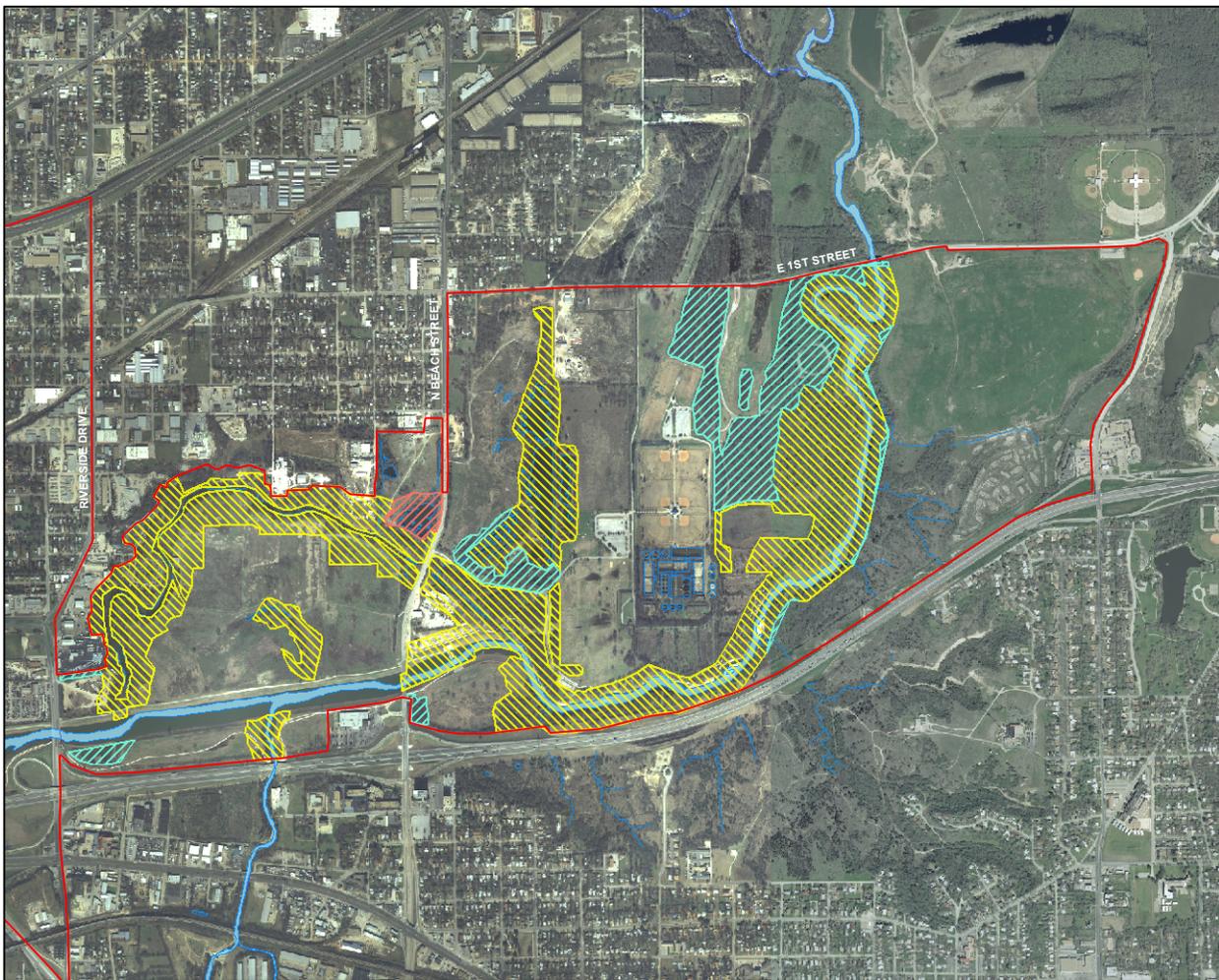


Central City
Figure 7 - Environmentally Sensitive Areas in Riverside Oxbow



Legend

- MODIFIED PROJECT STUDY AREA BDY
- STREAMS

ENVIRONMENTALLY SENSITIVE AREAS

- ESSENTIAL RESTORATION LANDS
- IMPORTANT RESOURCES TO AVOID
- LIMITED TO VALLEY STORAGE ACCESS

0 0.125 0.25 0.5 Miles
 Aerial Photography Date: January 2005

US Army Corps of Engineers
 Fort Worth District

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Central City

Figure 8 - Potential Valley Storage Sites

Legend

-  POTENTIAL VALLEY STORAGE SITES
-  STREAMS
-  EXISTING LEVEE



0 0.375 0.75 1.5 Miles

Aerial Photography Date: January 2005



**US Army Corps
of Engineers**
Fort Worth District

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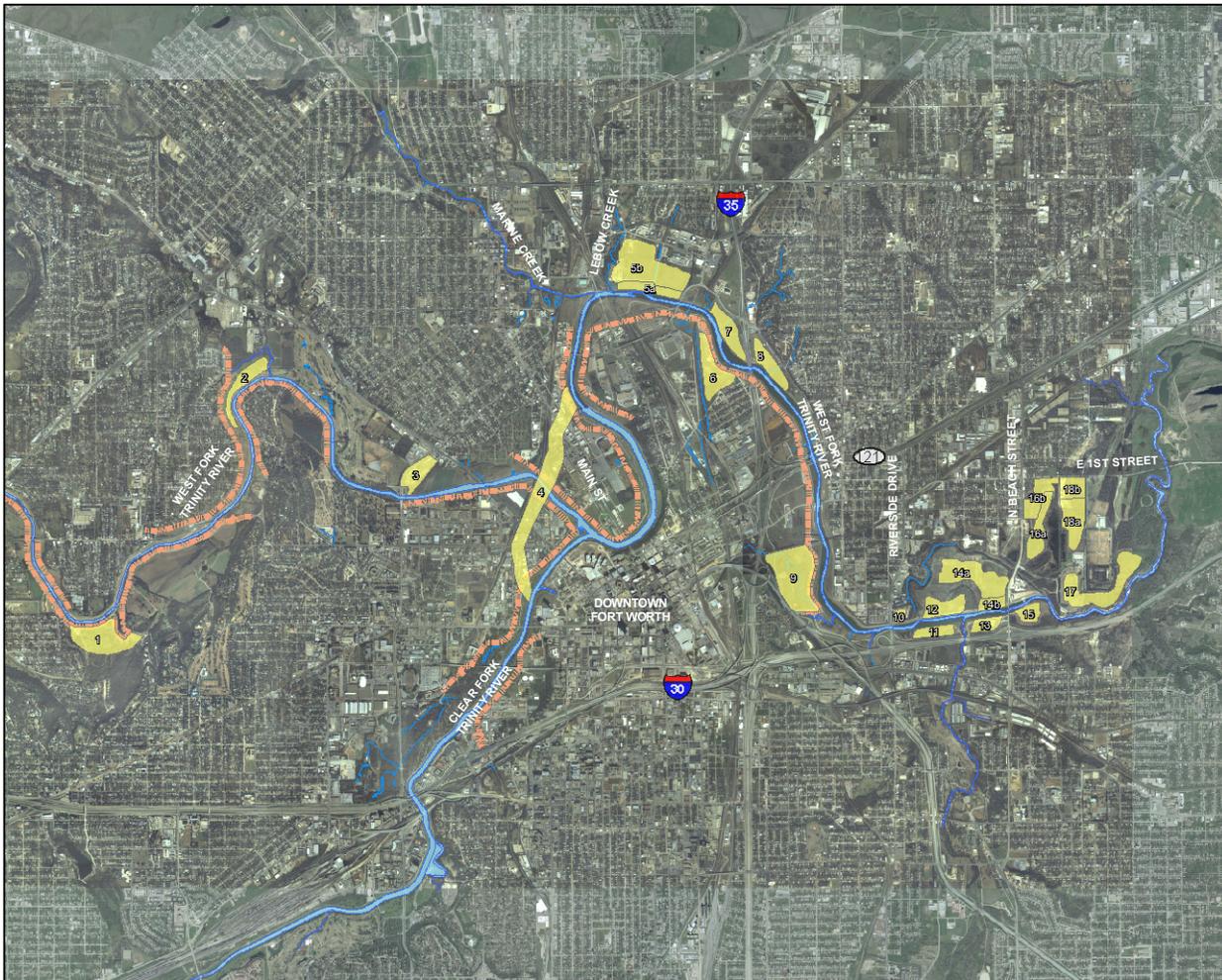


Table 3-2
Initial Screening of Potential Valley Storage Sites

Site ID	Consensus Status	Discussion
1	Potential Constraints	Due to costs associated with relocation of a 72" sewer line and requirement for a new levee, loss of high quality riparian and upland hardwood vegetation, and requirement to redesign drainage channel restoration to discharge downstream of Tucker Dam
2	Potential Constraints	Requires modification to footprint to expand site to the north even though it is narrow and to avoid impact to riparian vegetation on downstream portion of the site which can be used as focus for project mitigation requirements or for desired future
3	Potential Constraints	Identified imminent future development of the property. Site was not originally considered in the Central City project for valley storage but for disposal of excess material. Potential for valley storage gain due to vertical realignment of university drive will still be assessed as evaluations continue.
4	No Apparent Constraints	This is the bypass channel which provides valley storage as an integral part of the Central City Project
5a	No Apparent Constraints	Conditional on the relocation of Samuels Dam to a site upstream of the confluence of Marine Creek
5b	Potential Constraints	Landfill site with unacceptable excavation and relocation costs
6	No Apparent Constraints	Conditional that site be reduced in size to keep on public lands in order to reduce acquisition of private lands with associated reduction of costs
7	Potential Constraints	Sponsor is aware of development plans for property and land cost could be too high
8	No Apparent Constraints	Conditional to the elimination of the north portion of the site which is currently under consideration for private development with associated high acquisition cost. Reduce central portion of the site to avoid quality vegetation. Explore possible increase of site south along narrow strip of public lands
9	Potential Constraints	Conditional to re-analysis of the site for valley storage without impact to current or restored habitat values. Aquatic and Riparian habitat restoration along Ham Branch will continue to be an integral part of the Central City project either as mitigation for other project features and/or as an ecosystem restoration feature of the project
10	No Apparent Constraints	Accepted as delineated
11	No Apparent Constraints	Accepted as delineated
12	No Apparent Constraints	Accepted as delineated
13	Potential Constraints	Private property with existing development which is currently undergoing extensive renovation
14a	No Apparent Constraints	Accepted as delineated
14b	No Apparent Constraints	Accepted as delineated
15	No Apparent Constraints	Accepted as delineated
16a	No Apparent Constraints	Accepted as delineated
16b	No Apparent Constraints	conditional on elimination of western road frontage portion of the site
17	Potential Constraints	Habitat values for the Without Project condition must be recalculated and will likely drop significantly beginning at Target Year 2011 since the damage to habitat values will be caused by non-project related actions associated with mandated soil cleanup
18a	No Apparent Constraints	Accepted as delineated
18b	No Apparent Constraints	Accepted as delineated

Based upon the screening of the 22 identified potential valley storage sites, Corps hydraulic engineers, GIS staff, and biologists undertook a third iteration at refining the footprints of those sites in order to minimize any adverse effects on riparian woodlands and emergent wetlands while maximizing valley storage. Using the planning objective of obtaining approximately 5,250 acre-feet of storage, and considering the potential constraints the study team refined the site list to a group of 17 preferred valley storage sites. During this refining process, an attempt was also made to identify the density of riparian woodlands that could be reestablished within each of the sites.

Table 3-3 and Figure 9 (Initially Identified Valley Storage Sites to Meet Minimum Requirements) present those sites identified as preferred, along with their updated acreages to avoid significant habitats, updated valley storage estimates, existing dominant habitat types, and potential revegetation densities associated with the required hydraulic roughness for each site.

Table 3-3
Initially Identified Valley Storage Sites (Minimum Requirement)
Re-vegetation Potential

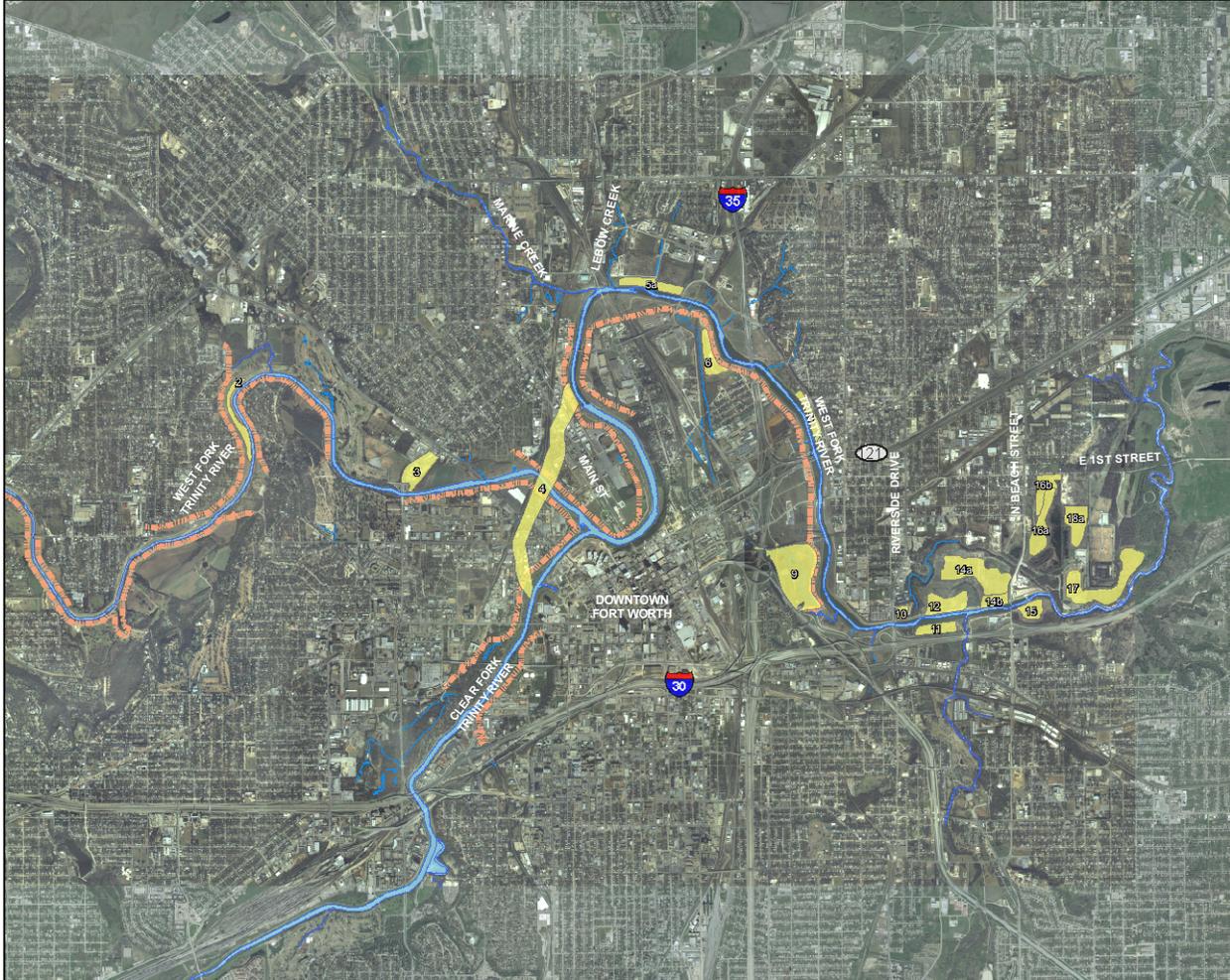
Site ID	Acre	Est. Volume (acre-feet)	Predominant Existing Habitat Type	Revegetation Potential
2	14.6	183	floodway grassland	grassland/savannah
3	21.6	600	disturbed	grassland
4	100.2	200	grassland/upland wooded	bypass channel
5a	17.4	272	floodway grassland	grassland/savannah
6	16.0	264	grassland/disturbed	grassland/savannah
8	11.8	120	grassland	grassland/savannah
9	71.0	774	grassland	grassland/savannah
10	4.2	44	disturbed	5% riparian woods
11	12.5	94	grassland	5% riparian woods
12	21.3	98	grassland	5% riparian woods
14a	47.2	659	grassland	5% riparian woods
14b	9.6	125	grassland	5% riparian woods
15	10.9	95	grassland	5% riparian woods
16a	23.8	357	grassland	dense riparian woods
16b	15.0	283	riparian woods/ grassland	dense riparian woods
17	48.9	817	riparian woods/ grassland	emergent wetland after soil remediation
18a	21.2	214	grassland	dense riparian woods
Total	467.2	5200		

Note: Estimated valley storage volume based on potential excavation volume. Volume subject to change during more detailed hydraulic modeling.

These initially identified 17 sites that would marginally meet the 5,250 acre-feet valley storage requirement were then coordinated with the Tarrant Regional Water District and the City of Fort Worth. The City at that time was in the process of coordinating their Recreation Master Plan Update for Gateway Park with the public and locally affected community leaders, which provided excellent opportunity for public input to the planning process. That public input combined with the need for more detailed hydraulic modeling required further coordination between the hydraulic engineers and environmental planners. The follow-on detailed analysis indicated that storage values could not be achieved without significant modification of the sites geometries, depth and extent of excavations, and probable adverse effects to existing riparian habitats. The refined analysis combined with public input led to identification of additional sites to be included in a recommended valley storage plan.

