	Range
Heavy-duty bulldozer	99	5	91-107
Vibrating road roller	97	4	91-104
Light-duty bulldozer	96	2	93-101
Asphalt road roller	95	4	85-103
Wheel loader	94	4	87-100
Asphalt spreader	91	3	87-97
Light-duty grader	89	1	88-91
Power shovel	88	3	80-93
Laborers	90	6	78-107
Crawler crane - .35 ton Noninsulated cab	97	2	93-101
Crawler crane - 35 ton Noninsulated cab Insulated cab	94 84	3 3	90-98 80-89
Rubber tired cane - 35 ton Noninsulated cab Insulated cab	84 74	5 9	78-90 59-87
Rubber tired crane - 35 ton Insulated cab	81	4	77-87
Truck-mounted crane	79	2	76-83
Tower crane	74	2	70-76

Lighting

The Tentatively Selected Plan would produce approximately 140 acres of parklands plus recreational trails in the ecosystem restoration areas in Timer Creek and Onion Creek Forest/Yarrabee Bend. Lighting would not be used on the trails in the restoration areas. The only proposed lighting would be at parking lots and restrooms. The lighting would be to provide security only and would be of a low-light type mounted high with cutoffs to prevent stray light from impacting adjacent residential areas. Temporary lighting may be required for occasional nighttime amphitheater presentations. However, there would be no significant adverse impacts caused by lighting.

Vibrations

Some of the construction areas have thick layers of rock. Blasting was ruled out as a consideration due to the dame it could cause to adjacent residences. Rippers and jack hammers would be used to remove the existing rock. As a result of project construction, minor vibrations

may be felt in adjacent homes during constructions. These vibrations are not expected to cause damage to adjacent homes.

Socioeconomics

Overall, there would be positive and negative effects to socioeconomics as a result of implementation of the Tentatively Selected Plan. There would be long-term annual savings from the reduction in flood damages occurring in Travis County and the cities of Austin and Sunset Valley. There would be short-term employment effects associated with project construction that would stimulate increased demand locally for construction materials and services. These expenditures would be expected to result in a positive multiplier effect on the local community and would last for the period of construction, which is estimated at 24 months. There would be a negative reduction in local tax base as a result of taking property off of the tax roles and putting it into public ownership. This would be partially offset if people build new houses in the taxing district. However, the reduction in flood damages and the benefit to the environment would outweigh these negative impacts.

MITIGATION

One of the principal requirements for complying with the guidance in ER 1105-2-100 on protecting ecological resources during the Feasibility Study Phase is to demonstrate that damages to significant ecological resources have been avoided or minimized to the extent practical and that unavoidable damages to resources (wetlands and riparian/hardwood forests) have been compensated to the extent justified. ER 1105-2-100 also provides special requirements that riparian/hardwood forest be mitigated in-kind, to the extent practical, so that the forest is mitigated as an ecological system. No mitigation requirements would be required for implementation of the Tentatively Selected Plan in Timber Creek or Onion Creek Forest/Yarrabee Bend, or in the Williamson Creek stand-alone ecosystem restoration areas since these are either non-structural or ecosystem restoration projects.

Although the project impacts were minimized to the extent practical, there are still unavoidable impacts to riparian woodlands and waters of the U.S. as a result of implementing the structural flood damage reduction component of the Tentatively Selected Plan for Williamson Creek. Implementation of the overbank benching on Williamson Creek would result in an impact to approximately 15 acres or riparian habitat and 8,500 feet of Waters of the U.S..

Because the proposed project falls within political jurisdictions of two different cities, mitigation for impacts in Sunset Valley would be mitigated within that city. Therefore, the mitigation will be discussed by reach.

Mitigation Analysis by Reach

Heartwood Reach

The proposed project would impact 1.4 acres of riparian woodlands and 0.8 acres of parklands resulting in a loss of approximately .69 AAHU's of riparian woodlands and 1,200 feet of Waters of the U.S.

Radam Reach

The proposed project would impact 2.4 acres of parklands resulting in a loss of approximately .46 AAHU's of riparian woodlands and 1,400 feet of Waters of the U.S.

Broken Bow Reach

The proposed project would impact 0.9 acres of riparian woodlands and 3.3 acres of parklands resulting in a loss of approximately 1.31 AAHU's of riparian woodlands and 2,900 feet of Waters of the U.S.

Bayton Loop Reach

The proposed project would impact 3.7 acres of riparian woodlands and 0.5 acres of grasslands resulting in a loss of approximately 2.31 AAHU's of riparian woodlands and 1,800 feet of Waters of the U.S. in the city of Austin and 2 acres of riparian woodlands with a loss of 1.25 AAHU's and 1,200 feet of Waters of the U.S. in Sunset Valley.

ANALYSIS SUMMARY

The Tentatively Selected Plan would result in a loss of a total of 6.02 AAHU's and 8,500 feet of Waters of the U.S. Approximately 1.25 AAHU would need to be mitigated in the city of Sunset Valley and the other 4.77 in the city of Austin.

PROPOSED MITIGATION AREAS

Since mitigation requirements would be the same type of habitat that is being restored under the proposed restoration, the requirements for mitigation could be subtracted from the restoration benefits and the cost allocated to the flood damage reduction portion of the study. As a result of the high land costs for the proposed restoration project, determined as part of the Real Estate Gross Appraisal, it was deemed more beneficial to the flood damage reduction project to find an alternative site outside the existing study area, but still within Williamson Creek, for the proposed mitigation. Therefore, a few of areas were analyzed for potential mitigation sites; however, one site stood out because it has been previously disturbed by channelization and vegetation removal. The AAHU that would need to be mitigated in Sunset Valley could be developed in the proposed restoration areas.

The proposed additional mitigation area is approximately 23 acres in size and is located about 4 miles upstream of the Bayton Loop Reach (Figure 5-9). There are approximately 4 acres of grasslands and 19 acres of existing woodlands at this site. The grasslands have an existing conditions habitat suitability index of 0.86 for grassland, which would produce a future without-project condition of 3.63 AAHU of grassland habitat. The existing riparian woodland habitat has an existing habitat suitability index of 0.46, which would produce a future without-project condition of 8.79 AAHU. This area had standing water during site visits; however, this area is more than likely still an intermittent stream that has perennial pools. The pools are flourishing with aquatic vegetation consisting of water willow, pond weed, cattails and other aquatic species. Small pockets of invasive river cane were also observed in this segment. The area appears to have been channelized at one time. There is an existing diversity of tree species in some reaches, but is not consistent throughout the reach. Tree species include Ashe juniper, red oak, live oak, willow, and sycamore. This area was noted as having a potential to improve water quality of the creek if water quality ponds could be constructed, since several parking lots were in the close vicinity of the reach.

A mitigation measure was formulated for the area, consisting of restoring the area back to riparian woodlands by planting the following densities:

Grassland Conversion: 300 trees, 150 shrubs, and woodland grass forbs mix per acre
Woodland Conversion: 75 trees, 100 shrubs, and woodland grass and forbs mix per acre

This area, with implementation of the mitigation measure, would produce 7.22 AAHU of riparian woodland habitat above the "No Action" plan, which would satisfy the mitigation requirements. This plan would also restore or improve approximately 4,000 linear feet of creek. Because of the size of the parcels which would have to be acquired, there is no practical way to formulate mitigation measures to produce exactly 6.02 AAHU and precisely meet mitigation requirements. Furthermore, since land acquisition costs constitute $720,000 of the $1,207,000 estimated mitigation costs, the additional costs needed for physical implementation of the mitigation measures, over and above the minimum amount required, would be nominal.

A cost comparison was performed to see if it was more cost effective to perform the mitigation in the mitigation area, or simply reduce the gains of the restoration project by 6.02 AAHU and allocate that cost to the flood damage reduction. As stated above, the total first cost of the mitigation would be approximately $1,207,000, which would make the average annual cost approximately $26,000. With annual operations and maintenance cost of $10,000, the average annual cost would be approximately $36,000. With the benefits of 7.22 AAHU, the AAC/AAHU would be approximately $5,000/AAHU. This would make the mitigation area approximately $10,000/AAHU less than the restoration cost. Therefore, the newly proposed mitigation area was selected as the preferred mitigation area. It should be noted that while the restoration costs per output are higher, restoration is more important in those more urban environments.