The Recommended Valley Storage Plan is presented in Figure 10 – Recommended Valley Storage Plan and in Table 3-4. The Recommended Plan consists of 21 sites that were identified as locally preferred valley storage sites. The Recommended Plan has four significant strengths. First, it provides flexibility in assuring that valley storage requirements could be achieved as planning progresses into more detailed design. Second, it allows for almost total avoidance of adverse impacts to habitat resources of significance. Third, the Recommended Plan would maximize opportunities for riparian

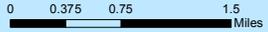
Central City Figure 9 - Identified Valley Storage Sites to Meet Minimum Requirement



Legend

- POTENTIAL VALLEY STORAGE SITES
- STREAMS
- EXISTING LEVEE





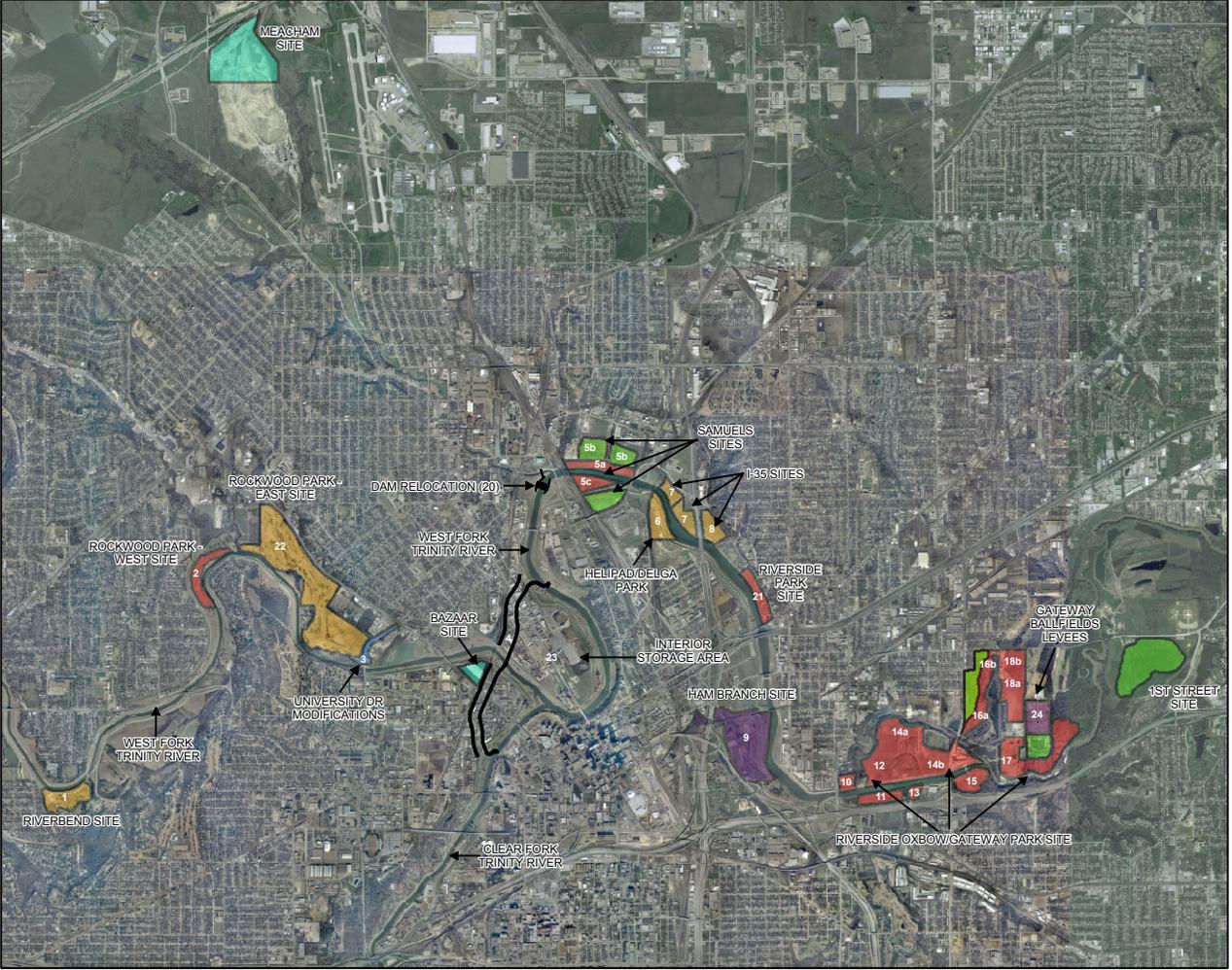
0 0.375 0.75 1.5 Miles

Aerial Photography Date: January 2005



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Central City
Figure 10 - Modified Central City Recommended Valley Storage Plan

Legend

- BYPASS CHANNEL
- VALLEY STORAGE SITE - CUT
- VALLEY STORAGE SITE - FILL
- VALLEY STORAGE SITE - LEVEE MODIFICATIONS
- VALLEY STORAGE SITE - ROADWAY RAISE (NO CHANGE - FROM CENTRAL CITY EIS)
- VALLEY STORAGE SITE - CONTINGENCY
- VALLEY STORAGE SITE - POTENTIAL FILL SITE (NO CHANGE - FROM CENTRAL CITY EIS)

0 1,750 3,500 7,000 Feet
 Aerial Photography Date: January 2005

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woodland development consistent with expressed public desires. And, finally, it accommodates public input by providing for compatible recreation development consistent with the City's Gateway Park Master Plan. Another important aspect of the Recommended Plan is that it would restore flows through the old Sycamore Creek Oxbow as well as restoration of the old cutoff Trinity River Oxbow (Riverside Oxbow).

Table 3-4
Recommended Valley Storage Plan

Site ID	Site Description	Environmental Study Reach	Approximate Cut Elevation	Acres	Est. Volume (acre-feet)	Habitat Impacts (AAHU's) ⁽³⁾			Costs ⁽⁴⁾				
						Wetland	Riparian	Upland					
Primary Sites													
2	Rockwood Park West	West Fork Rockwood (West)	Normal Pool @ 525 +1' (526 NGVD)	22.8	92	0	-0.05	0	\$2,979,900				
3	University Drive	North Main	No Cut, gains by backwater	13.3	1275	0	0	-0.50	\$3,913,000				
5a	Samuels Sites	West Fork North	Normal Pool @ 501 +1' (502 NGVD)	20.8	538	0	0	-0.20	\$5,122,100				
5c		West Fork South		16.1		0	0	0					
9	Ham Branch	West Fork South	No Cut, relocate levee	99.6	750	0	2.04	-0.98	\$802,000				
10	Riverside Oxbow Sites	Oxbow North	500 to 506 NGVD	8.2	1373	Habitat Outputs not available for individual valley storage sites but are displayed in Table 4-1 for the Environmental Study Reaches			\$54,728,800				
11		Oxbow South		16.4									
12		Oxbow Center		38.7									
13		Oxbow South		4.6									
14a		Oxbow Center		85.7									
14b		Oxbow Center		17.4									
15	Gateway Park Sites	Gateway South	Variable (new 2 yr elevation or greater) 492 to 500 NGVD	20.0	533								
16a		Gateway Beach		111.5						273			
16b		Gateway Beach											
18a		Gateway Beach											
18b		Gateway Beach											
17	Gateway Park/Gateway East	65.0											
20	Dam Relocation - drawdown reduction ⁽¹⁾	Several	No Cut			0	0	0	N/A				
21	Riverside Park	West Fork North	504 to 510 NGVD	20.0	187	0	0	-0.17	\$5,617,400				
23	Interior Storage Area	North Main	No Cut	412.6	140	0	0	0	N/A				
24	Gateway Park Ball fields	Gateway Park	No Cut	25.8	270	0	0	0	\$100,000				
Subtotal					5431⁽²⁾	0	1.99	-1.85	\$73,263,200				
Contingency Sites⁽⁵⁾													
1	Riverbend Site	West Fork Riverbend (TRWD Owned)	2 yr @ 536 + 1' (537 NGVD)	32.1	246	-0.04	0	-2.68	\$8,344,700				
7	I-35 Sites	West Fork North	Normal Pool @ 501 + 1' (502 NGVD)	26.1	671	0	-0.11	-0.03	\$19,216,200				
8		West Fork North		18.0		0	0	0					
6	Helipad / Delga Park	West Fork South		26.1	210	0	0	-0.16	\$5,884,800				
22	Rockwood Park East	West Fork Rockwood (East)	2yr @ 529 + 1' (530 NGVD)	184.4	1050	0	-0.12	-1.42	\$40,505,700				
Subtotal						2177	-0.04	-0.11	-4.29	\$73,951,400			
Total					7608								

⁽¹⁾ Valley storage volume to be determined by hydraulic modeling and future design refinement.

⁽²⁾ Estimated storage volume based on potential excavation volume. Volumes subject to change during more detailed hydraulic modeling.

⁽³⁾ Habitat impacts represent those impacts due to construction that must be mitigated. The mitigation plan for Ham Branch for the original Central City Project, which would be implemented with the Modified Project, more than offsets riparian habitat losses of the primary sites.

⁽⁴⁾ Cost shown include valley storage site preparation and excavation, habitat development, and all advanced planning, engineering, and design costs.

⁽⁵⁾ Use of any contingency site is not anticipated unless advanced planning, engineering, and design indicates a need for additional storage. In the event that contingency storage may be required, the smallest, least costly site(s) would be selected to meet the additional requirement.

It should be noted that even though the primary valley storage sites of the Recommended Plan shown on Table 3-4 are preliminarily estimated to provide substantially more valley storage than the required 5,250 acre feet, five additional sites were identified as “contingency” sites within the Recommended Plan. These contingency sites could be used to supplement or replace valley storage requirements in the event that roughness coefficients of optimal riparian woodland development as refined during detailed design, or other design constraints, necessitate additional storage. If it is determined during detailed design that additional valley storage might be required, use of any contingency site would be on an “as needed” basis only. For example, if it was determined during detailed design that the primary sites might result in a valley storage shortfall of 150 acre-feet, only Site 6 (Helipad / Delga Park) would be modeled in detail and then included in the plan if it could meet the shortfall requirement. Habitat outputs in Average Annual Habitat Units (AAHUs) shown in Table 3-4 are net outputs which reflect reductions due to adverse effects from construction.

Habitat outputs in Average Annual Habitat Units (AAHUs) shown in Table 3-4 are the estimated direct impact due to construction prior to formulation of a habitat restoration plan for each site. Configurations of valley storage sites were selected and aligned to avoid adverse effects to riparian woodlands thereby minimizing the need for habitat mitigation due to excavations. Dominant habitat types currently existing in all of the primary sites (and contingency sites) are either grassland or disturbed. Additionally, the primary sites are configured and aligned to preserve and enhance existing mature trees and tree motts within the existing floodplain grassland/savannah habitats. Depths of cut indicated in Table 3-4 are preliminarily designed to be at an elevation above the normal groundwater elevation, thereby allowing for maximum restoration of riparian and bottomland hardwoods within the side slopes and bottoms of the excavated sites. While a goal of excavation depth, or depth of cut, is to retain a bottom elevation of 5 feet above normal ground water elevation in sites to be restored to riparian woodland, some of the preliminary site designs call for a depth of cut to one foot above pool elevation in the bypass channel. Most of those sites, however, are associated with the channel and levee system and are not proposed for intensive riparian woodland development.

Hydraulic modeling indicates that the roughness coefficients associated with the currently existing riparian forest within the Gateway Park East environmental study reach is appropriate to accomplish valley storage requirements. Based upon that analysis, this Gateway East riparian forest site was evaluated to determine vegetation components that contribute to that roughness. Those vegetation components were then incorporated into the excavated valley storage sites to provide the required roughness and riparian woodland development. Refer to Appendix E for a detailed description of this evaluation and analysis.

Other Formulation Considerations. Two structural features of the Central City Project, in addition to potential valley storage sites, were also given consideration in the formulation process for project modification. The two structural features considered to have potential to reduce habitat mitigation requirements and project costs were the Samuels Avenue Dam and the Marine Creek Low Water Dam.

Modified Central City Description:

As has been stated, the Modified Central City alternative consists of changes in three categories or features from the original Central City Project. These changes from the original project include the: location, size, and public versus private ownership of the valley storage sites; location and configuration of the Samuels Avenue Dam; and inclusion of the Marine Creek low water dam and boat channel and lock facility between the Trinity River impoundment and Marine Creek. All other design features of the Modified Project Alternative remain unchanged from the Central City Project as described in the Final EIS for that project. The following paragraphs provide descriptions of the features of the Modified Central City alternative that are changed from the original Central City Project.

Valley Storage Sites: Rockwood Park West is a 23 acre site, publicly owned (City of Fort Worth), within the existing Trinity River floodplain on the southwestern portion of the existing Rockwood Park Golf Course. The 27-hole golf course is owned and operated by the City of Fort Worth and located south of Henderson Street (Jacksboro Hwy) on the West Fork Trinity River between the White Settlement

Road and University Drive bridges. The site is bounded by the Trinity River on the east and existing federal levee to the west. Currently the site contains several golf course holes which would be eliminated as part of the City's plan to scale down the course. Vegetative cover on the site is primarily grassland with minimal tree coverage. Tree coverage to north and south of the site are to be preserved. Site elevations vary from 522-540 NGVD and slopes toward the river. The proposed work includes grading the site to gently slope towards the river to a bank elevation approximately 1ft above the proposed normal pool elevation (E.L. 525.0 NGVD) to obtain optimize valley storage mitigation. A minimum 30 foot buffer is to be provided from the base of the levee to the proposed excavation to maintain the integrity of the levee and provide a maintenance road and trail access in front of the levee. An existing 36-inch sanitary sewer (M-217) located near the levee will remain in place. Excavated materials will be transported and disposed of off-site. The majority of the spoil materials generated by the proposed excavation at Rockwood Park – West will be transported to the University Drive valley storage mitigation site to raise the roadway. The remainder of the material will be transported to the Bypass Channel construction zone for use in backfilling the hard edge or Bazaar Fill Site as shown on Figure 10. The proposed haul route from Rockwood Park – West to University Drive will be through the use of a temporary access road along the edge of the existing Rockwood Golf Course to Jacksboro Highway (SH 199) and south approximately 1.25 miles to University Drive. The haul route to the Bypass Channel/Bazaar area will be the same, but continuing an additional one mile south on Jacksboro Highway. Hauling will be frequent during excavation work to minimize the number of hauling activity days. Additional detail is available in the Technical Appendix C- Volume I. This valley storage site was previously analyzed as part of the original Central City EIS. Storage in the Interior Storage Area is being credited as a function of how the isolation gates and downstream dam are operated.

The Samuels Avenue sites cover approximately 37 acres within the Trinity River floodplain and are located downstream of the Samuels Avenue Bridge. The sites lie along the north and south banks of the West Fork Trinity River and consist of three sites that were previously analyzed and recommended as part of the original Central City EIS. The sites are bounded by Brennen Avenue to the north, Northside Drive to the east and south, and the Union Pacific Railroad right-of-way to the west. The southern site is bounded by a federal levee while the northern site is flanked by two old landfills. Property ownership is a combination of City of Fort Worth and Tarrant Regional Water District. Vegetative cover on the site is primarily grassland. Site elevations vary from 518-526 NGVD and slope towards the river. A high voltage transmission line transects the southern portion of the site. Along the northwest corner of the northern property an existing 42-inch sanitary sewer (M-106 R*), runs across Lebow Creek and will not be impacted. Proposed work includes grading the sites to gently slope towards the river to a bank elevation approximately 1ft above the static water elevation (EL 501.0) which is controlled by the 4th Street low water dam. Access to the high voltage transmission lines will be maintained by providing a 50-ft grading offset. A maintenance road and recreation trail access will be reconstructed within the offset area to provide access and continuity of the existing trail system. Excavated materials from the sites will be disposed of in the adjacent City owned impound lot and Brennen Avenue landfill. No offsite hauling of excavated material is anticipated.

The Riverside Park site is a 20 acre, publicly owned (City of Fort Worth) property located on the east bank of the West Fork Trinity within the existing Trinity River floodplain. The site is located immediately north of E. Belknap Street and is bounded by Oakhurst Scenic Drive on the east. The north side of the site is defined by an area of large old growth trees which are to be preserved. Existing park features include a soccer field, baseball field and associated parking and trails facilities. Current site elevations vary from 518-524 NGVD and slope gradually towards the river. Vegetative cover on the site is mainly mowed grass. Proposed work includes grading the site to an elevation ranging from EL 504 to EL 510 NGVD, gently sloping towards the river to maintain a minimum of approximately 3 ft above the static water elevation (EL 501 NGVD) which is controlled by the 4th Street low water dam. An existing 18-inch sanitary sewer (M-1728) located on the east side of the site near Oakhurst Scenic Drive will require relocation. An existing 30-inch storm water outfall and box culvert under Oakhurst Scenic Drive, located on the south of the site, will be removed and replaced. Overhead power lines cross the site and will need to be relocated to accommodate the proposed work. Excavated materials will be transported and disposed of off-site. The spoil materials from Riverside Park will be placed at the Brennen Avenue landfill site which is less than one mile away via a combination of Oakhurst Scenic Drive and Northside Dr.

Borrow material, estimated at 15,000-20,000 CY that is suitable for levee construction will also be transported to the Ham Branch Site via a combination of Belknap, Sylvannia Blvd, and 4th Street for use in reconstruction of the back levee. Additional detail is available in the Technical Appendix C- Volume I.