CUMULATIVE IMPACTS

The *Final Programmatic Environmental Impact Statement for Flood Damage Reduction and Ecosystem Restoration, Lower Colorado River Basin, Colorado River, Texas August 2005* (PEIS), was prepared by the Corps in cooperation with the Lower Colorado River Authority to address the baseline existing conditions, direct and indirect impacts, and cumulative impacts for flood control, ecosystem restoration and multi-purposed Corps projects within the lower Colorado River basin. The PEIS is available on the Corps website at www.swf.usace.army.mil. The Council on Environmental Quality has defined cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or Non-Federal) or person undertakes such other actions." Extensive public scoping was performed during the preparation of the PEIS to identify existing and reasonably foreseeable projects of others in the basin. Scoping included: mailings, public scoping meetings, phone calls, and field trips. A brief summary of the findings of the PEIS is discussed below.

EXISTING CORPS FLOOD CONTROL PROJECTS

Boggy Creek Flood Protection Project

The Boggy Creek Flood Protection Project was completed in 1992 and provides local flood protection and recreation within the city of Austin. The project consists of 1.1 miles of grass-lined channel and 1.7 miles of paved channel. Fifty-four acres of land was acquired to mitigate habitat losses. The recreational component of the project consists of a one-mile nature trail.

EXISTING PROJECTS OF OTHERS IN THE BASIN

Urban Growth and Expansion

There are numerous existing residential and commercial developments, roads, gravel mines, etc. within the Onion and Williamson Creek Watersheds as a result of urbanization within the watershed. It would be impracticable to try and account for each of these actions and the impacts they have had on the environment.

Reasonably Foreseeable Projects of Others

Urban Growth and Expansion

Urban growth and expansion would continue within the basin. This growth was accounted for in the projected future without-project conditions of the basin.

City of Austin Projects

The city of Austin has numerous stormwater, flood damage reduction, and recreation projects planned within the study area. These projects are described in more detail in the PEIS. These projects are generally projects to improve water quality, voluntary buyouts to remove structures out of the floodplain, and local recreation projects.

Transportation Projects

Coordination was conducted with the Texas Department of Transportation (TxDOT). Due to the substantial growth of the Austin area, there are several transportation projects underway to alleviate the traffic congestion in the city. These projects are explained in detail in the PEIS, and include: 1) the widening of Loop 1/U.S. 183 over the Colorado River and Onion Creek, 2) widening of Interstate Highway 35 through Travis County, which would cross Williamson and Onion Creek; State Highway 130, which will cross Onion Creek; and, the Trans-Texas Corridor, which could cross both Williamson and Onion Creek if eastern Travis County is selected as the preferred route.

Reasonably Foreseeable Corps Projects

Wharton Interim Feasibility Study

The Wharton Interim Feasibility Study (Volume III of the Lower Colorado River Phase 1, Texas Interim Feasibility Report and Integrated Environmental Assessments) is investigating measures to reduce flood damages within the City of Wharton, Texas. The proposed alternative is a combination of levees, floodwalls, and drainage structures along the Colorado River and a combination of levees, floodwalls and channel improvements on Baughman Slough. Although the Onion Creek Interim Feasibility Study and the Wharton Interim Feasibility Study are being combined into one Project Report, the two projects are completely separable, and are over one hundred miles apart. However, the combining of the two projects reflects the Corps' philosophy of undertaking more holistic, watershed approaches in addressing water resource-related problems.

Shoal Creek Interim Feasibility Study

The Shoal Creek Interim Feasibility Study will investigate measures to reduce flood damages on Shoal Creek in Austin, Texas. This study has not been initiated to date, but a project management plan is expected to be drafted to officially begin this study this fiscal year.

Walnut Creek Interim Feasibility Study

The Walnut Creek Interim Feasibility Study will investigate measures to reduce flood damages on Walnut Creek in Austin, Texas. This study has not been initiated to date, but a project management plan is expected to be drafted to officially begin this study this fiscal year.

Highland Lakes Interim Feasibility Study

The Highland Lakes Interim Feasibility Study will attempt to reduce damages related to potential flooding in Lake Travis. The study is in the preliminary stages and is in the preliminary alternative analysis phase. This project would have a very slight potential for a cumulative impact since it is upstream of the existing reservoirs on the Colorado River, and impacts from the Tentatively Selected Plan is limited to Onion and Williamson Creeks.

Boggy Creek Section 14 Study

The Boggy Creek Section 14 Study is an emergency streambank protection study that would provide protection to support structures for the State Highway 183 bridge over Boggy Creek. The project would consist of armoring both sides of the bottom of Boggy Creek for a short distance upstream and downstream of the bridge pilings.

CUMULATIVE EFFECTS BY RESOURCE

Land Use

The Tentatively Selected Plan would convert existing residential developments to parks and open space or ecosystem restoration areas in Onion Creek. The Tentatively Selected Plan for Williamson Creek would utilize the existing draining easement or purchase the land to widen the channel to increase channel valley storage and conveyance. Projects of others in the basin would generally convert the existing open space to impervious cover. Overall, the proposed project would have a slight beneficial impact on land use because it would remove impervious cover and protect additional areas from becoming impervious cover. These impacts would not be significant.

Geology and Soils

The Tentatively Selected Plan would have minor impacts to soils. Overall, projects of others in the basin would also have minor impacts to soils as a result of construction. These impacts are expected to be minor, and due to the fact that storm water permits would be required for major construction projects as well as the Tentatively Selected Plan, these impacts should be insignificant and should be temporary in nature.

Hydrology

The Tentatively Selected Plan, in combination with urban development, would increase flow velocities in some areas along Williamson Creek, as a result of the channel modification. As discussed throughout this document, however, the city of Austin has extensive storm water management ordinance which would reduce the impacts from future impervious cover. Therefore, the cumulative impacts would be insignificant.

Air Quality

As described in the PEIS, the impacts from the proposed project would only include temporary impacts to air quality and, as such, no cumulative effects to air quality would occur as a result of implementation of the proposed project.

Biological Resources

Riparian Resources

The Tentatively Selected Plan would adversely impact approximately 15 acres of vegetation, which would be restored to grassland with trees on 40-foot centers. Over time, the area would function similar to existing conditions. These impacts would be mitigated; therefore, there would be no cumulative adverse impacts to riparian vegetation. In fact, there would be a beneficial cumulative impact from the ecosystem restoration portion of the Tentatively Selected Plan combined with the purchase of additional water quality lands in the watersheds. These benefits, although important, would still be insignificant in terms of cumulative effects.

Wildlife Resources

The impacts to vegetation would have an adverse impact of approximately 6.02 AAHU of habitat. This impact would be fully mitigated to ensure no net loss; therefore, there would be no cumulative adverse impacts to wildlife. There would be beneficial cumulative impacts as a result of the city purchasing additional water quality lands in the upper watershed. These lands are purchased and set aside from development to protect water being recharged. However, these benefits would still be minor.

Threatened and Endangered Species

The Tentatively Selected Plan would not affect threatened and endangered species; therefore, there can be no cumulative effects from implementation of the Tentatively Selected Plan.

Aquatic Resources

Aquatic Habitat

The proposed project would negatively affect aquatic habitat during construction and until vegetation is reestablished if a rain event occurred. These impacts would be temporary in nature, but when combined with construction related to urbanization, the impacts would be a little less temporary and would result in cumulative impacts to the aquatic habitat. These impacts would be increased turbidity, increased sedimentation, and increased scour and erosion. Because of storm water regulations and best management practices that would be implemented during construction of the Tentatively Selected Plan as well as during the construction of the reasonably foreseeable projects of others, these cumulative impacts should be less than significant. In addition, the proposed project would restore riparian woodlands, which should help to offset some of these impacts by acting as a buffer zone and filtering suspended solids and nutrient loads so that they do not end up within the creek. Furthermore, the city of Austin is proposing to implement a few water quality ponds, which would further reduce water quality impacts to the aquatic habitat.

Water Quality

The proposed project would negatively affect water quality during construction and until vegetation is reestablished if a rain event were to occur. These impacts would be temporary in nature, but when combined with construction related to urbanization, the impacts would be a little less temporary and would result in cumulative impacts to water quality. These impacts would be increased turbidity and increased sedimentation. Because of storm water regulations and best management practices that would be implemented during construction of the Tentatively Selected Plan as well as during the construction of the reasonably foreseeable projects of others, these

cumulative impacts should be less than significant. In addition, the proposed project would restore riparian woodlands, which should help to offset some of these impacts by acting as a buffer zone and filtering suspended solids and nutrient loads so that they do not end up within the creek and further degrade water quality. Furthermore, the city of Austin is proposing to implement a few water quality ponds, which would further reduce water quality impacts.

Ground Water

Implementation of the Tentatively Selected Plan would not affect ground water; therefore, there would be no cumulative effects.

Hazardous, Toxic and Radioactive Wastes

Implementation of the Tentatively Selected Plan would not affect any hazardous, toxic, or radioactive waste; therefore, there would be no cumulative effects.

Cultural Resources

No cultural resources have been identified within the areas of interest to date. Backhoe trenching and coordination with SHPO will continue during the Preconstruction, Engineering, and Design Phase, and if any artifacts are discovered, they will be properly mitigated. Since they would be mitigated, there would be no cumulative effects.

Other Social Effects

Public Heath and Safety

The Tentatively Selected Plan combined with the other proposed Corps flood damage reduction projects on Shoal Creek, the Highland Lakes, and Walnut Creek and the city's flood damage reduction projects would result in benefits to public services by reducing costs and relieving the strain on public rescue services during flood events. No cumulative adverse affects to public health and safety would occur.

Public Services

The Tentatively Selected Plan combined with the other proposed Corps flood damage reduction projects on Shoal Creek, the Highland Lakes, and Walnut Creek and the city's flood damage reduction projects would result in benefits to public services by reducing costs and relieving the strain on public rescue services during flood events. No cumulative adverse affects to public services would occur.

Recreational and Public Access

The Tentatively Selected Plan would include constructing two recreational parks on lands vacated for flood damage reduction. The recreation would be an alternate use of the land. In addition, the city of Austin and Travis County have existing and future planned parks in the vicinity of the proposed project. Combined with these proposed facilities, there would be a beneficial cumulative effect, especially since the Tentatively Selected Plan would supplement some of the existing facilities that do not meet latent demand. However, this cumulative effect would not be significant.

Traffic

The impacts to traffic as a result of implementation of the Tentatively Selected Plan would be localized in residential areas; therefore, no cumulative effects associated with the reasonably foreseeable large highway construction would exist.

Noise

The noises related to the construction of the proposed project when combined with the construction of new development, roads, and other projects in the area would result in cumulative impacts; however, since the construction would be limited to daylight hours when higher levels of noise are tolerated, these cumulative impacts would not be significant.

Lighting

The proposed project only recommends safety lights associated with parking lots and restroom facilities. No other reasonably foreseeable project recommends installing lighting in the immediate vicinity of the project; therefore, there would be no cumulative impacts from lighting.

Socioeconomics

The proposed project would benefit the local economy during construction, as would other construction in the area, which would result in a cumulative beneficial effect. In addition, if the other proposed Corps flood damage reduction projects on Shoal Creek, the Highland Lakes, and Walnut Creek and the city's flood damage reduction projects all come to fruition, then there would be reductions in flood damages and flood insurance rates, and additional benefits as a result of the construction effort.

ENVIRONMENTAL COMPLIANCE

Table 5-13 shows the status of environmental compliance of this report with applicable laws, executive orders and other environmental issues. More detailed descriptions of environmental compliance are explained where compliance issues were encountered.

ENDANGERED SPECIES ACT OF 1973

A Planning Aid Letter was received from USFWS, which listed possible threatened and endangered species. The Corps determined that the project would not likely adversely affect any Federally-listed threatened or endangered species. In the draft Fish and Wildlife Coordination Act Report dated August 23, 2006 (Appendix D), USFWS concurred that the project would not likely adversely affect Federally-listed threatened or endangered species. Therefore, the plan is in full compliance with the Endangered Species Act.

CLEAN WATER ACT – SECTION 404

The Corps has been directed by Congress under Section 404 of the Clean Water Act (33USC 1344) to regulate the discharge of dredged and fill material into all waters of the United States, including adjacent wetlands. The intent of Section 404 is to protect the nation's waters from indiscriminate discharge of material capable of causing pollution and to restore and maintain the chemical, physical and biological integrity of these areas. Although the Corps does not issue

itself permits for proposed activities which would affect waters of the U.S., the Corps must meet the legal requirements of the act. Approximately 8,500 feet of Waters of the U.S. would be affected by the Tentatively Selected Plan on Williamson Creek. The Section 404 (b)(1) analysis for the Tentatively Selected Plan is included in Appendix B. Section 401 of the Clean Water Act requires that State Water Quality Certification be obtained for the project. The proposed project is being coordinated with the Texas Commission on Environmental Quality.

EXECUTIVE ORDER 11988 – FLOOD PLAIN MANAGEMENT

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 facilities development without placing fill within the floodplain. Material removed from the project area requiring disposal, as part of the proposed plan, would be placed in approved landfills for the types of materials involved. The proposed fill actions would not result in adverse environmental impacts. Further, floodplain fills for recreational facilities 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 was considered during the development of the proposed project. The proposed project would neither adversely impact nor result in any loss of wetland areas; therefore, the project is in compliance with Executive Order 11990.

EXECUTIVE ORDER 12898, FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW INCOME POPULATIONS

Executive Order 12898 provides for review of proposed activities to assess the effect on minority and low income populations. The area of potential project impact was screened and it was determined that the Timber Creek area does contain minority and low income populations. This fact was made more evident during conservations with local residents while the project delivery team was conducting site visits to this area. The residents stated that they could not afford to purchase similar property out of the floodplain in the Austin area. It was explained to the individuals that relocation assistance would be provided, to the extent authorized, in addition to the fair market value of the land.

Additional alternatives were considered to resolve the flooding issues in this area so that minority and low income residents were not displaced, but those alternatives are not practical in that they do not provide sufficient flood reduction and are not economically feasible. The structural alternative was a 250-foot wide diversion channel which only lowered the water surface elevation by a couple of feet. The benefit-to-cost ratio for the structural alternative was 0.2.

The flooding problem is intensified in the Timber Creek area because these residences are in the floodway. The Timber Creek area experiences high velocities through the neighborhood which causes the mobile homes to be pushed off of their supports and float downstream for several hundred feet in some cases. Therefore, flood proofing measures are not feasible. In addition, flooding in this area frequently results in vehicle and personal property damages, which only intensifies losses these residents experience during flooding. There are no feasible alternatives that could alleviate the flooding problem in this area.

Travis County implemented a voluntary buyout program using FEMA flood hazard mitigation funds in this area. The FEMA grant did not provide sufficient funds to complete the buyouts so only forty-one parcels were purchased, which left the remaining residents in the floodplain and at risk for flooding. The fact that Travis County ran out of funds before it could complete the voluntary buyouts shows that additional residents still desire to receive funding to assist them in relocating out of the floodplain.

Three public meetings have been conducted in the Onion Creek watershed in which the general public was asked to provide comments on the proposed project. Several members from the Timber Creek area were present during the public meetings; however, no real issues with the proposed plan were identified. It was explained that relocation assistance would be provided to assist the residents in finding alternative housing.

As mentioned earlier, the project delivery team conducted several site visits during the feasibility study. During the visits, several residents asked about the proposed Tentatively Selected Plan for the Timber Creek area. The Tentatively Selected Plan and other alternatives were explained in detail. The residents acknowledged that there was not a lot that could be done to resolve the flooding problem other than buyouts.

The Corps conducted a coordination meeting with the United States Environmental Protection Agency (EPA), during which the EPA concurred that there did not seem to be any additional alternatives that would resolve the flooding area in this reach. EPA preliminarily supported the buyouts as long as relocation assistance was provided to the residents. They concurred that the only other practical alternative was the no action alternative, which would leave the low income populations unprotected from the flooding and did not meet the objectives of the study or most of the residents.

Low-income populations have not been identified in the other areas of interest of the project; consequently, environmental justice is not considered an issue in these areas. Recognizing the overall balance of benefits and impacts, it has been determined that implementation of the Tentatively Selected Plan would be in compliance with the intent and spirit of Executive Order 12898.

ADVISORY CIRCULAR 150-5200-33 – HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS

The project is being coordinated with the Federal Aviation Administration (FAA) as required by the Memorandum of Agreement. A letter transmitting the proposed plan was mailed on August 1, 2005 to the FAA. Several follow-up telephone conversations have occurred and the FAA has sent the proposed plan to their Washington Office, but no recommendation from the FAA has been provided to the Corps.

SECTION 106 COMPLIANCE

Coordination was initiated with the State Historic Preservation Officer (SHPO) during the feasibility study. A draft programmatic agreement (PA) for the project component was prepared and forwarded to SHPO for their concurrence on how to address Section 106 compliance. Comments on the proposed PA were provided to the Corps and the Corps forwarded a final PA via email (Included in Appendix C). A PA will be executed between the SHPO and the Corps to ensure Section 106 compliance. The Correspondence is enclosed in Appendix H.