The Ham Branch site is a 100 acre property located along the east of US Hwy 287 and Spur 280 (Martin Luther King Freeway) which is currently protected by the Fort Worth Floodway levee on the east and south sides. The site is bounded by Interstate-30 to the south, the West Fork Trinity River to the east, North Freeway service road to the west. The northern extents of the site are approximately 150 feet north of the railroad centerline. The site is primarily owned by the City of Fort Worth and is used as a park known as Harmon Park. Vegetation on the site consists mainly of mowed turf and prairie grass. Transecting the site is a small creek that runs diagonally across from the northwest to southeast prior to discharging into the West Fork Trinity River through a gate controlled structure. The creek is lined by dense vegetation and is included as a component of the Central City Project as an aquatic mitigation site. The site also functions as an interior drainage feature (Sump 31) of the Fort Worth Floodway. The concrete sluice drainage structure is located within the levee and is used to drain the interior portion of the Ham Branch area (Sump No. 31). Other significant site features include a recreation center, three competition soccer fields, and a baseball field. A dense network of sanitary sewer lines along with gas and fiber optic lines exist on the property with a majority being located on the eastern side of the site. Site elevations for the enclosed sump area vary from 512-520 NGVD. The site was previously identified and evaluated during the Central City EIS for ecosystem restoration and valley storage purposes.

The proposed work at the Ham Branch site includes lowering portions of the existing levee to allow inundation of the site during high flow events on the Trinity River. Rehabilitation of a portion of a former levee is proposed to the north of the railroad embankment to maintain existing levels of protection to areas outside of the Ham Branch valley storage site. Aside from the levee area, minimal grading work is proposed because of the site's relatively low grade and habitat mitigation requirements. The recreational features will be maintained by rerouting of portions of the trails to accommodate the levee lowering. Several manhole and inspection chambers will require modification to seal or raise their elevation above the SPF water surface elevation. Spoil material is to be reused on site with additional borrow material to be imported from the Riverside Park site for rehabilitation of the former levee.

The Riverside Oxbow Sites are located immediately north of Interstate 30 and bounded by Beach Street on the east and Riverside Drive on the west consisting of approximately 170 acres entirely within the existing floodplain. The site is primarily encompassed within the current river channel and the old river oxbow; however portions of the site extend to the north for habitat development purposes. The oxbow valley storage site also includes some property on the south bank near Sycamore Creek. The property is primarily publicly owned with the exception of a gas drilling site located in the northeast corner of the property, however no excavation is planned for this area. Much of the oxbow area is vegetated with tall grass with a number of scattered mature trees, mostly pecan. The old river oxbow channel is lined by dense riparian vegetation consisting of mature trees. Evidence of an old oxbow from Sycamore Creek also runs through the interior of the site. Existing site elevations vary from 510-514 NGVD. Excavation within these sites will be limited to 500 NGVD because hydraulic analysis indicates that below 500 NGVD water surface elevation is frequent enough to impair riparian woodland establishment.

The Gateway Park sites are located to the east of the Riverside Oxbow. The approximately 197 acres are bounded by Beach Street on the west, East 1st St on the north Trinity River on the east and I-30 to the south. Northeast and eastern portions of the site are characterized by fairly dense and mature riparian woodlands while the central and southern portions of the site are predominantly park and athletic facilities. The northwest portion of the site is largely vacant land with some commercial development along Beach Street. The site includes a closed wastewater treatment plant. Property ownership is a combination of public (City of Fort Worth, Tarrant Regional Water District) and private property. Existing site elevations generally vary from 506-510 NGVD. Proposed work includes grading the sites to elevations ranging from 5-year to less than 2-year frequency event flood elevations to maximize valley storage benefits. Due to the site's proximity to Gateway Park, the City has included the site as part of the Gateway Park Master Plan. Proposed recreational features which will be constructed by the local

partners include soccer fields, basket-ball courts, splash park and picnic areas. Recreational trails would be constructed as part of the grading work. Critical facilities will be constructed at or above the 2-year flood frequency elevation. Associated access roads, maintenance road, and parking will also need to be constructed. Habitat development includes riparian woodlands, emergent wetlands, and native grassland. An 84-inch sanitary sewer (M-245P) and an 18-inch main (M-126) will need to be protected during excavation activities in some areas. An existing natural gas line and water mains which transect the property will remain in place. Additional storage at the Gateway Park Ball Fields will be attained by a small raise in the top of the existing levee (likely less than 2 feet but detailed survey is needed during final design to confirm) and modification of the existing cuts through the levees. The spoil material from the Riverside Oxbow and Gateway Park sites will need to be disposed of at a combination of off-site and on-site disposal areas. The on-site disposal areas, as shown on Figure 10, include an old WWTP site to the north of Site 17 and area adjacent to Beach Street. Off-site disposal will occur at a site south of 1st Street and west of and Oakland Boulevard, as shown on Figure 10 which is approximately 2.3 mi from the Riverside Oxbow site and 1.5 mi from the Gateway Site. Off-site material will be transported primarily on Beach Street (0.8mi) and 1st Street (1.5mi). Less frequent haul routes will include Riverside Drive (3/4 mi) from the West Fork Trinity River to 1st Street, 1st Street (0.7 mi) from Riverside Drive to Beach Street and Lancaster Avenue (0.7mi). Hauling of material will be stagger based on the final construction sequence but is generally anticipated to occur during daylight hours. Additional detail is available in the Technical Appendix C- Volume I.

Existing woodland vegetation near the Gateway Park drive, along the Trinity River, and northeastern portions of the site would be preserved and enhanced as part of the habitat development activities. The proposed work consists of the northeast and southwestern portions of the site to obtain valley storage. The northern area would be restored with a combination of woodlands and native grasslands to enhance the site. The southern portion of the Gateway site will consist of two soccer fields and a wetland pond area. The pond area will be constructed by the City of Fort Worth as part of their on-going activities. The closed wastewater treatment plant site is proposed for disposal of the excavated materials to minimize transport expenses. The site contains an existing 10-inch water main and numerous sanitary sewer mains which now carry wastewater flow to the Village Creek Wastewater Treatment plant. Additional utilities include an overhead high voltage transmission line. The proposed work includes the construction of numerous walking trails.

Contingency Valley Storage Sites: Although the hydraulic analyses conducted at the planning level indicate that the primary valley storage sites should more than accommodate the estimated requirement of 5,250 acre-feet of valley storage by providing an estimated 5,431 acre-feet, five sites have been identified in the contingency that detailed design and hydraulic analyses indicate the need for additional storage or one or more of the primary sites becomes infeasible. These contingency sites are shown on Table 3-4 and in Figure 10. Among the contingency sites is a portion of the Riverbend Site, which is a 32 acre parcel currently owned by the Tarrant Regional Water District and located on the western end of the larger Riverbend site identified in the original Central City EIS. This Riverbend parcel would require excavation to the 2-year frequency elevation of 537 NGVD in that area and would generate approximately 246 acre-feet of valley storage. There is currently a fairly diverse re-growth of riparian woodland within this site that would be impacted by the excavations and would require revegetation as a habitat mitigation measure.

The I-35 and the Helipad/Delga Park contingency sites shown on Table 3-4 and in Figure 10 are currently mostly in grassland habitat. If required for valley storage, these sites, consisting of about 70 acres, would be excavated to an elevation of 502 NGVD and would generate 880 acre-feet of valley storage. A final contingency site, identified at the Rockwood Park East site consists of 184 acres of the publicly owned Rockwood Park golf course. If required, this site would be excavated to the 2-year flood elevation of 530 NGVD to potentially generate 1,050 acre-feet of valley storage. The site would be re-established as a golf course with mostly manicured grasses and scattered trees.

It is not currently anticipated that any of the contingency sites would be required but they are discussed and disclosed here in case they are needed following detailed design. As can be seen from Table 3-4, the primary valley storage sites of the recommended plan are projected to achieve up to 5,431

acre-feet of valley storage, based on planning level hydraulic analyses. Again, if it is determined during detailed design of the primary valley storage sites that roughness coefficients of the desired habitat development measures or constraints on depth of cut combine to yield less than the required 5,250 acre-feet of storage, use of one or possibly more of the contingency sites may be required. In the event that additional valley storage may be required, the use of contingency sites would be prioritized so that the additional requirement would be met through use of the contingency site(s) to minimally meet the requirement.

Samuels Avenue Dam. The original Central City Project includes an in-channel dam to achieve the urban design objective of maintaining water levels in the project interior at a relatively constant normal water surface elevation of approximately 525 NGVD. The dam also must have the capability to lower the crest elevation to allow passage of flood flows. Navigability throughout the Central City area to connect Downtown to the Stockyards, the Cultural District, and the Rockwood Park area is also desired. To meet this project objective of water connectivity and to create desired neighborhood linkages, dam site considerations were limited to locations near the confluence of Marine Creek in the West Fork of the Trinity River.

The original Central City EIS proposed to site the dam downstream from Samuels Avenue and the adjacent three railroad bridges, approximately 1,300 feet downstream from the confluence with Marine Creek. Several alternative configurations and types of gates for the dam were conducted as part of the original site evaluations. The selected location resulted in adverse impacts to Marine Creek due to both the high backwater elevation of 525 NGVD as well as additional operations when passing flood flows on the Marine Creek watershed. The original site also impacted the lower segment of Lebow Creek by loss of habitat resulting from rerouting of the creek downstream of the dam.

During this re-evaluation, alternative sites for the dam were evaluated from a geotechnical standpoint on the West Fork upstream of the Marine Creek confluence, ranging from immediately at the confluence to just downstream of Northside Drive. Sites south of Northside Drive were eliminated due to impacts on Northside Drive, limited area, and conflicts with the bypass channel. Placing the dam too close to the confluence could introduce scour potential at the Samuels Avenue Bridge, while placing it further upstream towards Northside Drive reduced or eliminated options to maintain water connectivity with Marine Creek. In addition, any selected site must allow adequate area for construction and temporary diversions.

The selected site for the gated dam is proposed on the main stem of the West Fork of the Trinity River just upstream of the confluence with Marine Creek. This dam site is still referred to as the Samuels Avenue dam due to its proximity to the Samuels Avenue Bridge. The proposed Samuels Avenue Dam site for this re-evaluation is located approximately 1,750 feet downstream of Northside Drive, immediately upstream from the confluence of Marine Creek.

During normal dry weather operation the proposed dam would maintain the normal water pool level elevation of 524.3 NGVD. Based on hydraulic modeling, the dam was sized to operate with seven 48-foot wide and 18-foot high gates. The gate width was chosen as the maximum reasonable width, enhancing the hydraulic capacity, while providing reasonably operable gates. The proposed structure would also incorporate low flow conduits 4-foot wide by 6-foot high located at the base of three piers to minimize the use of the large flood gates and to simplify operations. Under this design concept, a stilling basin would also be needed. It would be fully sized to contain a hydraulic jump for energy dissipation of the gate releases. Vertical walls would be required for both the approach and the exit to transition to and from the 390-foot wide structure to the approximately 250-foot wide channel.

The downstream end of the northern stilling basin wall will connect to a low water dam located on Marine Creek which will maintain a normal water pool level elevation of 516.5 NGVD. The two pools will maintain hydraulic connectivity through the use of a lock and channel located on the west side of the dam, allowing small boat traffic to travel upstream and downstream of Samuels Avenue Dam. The lock structure will be approximately 40-foot long by 16-foot wide and have a maximum lift of 8.5 feet. Figure 11 provides an overview of the location of these structural features.

Central City

Figure 11 - Proposed Samuels Avenue Dam and Site Layout Features

Legend

-  STRUCTURAL COMPONENTS
-  CHANNEL GRADING
-  RELOCATED TRAIL

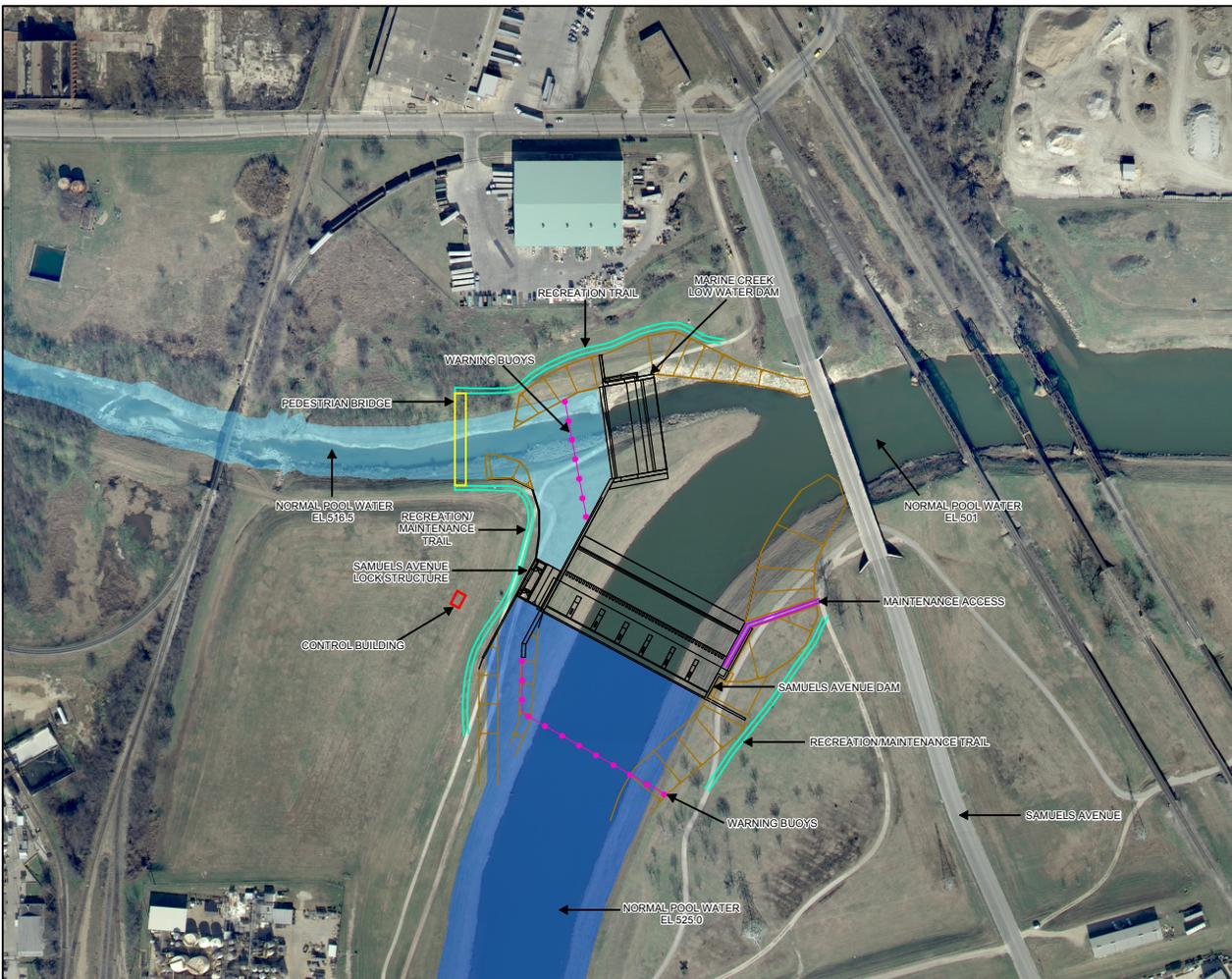


0 100 200 400 Feet

Aerial Photography Date: January 2005



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 As of 10/1/07



The benefits of this dam site include reduced backwater impacts to Marine Creek as well as simplifying the operational demands of Samuels Avenue Dam by allowing Marine Creek flood flows to pass without affecting the urban lake pool elevation. Water connectivity is maintained, which satisfies project objectives. A significant benefit to this dam site is the elimination of impacts to stream aquatic and riparian habitat of Lebow Creek.

Marine Creek Low Water Dam. In association with the proposed new site and configuration for the Samuels Avenue Dam, a fixed low water dam is proposed on Marine Creek at the confluence with the main stem of the West Fork of the Trinity River to meet project objectives of water connectivity. Several alternatives were evaluated for the Marine Creek low water dam including both the use of a gated or fixed structure as well as varying the crest width and height. A fixed structure is recommended on Marine Creek as it is able to meet the design requirements of maintaining existing 100-year water surface elevations on Marine Creek while also reducing construction, operation, and maintenance costs. This fixed dam would also pass lower frequency storms without operation or controls, which was not possible under the previous Samuels Avenue Dam location downstream of the Marine Creek confluence. This structure will have a crest elevation of 516.5 NGVD and a crest length of 200 feet. The Marine Creek channel will need to be widened by approximately 50 feet near the dam site in order to accommodate the 200 feet of crest length needed to pass the 100-year flow without causing increases in water surface elevations upstream.

Widening of Marine Creek and construction of a turnaround basin is proposed just upstream of 23rd Street at the limits of the 516.5 NGVD pool elevation. Bank stabilization would be accomplished through the use of compacted concrete with rip-rap at appropriate locations. Maintenance access would be provided for trash and debris removal. The downstream or outfall of the low water dam would be sloped and appropriately rip-rapped to assure adequate re-aeration of both low and high flows.

This combination of structures meets the goals and objectives of the TRV Master Plan to enhance neighborhood linkages by impounding water to a point upstream on Marine Creek, thus providing a waterway within the combined Clear Fork and West Fork system to connect the Cultural District, Downtown, and the Rockwood Park area to the Stockyards area. This revised proposal also reduces adverse impacts to aquatic and riparian habitats of Marine Creek.

Project Costs:

As formulated, the Modified Central City Project alternative would have an initial total cost of about \$519.0 million (2005 dollars). This cost updated to 2007 would be approximately \$576.0 million. Federal costs of the Modified Project alternative would remain subject to the provisions of Section 116 of Public Law 108-447, dated 8 December 2004, which authorized Corps of Engineers' participation for construction to a limit of \$110.0 million. A breakout of project costs of the Modified Project alternative relative to the original Central City Project and the Riverside Oxbow Project is presented in the comparison of alternatives section of Chapter 4 – Environmental Consequences, of this SEIS.

Project Outputs:

The Modified Project Alternative outputs are primarily in the areas of retention of existing or design level flood protection, habitat development, and recreation. Although not actual outputs, the need for habitat mitigation and the acquisition of private lands would both be reduced with the Modified Central City Project alternative. These outputs and effects are discussed in detail in the comparison of alternatives section of Chapter 4 – Environmental Consequences, of this SEIS.

Other Considerations:

The use of public lands in lieu of the acquisition of private lands is a primary consideration with the Modified Project alternative. Institutional constraints or implementability is also a significant

consideration for any alternative considered. As with project outputs of the Modified Project alternative, detailed discussion of these issues is contained in Chapter 4 – Environmental Consequences.

Comparison of Alternatives

Refer to the discussion on page 4-17 and Table 4-2 for a detailed comparison between the No Action and Modified Central City alternatives. The primary differences between the alternatives is the location of the valley storage mitigation sites, the changed location of Samuels Avenue Dam to upstream of the Marine Creek mouth, a channel and lock structure connecting Marine Creek with the Trinity River, and a low water dam on Marine Creek. Under the Modified Central City alternative, the valley storage mitigation sites are located downstream in the Riverside Oxbow area instead of the upstream Riverbend area. This reduces the amount of private land acquisition and increases the amount of excavation required to attain the necessary valley storage. These Riverside Oxbow valley storage sites are located primarily in grassland areas so the extent of impacts to existing riparian and wetland habitat from construction is reduced. Following excavation, these valley storage sites will be developed into riparian woodland and wetland habitat which will result in more riparian woodland and slightly less wetland habitat than under the No Action alternative. In addition, the extent of impacts to stream habitat is reduced with the Modified Central City alternative due to less inundation of Marine Creek and the Modified alternative would develop more stream habitat by also restoring Sycamore Creek in the Riverside Oxbow area. The Modified Central City alternative would cost approximately \$60.0 million more than the No Action alternative and both alternatives would provide similar levels of flood protection.

Chapter 4 - Environmental Consequences

For the purposes of this Supplement No. 1 to the Final EIS for Central City, the “No Action” alternative assumes that the Central City Project and the Riverside Oxbow Project will be implemented as described in their respective project reports. The study area for evaluation of the City of Fort Worth’s proposal is displayed on Figure 4 – Modified Central City alternative Study Area. This section compares the impacts of proceeding with each project separately as they are currently approved (No Action) to the Modified Central City alternative. These alternatives are evaluated within this Supplemental EIS for their effects on technical soundness, environmental acceptability, real estate requirements, habitat development and recreation outputs, project costs, and institutional reasonableness. A 50-year period of analysis was used for this evaluation.

No Action Alternative

Land Use, Hydrology, and Hydraulics

Without hydraulic mitigation, the Central City portion of the No Action alternative would result in a loss of floodplain or valley storage due to the fact that the bypass channel is shorter and more efficient than the existing river channel. With no corrective action, as much as 5,250 acre feet of valley storage could be lost. To mitigate for this potential loss of storage, valley storage mitigation sites are included. Three areas would provide valley storage mitigation: along the West Fork of the Trinity River upstream of the project area at the Riverbend site; in the vicinity of the Samuels Avenue Dam; and slightly downstream of the dam in proximity to I-35. Construction of the bypass channel and associated valley storage sites would not increase downstream water surface elevations or downstream flow.

Implementation of the bypass channel and other flood protection measures that are part of the Central City Project would include removal of the existing levees, thereby providing a river orientation of the area which would be conducive to urban revitalization. These flood protection measures (in particular the bypass channel and the dam described previously) would be designed in such a manner as to reintroduce the river’s importance to the settlement of Fort Worth. The bypass channel would incorporate a series of retaining walls along the east edge, which would allow future urban revitalization immediately adjacent to the amenities offered by the river. An interior water feature would expand the water surface within the area, further emphasizing the importance of the riverine system.

An anticipated result with implementation of the Central City Project would be land use changes within the study area. These private or community sector actions outside the flood conveyance system provided by the Central City Project would not be implemented by the Corps of Engineers but are described as follows.

Levee Removal. The bypass channel and its appurtenant structures would replace the flood protection currently provided by portions of the existing levee system, rendering some 8,800 linear feet of existing levee unnecessary. Since this portion of the existing levee serves as a barrier to the river, the Trinity Uptown Plan envisions removal of the remaining portions of levees at some future time in conjunction with private sector redevelopment project(s). Complete removal would require the movement of some 460,000 cubic yards of earthen fill. That excess material could be used at that time to further level the interior area as envisioned by the Trinity Uptown Plan.

Land Use Changes. The Trinity Uptown Plan envisions the project interior (some 327 acres) to transition from predominately heavy industry to mixed land uses with an emphasis on urban residential with support retail and commercial. The 50-year build out is estimated to be approximately 12 million square feet of total development, which would include about 10,000 homes, about 1.1 million square feet of retail/commercial, and about 500,000 square feet of civic and educational facilities. The land use goals are designed to complement and support the surrounding districts which include the Near North Neighborhoods (north of Oakwood Cemetery), Samuels Neighborhood, North Main corridor, Stockyards Area, Cultural District, and Downtown. Combined with these districts Trinity Uptown can provide a much

needed sustainable population to support the economic base of this greater central city area.

Transportation Modifications. In addition to the bridges and street improvements the Trinity Uptown Plan envisions improvements to the transportation system in conjunction with land use changes. Examples of the type of street improvements which may be appropriate include realignment of North 4th Street in order to link the proposed campus of Tarrant County Community College to North Main Street and extension of Northeast 7th Street across the river to connect with Samuels Avenue. A new Waterfront Drive along the base of the bluff is also contemplated, as presented in the Trinity Uptown Plan. All such street improvements would be subject to the standard State and local processes for financial approval and environmental evaluation at the time definitive plans are developed.

Modification/Extension of the Water Linkages. Water is the main theme of the urban design for the Trinity Uptown Plan and is used in that design to create a variety of unique places within the site. The water and associated landscape are intended to create an urban oasis. To extend the presence of water throughout the project site, the Trinity Uptown Plan envisions one or more canals extending through the project interior. Other potential modifications to the system of water linkages include reduction in the width and depth of the original river channel to enhance connectivity across the river and increase the variety of potential uses. Another option is extension of the interior water feature to accommodate a small boat marina. These concepts, if actually proposed, would be developed as components of future private sector projects, and would be subject to engineering evaluation and environmental review tiered to this document.

Riverside Oxbow Effects on Land Use, Hydrology, and Hydraulics. Ecosystem restoration activities as part of the Riverside Oxbow Project would increase wooded vegetation thereby slowing floodwaters and affecting valley storage in the immediate Riverside Oxbow study area. The Riverside Oxbow Ecosystem Restoration Project incorporates hydraulic mitigation consisting of excavation of floodplain material near the south shoreline of the existing channelized segment of the West Fork. With this hydraulic mitigation, the Riverside Oxbow plan meets the criteria of the Trinity Regional Environmental Impact Statement and Record of Decision (ROD) in 1988. Meeting these criteria minimizes the cumulative hydraulic and hydrologic impacts of the project to the Upper Trinity River Basin. No significant impacts to hydrology or hydraulics would occur from implementation of the Riverside Oxbow project. In the area of the Riverside Oxbow Project, the study area includes undeveloped private lands and publicly owned properties. There is currently low demand for business development along the private lands because most of these properties are within the 100 yr floodplain and therefore implementation of the restoration plan would have minimal negative impact on future land use. Land use within the ecosystem restoration areas would remain essentially the same as is currently exists, but with enhanced wildlife habitat, recreational, and aesthetic values. Placing the entire Riverside Oxbow area in public ownership and management for restoration and improvement of ecosystem values would provide a positive environmental and economic benefit to the immediately adjacent community.

Water Quality

Temporary Impacts. The No Action Alternative would cause temporary adverse water quality impacts associated with construction activities. Construction of the channel/impoundment and oxbow features (bypass channel, Samuel Avenue Dam, isolation gates, pump station, interior water feature, recreation, bridge construction/modification, hydraulic mitigation, and ecosystem improvements) would generate the production of dust and temporarily subject the watercourse to turbidity conditions. Direct construction in the water course would mix sediment into the water column. These turbidity conditions are expected to be temporary and have no long term after-effects to the water course. These conditions would be further lessened with the implementation of standard storm water controls and best management practices, such as screen curtains, hay bales, and temporary detention structures during construction. The construction of the additional Trinity Uptown Features (including urban development, associated water body modifications, transportation modifications, and levee removal) would also generate the production of dust and temporarily subject the watercourse to increased turbidity. The conditions are expected to be temporary with no long term effects. These conditions would be further lessened as operators comply with storm water control measures required by TCEQ permit requirements.

Long-term Impacts. The No Action Alternative consists of two implementation components: (1) direct channel alterations including bypass channel, instream impoundments, and diversion/release control mechanisms and (2) Riverside Oxbow habitat improvements. The direct channel alteration component, which involves various features including linear impoundments for the main pass-through and bypass channel, isolation gates, and pump station is operationally complex, while the Riverside Oxbow Project component involves no operational flow controls to operate once completed. With the increased water surface and depth of the channel alterations and impoundment there is a potential for water stagnation and algal problems to occur on a slightly greater frequency during summer. Evaporation would increase as impoundment surface area is enlarged. In summertime, as is typical for water bodies of the region, thermal water stratification is expected to occur on occasion in the deeper impounded areas with depressed dissolved oxygen at lower elevations. Events of depressed dissolved oxygen concentrations would not be expected to exceed stream standards. These occurrences would be minimized with fresh water circulation maintained in the project area. It should be noted that the design for the Central City component of the No Action Alternative is flexible and includes optional features that could produce improved water quality. A dialog has been initiated with TCEQ to provide them with the information and modeling analyses developed as part of the water quality assessment for the Central City project. TCEQ's initial comments on the technical analyses are included in the Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006.

Since maintenance of acceptable water quality is critical to the overall success of the Central City component of the No Action Alternative, a number of operational strategies were identified to mitigate water quality problems should they develop. These strategies include variation in water depth with the project interior to minimize temperature stratification and the opportunity for water "turning", periodic flushing of the interior waterways with flood flows or make-up water, control of nutrient runoff through the institution of storm water controls with water quality monitoring, the operations of the Central City Project could be further improved to best jointly meet pool elevation and water quality purposes.

The implementation of the direct channel alterations part of the No Action alternative creates an additional 112 acres of water surface and an additional 2,114 acre-feet of volume within the system as corresponded to the existing watercourse conditions. The additional annual evaporative loss as a result of this increase in surface area is estimated to be about 275 acre-feet. The TRWD has the water management capability to minimize evaporative losses throughout their system, as well as the means to manage the level of the waterway (avoiding drawdown in dry periods) and to assist in maintaining aesthetics of the water body.

Several means are currently available to TRWD of inducing additional flow within the system and will be considered during the detailed design phase of the project. Each of these methods has a review and approval process within the State of Texas, which upon selection of any appropriate method(s) will be followed:

- *Augmenting flow with additional surface water.* Additional water rights might be cost-effectively secured that allow for additional releases from upstream reservoirs during dry periods to supplement flow in the proposed waterways.
- *Augmenting flow with groundwater.* The Trinity Aquifer can produce water of suitable quality at rates up to 300 gallons per minute per well. Wells could be placed in the area to draw water from the aquifer to supplement the surface water supply.
- *Augmenting flow with reclaimed wastewater.* Reclaimed wastewater, most likely from a new ultra-pure satellite wastewater treatment facility located in the project area could be used to supply additional water to the water body.

Wetland development is a beneficial feature to the No Action Alternative. Depending on the wetland size and water retention characteristics, this feature could offset much of the slight adverse effects. Wetland development proposed in the two projects would contribute to water quality improvement.

With the additional implementation of the Trinity Uptown Features, several changes in water quality could occur based on connected items.

- The potential addition of more canals and extension of the urban water feature would tend to create more water surface subject to evaporation. As a result, water would be held in the impounded sections for longer detention times and relatively less water would be released unless an additional make-up water supply source is provided. This condition could result in stagnation without fresh make-up water or aeration mechanisms.
- Land use intensification through real estate development in the project area would also tend to slightly degrade the water quality as impervious surfaces are increased with parking lot pavements, concrete sidewalks, hard road surfaces, and buildings. The increase in impervious surfaces near the water course would increase the incidence for urban contaminants to be picked up in storm water runoff and carried directly to the water. Additional concrete and pavement would also tend to become irradiated and conduct heat during the hot summertime months. During such occurrences, the stream water would have a tendency to also be heated due to close proximity of pavement and concrete structures. However, urban design concepts for re-development associated with the Central City project outline aggressive storm water quality practices.
- As development progresses, transportation modifications would be necessary to accommodate the increased traffic resulting in the project area. The effects of this activity are similar to land intensification discussed above. Construction of impervious road surfaces (asphalt, concrete, etc.) would also allow contaminants on these surfaces to be readily picked-up by storm water runoff. Typical contaminants lying on these surfaces include exhaust particulates, various petroleum residues (oils, greases, etc.), and street litter. Because there would be more traffic in the project area, there is also a greater risk for accidental chemical spills on bridges and ramps. Road and bridge construction would also incur temporary increases in stream turbidity.
- Levee removal would also likely temporarily increase stream turbidity during the construction activity. The use of best management construction techniques (i.e., screen curtains, temporary detention and diversion structures, etc.) to prevent and control storm water pollution would offset most of these temporary adverse effects. Long term effects from the removal of the levee itself are not considered to be significant and could be slightly beneficial or slightly adverse depending on the associated follow-up activity. Removal of the levee and creation of wetlands would create an opportunity to improve instream water quality. Whereas, increased urban infrastructure development in closer proximity to the water course because of levee removal could tend to slightly degrade the water quality.

As part of the No Action alternative, the separate construction of the Riverside Oxbow would have a net positive long term affect. The additional vegetation planted for the project would act as a filter buffer removing sediments, heavy metals and hydrocarbons. Overall, the long term impacts associated with the No Action Alternative are not considered to be significant. The ability to control downstream flow releases at the Samuel Avenue Dam will allow a measure of system flexibility to optimize water quality conditions. As stated previously, Riverside Oxbow habitat development would slightly improve the long term water quality condition of the downstream portion of the project area. Trinity Uptown Features would tend to slightly degrade water quality with extensive urban development that increases adjacent impervious ground surfaces allowing runoff of urban pollutants, and by channel modifications that tend to increase evaporation. As with any modern construction activities, it is anticipated that standard abatement measures and storm water controls, as have been mentioned above and as required by State and local codes, will be placed in effect for any and all private development activities prior to approval of construction as Trinity Uptown Features are incorporated.

Aquatic Resources

The Central City Project adds approximately 112 acres of impounded river through construction of the bypass channel and approximately 6 acres by increasing the existing water surface elevation in the West and Clear Fork and in Marine Creek. Samuels Avenue Dam would be operated so that at most inflows, the existing water surface elevation would be increased to 525 feet NGVD. This would increase depth and water surface area throughout the existing impounded river and bypass channel and could increase the probability and duration of stratification during the summer months. The capability to cause mixing of the water column and maintain water quality is possible through operation of the isolation gates and outlet gates at Samuels Avenue Dam depending on inflows. The increase in water surface area of 112 acres was not considered to be a significant effect because impounded river habitat is abundant in the study area. Evaluation of the information available indicates that the better impounded river habitat is associated with the shallow inundated edges of the channel. The project would shorten the channel length, but would increase the impounded water's edge. The Corps and USFWS have concluded based on the analysis in the FEIS for Central City and in the USFWS Report that the additional inundation would not cause significant adverse impact to the impounded Trinity River channel (other than to Marine Creek).

Reconnection of 5.1 acres of abandoned oxbows would occur with the Central City Project in the Rockwood Park Ecosystem Improvement Areas and would result in a gain of 4.3 AAHUs of oxbow habitat. This oxbow habitat would provide better quality spawning and nursery habitat for the local fish population due to decreased water velocity and better cover.

The most significant permanent change to the aquatic habitat values would be the inundation of 3.2 acres of Marine Creek by Samuels Avenue Dam. Preliminary investigations by the US Fish and Wildlife Service indicate this stream has exceptional riffle pool habitat during some times of the year and there is particular concern about the loss of approximately 1,875 linear feet of riffle pool habitat that exists from just below the railroad to just upstream of 23rd Street. Following a survey and analysis using the Index of Biotic Integrity, this impact was determined to be 1.08 AAHUs of stream habitat. In addition, the original Central City Project would fill the lowermost 400 linear feet of Lebow Creek which would result in an impact of 0.1 AAHUs of stream habitat.

The USFWS's Planning Aid Letters, and Draft and Final Fish and Wildlife Coordination Act Reports on the original Central City Project include their analyses of the fish and wildlife habitat, ecosystem mitigation requirements, and habitat improvement measures. The reports contain the Services' recommendations which were incorporated into the Central City Project to the extent practicable. The Service's recommendation to minimize the aquatic impacts by relocating Samuels Avenue Dam were evaluated but found not to be feasible to implement at that time, resulting in the need to include aquatic habitat mitigation in the project. The Service subsequently concurred with the proposed project based on inclusion of the aquatic mitigation. The Service reviewed the aquatic mitigation plan and concurred that the plan was feasible and would offset adverse impacts.