TABLE 5-13
Relationship of Plan to Environmental Protection Statutes and Other Environmental Requirements

Policies	Compliance of Plan
Public Laws	
Archeological and Historic Preservation Act, 1974, as amended	Plan in Full Compliance
Archeological Resources Protection Act, 1979, as amended	Plan in Full Compliance
Clean Air Act, 1977, as amended	Plan in Full Compliance
Clean Water Act, 1972, as amended	In Progress
Coastal Zone Management Act, 1972, as amended	Not Applicable
Endangered Species Act, 1973, as amended	Plan in Full Compliance
Farmland Protection Policy Act	Not Applicable
Fish and Wildlife Coordination Act, 1958, as amended	Plan in Full Compliance
Magnuson Fisheries Conservation and Management Act	Not Applicable
Migratory Bird Treaty Act, 1918, as amended	Plan in Full Compliance
National Environmental Policy Act, 1969, as amended	Plan in Full Compliance
National Historic Preservation Act, 1966, as amended	In Progress
Native Graves Protection and Repatriation Act, 1990	Plan in Full Compliance
Rivers and Harbor Act, 1899	Not Applicable
Wild and Scenic Rivers Act, as amended	Not Applicable
Executive Orders	
Environmental Justice (E.O. 12898)	Plan in Full Compliance
Flood Plain Management (E.O. 11988)	Plan in Full Compliance
Protection of Wetlands (E.O. 11990)	Plan in Full Compliance
Protection of Children from Environmental Heath Risks (E.O. 13045)	Plan in Full Compliance
Others	
FAA Advisory Circular 150-5200-33	In Progress

ECONOMIC ANALYSIS

UPDATED ECONOMICS

Table 5-14 provides equivalent annual damages for the without-project condition, by reach, for Onion and Williamson Creek. These values are at August 2006 price levels, and are derived from calculations of projected hydrologic conditions in 2010 and 2060. These damages will be compared to with-project conditions for the Tentatively Selected Plan to determine final benefits for the project.

Table 5-14
Equivalent Annual Damages
August 2006 Price Levels

Reach	Equivalent Annual Damages Without-Project Conditions
Onion Creek	
Timber Creek	$396,000
Onion Creek Forest/Yarrabee Bend	$3,419,000
Bear/Onion Confluence	$138,000
Total – Onion Creek	**$4,003,000**
Williamson Creek	
Heartwood	$128,000
Radam	$173,000
Broken Bow	$299,000
Bayton Loop	$382,000
Total – Williamson Creek	**$982,000**
Total – All Areas	**$4,985,000**

COST ANALYSIS

PROJECTED FIRST COST

The projected first cost includes estimates for lands and damages; demolition and disposal of structures; cost of construction for benching, fish and wildlife restoration, and recreational facilities; engineering and design; and, construction management.

Contingencies were added to these items in accordance with the level of confidence associated with the item. Construction cost data were developed using material, equipment, and labor costs typical for work of this nature in the Austin area. Real estate costs were developed after the Gross Appraisal was completed. A summary of the project first cost, by reach, for the Tentatively Selected Plan is found in Table 5-15.

ANNUALIZED COST

The project first cost was converted to an annual basis, using a 50-year amortization period and the current applicable Federal interest rate of 5.125 percent. Accrued interest during the construction period was calculated and added to the first cost to produce a total investment cost. The annualized costs for the NED Plan and the Tentatively Selected Plan were used for computation of the benefit-to-cost ratio (BCR) for each plan.

ECONOMIC SUMMARY

Table 5-15 shows a cost estimate for the Tentatively Selected Plan. Tables 5-16 through 5-18 present the economic summary for Timber Creek, Onion Creek Forest/Yarrabee Bend, and Williamson Creek, respectively. Table 5-19 presents the economic summary for the flood damage reduction and recreation components of the Tentatively Selected Plan. Ecosystem restoration benefits are not included in these tables, since the outputs of an ecosystem restoration plan are non-monetary in nature. In addition, and as reflected in Tables 5-16 through 5-19, ecosystem restoration costs are not used in the calculation of benefit-cost ratios to determine economic feasibility of the project. However, ecosystem restoration costs are used in the cost effectiveness / incremental analysis used to justify the ecosystem restoration component of the Tentatively Selected Plan. Furthermore, in accordance with current regulations, costs for real estate relocation assistance are not considered economic costs in the determination of economic feasibility, but are appropriately shown as financial costs of the project. Table 5-20 presents an economic summary of all of the proposed ecosystem restoration.

As presented in Table 5-19, the Tentatively Selected Plan would have annual costs allocated to flood damage reduction and recreation of $4,403,000; total annual economic benefits of $6,422,000; annual net benefits of $2,019,000; and, a BCR of 1.5.

Table 5-20 presents the economic summary for the ecosystem restoration component of the Tentatively Selected Plan. Overall, the ecosystem restoration component would have a first cost of approximately $16,651,000 and an average annual cost of about $1,014,000. The proposed plan would result in a gain of 106.38 AAHU over the "No Action" alternative, which would result in a average annual cost of approximately $9,500 per AAHU gained.

Table 5-15
Cost Estimate Summary for the Tentatively Selected Plan
August 2006 Price levels

Description	First Costs – Tentatively Selected Plan			
	Timber Creek	OCF/YB	Williamson Creek	Total
Lands and Damages	$6,245,000	$49,069,000	$14,512,000	**$69,826,000**
Relocation Assistance	$1,823,000	$11,070,000	$27,000	**$12,920,000**
Restoration Construction	$129,000	$1,479,000	$874,000	**$2,482,000**
FDR Construction/Demo	$544,000	$3,249,000	$1,018,000	**$4,811,000**
Recreation Facilities	$1,021,000	$2,790,000	$0	**$3,811,000**
PED	$263,000	$960,000	$601,000	**$1,824,000**
Construction Management	$180,000	$401,000	$188,000	**$769,000**
HTRW	$0	$499,000	$0	**$499,000**
Contingency	$534,000	$2,344,000	$671,000	**$3,549,000**
Adaptive Management	$6,000	$120,000	$40,000	**$166,000**
Total First Costs – Tentatively Selected Plan	**$10,745,000**	**$71,981,000**	**$17,931,000**	**$100,657,000**

Table 5-16
Economic Summary of the Tentatively Selected Plan
TIMBER CREEK
(August 2006 Prices, 5.125%, 50 year period of analysis)

Project Costs	First Cost
Flood Damage Reduction	
Lands and Damages	$5,182,000
Relocation Assistance	$1,823,000
Demolition	$544,000
Preconstruction, Engineering and Design	$143,000
Construction Management	$33,000
Construction Contingency	$180,000
Real Estate Contingency	$965,000
Total for Flood Damage Reduction	**$8,870,000**
Recreation	
Construction	$1,021,000
Preconstruction, Engineering and Design	$80,000
Construction Management	$139,000
Construction Contingency	$310,000
Total for Recreation	**$1,550,000**
FDR and Recreation Annualized Computations	
FDR and Recreation First Cost (excluding Relocation assistance)	$8,597,000
Interest During Construction	$330,000
Total Investment	$8,927,000
Annual FDR and Recreation Costs	
Interest and Amortization	$499,000
OMRR&R	$25,000
Total Annual Costs	$524,000
Annual FDR and Recreation Benefits	
Flood Damage Reduction	$328,000
Municipal and Insurance Cost Reduction	$55,000
Recreation	$471,000
Total Annual Benefits	$854,000
Net Annual Benefits	**$330,000**
Benefit-to-Cost Ratio	**1.6**
Ecosystem Restoration	
Construction	$129,000
Lands	$83,000
Preconstruction, Engineering and Design	$40,000
Construction Management	$8,000
Construction Contingency	$44,000
Real Estate Contingency	$15,000
Adaptive Management	$6,000
Total for Ecosystem Restoration	**$325,000**
Total Timber Creek Summary	
Project First Cost	**$10,745,000**

Table 5-17 **Economic Summary of the Tentatively Selected Plan** **ONION CREEK FOREST/YARRABEE BEND** (August 2006 Prices, 5.125%, 50 year period of analysis)	
Project Costs	**First Cost**
Flood Damage Reduction	
Lands and Damages	$39,402,000
Relocation Assistance	$11,070,000
Demolition	$3,249,000
HTRW	$499,000
Preconstruction, Engineering and Design	$560,000
Construction Management	$187,000
Construction Contingency	$1,124,000
Real Estate Contingency	$7,561,000
Total for Flood Damage Reduction	**$63,652,000**
Recreation	
Construction	$2,790,000
Preconstruction, Engineering and Design	$320,000
Construction Management	$140,000
Construction Contingency	$812,000
Total for Recreation	**$4,062,000**
FDR and Recreation Annualized Computations	
FDR and Recreation First Cost (excluding Relocation assistance)	$56,644,000
Interest During Construction	$2,928,000
Total Investment	$59,572,000
Annual FDR and Recreation Costs	
Interest and Amortization	$3,326,000
OMRR&R	$200,000
Total Annual Costs	$3,526,000
Annual FDR and Recreation Benefits	
Flood Damage Reduction	$2,439,000
Municipal and Insurance Cost Reduction	$130,000
Recreation	$2,591,000
Total Annual Benefits	$5,160,000
Net Annual Benefits	**$1,634,000**
Benefit-to-Cost Ratio	**1.5**
Ecosystem Restoration	
Construction	$1,479,000
Lands	$1,781,000
Preconstruction, Engineering and Design	$80,000
Construction Management	$74,000
Construction Contingency	$408,000
Real Estate Contingency	$325,000
Adaptive Management	$140,000
Total for Ecosystem Restoration	**$4,267,000**
Total Onion Creek Forest/Yarrabee Bend Summary	
Project First Cost	**$71,981,000**