The plan to mitigate the stream habitat impacts to Marine and Lebow Creek is part of the "No Action" alternative. Mitigation measures include diverting flows, varying by season up to 5 cubic feet per second, to the mid-reach of Lebow Creek. A gravity flow pipeline would be included from the Samuels Avenue Dam to a point on the stream where the bottom elevation is approximately 525 feet NGVD, which appears to be near Brennan Avenue. Aquatic habitat would be created by modifying the channel bottom of Lebow Creek within the reach downstream of Brennan Avenue including the 1500 feet of new channel. This would result in a gain of 0.56 AAHUs of stream habitat in Lebow Creek. In addition to these in-stream habitat mitigation measures, stream habitat mitigation would also be required along Ham Branch to fully compensate for adverse aquatic impacts. Approximately 305 feet of the existing channel would be relocated to provide adequate width for riparian forest development adjacent to an existing fenced soccer field. Riparian forest would be planted on 7.4 acres and the existing 1.4 acres of riparian forest would be improved to provide a total 8.8 acres along the creek, resulting in 2.04 AAHUs of riparian habitat. Approximately 25 percent of the total length (3,568 feet) of the stream segment would be modified to provide approximately 900 linear feet of rock based riffles at locations to be determined by additional studies. This would result in a gain of 0.55 AAHU of stream habitat in Ham Branch which, in conjunction

with Lebow Creek mitigation, would fully compensate for stream habitat impacts.

One concept of the master plan for the area of impact considered for the Trinity Uptown Features is that local runoff would be treated and improved through series of artificial wetland areas or holding areas that could provide some improvement in storm water runoff quality. While these singular improvements are not quantifiable, they should be encouraged as cumulatively there could be demonstrable benefits to the West Fork Trinity River aquatic habitats if more of these type runoff treatment facilities are incorporated into other proposed developments.

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

Implementation of the Riverside Oxbow project would also cause minor short-term negative impacts to the aquatic resources in the study area during the demolition and construction phase of the project until channel conditions stabilize. However, because of the buffering and shading effects of vegetation along the riparian zone, the long-term impacts are expected to be positive. No significant adverse impacts to aquatic resources would occur from implementation of the Riverside Oxbow Project and over time the project would result in significantly increased quality of aquatic resources in the project area.

Vegetative Cover and Wildlife Habitat Values

Habitat values for the No Action alternative were derived from the Final EIS for Central City and the Interim Feasibility Report and Integrated Environmental Assessment for the Riverside Oxbow project as revised by the addendum to that report, dated April 2005. As discussed in the Alternatives Chapter, habitat outputs of the Riverside Oxbow project were not separated by habitat type in the original documents. In order to compare high priority habitat types between the No Action and Modified Central City alternatives, total outputs were separated by habitat type based on the extent of specific habitat type restoration measures described in the report and addendum. Following this, and to enable a direct comparison of habitat impacts and outputs between the alternatives, the updated vegetation mapping and habitat values for similar habitat measures used in the Modified Central City alternative were used to generate AAHUs by habitat type for the Riverside Oxbow project.

Ecosystem improvements in the original Central City Project are tied to the areas proposed for valley storage mitigation as well as the Rockwood Park Ecosystem Improvement Area. The proposed habitat development activities include establishment of native grasslands, enhancement of upland woodlands where appropriate, enhancement of existing riparian woodlands, creation of a large area of riparian woodlands with breaks in existing levees, reestablishment of historic oxbow stream channels, and creation of emergent wetlands.

Construction activities in the Riverbend area associated with mitigation of valley flood storage would result in an initial loss of 8.8 acres of emergent wetlands. However, following these activities, 15 acres of wetlands would be restored in this area and would be of higher value due to more frequent interchange with the river and long-term maintenance commitments. The original Central City Project would result in a net increase of 6.2 acres and 12.5 AAHUs of emergent wetlands. No wetlands were identified within the area potentially impacted by the Trinity Uptown Features, and therefore, no impacts to wetlands are anticipated due to the Trinity Uptown Features.

The original Central City Project would result in the initial loss of 34.5 acres of riparian woodlands. The majority of these losses would occur in the Riverbend site due to excavation for valley storage. Approximately 1.2 acres of riparian woodlands would be lost due to the Trinity Uptown Features. These represent a permanent impact to the existing trees but only a short term impact to riparian woodlands values because the Central City Project includes riparian habitat improvement and development in the Riverbend Area and in the Rockwood Park Ecosystem Improvement Area, which, taken together, would result in a net increase of 84.2 acres and 41.5 AAHUs. Riparian habitat improvement and development would include control of invasive species, planting trees and shrubs to increase the density and diversity of existing woodlands, and reforestation. In addition there would be a gain of 8.8 acres and 2.04 AAHUs of riparian woodland associated with the Ham Branch mitigation area which was computed following more detailed design of this mitigation and following finalization of the Central City EIS.

As a result of construction and valley storage with the Central City Project, there would be an initial loss of 51.5 acres of upland woodlands. The anticipated development which would occur within the study area as a result of the Trinity Uptown Features would impact an additional 16.4 acres of upland woodlands. However, within the Riverbend valley storage site and the Rockwood Park Ecosystem Improvement Area, proposed ecosystem improvements would include management of 13.3 acres of existing upland woodland and creation of 45.5 acres of upland woodland. With these measures taken together there would be a net loss of 19.7 acres of upland woodland and a net loss of 33.4 AAHUs with the original Central City Project.

The original Central City Project would result in a net loss of 271.3 acres of grassland and 100.3 AAHUs. These impacts primarily occur in the Riverbend and West Fork North study reaches and are related to construction of the bypass channel and the hydraulic mitigation at Riverbend. This accounts for the 42.4 acres of native grassland that would be established in the Riverbend area. Additional grassland losses would be associated with various other features such as recreational trail development, maintenance access, interior water feature, and future Trinity Uptown developments. The identified Trinity Uptown Features would impact an estimated 122.9 acres of grassland habitat resulting in a total loss of 394.2 acres and 163.9 AAHUs. This loss of grassland habitat is not considered significant due to its low value to wildlife and its relative abundance in the area.

The estimated cost of all required and planned habitat mitigation for the total original Central City Project for all habitat types, including direct effects of the valley storage, bypass channel, interior water feature, transportation developments, and future Trinity Uptown developments is \$4,600,000. That habitat mitigation cost estimate is included in the overall costs of the original Central City Project.

The Riverside Oxbow Project would restore the biological integrity of the wetland and bottomland hardwood communities through a combination of measures directed at either specific habitat types or specific problems within the existing ecosystem. Collectively, these restoration measures would help restore the ecological integrity, function, and dynamic processes of the floodplain and adjacent uplands to a less degraded, more natural condition. Because the Riverside Oxbow project was formulated as an ecosystem restoration project, no adverse habitat effects or compensation would occur.

Air Quality

Impacts to air quality from implementation of the No Action alternative would primarily occur during by-pass channel construction activities. Because the project area lies within the nonattainment area for eight-hour ozone standard, the No Action Alternative must be reviewed regarding compliance with the "General Conformity" requirements for ozone as established in Section 176(c) (1) of the Clean Air Act (CAA) and 40 CFR 51 Subpart W. The General Conformity rule prohibits any Federal agency from supporting or approving any action or project that does not conform to an EPA-approved State Implementation Plan (SIP). In the Texas SIP, EPA has approved TCEQ's request for "*de minimis*" levels for determining what projects require a detailed General Conformity analysis; projects that have annual emissions less than the *de minimis* levels (or threshold levels) do not require a conformity analysis. For the D/FW non-attainment area, the *de minimis* levels established in the SIP are 100 ton/yr of nitrous

oxides (NO_x) or volatile organic compounds (VOC) (Texas Administrative Code Title 30, Chapter 101, Subchapter A, Rule 101.30). Both NO_x and VOC are precursors for ozone.

Emissions of NO_x and VOC from the No Action alternative would result primarily from engines in off-road construction equipment. Emissions for NO_x and VOC were calculated using emission factors from EPA's draft NONROAD 2004 emission model. Construction activity levels, in the form of hours of operation for specific types of construction machinery, were estimated for the highest-activity year (i.e., the year with the most equipment activity). Under the No Action alternative, the basic activities of the direct channel modifications and Riverside Oxbow would be independent projects with their own independent phased construction schedules. The projected highest-activity year for the No Action Alternative would be the year assigned for the construction of the by-pass channel phase. Based upon reasonable estimations on the type and operation of equipment, the calculated NO_x and VOC emissions for the construction within the highest activity year of the by-pass channel are less than 100 tons/year for each pollutant; the highest emitted pollutant was NO_x at 75 tons/yr. Further details on the by-pass channel pollutant calculations are discussed in Air Quality Technical Section of Appendix G of *Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006*.

Under the No Action alternative, there is a possibility that Riverside Oxbow construction activity as an independent project, managed separately, could occur concurrently as the by-pass channel construction, but the scope of the oxbow construction activity is significantly less than the by-pass channel construction activity. Even if the two independent construction projects were conducted concurrently within the same construction year under the No Action alternative, it is not anticipated that any air pollutant de minimis emissions would be exceeded if respective pollutant emission were combined.

Depending on the underlying bedrock/substrate conditions, limited/short duration blasting isolated to the construction of bypass channel may be required to excavate material. If required, a steel blanket would be used to limit air dispersion of blast particulates. Under these controlled and temporary conditions, blasting would not significantly affect air quality. No NO_x and VOC emissions would be introduced with blasting. Other indirect impacts to air quality resulting from any of the Trinity Uptown Features associated with the No Action alternative would be long-term temporary impacts related to construction activities. As these actions are not clearly defined and no construction schedules are developed, the length of construction, and thus the impact is unknown; however, given the nature of these types of activities, it is anticipated that the impacts would be intermittent for five or more years.

Noise

Implementation of the No Action alternative would result in impacts to noise levels associated with construction activities. Noise impacts would be expected to be confined to daylight hours and would be temporary in nature, as construction activities would not be occurring throughout the entire project area simultaneously. It is anticipated that most of the noise generated for the No Action alternative would be associated with the construction of the bypass channel, since construction in the Riverside Oxbow restoration area is comparatively less with this alternative. In the sensitive residential neighborhoods within the western portion of the study area, temporary construction noise would be more noticeable than in the highly urbanized commercial and industrial areas adjacent to the bypass channel feature. Construction in the Riverside Oxbow area (Eastern portion) for the No Action Alternative would be relatively minor and considered to be much less of a contributor to adverse noise levels than the western portion in the No Action Alternative.

Also it is anticipated that blasting techniques used in certain areas will incur noise impacts, but that these events would occur relatively infrequently and would not result in noise levels of significant concern to nearby sensitive receptors (schools, hospitals, and residences).

There could be some long term noise impacts associated with implementation of the transportation features of the No Action Alternative where road alignments would be modified. These potential impacts would be expected to be confined to the downtown portions of the project where ambient levels already reflect a highly urbanized setting.

Cultural Resources

In the original Central City project, historic architectural properties were found to be adversely affected and those impacts were mitigated through stipulations defined in an August 2006 Programmatic Agreement (PA) between the Army, the City of Fort Worth and the Texas Historical Commission (THC). No archaeological resources were identified; however the PA requires coordination with the THC prior to construction activities. Separate, on-site investigations conducted during the feasibility study for the Riverside Oxbow Restoration Project resulted in the identification of an archeological site and project features were configured to avoid impacts to this site in consultation with the Texas Historical Commission. No architectural properties exist in the Riverside Oxbow Restoration Project area.

Recreation

Although planning for the development of the Central City Project and the Riverside Oxbow Restoration Project was conducted independently, a key goal of both projects was to provide recreational amenities that increased direct public access to the Trinity River and public interaction with the natural ecosystem. Together, the two projects include a total of 32,767 feet of concrete-paved trails, 25,815 feet of composite trails, 1,326 feet of access roadway, 10,080 square feet of parking and two restroom facilities. These totals represent only those recreational features in which the Corps of Engineers can participate. The Tarrant Regional Water District and the City of Fort Worth both have access and recreation plans that would be implemented within each project area independently from those which can be federally cost shared. For example, the City of Fort Worth's Master Plan for Gateway Park includes the construction of a new bridge associated with relocation of the entrance to Gateway Park, as well as development of more intensive flood compatible recreation facilities within the park. More detail regarding the proposed recreation development associated with each project is presented in the previously referenced project reports and NEPA documentation.

Public Versus Private Lands

Land requirements for both the Central City Project and the Riverside Oxbow Project are described in the project reports and NEPA documentation for the respective projects. Only those real estate requirements that are associated with valley storage and the Samuels Avenue Dam for the Central City Project, and the lands that are required for ecosystem restoration associated with the Riverside Oxbow Project are subject to change in the event of selection of the Modified Central City alternative. All features of the original Central City Project, including valley storage, bypass channel, water feature, and Samuels Avenue Dam would require the acquisition of 453 acres of private and use of 198 acres of public lands. Cost for acquisition of private lands is estimated at \$72,600,500. Lands required for implementation of the Riverside Oxbow Project and associated compatible recreation development would include acquisition of 232 acres of private lands and use of 336 acres of lands already in public ownership. Cost of private land acquisition associated with implementation of the Riverside Oxbow Project is estimated at \$2,277,218. Total acreages for the No Action alternative (which assumes both projects will proceed independently) would therefore be 685 acres currently in private ownership and 534 acres currently in public ownership. Total cost for acquisition of private lands for the No Action alternative is estimated at \$74,877,718.

Project Costs

Total project costs for the Central City project were estimated in the project report at \$435,414,650 in 2005 dollars. The authorizing legislation for the Central City Project limits the amount in which the Corps can share to \$220,000,000 with the Corps share being \$110,000,000. The remainder of the total project cost beyond the \$220,000,000 is a local cost. The total cost of the Riverside Oxbow Project in the 2005 Addendum is about \$20,800,000 with a Federal cost of about \$8,300,000 (in October 2002 dollars). When updated to 2005 dollars, the cost of the Riverside Oxbow Project is \$23,625,413, making the total project cost of the No Action Alternative \$459,040,063 in 2005 dollars.

Modified Central City Alternative

Those features that would not change with the Modified Central City alternative include the bypass channel, interior water feature, all related flood control gates, all pedestrian and vehicular bridges, and future development by private interests of the Trinity Uptown area. Among the changes associated with the Modified Central City alternative are the relocation of the Samuels Avenue Dam with a small craft lock facility and Marine Creek low water dam, the removal of the primary valley storage at Riverbend, addition of new valley storage areas along West Fork including the Ham Branch area and the Riverside Oxbow and Gateway Park areas. Avoidance of riparian and upland forest and wetlands was maximized during the selection of alternate valley storage sites. Habitat development within the Riverside Oxbow and Gateway Park areas are made possible by using the excavated valley storage sites for dense riparian forest and wetland development.

Hydrology and Hydraulics

The hydraulic evaluation of the proposed valley storage changes with a Modified Central City Project was performed using the U.S. Army Corps of Engineers model, HEC-RAS version 3.1.3. The hydraulic elements of the modified valley storage sites and features were incorporated into the previously approved proposed conditions model to create the modified alternative proposed conditions model. Valley storage sites no longer used in the modified alternative were removed. The revised dam location was also incorporated into the modified proposed conditions model. The gate opening, crest elevation, and dam configuration remained the same as in the approved project. The dam was modeled assuming the gates were in the fully open position for both the 100-year and the SPF flood events. The goal of initial or planning level hydraulic modeling in an iterative process was to identify a valley storage capacity of 5,250 acre-feet. Through that iterative planning process, compensation for valley storage loss is proposed to be provided by those sites identified earlier in Table 3-4 and summarized below as:

- Riverside Oxbow – Gateway Park valley storage sites
- Off-line storage within the existing Gateway Park ball park levees
- Two in-line, overbank sites downstream of Samuels Avenue
- One in-line, overbank site in Riverside Park upstream of Belknap Avenue
- One in-line, overbank site in Rockwood Park West
- Ham Branch (West Fork Sump 31) off-line storage site;
- Drawdown mitigation by raising University Drive
- Utilization of the interior water feature for valley storage

The Riverside Oxbow – Gateway Park valley storage sites are located adjacent to the West Fork. These sites would provide a preliminarily estimated 2,179 acre-feet in the SPF flood. Refer to Appendix C, Volume 2 for proposed Riverside Oxbow – Gateway Park grading plans. Existing Manning “n” values in the Riverside Oxbow – Gateway Park overbank area vary from 0.04 to 0.20. Coordination between the study team’s Biologists and Hydraulics Engineers was maintained to determine acceptable Manning “n” values for the areas that would be incorporated for habitat development measures.

The Ham Branch Sump (West Fork Sump 31) is located on the west side of the West Fork downstream of East 4th Street. The proposed Modified Project alternative would convert the existing sump near the confluence of Ham Branch and the West Fork to a dual use storage area. Under the dual use plan, the sump would serve as valley storage in river floods exceeding the 100-year stage at the Ham Branch location. At all other times, the sump would continue to store runoff from the Ham Branch watershed. Based on the unsteady flow analysis, the Ham Branch Sump would provide 750 acre-feet of valley storage during the SPF event on the West Fork.

To recover a portion of the drawdown loss, the University Drive roadway would be raised to return the 100-year and SPF water levels upstream of University Drive to near the levels of baseline conditions model. This site was evaluated and reviewed during the Central City EIS process. The area identified as fill in the Central City Project at University Drive would no longer be required.

The Modified Project alternative would require appropriate interior drainage storage and conveyance facilities to prevent structure flooding in interior areas. The three distinct interior drainage areas were evaluated and reviewed during the Central City EIS process. No changes are proposed to the approved interior drainage plan. Based on preliminary operations modeling of the interior area, approximately 140 acre-feet of valley storage will be available during the SPF event.

The revised Samuels Avenue dam site and configuration was incorporated into the hydraulic model for analyzing proposed modified project conditions. The benefits of this revised dam site include reduced backwater impacts to Marine Creek as well as simplifying the operational demands of Samuels Avenue Dam by allowing Marine Creek flood flows to pass without affecting the urban lake pool elevation. Hydraulic connectivity is maintained, which satisfies project objectives. Secondly, a benefit to this dam site is the elimination of environmental impacts to Lebow Creek and associated habitat.

The channel and lock structure connecting the Trinity River impoundment with Marine Creek in conjunction with the low water dam on Marine Creek would result in a normal pool elevation of 516.5 NGVD in Marine Creek. Although this would reduce adverse impacts from the original project pool elevation of 525 NGVD, some modifications to existing structures would still be required. Several existing railroad bridge piers would still be inundated by the 516.5 NGVD pool elevation. An analysis of existing storm drain systems was conducted to ensure these systems are not impacted by the proposed revised pool elevation. Hydraulic modeling results indicate that backwater impacts from the low water dam would be minimal. An existing low water dam in Saunders Park maintains a pool elevation of approximately 518.5 NGVD. Since the pool elevation of 516.5 NGVD is below the existing Saunders Park elevation no impacts are anticipated upstream.

The valley storage loss associated with the Modified Central City project features would be mitigated well over 100% in the 100-year flood event. The net gain of valley storage in the SPF event is approximately 71 acre feet. Therefore the SPF level of protection would be retained as well. The modeled geometry is expected to change during the detailed design process as field survey data is incorporated into the model. During the detailed design process, the final design will be configured to provide valley storage at the SPF+4 level in all areas where that is the design elevation.

The sediment transport analysis originally conducted for the Central City Project did not indicate any change after construction of the bypass channel that would indicate a substantial change from existing conditions. The proposal for the bypass channel has not changed within the Modified Central City Project Alternative and, as a result, the proposed project would not appear to affect sediment deposition from that of the existing condition.

Water Quality

Temporary Impacts. The Modified Central City alternative would have essentially the same temporary water quality impacts due to construction as the No Action alternative, as disclosed in the Final EIS and the Interim Feasibility Report. The major physical differences in the Modified Central City alternative and the No Action Alternative include relocation of the Samuel Avenue Dam, addition of lock and dam system tie-in with Marine Creek, relocations of valley storage excavations and fill sites, and more extensive conversion of grassland to forested areas in the downstream areas in the vicinity of Riverside Oxbow area. The approximate level of construction with the Modified Central City alternative would differ from the combined activity of the separate Riverside Oxbow and original Central City project primarily in location of excavation for valley storage with only minor changes in duration of excavation activities. Therefore, it is anticipated that the watercourse will have the same temporary mainstream turbidity conditions that would occur during construction with the Modified Central City alternative as previously disclosed for the separate projects.

Long-term Impacts. The Modified Central City alternative would have similar long term water quality impacts as the No Action Alternative. Major physical differences in the Modified Central City alternative over the No Action alternative include relocation upstream of Samuel Avenue Dam, addition of

lock and dam system tie-in with Marine Creek, relocations of valley storage excavations and fill sites, minor wetland changes, and some exchange of grassland to forested areas in the downstream areas in the vicinity of Riverside Oxbow area. The approximate level of construction with the Modified Central City alternative is very similar to the combined activity of the separate Riverside Oxbow and original Central City project. Motorized boat traffic past the dam and along Marine Creek would not be expected to change from what was projected for the original Central City Project, and boating in the Riverside/Gateway area would be non-motorized. Therefore, it is anticipated that the watercourse will have the same long term water quality impacts with the Modified Central City alternative as the No Action alternative as described above.

Results of modeling conducted for the Modified Central City Project alternative under a worst case summer condition for seven-day/ two-year low flow (7Q2) and median flow depicted that instream dissolved oxygen conditions for the principle impoundment areas of the mainstream would be above the Texas Surface Water Standard of 5.0 mg/L. Further details are discussed in the Technical Memorandum, Supplemental Water Quality Assessment of the Fort Worth Central City Project, dated 21 September 2007. The results of this modeling does not discount the possibility of occurrences low dissolved oxygen in certain undersurface stratified portions of the deeper stream cross-sections as has been exhibited on certain summertime occasions in the past. The implementation of the Modified Central City alternative creates approximately 4.4 acres of less water surface area with the upstream movement of the Samuel Avenue Dam (approximately 1600 feet). This is less than a 5% reduction of the No Action alternative. As a result, the evaporation losses from the Modified Central City alternative would be slightly less than that of the No Action alternative.

Aquatic Resources

The extent of impounded river would be about the same for the Modified Central City alternative except there would be less inundation of Marine Creek. The oxbow restoration features within the Rockwood Park Ecosystem Improvement areas would remain as a component of the Modified Central City alternative. Restoration along those two severed oxbows is projected to result in a net increase of about 5.1 acres (converted from length of stream by stream width) and 4.3 AAHUs of oxbow habitat.

Losses to Lebow Creek would be avoided due to relocation of Samuels Avenue Dam and impacts to Marine Creek would be reduced to 0.97 AAHU due to the reduced length of stream inundated with the Modified Central City alternative. These losses would be largely mitigated by the Ham Branch stream mitigation features which result in 0.55 AAHUs and are part of the Modified alternative. The proposed stream mitigation features within Lebow Creek as part of the authorized Central City Project would not be developed with the Modified Central City alternative because it would no longer be feasible to construct a gravity flow pipeline from the Trinity River impoundment to Lebow Creek near Brennan Avenue because of the relocated dam site. Therefore, the remaining mitigation requirement of 0.42 AAHU for Marine Creek would be compensated by restoring the severed Sycamore Creek channel. This would include removing the channel plug at the severed channel confluence and incorporating stream habitat restoration features (rock weirs) to restore riffle/pool complexes. Outputs for the Sycamore Creek restoration, after accounting for mitigation of Marine Creek (0.42 AAHUs) that is not addressed by the Ham Branch improvements, are estimated at 0.25 acres and 0.22 AAHUs.

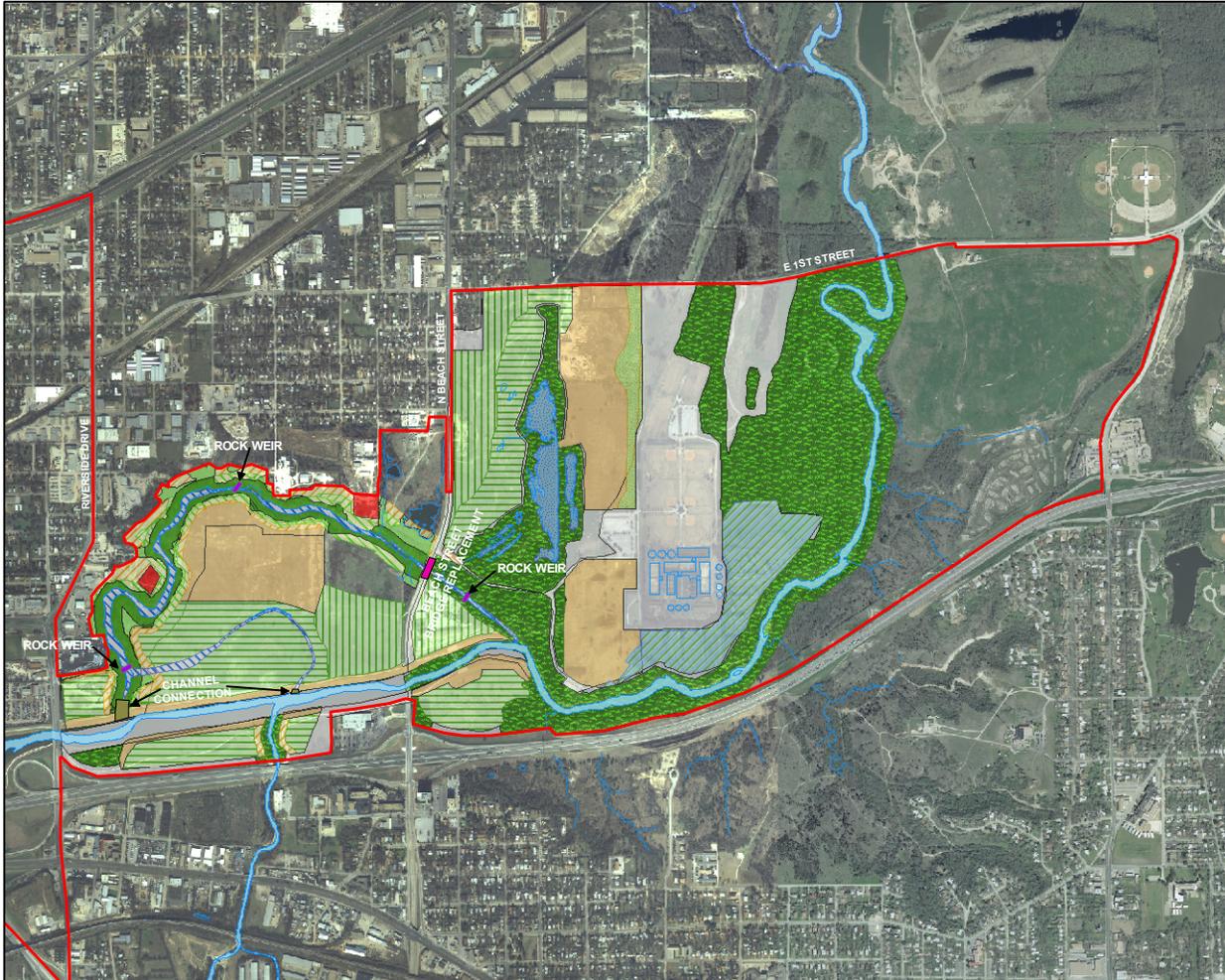
The Modified Central City alternative also includes removing the channel plug to a 2-year frequency elevation at the Riverside Oxbow confluence to the operating water surface elevation of the mainstem channel. This will allow both base flows and flushing flows through the severed Riverside Oxbow channel and additional in-stream measures (rock weirs) will be incorporated into the channel to help restore riffle and pool complexes resulting in approximately 4.6 AAHUs. This AAHU estimate is calculated from the length of severed channel to be restored (1.3 miles) and an estimated average stream width of 35 feet resulting in 5.5 acres to be restored. The same AAHU/area ratio that resulted for stream aquatic restoration for similar areas within the authorized Central City Project (0.84) was used to calculate 4.6 AAHUs. This output combined with net outputs from Sycamore Creek would result in 5.75 acres and 4.8 AAHUs of stream habitat outputs for the Modified Central City alternative.

Vegetative Cover and Wildlife Habitat Values

The iterative planning process for valley storage site selection and site configuration with the Modified Central City alternative described earlier in the Alternatives Chapter resulted in avoidance of significant resources to the extent possible, thereby significantly reducing habitat impacts. Valley storage sites were selected only after evaluation of each site for potential impacts to riparian woodland and wetlands. Even with this process, however, some minor impacts to resources would occur that must be mitigated. These losses would be due to construction related features of the Central City project that would not change, excavation of the valley storage sites, to the footprints of the Samuels Avenue and Marine Creek dams, and to inundation impacts along the lower portion of Marine Creek. Most of the losses to riparian and upland woodlands would be within Sites 16 and 18 in the Riverside Oxbow area. In order to optimize valley storage within these sites it was necessary to extend the excavation areas to within the drip line of some existing wooded areas, thereby creating unavoidable losses of habitat value that would require compensation. Mitigation for riparian woodland impacts with the Modified Central City alternative would be small and would be accomplished by in-kind riparian woodland development within the valley storage sites. The overall Modified Central City Project alternative, would require compensation for loss of about 18.3 acres of riparian woodlands, 59 acres of upland woodlands, and less than an acre of emergent wetlands. The cost for all required habitat mitigation is estimated at \$3,120,000 on prorated basis of the habitat mitigation cost associated with the original Central City Project.

Habitat development outputs of the Modified Central City Project alternative were calculated based on the vegetation species and densities described in the Alternatives Chapter, Appendix E, and consistent with the habitat development plan depicted on Figure 12 and are summarized in Table 4-1. All acreages, qualitative values, and assumptions used in calculating habitat development outputs of the Modified Project alternative are contained in Attachment 1 to Appendix E – Habitat Evaluations of this Supplement to the EIS.

Central City
Figure 12 - Habitat
Development Plan for the
Riverside/Gateway Area



Legend

- MODIFIED ALTERNATIVE STUDY AREA BOUNDARY
- STREAMS

RESTORATION DESCRIPTION

- STREAM RESTORATION
- DISTURBED (GAS WELL)
- NATIVE GRASS BUFFER
- TURF GRASS PLANTINGS
- CREATE RIPARIAN FOREST, <165 FT
- CREATE RIPARIAN FOREST, >165 FT
- IMPROVE RIPARIAN FOREST, <165 FT
- IMPROVE RIPARIAN FOREST, >165 FT
- RIPARIAN FOREST DEVELOPMENT IN EXCAVATIONS
- IMPROVE EXISTING RIPARIAN FOREST
- SAVANNAH (90% GRASSLAND, 10% RIPARIAN FOREST)
- SAVANNAH (95% GRASSLAND, 5% RIPARIAN FOREST)
- CREATE WETLAND COMPLEX
- CONVERT WATER TO WETLANDS
- NO HABITAT IMPROVEMENT PROPOSED

0 0.125 0.25 0.5 Miles

Aerial Photography Date: January 2005



ATTENTION

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Table 4-1
Habitat Outputs (AAHUs) By Study Reach for No Action and Modified Central City Alternatives
(Outputs reflect reduction due to unavoidable direct impacts)

Study Reach	No Action Alternative ⁽¹⁾				Modified Central City Alternative			
	Riparian	Wetland	Upland	Grass/Sav	Riparian	Wetland	Upland	Grass/Sav
Clear Fork West	0	0	-10.43	-24.56	0	0	-10.48	-24.87
Clear Fork East	0	0	-0.81	-0.38	0	0	-0.81	-0.38
North Main	-2.87	0	-11.09	-71.85	-2.87	0	-12.18	-74.27
West Fork North	0	0	-0.77	-26.89	0	0	-1.17	-40.50
West Fork South	2.04	0	-1.49	-11.88	2.04	0	-1.27	-16.65
West Fork Riverbend ⁽²⁾	44.34	12.47	-8.8	-28.4		0	0	0
West Fork Rockwood ⁽²⁾					7.15	0	-0.05	-12.93
SUBTOTAL	43.51	12.47	-33.39	-163.96	6.32	0	-25.96	-169.60
Oxbow North	20.25	2.68	0	27.49	22.14	0	0	-7.17
Oxbow Central	-1.37	10.26	0	25.74	16.39	-0.14	0	-38.76
Oxbow South	1.68	0	0	13.62	9.50	0	0	-0.10
Gateway Central	7.92	0	0	13.17	0.96	0	0	11.03
Gateway South	7.44	0.96	0	-0.6	8.24	0	-0.12	-2.20
Gateway Beach	12.26	6.4	0	-6.45	21.15	16.71	-5.35	28.64
Gateway Park				-7.79	5.31	0	-0.23	-5.89
Gateway East	15.15	22.42	0	-0.92	19.81	31.21	-0.09	-0.87
SUBTOTAL	63.33	42.72	0	64.26	103.5	47.78	-5.79	-15.33
Gateway Oakland ⁽³⁾	NA	NA	NA	NA	0	0	-0.07	0.54
Meacham Airfield Fill Site ⁽³⁾	NA	NA	NA	NA	0	0	-2.3	-0.85
SUBTOTAL					0	0	-2.37	-0.31
Totals	106.84	55.19	-33.39	-99.7	109.82	47.78	-34.12	-185.23

⁽¹⁾ Derived from original project reports and addendum

⁽²⁾ Reaches combined in final Central City

⁽³⁾ Fill sites not included in the approved plans

The Modified Central City alternative would shift the primary location of habitat development from the previously proposed Riverbend area of the West Fork on the west side of Fort Worth to the Riverside Oxbow and Gateway Park locations on the east side of downtown Fort Worth. The primary restoration features of the Riverside Oxbow including the development and improvement of riparian woodland values, creation and improvement of wetlands and development of native grassland buffer along the oxbow corridor have also been retained. A primary difference of the Modified Central City alternative is to significantly increase the area of riparian woodland development in the reaches above and below Beach Street within the valley storage sites. Excavation of predominantly grassland and disturbed areas provides the valley storage needed, but additional hydraulic roughness (i.e., trees to slow the flow) is also required to balance the hydrology and hydraulics of the study area to avoid adverse downstream flooding impacts.

Based on the available data and the known attributes of the floodway system, a conservative estimate of sediment deposition has been estimated to be approximately 3.5 inches of sediment over a 30-year period. Therefore, there is not a significant concern that sediment deposition would have a detrimental effect on the proposed habitat development within the Riverside Oxbow portion of the combined study area, especially based on the fact that existing vegetation and forest on the eastern side of the Gateway Park area are not currently exhibiting detrimental effects from sediment deposition.

Air Quality

Impacts to air quality from implementation of the Modified Central City alternative would primarily occur during excavation in the Riverside/Gateway area as this is the most significant change from the No Action alternative. As discussed previously in the No Action alternative, the same *de minimis* levels of 100 ton/yr each for NO_x and VOC are used for determining whether there is an air conformity concern within the DFW non-attainment area for ozone.

Assessment of the air impacts from the increased grading operations from the Modified Central City alternative were considered in a second general conformity analysis to assess whether air impacts had changed from those previously discussed in the Air Quality Section of Appendix G of the *Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006*. Emissions of NO_x and VOC from the Modified Central City alternative would result primarily from engines in off-road construction equipment however on-road emissions as the result of hauling excavation materials off-site were also considered. Emissions for NO_x and VOC were calculated using emission factors from EPA's draft NONROAD 2004 emission model. Construction activity levels, in the form of hours of operation for specific types of construction machinery, were estimated for the highest-activity year (i.e., the year with the most equipment activity). Under Modified Central City Project, the basic construction activities would be conducted in eight sequential stages: roadway bridges, interior by-pass channel, Riverside/Gateway Park area for valley storage and habitat development, by-pass channel tie-ins, elevation of University Drive, isolation gate construction, Samuel Avenue Dam construction, and construction of interior water feature and connector.