Table 5-18 **Economic Summary of the Tentatively Selected Plan** **WILLIAMSON CREEK** (August 2006 Prices, 5.125%, 50 year period of analysis)	
Project Costs	**First Cost**
Flood Damage Reduction	
Lands and Damages	$2,700,000
Relocation Assistance	$27,000
Lands (Mitigation)	$602,000
Construction (Mitigation)	$389,000
Construction	$629,000
HTRW	$0
Preconstruction, Engineering and Design	$400,000
Construction Management	$101,000
Construction Contingency	$380,000
Real Estate Contingency	$525,000
Real Estate Contingency (Mitigation)	$119,000
Total Flood Damage Reduction	**$5,872,000**
FDR Annualized Computations	
FDR First Cost (excluding Relocation assistance)	$5,845,000
Interest During Construction	$149,000
Total Investment	$5,994,000
Annual FDR Costs	
Interest and Amortization	$335,000
OMRR&R	$18,000
Total Annual Costs	$353,000
Annual FDR Benefits	
Flood Damage Reduction	$349,000
Municipal and Insurance Cost Reduction	$60,000
Total Annual Benefits	$409,000
Net Annual Benefits	**$56,000**
Benefit-to-Cost Ratio	**1.2**
Ecosystem Restoration	
Construction	$874,000
Lands	$8,825,000
Preconstruction, Engineering and Design	$201,000
Construction Management	$87,000
Construction Contingency	$290,000
Real Estate Contingency	$1,741,000
Adaptive Management	$40,000
Total Ecosystem Restoration	**$12,058,000**
Total Williamson Creek Summary	
Project First Cost	**$17,930,000**

Table 5-19 **Economic Summary** **TOTAL TENTATIVELY SELECTED PLAN** (August 2006 Prices, 5.125%, 50 year period of analysis)	
Project Costs	**First Cost**
Flood Damage Reduction	
Lands and Damages	$47,284,000
Relocation Assistance	$12,920,000
Lands (Mitigation)	$602,000
Construction (Mitigation)	$389,000
Construction	$4,422,000
HTRW	$499,000
Preconstruction, Engineering and Design	$1,102,000
Construction Management	$322,000
Construction Contingency	$1,684,000
Real Estate Contingency	$9,051,000
Real Estate Contingency (Mitigation)	$119,000
Total Flood Damage Reduction	**$78,394,000**
Recreation	
Construction	$3,811,000
Preconstruction, Engineering and Design	$400,000
Construction Management	$279,000
Construction Contingency	$1,122,000
Total Recreation	**$5,612,000**
FDR and Recreation Annualized Computations	
FDR and Recreation First Cost (excluding Relocation assistance)	$71,086,000
Interest During Construction	$3,407,000
Total Investment	$74,493,000
Annual Costs	
Interest and Amortization	$4,160,000
OMRR&R	$243,000
Total Annual Costs	$4,403,000
Annual Benefits	
Flood Damage Reduction	$3,116,000
Municipal and Insurance Reduction	$244,000
Recreation	$3,062,000
Total Annual Benefits	$6,422,000
Net Annual Benefits	**$2,019,000**
Benefit-to-Cost Ratio	**1.5**
Ecosystem Restoration	
Construction	$2,481,000
Lands	$10,689,000
Preconstruction, Engineering and Design	$321,000
Construction Management	$169,000
Construction Contingency	$743,000
Real Estate Contingency	$2,082,000
Adaptive Management	$166,000
Total Ecosystem Restoration	**$16,651,000**
Total Tentatively Selected Plan Summary	
Project First Cost	**$100,657,000**

Table 5-20 **Economic Summary of the Ecosystem Restoration** (August 2006 Prices, 5.125%, 50-year Period of Analysis)				
Costs	**Timber Creek**	**OCF/YB**	**Williamson Creek**	**Total**
First Costs				
First Cost	$325,000	$4,267,000	$12,059,000	$16,651,000
Interest During Construction	$8,000	$108,000	$306,000	$422,000
Total Investment	$333,000	$4,375,000	$12,365,000	$17,073,000
Annualized First Cost	$19,000	$244,000	$690,000	$953,000
Annual O&M	$3,000	$45,000	$13,000	$61,000
Average Annual Cost (AAC)	$22,000	$289,000	$703,000	$1,014,000
Benefits				
AAHU	**5.86**	**56.76**	**43.76**	**106.38**
Summary				
Annual Cost/AAHU	**$3,800**	**$5,100**	**$16,100**	**$ 9,500**
Cost per Acre	**$21,000**	**$23,000**	**$108,000**	**$53,000**

Socioeconomic Effect of the Tentatively Selected Plan

The potential economic and social effects from implementation of the investigated plan on the study area are comprised of the value of the long-term reduction in periodic flood damages, direct and indirect short-term income, and employment impacts of project construction. The permanent reduction in periodic flood damages would effectively increase the income available to floodplain property owners released from the financial burden inherent to residing in the floodplain.

To the extent that this additional disposable income is spent within the city, it would result in a local "multiplier effect": increases in business revenues, employment, and personal income rippling throughout the local economy as each new dollar brought in is spent and respent. Property values, and local tax revenues, could also increase as a general result since the public perception of the area would be improved by project implementation.

Short-term impacts associated with project construction results from the temporary presence of construction workers and expenditures for construction materials and services. These expenditures would be expected to result in a positive multiplier effect on the local economy and would last for about two years. The lasting economic and social effects of project implementation would be the benefits resulting from the permanent reduction in flood damages and designation of the land for recreational and restoration purposes.

PROJECT COST SHARING

The provisions of the Water Resources Development Act of 1996 (Public Law 104-303), approved October 12, 1996, stipulates cost sharing requirements which local sponsors must meet for the Federal government to be involved with water resource projects. Cost sharing provisions for the flood control, ecosystem restoration, and recreational development purposes are outlined below.

FLOOD CONTROL

Under the provisions set forth in Public Law 104-303, as amended, the designated Sponsor would be required to formally approve the recommendations of the Interim Feasibility Report before initiating the Preconstruction, Engineering, and Design Phase of the project.

For non-structural flood control projects, the non-Federal cost would be at least 35 percent of the total project flood control costs. The non-Federal sponsor would be responsible for 100 percent of the operation, maintenance, repair, rehabilitation and replacement costs for the flood control portion of the project.

ECOSYSTEM RESTORATION

Public Law 104-303, as amended, states that the non-Federal cost for ecosystem restoration projects would be 35 percent of the total ecosystem restoration project costs. The non-Federal sponsor would be responsible for 100 percent of the operation, maintenance, repair, rehabilitation and replacement costs for the ecosystem restoration portion the project.

RECREATIONAL DEVELOPMENT

Under the Federal Water Project Recreation Act of 1965 (Public Law 89-72), outdoor recreational facilities can be provided at Federal non-reservoir flood damage reduction projects. However, recreational developments must be within the lands acquired for the basic project, except for separable lands required for access, parking, potable water, sanitation, and related developments for health, safety, and public access. Also, the facilities for cost sharing must be in accordance with the approved list in ER 1165-2-400. As stipulated in Public Law 104-303, recreational development including lands required for public access, health, and safety, is cost-shared on an equal (50/50 percent) basis between Federal and non-Federal public interests. The cost of lands provided by local interests for the basic project is not included for recreational cost sharing purposes. Operation, maintenance, repair, rehabilitation and replacement costs would be the responsibility of the non-Federal sponsor.