The projected highest-activity year for the Modified Central City alternative would be the year assigned for the construction of the Riverside/Gateway Park area (including both creation of hydraulic valley storage and subsequent habitat development) as the remainder of the construction activities were previously analyzed. Based upon construction engineering estimations on the type and operation of equipment, the calculated NO_x and VOC emissions for construction within the Riverside/Gateway Park area for the highest activity year are less than 100 tons/year for each pollutant; the highest emitted pollutant was NO_x at 86 tons/yr. Further details on the Riverside/Gateway Park construction area pollutant calculations are discussed in the General Conformity Analysis, Fort Worth Central City Riverside Oxbow/Gateway Park Site dated 4 October, 2007.

Similar to the No Action Alternative, temporary dispersion of dust particulates from short-duration blast operations with applicable controls such as a steel blanket would not be significant. No NO_x and VOC emissions would be introduced with blasting.

Overall, although the annual maximum pollutant emissions for the Modified Central City alternative is projected to be slightly but not significantly greater than the No Action alternative due to concurrent construction, the long term emission after construction are expected to be somewhat reduced due to uptake of pollutants by the more intensive riparian woodland plantings. Indirect air quality impacts associated with future development of subsequent Trinity Uptown Features would also be similar with Modified Central City Project as with the No Action Alternative.

Noise

Implementation of the Modified Central City alternative would generally result in greater construction impacts to noise levels than the No Action Alternative. Construction noise effects would be expected to be greater in the eastern portion than the Western portion of the study area due to the larger sites and more intensive construction activities.

Relative noise impacts were assessed with respect to nearby sensitive receptors for schools, hospitals, and residences. A noise analysis was conducted for construction in the Riverside/Gateway Park Area (eastern portion of the project area). Based on this analysis, it was determined that the maximum predicted construction noise level would be 80.1 A-weighted decibels (dBA) equivalent sound

level (Leq) to the nearest residence within 50 meters on the outer edge of the construction site during the final grading and stabilization phase of construction in the Riverside/Gateway Park Area. However, the maximum noise levels predicted for the other school and hospital receptors for all construction phases in the area were less than 57 dBA Leq and the levels for other residential receptors during the other construction phases were less than 65 dBA Leq. In addition, nominal noise levels were also predicted from the center of the construction area to the sensitive receptor. In all these nominal noise level predictions, all results for receptors in each of the construction phases were less than 58 dBA Leq. As a rough comparison, HUD designates a day-night average of 65 dBA as being acceptable (Title 24 CFR Part 51). Refer to Noise Impacts Review for Modified Fort Worth Central City, Riverside/Gateway Area, dated 8 October 2007 for more analysis details.

Based on another worst case with all excavation activities occurring during a compressed two-phase approach, noise levels along construction haul roads were also analyzed. Noise levels along haul roads could vary from 49.7 to 71.8 dBA Leq depending on one of sixteen routes during the applicable construction phase. However, in practice, haul traffic would be less concentrated as actual excavation would be more staggered among sites.

Since construction activities will be typically performed during the daylight hours after 7:00 AM, the more sensitive times of the night would be minimized. All construction activities would be temporary. Best management practices, including proper equipment maintenance and use, and retention of vegetative buffers, would also be used onsite to minimize adverse noise conditions immediately offsite.

Similar to the No Action Alternative, there will be occasions for blasting to be used for the Modified Central City alternative. Also it is anticipated that blasting techniques used in certain areas will incur noise impacts, but that these events would occur sparingly and infrequently in a manner muffled by the material being excavated and would not result in noise levels that could be anticipated to be of concern to nearby sensitive receptors (schools, hospitals, and residences).

Like the No Action Alternative, there could be some long term noise impacts associated with implementation of the transportation features of the Modified Central City alternative where road alignments would be modified. These potential impacts would be expected to be confined to the downtown portions of the project where ambient levels already reflect a highly urbanized setting.

Cultural Resources

The archaeological site identified in the Riverside Oxbow area would be impacted by excavations associated with the Modified Central City Project. As a result of that finding, this site will be excavated in accordance with a mitigation plan designed in consultation with the THC prior to project construction. Site specific investigations for archeological sites in the Central City area will be conducted before construction. Any NRHP-eligible sites located during those studies will be excavated in accordance with a mitigation plan designed in consultation with the SHPO prior to project construction.

Architectural properties over fifty years of age occur within the Riverside Oxbow/Gateway Park area and are within the Modified Central City alternative's area of potential effect. A city-owned abandoned waste water treatment facility in Gateway Park has been identified as a possible location for placement of borrow material. The Army has found it not eligible for the NRHP due to loss of integrity of character defining elements such as materials and workmanship. In addition, the city is scheduled to clean up the plant under a separate project and the facility may not be extant at the time of the undertaking.

Oakhurst Scenic Drive is found to be eligible for the NRHP and is potentially affected by the undertaking. The roadway surface materials have been continuously replaced over the years and are not original to the road. The character defining elements of Oakhurst Scenic Drive are its location and setting and not the materials and workmanship of the road surface. Oakhurst Scenic Drive has the potential to be effected by the hauling of excavated material in trucks and by the replacement of a sewer line that requires temporary disturbance of use and removal and replacement of roadway materials. Hauling of

excavated material is not anticipated to affect the integrity of the roadway surface, which is not a character defining element. The interruption of the use of the road is temporary and not found to be an adverse effect as the primary character defining elements, location and setting, are undisturbed during the work.

Several NRHP eligible bridges and structures span the floodway in the Riverside Oxbow project. These structures are only visually affected by the undertaking. No physical impacts will occur to any NRHP bridges either by direct construction of project features or by the hauling of excavated material by trucks using the roadway. The visual effect of occasional water storage within the valley storage sites is limited to changes in the volume or level of the water in the active floodway. The Corps has found this to be no adverse effect physically or visually on these properties.

Recreation

The City of Fort Worth has a long history of improving the quality of life for its citizens by capitalizing on opportunities to preserve and enhance the natural environment and recreational amenities. Gateway Park is one of several major urban recreational areas within the City. Located east of downtown and along the north bank of the West Fork of the Trinity River, Gateway Park's current recreational facilities include the Fort Worth Rowing Club, athletic fields, pedestrian trails, and a dog park. Additional facilities that are part of the City of Fort Worth's Master Plan for Gateway Park include soccer fields, basketball courts, a concession stand, a water park, an amphitheater and additional roadway and parking areas. These features are shown in Figure 13, Conceptual Recreation and Infrastructure Plan for the Riverside Oxbow/Gateway Park Area.

As was previously stated for the No Action Alternative, during the independent development of both the Central City Project and Riverside Oxbow Project, a key goal was to provide recreational amenities that increased public access to the Trinity River and to the natural environment of the project area. The two projects together include a total of 32,767 feet of concrete-paved trails, 25, 815 feet of composite trails, 1,326 feet of access roadway, 10,080 square feet of parking and two restroom facilities. The Modified Central City Project Alternative further enhances the goal of recreation and natural environmental access by providing an additional 1,533 feet of paved trails, 19,985 feet of composite trails, 2,154 feet of access roadway and 37,980 square feet of parking to the existing Trinity Trail system.

In addition to restoring existing trails and facilities that will be impacted during construction activities associated with the valley storage portion of the Modified Project alternative, the proposed trail system within the Riverside Oxbow area has been expanded to provide increased public access to the proposed habitat development areas. The trail system includes concrete-paved stretches that can also be used for maintenance and access. In addition composite-paved stretches that are less expensive to construct and maintain will provide continuous public access along the waterway and equestrian trails. The numerous access points to the trail system create linkages to neighborhoods along the river. Benches and picnic areas along the trail system also encourage public use of the facilities and appreciation for the natural environment.

The expanded trail system in the Riverside Oxbow Area will include additional roadway and parking facilities that not only provide easier public access to the varied habitats but also protect the same habitats from unauthorized vehicular access. The proposed 2,154 feet of Riverside Oxbow roadway follows a natural divide between upland and lowland areas and will provide access to a new boat launch on the upstream stretch of the oxbow. The boat launch will provide access to a quiescent stretch of the river. An additional boat launch is located at the downstream end of the oxbow, just above the water control structure. Three new parking areas along the roadway will provide an additional 37,980 square feet of parking facility enhancing the park accessibility. An overview of all of the recreation features associated with the Modified Central City alternative is presented in Figure 14 - Modified Alternative Recreational Features. It is important to note that most of the features that are within the Central City portion of the Modified Central City Project area are essentially the same as the recreation features proposed for the original Central City Project. Those facilities, therefore, would also be considered as part of the No Action condition.

Central City

Figure 13 - Modified Central City Project
Conceptual Recreation
and Infrastructure Plan for the
Riverside Oxbow/Gateway Park
Area

Legend

-  EXISTING TRAILS
-  EXISTING TRAIL TO BE REBUILT (CONCRETE)
-  PROPOSED TRAIL (CONCRETE)
-  PROPOSED TRAIL (SOFT PAVED)
-  PROPOSED EQUESTRIAN TRAIL
-  BEACH ST RECONSTRUCTION
-  ROADWAY AND PARKING
-  PROPOSED BOAT LAUNCH
-  PROPOSED ROCK CLUSTER CONTROL STRUCTURE

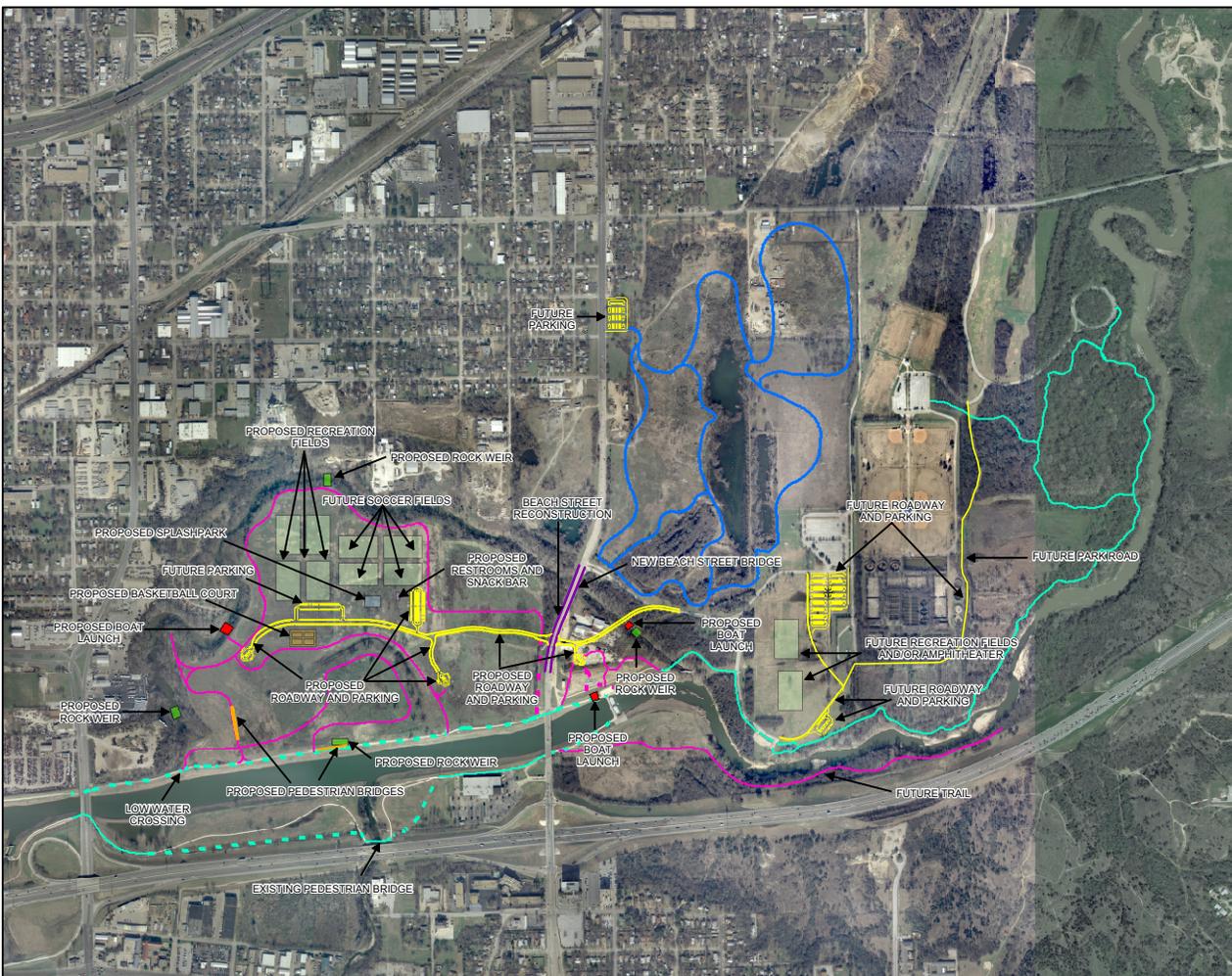


0 430 860 1,720
Feet

Aerial Photography Date: January 2005



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Central City

Figure 14 - Modified Central City Project Recreational Features

Legend

-  APPROVED CENTRAL CITY TRAILS
-  EXISTING TRAIL
-  EXISTING TRAIL TO BE REBUILT
-  PROPOSED NEW TRAIL
-  PROPOSED EQUESTRIAN TRAIL
-  PROPOSED RELOCATED TRAIL

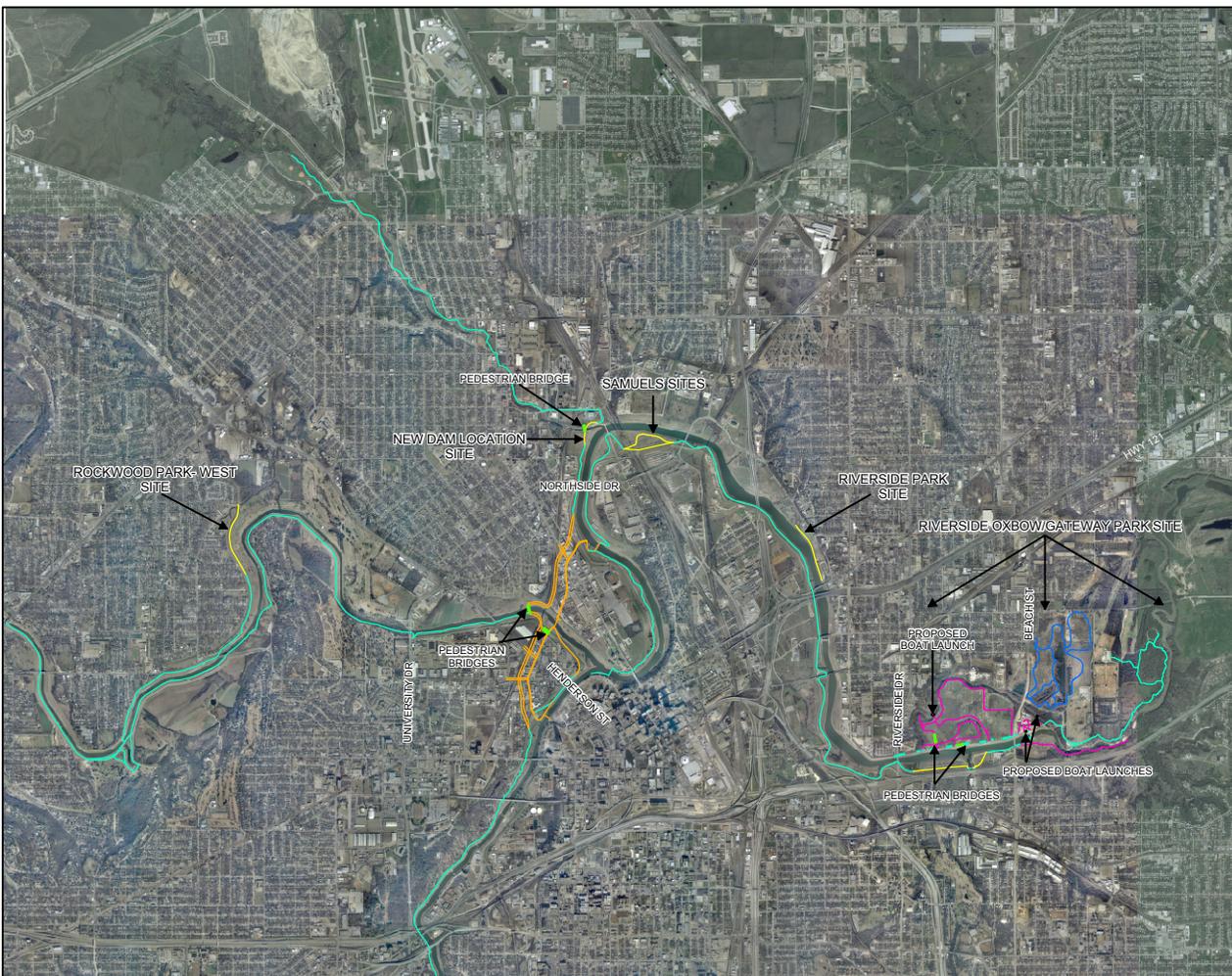


0 1,700 3,400 6,800 Feet

Aerial Photography Date: January 2005



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Public Versus Private Lands

The only land uses subject to change from the approved Central City Project with implementation of the Modified Central City Alternative are those lands required for valley storage and the Samuels Avenue Dam. All other features of the original Central City Project would remain unchanged. Lands required for the Riverside Oxbow Project would also be required for the Modified Central City Project Alternative, but the lands would serve the additional function of valley storage. A total acquisition of 685 acres of private land and utilization of 534 acres of public land is currently required for the No Action alternative. The Modified Central City Project alternative would utilize the same public lands as the No Action alternative but would incorporate the additional valley storage function and more extensive habitat development measures within the Riverside/Gateway area. The total requirement for acquisition of private lands with the Modified Project would be 397 acres at an estimated cost of \$60.0 million.