MONITORING AND ADAPTIVE MANAGEMENT

ER 1105-2-100 allows for monitoring and adaptive management. Adaptive management for complex specifically authorized projects may be recommended. The cost of adaptive management is limited to 3 percent of the total project cost excluding monitoring costs. The Federal Government is responsible for monitoring and adaptive management. The restoration measures will be periodically surveyed to provide feedback on the response of the ecosystem to the management measures taken. By connecting the ecosystem response to the restoration as well as the management measures, potential beneficial adaptations and adjustments to the project or management plan can be identified to ensure continued success of the project. To accomplish this goal, periodic monitoring of the restoration measures by the Government will be conducted during project implementation prior to the project being turned over to the non-Federal sponsor for operation and maintenance, and will be cost-shared between the Government and

the non-Federal sponsor as part of the total project cost. A monitoring and adaptive management plan will be developed during the Preconstruction, Engineering and Design phase and will not exceed five years after the end of the construction phase. Table 5-21 displays the estimated cost of the Adaptive Management Plan.

Table 5-21
Estimated Cost of Adaptive Management
August 2006 Price levels

Description	Area of Interest			
	Timber Creek	**OCF/YB**	**Williamson Creek**	**Total**
First Cost Ecosystem Restoration without Adaptive Management	$319,000	$4,147,000	$12,019,000	$5,000
Proposed Adaptive Management	$6,000	$120,000	$40,000	$146,000
Total allowable at 3%	**$9,570**	**$124,410**	**$360,570**	**$494,550**

OPERATION, MAINTENANCE, REPAIR, REHABILITATION, AND REPLACEMENT

The Federal Government and the City of Austin, City of Sunset Valley and Travis County would enter into a project cooperation agreement (PCA) under which the entities would accept the project following completion of construction and insure operation, maintenance, repair, rehabilitation and replacement (OMRRR), in accordance with Federal regulations. The major items involved would include: maintenance of benches, regular maintenance of park facilities, restriping access areas, debris cleanup, selective trimming in restoration and invasive species control. A break down of the costs is provided in table 5-22. An operation and maintenance manual would be prepared by the Corps after completion of the project, and periodic inspections would be conducted to ensure that all required maintenance was being performed.

Table 5-22
Breakdown of Annual OMRR&R Costs for the Tentatively Selected Plan
August 2006 Price levels

Description	Area of Interest			
	Timber Creek	OCF/YB	Williamson Creek	Total
Flood Damage Reduction				
Maintenance of Benches at 10 year Intervals	$0	$0	$18,000	$18,000
Total FDR O&M	**$0**	**$0**	**$18,000**	**$18,000**
Recreation				
Regular Maintenance (Debris Pickup)	$8,000	$70,000	$0	$78,000
Replacement of trails at 25-years	$4,000	$20,000	$0	$24,000
Resurfacing / striping access areas at 5-year intervals	$4,000	$15,000	$0	$19,000
Grounds Maintenance	$9,000	$95,000	$0	$104,000
Total Recreation O&M	**$25,000**	**$200,000**	**$0**	**$225,000**
Ecosystem Restoration				
Selective thinning	$1,000	$10,000	$3,000	$14,000
Continued removal of invasive species	$2,000	$35,000	$10,000	$47,000
Total Ecosystem Restoration	**$3,000**	**$45,000**	**$13,000**	**$61,000**
Total O&M				
Total O&M	**$28,000**	**$245,000**	**$31,000**	**$304,000**

DIVISION OF PLAN RESPONSIBILITIES

IMPLEMENTATION SCHEDULE AND EXPENDITURE SCHEDULE

An implementation and expenditure schedule can be found in the Main Report, Volume I.

COST APPORTIONMENT

A cost apportionment has been performed for the Tentatively Selected Plan in each of the three project areas. Each area may eventually have a different cost sharing sponsor or sponsors. Currently, it is believed that Travis County would serve as the local sponsor for the Timber Creek Area of Interest. The City of Austin would be the local sponsor for the Onion Creek Forest/Yarrabee Bend area, and the Williamson Creek area would be jointly sponsored by the Cities of Austin and Sunset Valley.

Table 5-25 shows the cost apportionments for the Timber Creek component of Tentatively Selected Plan. Table 5-26 shows the cost apportionments for the Onion Creek Forest/Yarrabee Bend component of the Tentatively Selected Plan. Table 5-27 provides the cost apportionments for Williamson Creek component. Table 5-28 shows the cost apportionment for the total project. The total cost of the Tentatively Selected Plan, including relocation assistance, is estimated at approximately $100,490,000. Of this amount, $63,443,000 (63.0 percent) would be a Federal responsibility, while $37,213,000 (37.0 percent) would be a local responsibility.

Table 5-23
Cost Apportionment for the Tentatively Selected Plan
Timber Creek
August 2006 Prices

Feature	***Federal***	***Non-Federal***	***Total***
Flood Damage Reduction			
Lands, Structures		$5,182,000	$5,182,000
Relocation Assistance		$1,823,000	$1,823,000
Demolition, Removal	$544,000	$0	$544,000
Preconstruction, Engineering & Design	$143,000	$0	$143,000
Construction Management	$33,000	$0	$33,000
Contingency	$180,000	$0	$180,000
RE Contingency		$965,000	$965,000
Unadjusted total	$900,000	$7,970,000	$8,870,000
Adjustment to receive 65/35	**$4,866,000**	**-$4,866,000**	
Subtotal FDR	**$5,766,000**	**$3,104,000**	**$8,870,000**
Recreation			
Recreation Facilities			
Fed Cost Shared	$476,000	$476,000	$952,000
100% Local Sponsor Cost	$0	$104,000	$104,000
Preconstruction, Engineering & Design	$37,500	$37,500	$75,000
Construction Management	$65,000	$65,000	$130,000
Contingency	$144,500	$144,500	$289,000
Subtotal Recreation	**$723,000**	**$827,000**	**$1,550,000**
Ecosystem Restoration			
Restoration Facilities (excluding lands)	$129,000		$129,000
Lands		$83,000	$83,000
Preconstruction, Engineering & Design	$40,000		$40,000
Construction Management	$8,000		$8,000
Contingency	$44,000		$44,000
RE Contingency		$15,000	$15,000
Adaptive Management	$6,000		$6,000
Unadjusted Total	$227,000	$98,000	$325,000
Adjustment to achieve 65/35	-$16,000	$16,000	
Subtotal ER	**$211,000**	**$114,000**	**$325,000**
Total Cost Apportionment	**$6,700,000**	**$4,045,000**	**$10,745,000**
Cost Percentage	**62.4%**	**37.6%**	**100%**

Table 5-24
Cost Apportionment for the Tentatively Selected Plan
Onion Creek Forest/Yarrabee Bend
August 2006 Prices

Feature	***Federal***	***Non-Federal***	***Total***
Flood Damage Reduction			
Lands, Structures		$39,402,000	$39,402,000
Relocation Assistance		$11,070,000	$11,070,000
Demolition, Removal	$3,249,000		$3,249,000
HTRW	$499,000		$499,000
Preconstruction, Engineering & Design	$560,000		$560,000
Construction Management	$187,000		$187,000
Contingency	$1,124,000		$1,124,000
RE Contingency		$7,561,000	$7,561,000
Unadjusted total	$5,619,000	$58,033,000	$63,652,000
Adjustment to receive 65/35	$35,755,000	-$35,755,000	
Subtotal FDR	**$41,374,000**	**$22,278,000**	**$63,652,000**
Recreation			
Recreation Facilities			
Fed Cost Shared	$1,251,000	$1,251,000	$2,502,000
100% Local Sponsor Cost	$0	$288,000	$288,000
Preconstruction, Engineering & Design	$143,000	$177,000	$320,000
Construction Management	$63,000	$77,000	$140,000
Contingency	$364,000	$448,000	$812,000
Subtotal Recreation	**$1,821,000**	**$2,241,000**	**$4,062,000**
Ecosystem Restoration			
Restoration Facilities(excluding lands)	$1,479,000		$1,479,000
Lands		$1,781,000	$1,781,000
Preconstruction, Engineering & Design	$80,000		$80,000
Construction Management	$74,000		$74,000
Contingency	$408,000		$408,000
RE Contingency		$325,000	$325,000
Adaptive Management	$120,000		$120,000
Unadjusted Total	$2,161,000	$2,106,000	$4,267,000
Adjustment to achieve 65/35	$613,000	-$613,000	
Subtotal ER	**$2,774,000**	**$1,493,000**	**$4,267,000**
Total Cost Apportionment	**$45,969,000**	**$26,012,000**	**$71,981,000**
Cost Percentage	**63.9%**	**36.1%**	**100%**

Table 5-25
Cost Apportionment for the Tentatively Selected Plan
Williamson Creek
August 2006 Prices

Feature	*Federal*	*Non-Federal*	*Total*
Flood Damage Reduction			
Lands (except Mitigation)		$2,700,000	$2,700,000
Relocation Assistance		$27,000	$27,000
Lands Mitigation	$602,000		$602,000
Mitigation Plantings	$389,000		$389,000
Construction	$629,000		$629,000
Preconstruction, Engineering & Design	$400,000		$400,000
Construction Management	$101,000		$101,000
Contingency	$380,000		$380,000
Real Estate Contingency		$525,000	$525,000
Real Estate Contingency (Mit)	$119,000		$119,000
5% Cash			
Subtotal	$2,884,000	$2,988,000	
Reimbursement (50/50)	$52,000	-$52,000	
Subtotal FDR Portion	**$2,936,000**	**$2,936,000**	**$5,872,000**
Ecosystem Restoration			
Construction First Cost	$874,000		$874,000
Lands		$8,825,000	$8,825,000
Preconstruction, Engineering & Design	$201,000		$201,000
Construction Management	$87,000		$87,000
Contingency	$291,000		$291,000
Real Estate Contingency		$1,741,000	$1,741,000
Adaptive Management	$40,000		$40,000
Adjustment for (65/35)	$6,346,000	-$6,346,000	
Subtotal ER Component	**$7,838,000**	**$4,220,000**	**$12,058,000**
Total Cost - All Features	**$10,774,000**	**$7,156,000**	**$17,930,000**
Cost Apportionment in Percent	**60.1%**	**39.9%**	**100.00%**

Table 5-26
Cost Apportionment for the Tentatively Selected Plan
August 2006 Prices

Project Feature	Tentatively Selected Plan		
Flood Damage Reduction	$50,076,000	$28,318,000	$78,394,000
Recreation	$2,544,000	$3,068,000	$5,612,000
Ecosystem Restoration	$10,823,000	$5,827,000	$16,650,000
Total Cost	**$63,443,000**	**$37,213,000**	**$100,656,000**
Percent of Total Cost	**63.0%**	**37.0%**	**100.0%**

NON-FEDERAL RESPONSIBILITIES (ITEMS OF LOCAL COOPERATION)

Federal implementation of the recommended project would be subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies, including but not limited to:

a. Provide a minimum of 35 percent, but not to exceed 50 percent of total structural flood damage reduction costs as further specified below:

    1. Provide 25 percent of design costs allocated by the Government to structural flood damage reduction in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

    2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated by the Government to structural flood damage reduction;

    3. Provide, during construction, a contribution of funds equal to 5 percent of total structural flood damage reduction costs;

    4. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the structural flood damage reduction features;

    5. Provide, during construction, any additional funds necessary to make its total contribution for structural flood damage reduction equal to at least 35 percent of total structural flood damage reduction costs;

b. Provide 35 percent total non-structural flood damage reduction costs as further specified below:

    1. Provide 25 percent of design costs allocated by the Government to non-structural flood damage reduction in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

    2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated by the Government to non-structural flood damage reduction;

3. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the non-structural flood damage reduction features;

4. Provide, during construction, any additional funds necessary to make its total contribution for non-structural flood damage reduction equal to 35 percent of total non-structural flood damage reduction costs;

c. Provide 35 percent of total ecosystem restoration costs as further specified below:

1. Provide 25 percent of design costs allocated by the Government to ecosystem restoration in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated by the Government to ecosystem restoration;

3. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the ecosystem restoration features;

4. Provide, during construction, any additional funds necessary to make its total contribution for ecosystem restoration equal to 35 percent of total ecosystem restoration costs;

d. Provide 50 percent of total recreation costs as further specified below:

1. Provide 25 percent of design costs allocated by the Government to recreation in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated by the Government to recreation;

3. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the recreation features;

4. Provide, during construction, any additional funds necessary to make its total contribution for recreation equal to 50 percent of total recreation costs;

e. Provide, during construction, 100 percent of the total recreation costs that exceed an amount equal to 10 percent of the sum of the Federal share of total structural flood damage reduction costs and the Federal share of total ecosystem restoration costs; or 100 percent of the total recreation costs that exceed an amount equal to the sum of 50 percent of the Federal share of total non-structural flood damage reduction costs and 10 percent of the Federal share of total ecosystem restoration costs; depending on the nature of the flood damage reduction features in the particular sub-plan.;

f. Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefor, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;

g. Not less than once each year, inform affected interests of the extent of protection afforded by the flood damage reduction features;

h. Agree to participate in and comply with applicable Federal floodplain management and flood insurance programs;

i. 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, and to implement such plan not later than one year after completion of construction of the flood damage reduction features;

j. 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 flood damage reduction features;

k. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the flood damage reduction features afford, reduce the outputs produced by the ecosystem restoration features, hinder operation and maintenance of the project, or interfere with the project's proper function;

l. Shall not use the ecosystem restoration features or lands, easements, and rights-of-way required for such features as a wetlands bank or mitigation credit for any another project;

m. Keep the recreation features, and access roads, parking areas, and other associated public use facilities, are open and available to all on equal terms;

n. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected

persons of applicable benefits, policies, and procedures in connection with said Act;

o. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

p. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

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

r. Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, 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 at 32 Code of Federal Regulations (CFR) Section 33.20;

s. Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; 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 substantial 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 et seq.);

t. Perform, or ensure performance of, 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), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

u. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous

substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project;

v. Agree, as between the Federal Government and the non-Federal sponsor, that 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, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

w. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

FULLY FUNDED COST ESTIMATE

The fully funded cost estimate is intended to provide an indication of total project costs when inflation is taken into account. Inflation rates are based on rates developed as part of the Corps budgeting process. The fully funded cost estimate for the Tentatively Selected Plan is $103,900,000. Table 5-27 presents the fully funded cost estimate, by reach.

Table 5-27
Fully Funded Cost Estimate for the Tentatively Selected Plan

Reach	*First Cost*	*Fully Funded First Cost*
Timber Creek	$10,745,000	$10,988,000
Onion Creek Forest/Yarrabee Bend	$71,981,000	$74,054,000
Williamson Creek	$17,930,000	$18,859,000
Total Cost	**$100,656,000**	**$103,901,000**

FINANCIAL ANALYSIS

A financial capability analysis of the City of Austin and Travis County was conducted in accordance with ER 1105-2-100 to ascertain the sponsors' financial conditions and their ability to meet the cost sharing responsibilities for the proposed project. The assessment involved the calculation and analysis of nine key financial indicators. The selected indicators explain the difference in credit worthiness between communities with strong and weak credit ratings. Other relevant facts and data about the community which play a role in the analysis include population, per capita income and property tax information. Table 5-28 provides a key of the financial indicator ratings. Tables 5-29 and 5-30 show the indicator values and ratings for the City of Austin and Travis County, respectively. The indicators, calculated values and corresponding rating have been updated to reflect the sponsors' capability as of 2005, the most recent year where all data are available, and are summarized in Table 5-31 and 5-32.

The population for the city of Austin between 2000 and 2005 exhibits a 1.01 percent annual rate of change. Over the same period, the population of Travis County grew at an annual rate of change of 1.8%. The population growth indicator's stability in the economic base is useful because the economic base typically rises and falls with changes in the population. This would indicate a growing economic base from which to draw future revenues to support additional debt.

The proportion of surplus/deficit expenditures to total expenditures is also a significant indicator of the community's strength. For the Austin, the ratio indicates a surplus condition and is within average range. Travis County is currently operating at a deficit with expenditures exceeding revenues. This is a weak indicator, but reviewing trends in the county's budgets overtime show the deficit narrowing in recent years.

The third indicator measures the efficiency of the city's tax collection system. Both entities have a collection rate of 98%, at the upper end of the rating range, providing near strong indicator of their ability to collect the funds to meet financial obligations.

Indicators' five through eight are used to assess the community's debt capacity. The current and future debt situation of the Austin is mixed, while the situation for Travis County is very stable based on these indicators. Indicator five compares the amount of tax supported debt to the full market value of real property. A value that exceeds 5 percent shows a weakness, while values between three and 5 percent are considered average. The City of Austin exhibits a weak value of 7.2 percent. Travis County's indicator is .70, indicating a strong position here to take on additional debt.

Personal income can be used as a yardstick to judge the city's ability to repay debt. Personal incomes are not reported at the city level, so data for Travis County were used to estimate the per capita income of Austin. In 2004, the personal income of Travis County was $31,482,920,000. Looking at population and employment trends for the region, it is reasonable that the growth in income between 2004 and 2005 would be similar to the annual rate of change between 2000 and 2004. This would give an estimate personal income of $32,173,601,000. Using population data for Austin, the estimated personal income for 2004 would be $25,003,689,000.

Indicator six shows net debt representing about 19.5% of personal income for the City of Austin, which shows a weak position. For Travis County, the ratio is 1.34%, indicating a strong position.

Indicators' seven and eight represent the per capita direct and overall net debt. For Austin, the direct net per capita is $1,150, which is within the average range of most cities. It's

overall net debt per capita is $5,168, significantly higher than average. For Travis County, both indicators are strong, with the per capita debts at $476.

Finally, indicator nine compares the percentage of direct net debt due within five years to total outstanding direct net debt. Both sponsor's have fall within the strong range of the scale, with 39.7% for Austin and 42.7% for Travis County.

Travis County shows strong indicators in the majority of the categories, while Austin shows a more mixed result. Looking at other trends, including population growth, unemployment rates and bond ratings for the areas, there are no strong indicators that would suggest the two sponsor's would find difficulty in meeting their financial obligations or their cost apportionment of the projects.

Table 5-28
Financial Indicator Rating Key

Indicator	Weak	Average	Strong
1.Annual rate of change in population	<1%	1%	>1%
2. Current surplus/deficit as a percent of total current expenditures	<0%	0% to 5%	> 5%
3. Real property tax collection rate	<96%	96% to 98 %	>98%
4. Property tax revenue as a percent of full market value of real property	>4%	2% to 4%	<2%
5. Overall net debt as a percent of full market value of real property	>5%	3% to 5%	<3%
6. Overall net debt outstanding as a percent of personal income	>12%	4% to 12%	<4%
7. Direct net debt per capita	>$1,492	$663 to $1,492	<$663
8. Overall net debt per capita	>$1,989	$829 to $1,989	<$829
9. Percent direct net debt outstanding due within next 5 years	<10%	10% to 30%	>30%

Table 5-29
Current Community Financial Indicator Values
For the City of Austin

Indicator	Value	Rating
1. Annual rate of change in population	1.01%	Strong
2. Current surplus/deficit as a percent of total current expenditures	1.42%	Average
3. Real property tax collection rate	98%	Average
4. Property tax revenues as a percent of full market value of real property	.437%	Strong
5. Overall net debt as a percent of full market value of real property	7.17%	Weak
6. Overall net debt outstanding as a percent of personal income	19.5%	Weak
7. Direct net debt per capita	$1,150	Average
8. Overall net debt per capita	$5,168	Weak
9. Percent direct net debt outstanding due within next 5 years	39.7%	Strong

Table 5-30
Current Community Financial Indicator Values
For Travis County

Indicator	Value	Rating
1. Annual rate of change in population	1.8%	Strong
2. Current surplus/deficit as a percent of total current expenditures	-2.8%	Weak
3. Real property tax collection rate	98%	Average
4. Property tax revenues as a percent of full market value of real property	.50%	Strong
5. Overall net debt as a percent of full market value of real property	.70%	Strong
6. Overall net debt outstanding as a percent of personal income	1.34%	Strong
7. Direct net debt per capita	$476	Strong
8. Overall net debt per capita	$476	Strong
9. Percent direct net debt outstanding due within next 5 years	42.7%	Strong

Table 5-31
City of Austin
Summary of Financial Capability

A. BOND RATINGS	***Rating***	***Date***	
General Obligation	Aa2, AA+	Sep 05	
Revenue Bond Utility Prior Lien Utility Sub Lien Utility Sep Sub Lien	 A2, A+ A2, A, A+ A3, A2, A, A+	 Sep 05 Sep 05 Sep 05	
B. DEBT	***Outstanding***	***Projected***	***Total***
General Obligation Bonds	$927,401,000		$927,401,000
Revenue Bonds	$3,157,400,000		$3,157,400,000
Gross Direct Debt	$1,610,934,000		$1,610,934,000
Direct Net Debt	$805,352,000		$805,352,000
Overlapping Net Debt 1/	$2,813,991,000		$2,813,991,000
Overall Net Debt	$3,619,343,000		$3,619,343,000
Other Debt 2/	$416,412,000		$416,412,000
Estimated Future Debt	$292,335,000		$292,335,000
C. DEBT REPAYMENT SCHEDULE (principle only)			
	Outstanding	***Projected***	***Total***
Year 1	$566,634,000	0	$566,634,000
Year 2	$230,388,000	0	$230,388,000
Year 3	$225,802,000	0	$225,802,000
Year 4	$211,074,000	0	$211,074,000
Year 5	$203,929,000	0	$203,929,000
D. DEBT LIMITS			

[1] Overlapping net debt is the sponsor's share of taxes owed to other taxing bodies within the community, ie., a flood district.

[2] Other debt obligations include outstanding leases, unfunded pension liabilities, and notes with a maturity.

Table 5-32 Travis County Summary of Financial Capability			
A. BOND RATINGS	***Rating***	***Date***	
General Obligation	AAA	Sep 05	
Revenue Bond			
B. DEBT	***Outstanding***	***Projected***	***Total***
General Obligation Bonds	$430,316,881		$430,316,881
Revenue Bonds	$0		$0
Gross Direct Debt	$430,316,881		$430,316,881
Direct Net Debt	$422,728,919		$422,728,919
Overlapping Net Debt 1/	$0		$0
Overall Net Debt	$422,728,919	$422,728,919	$422,728,919
Other Debt 2/	$1,070,327		$1,070,327
Estimated Future Debt			
C. DEBT REPAYMENT SCHEDULE (principle only)			
	Outstanding	***Projected***	***Total***
Year 1	35,181,000	0	35,181,000
Year 2	35,181,000	0	35,181,000
Year 3	35,181,000	0	35,181,000
Year 4	35,181,000	0	35,181,000
Year 5	35,181,000	0	35,181,000
			175,905,000
D. DEBT LIMITS			
Article III, Section 52 of the Texas Constitution and Section 1471.011 of the Texas Government Code. Article III, Section 52 debt outstanding cannot exceed 25% of taxable assessed value within the County. Article VIII, Section 9 of the Texas Constitution and Subchapter C, Chapter 271 of the Texas Local Government Code Texas Constitution and Chapter 331 of the Texas Local Government Code.			
[1] Overlapping net debt is the sponsor's share of taxes owed to other taxing bodies within the community, ie., a flood district. [2] Other debt obligations include outstanding leases, unfunded pension liabilities, and notes with a maturity.			

NON-FEDERAL FINANCIAL PLANNING

The purpose of strategic financial planning is to optimize the use of capital over time in response to long-term financial goals. The three principal elements involved include cost recovery alternatives, if needed; selection of the preferred financing alternative; and implementation of the cost recovery approach. Although financing decisions are ultimately the

sponsors', the Corps of Engineers can assist in the decision making through the provision of timely information on costs, benefits and cost recovery opportunities. The sponsor is responsible for making arrangements to finance the project sufficiently in advance of construction to enable the project schedule to be met.

ABILITY-TO PAY ANALYSIS

Based on ER 1165-2-121 an ability-to-pay test should be applied to all flood control projects. The test determines the eligibility of the study area to qualify for a reduction in the amount to be cost shared by the Non-Federal interest. To qualify for a reduction the results of both the benefit and income portions of the twofold ability-to-pay test must fall within the specified guidelines.

The benefits' test determines the maximum reduction, called the "benefits based floor" (BBF), in the level of non-Federal cost sharing for any project. The factor is determined by dividing the project B/C ratio by four. If the factor (expressed as a percentage) is less than the standard level of cost sharing, the project may be eligible for a reduction in the non-Federal share to this BBF. The standard level cost share for a flood damage project is 25 percent and for ecosystem restoration projects it is 35 percent. The Tentatively Selected Plan's B/C ratio of 1.5 was divided by four to yield a BBF of 38 percent.

The income test determines qualification for the reduction calculated in the benefit step. Qualification depends on a measure of the current economic resources of both the project area and the State in which the project is located.

In accordance with factors released in Economic Guidance 05-03, the income index factors for the state of Texas is 94.5, for Austin, Sunset Valley, and Travis County it is 116.75, and for Wharton the index value is 77.16. The Eligibility Factor (EF) for a flood control project is calculated according to the following formula:

$$EF = a - b_1 * (\text{State factor}) - b_2 * (\text{area factor})$$

where:

$a = 18.1375$

$b_1 = 0.0790$

$b_2 = 0.1579$

Utilizing the above formula, an EF of -7.76 was calculated for Austin, Sunset Valley, and Travis County. An EF less than zero indicates ineligibility for a reduction in construction cost sharing.

As stated previously, a BBF factor for the investigated plan was calculated at 38 percent. However, to qualify for a reduction, the BBF factor must be less than the standard level of cost sharing. According to ER-1165-2-121 paragraph 5a(2), the sponsors do not meet the criteria for a reduction in construction cost. This project does not meet either of the tests; therefore, the sponsors must pay the standard percentage of the total project cost.