Project Costs

As has been stated, the total project cost for the No Action alternative is estimated at \$459.0 million in 2005 dollars. The Modified Central City Project alternative would remove certain components of the original Central City project but would also incorporate additional features to accommodate the new dam site and structures, additional recreation facilities that would not be developed with the No Action alternative, excavation, site preparation prior to habitat plantings and more extensive development of riparian woodland. The net result of the changes would be a cost increase of approximately \$60.0 million to an estimated total project cost of \$519.0 million (2005 dollars). This estimated cost in 2007 dollars is \$576.0 million. Current Authorizing legislation for the Central City Project would limit Corps participation to \$110.0 million of the estimated total project costs for the Modified Central City Project alternative.

Comparison of Project Alternatives

Table 4-2, Comparison of Alternative Outputs and Effects, presents an overview of the two alternatives relative to specific evaluation categories or affected resources. Those categories for comparison are Technical Soundness, Habitat Impacts, Habitat Outputs, Recreation, Real Estate, Total Project Costs, and Other Considerations. The table summarizes the information presented earlier in the Environmental Consequences chapter of this SEIS. Although the information in the table is pretty much self-explanatory, each of the comparison categories is briefly discussed in the following paragraphs.

Technical Soundness

Both the No Action and the Modified Central City alternative would meet the planning objective of retaining existing levels of flood protection throughout the project study area. Planning criteria for valley storage requirements to compensate for the hydraulic efficiency of the bypass channel is 5,250 acre-feet. With that additional valley storage, the existing levees within the study area would retain their design level of protection without increasing flood elevations downstream of the existing levee system. In the case of the No Action plan, that requirement would be met primarily with the Riverbend valley storage site, along with an plan for the Riverside Oxbow. Based on planning level hydraulic analysis it appears that the primary Valley storage sites of the Modified Central City Project alternative would achieve the planning objective with the potential to achieve even greater valley storage (5,431 acre-feet). The location of the primary valley storage sites downstream of the Central City Project features allows for greater development of riparian woodlands in the Riverside/Gateway area in order to transition the volumes and velocities to current levels downstream of the combined project study area. In the event that detailed hydraulic analysis of the Modified Project alternative indicates that additional valley storage may be required or one or more of the primary sites become infeasible, the contingency sites could be used to replace these primary sites. The currently approved projects (No Action) do not provide that same flexibility in assuring adequacy of valley storage during detailed project design.

Habitat Impacts

Valley storage and dam location features of the original Central City Project would adversely impact 35.7 acres of riparian woodland, 67.9 acres of upland woodland, and 8.8 acres of emergent wetland. These impacts would require mitigation if no habitat development was proposed, however the proposed habitat development would more than compensate for these impacts. The original Central City project would also impact 3.2 acres of Marine Creek stream habitat valued at 1.08 AAHUs and 0.1 AAHU in Lebow Creek, requiring mitigation at Lebow Creek and Ham Branch. The Riverside Oxbow project would not adversely affect any habitat and no compensation would be required.

The Modified Central City alternative would impact 18.3 acres of riparian woodland, 59.0 acres of upland woodland, and 0.8 acres of emergent wetland habitat. Again, these impacts would require mitigation if no habitat development occurred, but the proposed habitat development would more than compensate for these impacts. The Modified Central City alternative would impact less Marine Creek stream habitat but would still require some mitigation. This mitigation is proposed at Ham Branch and the severed Sycamore Creek channel and in combination with restoration of stream habitat in the severed Riverside Oxbow channel would result in a net gain of stream habitat.

By comparison, then, the Modified Central City alternative would reduce habitat impacts from the approved projects by 49% for riparian woodlands, 13% for upland woodland and 91% for emergent wetland. Stream aquatic mitigation requirements would also be significantly reduced with the Modified Projective alternative relative to proceeding with both projects independently. Costs for required habitat mitigation would be reduced with implementation of the Modified Project alternative from \$4,600,000 to an estimated cost of \$3,120,000 (32% reduction)

Table 4-2
Comparison of Alternative Outputs and Effects

Affected Resource	No Action			Modified Central City (Assuming Primary Valley Storage Sites)	
	Central City	Riverside Oxbow	Total		% Change
Technical Soundness					
Level of Protection	SPF +4	n/a ⁽¹⁾	SPF +4 ⁽¹⁾	SPF +4 ⁽¹⁾	No change
CDC Compliance	100%	100%	100%	100%	No change
Valley Storage Required	5,250 ac-ft	0 ac-ft	5,250 ac-ft	5,250 ac-ft	No change
Valley Storage Achieved	5,250 ac-ft	n/a	5,250 ac-ft	5,431 ac-ft	3% increase
Initial Habitat Losses (Acres)					
Riparian Woodland	35.7	0	35.7	18.3	49% reduced
Upland Woodland	67.9	0	67.9	59.0	13% reduced
Emergent Wetland	8.8	0	8.8	0.8	91% reduced
Grassland ⁽²⁾	394	0	394	737.9	87% increase
Stream Habitat	3.2	0	3.2	2.3	28% reduced
Mitigation Cost	\$4,600,000	\$0	\$4,600,000	\$3,120,000	32% reduced
Habitat Outputs (Acres reflect reductions due to Initial Losses) ⁽³⁾					
Riparian Woodland					
Preservation acres	0	26.8	26.8	0.6	98% reduced
Improvement acres	26.6	178.0	204.6	271.0	32% increase
Creation acres	66.4	65.4	131.8	147.1	12% increase
Total Riparian Woodland Acres	93.0	270.2	363.2	418.7	15% increase
Overall Riparian Woodland AAHU's	43.5	63.3	106.8	109.8	3% increase
Upland Woodland					
Preservation	0	0	0	0	No change
Improvement	13.3	0	13.3	0	>100% reduced
Creation (impact then create)	-33.0	0	-33.0	-59.0	>79% reduced
Total Upland Woodland Acres	-19.7	0	-19.7	-59.0	>100% reduced
Overall Upland Woodland AAHU's	-33.4	0	-33.4	-34.1	2% reduced
Emergent Wetland					
Improvement acres	0	0	0	6.9	>100% increase
Creation acres	6.2	49.1	55.3	51.4	7% reduced
Total Emergent Wetland Acres	6.2	49.1	55.3	58.3	5% increase
Overall Emergent Wetland AAHU's	12.5	42.7	55.2	47.8	13% reduced
Grassland/Savannah					
- Acres ⁽²⁾	-394.2	176.4	-217.8	NA	NA
- AAHU's	-163.9	64.3	-99.7	(-185.2)	86% reduced

#% = beneficial effect, %# = adverse effect, #% = no change compared to "No Action"

Table 4-2 (Continued)

Affected Resource	No Action			Modified Central City (Assuming Primary Valley Storage Sites)	
	Central City	Riverside Oxbow	Combined		% Change
Habitat Development Outputs (continued)					
Oxbow Aquatic – Acres	5.1	0	5.1	5.1	No Change
- AAHU's	4.3	0	4.3	4.3	No Change
Stream Aquatic - Acres	0	0	0	5.8	>100% increase
- AAHU's	0	0	0	4.8	>100% increase
Recreation ⁽⁴⁾					
Concrete Trails – linear feet	23,800	8,967	32,767	34,300	5% increase
Composite Trails – linear feet	16,900	8,915	25,815	45,800	77% increase
Maintenance Access – linear feet	-	1,326	1,326	3,480	162% increase
Parking – sq ft	-	10,080	10,080	48,060	376% increase
Rest Rooms - ea	-	2	2	2	No change
Real Estate					
Private Land Acquisition - Acres	453	232	685	397	42% reduction
Land Acquisition - Cost	\$72,600,500	\$2,277,218	\$74,877,718	\$60,132,218	20% reduction
Project Costs*					
Non-Federal **	\$110,000,000	\$14,198,873	\$124,198,873	\$110,000,000	11% reduction
Corps of Engineers	\$110,000,000	\$9,426,540	\$119,426,540	\$110,000,000	8% reduction
Total Federal Project Cost	\$220,000,000	\$23,625,413	\$243,625,413	\$220,000,000	10% reduction
Total Project Cost ***	\$435,414,650	\$23,625,413	\$459,040,063	\$519,047,360	13% Increase
*All costs shown are adjusted to 2005 dollars. ** Non-Federal costs do not include costs for local features beyond the Authorized or approved Federal cost sharing. ***Total Project Costs include all local costs.					
Other Considerations					
Changes Project Purposes	No	No	No		No
Requires Additional Project Report	No	No	No		Yes
Requires Higher Corps Approval	No	No	No		Yes
Requires ASA(CW) Approval	No	No	No		Yes
Requires Congress' Authorization	No	Yes	Yes		No (if within Corps HQ discretion)
Requires Congressional Funding	No	Yes	Yes		Yes

#% = beneficial effect, #% = adverse effect, #% = no change compared to "No Action"

(1) For Central City/Fort Worth Floodway only. Riverside Oxbow area has no flood damage reduction or increases with either plan or with the contingency sites.

(2) Due to classification as Resource Category III, and relatively easy replacement, habitat mitigation is not required for the grassland habitat. See narrative in this chapter under Habitat Outputs for additional on Grasslands.

(3) Acres of Habitat Development Outputs for all conditions are totals at the end of the period of analysis, which account for all planting, management, improvement, and preservation measures applied to the various habitat types. AAHUs shown represent net gains and losses by habitat type and reflect any reductions due to mitigation for initial impacts.

(4) Only those Recreation features in which the Corps can participate are reported in this table for comparative purposes. Many additional compatible recreation features are planned by the project sponsors.

Habitat Outputs

The following discussion is based on a comparison of the Modified Central City Project alternative with the No Action alternative, which includes substantial habitat development. Therefore, even though the Modified Project alternative may in some instances result in less habitat gains than the No Action alternative, it still produces substantial gains from the “without project” (without a Federal project) condition.

The Modified Central City Project alternative would improve 32% more existing riparian woodland than the No Action alternative due to improvement measures proposed for riparian woodlands in the Gateway area. It would also create 12% more riparian woodlands because of the relatively large contribution of riparian woodlands created in the valley storage sites in the Riverside Oxbow area. The Modified Central City Project alternative would result in a net gain of 109.8 AAHUs on 413 acres of riparian woodland at the end of the 50-year period of analysis. Overall, the Modified Central City Project alternative would increase riparian woodland acres by 15% and riparian woodland value (as indicated by AAHUs) by 3% over the No Action alternative. The Modified alternative would reduce upland woodland value (AAHUs) primarily due to excavation and then conversion to riparian woodland but this is not considered significant because of the habitat gains in riparian and wetland habitats.

The Modified Project alternative would reduce wetland value (AAHUs) by 13% from the No Action alternative due to elimination of wetland creation in the Riverbend Area and from within the Sycamore Creek area of the Riverside Oxbow Project. Substantial gains in wetland habitat would still occur in the Gateway areas with the Modified Project alternative. Emergent wetland outputs of the Modified Project alternative would be 47.8 AAHUs on 58.3 acres, with a gain of about 5% in acreage of that habitat type through the period of analysis compared to the No action alternative. Additionally, the Modified Central City Project alternative would eliminate the operationally intensive pumping system that is proposed for converting the remnant Sycamore Creek channel to emergent wetland with the Riverside Oxbow project. Under the Modified Central City Project alternative old Sycamore Creek channel would be restored as stream aquatic habitat. Elimination of the pumping facilities in that area would result in elimination of the first cost of the pumping system as well as the long term operation and maintenance costs.

There would be greater impacts to grassland with the Modified Project alternative than for the No Action alternative. This greater loss of grassland is due to locating the valley storage sites in grassland or disturbed areas and developing riparian woodland in its place. It is important to note that outputs for the grassland habitat types are a much lower priority than are outputs for riparian woodland and emergent wetlands, both of which are the primary output objectives of the alternatives. Grassland types include turf grasses, managed (mowed) grasses for stabilization on channel and levee slopes, and planted, managed, and improved native grasslands. The native grassland plantings and management areas are also inclusive of savannah (10% tree canopy) and scattered trees (5% tree canopy).

The Modified Central City Project alternative would impact less stream aquatic habitat and would result in a gain of stream habitat value relative to the No Action alternative. The modified damsite would reduce adverse stream aquatic impacts to Marine and Lebow creeks. Offsetting that beneficial effect somewhat would be the loss of stream restoration measures that would be implemented within Lebow Creek with implementation of the originally Authorized Central City Project. Modifications in the instream habitat structures and in restoration of flow through Riverside Oxbow would also increase stream aquatic habitat. Additionally, the Modified Project alternative would restore flows through the old Sycamore Creek channel within the Oxbow Central zone resulting in an overall gain of 5.8 acres and 4.8 AAHUs of stream aquatic habitat.

Recreation

The No Action alternative would consist of about 32,770 feet of concrete trails, 25,800 feet of composite trails, 1,300 feet of road for maintenance access, and 10,080 square feet of parking at two access points with restroom facilities. The Modified Central City Project alternative would include 34,300 feet of concrete trails (5% increase), 45,800 feet of composite trails (77% increase), 3,480 feet of

maintenance access (162% increase), and 48,060 square feet of parking (376% increase). There would be no change in the number of restroom facilities between alternatives. Costs of these recreation facilities with No Action alternative are estimated at \$1,449,636 (2005 dollars) and at \$4,876,939 (2005 dollars) for the Modified Project alternative.

Real Estate

Implementation of the No Action Alternative would require the acquisition of about 685 acres of private lands for valley storage, ecosystem restoration, and the Samuels Avenue Dam needs at a cost of about \$74,877,718. With implementation of the Modified Central City Project alternative, requirements for private lands would be reduced by about 42% to 397 acres, with an associated decrease in land acquisition costs of 20% to about \$60,132,218.

Total Project Costs

Total costs of the cost-sharable features of the original Central City Project are prescribed in the authorizing legislation at \$220,000,000, of which local cost and Federal Cost would each be \$110,000,000. Costs of the Riverside Oxbow Project were estimated in 2005 at \$20,787,000 in October 2002 dollars. In proceeding with each project separately (No Action), the total cost of those features in which the Corps can participate (Total Federal Project Cost) costs would be \$240,797,000 shared at \$122,516,700 local and \$118,280,300 Federal Cost. That estimate, however, is based on mixed year dollars as identified in the two approved project reports. When the Riverside Oxbow costs are updated to 2005 dollars, consistent with the Central City Project cost estimates, the Riverside Oxbow costs become \$23,625,413, of which about \$14,198,873 would be local costs and \$9,426,540 would be Federal costs.

Total project costs of cost-sharable features of the Modified Central City Project alternative would be limited by the Central City Project construction Authorization to \$220.0 million, with the local sponsor and the Federal Government each sharing half of that cost, or \$110.0 million each. When compared to the No Action alternative, and based on 2005 dollars, the Modified Central City Project alternative would result in a 10% reduction in total Federal Project costs. The local cost-sharing responsibility for the "Federal Project" features of the Modified Central City Project would be reduced from the No Action cost sharing responsibility by 11% and the Federal costs would be reduced by 8% compared to proceeding with each project independently. When all local costs of the total Modified Project alternative are considered, however, there would be a 13% increase in Total Project Cost from about \$459.0 million to about \$519.0 million. This estimated cost in 2007 dollars is \$576.0 million. All project costs beyond the authorized Federal Project cost of \$220.0 million would be the responsibility of the local project sponsors.

The increase in Total Project Costs of about \$60.0 million for the Modified Central City Project alternative, all of which would be local costs, are the net result of both savings and increases in costs of the No Action alternative of proceeding with each project separately. Savings would come primarily in the costs of lands and damages. Costs increases would be primarily in the development of the valley storage areas, dams and structures, fish and wildlife facilities, and recreation facilities. The associated benefits with these cost are the additional acreage of riparian woodland, additional recreational components consisting of equestrian, chat and hard trails, soccer fields, covered basketball goals and additional public use and access including boat launches, pedestrian bridges and public roads and parking.

Other Considerations

Implementation of the No Action alternative would continue in the absence of modifications that might alter the features of either the original Central City Project or the Riverside Oxbow Project. Both projects have been approved by higher Corps of Engineers authority and by the Assistant Secretary of the Army for Civil Works (ASA(CW)) and the Central City Project has been Authorized by Congress for construction. The Riverside Oxbow Project has not received Congressional funding authority as of this date. There would be no additional report preparation or approval requirements associated with proceeding with each of these projects independently. As the detailed design of the original Central City Project continues, it is anticipated that relocation of the dam site to the more upstream location that has

been selected for the modified Central City project alternative will be recommended. Such modification of the dam location and features during detailed design would, however, be within the approval authority of the Chief of Engineers under the current construction Authorization. Given this status of authorization and approval of each of the projects, construction or implementation schedules of the two projects are likely to differ fairly significantly. Different implementation or construction schedules will require duplication of many efforts, such as advertising and award of design and construction contracts, along with differing construction periods. It is also likely that the overall construction period would be extended by proceeding separately with each project, thereby extending the duration of construction related erosion control measures as well as temporary impacts including noise and air quality.

With the implementation of the Modified Central City alternative, the Project Report as discussed in the Final EIS, will be developed and submitted to higher Corps of Engineers offices and to the ASA (CW) for review and approval. This Project Report provides information necessary for the execution of a Project Cooperation Agreement (PCA) for construction. Because construction of the Central City project has been authorized, there was no typical feasibility report required, and project information needed to support the PCA will be provided through the Project Report. The Corp component would continue to include the funding and/or design participation in the overall Central City Project. With the Modified Central City Project alternative, all impacts to significant resources would be reduced. While some beneficial outputs would increase beyond those of the approved projects, others would be slightly reduced. The effect to the high priority resource categories of riparian woodland and emergent wetland acreages is beneficial but not to the extent requiring additional construction authorization.

The Modified Central City Project alternative would not add or delete any project purpose, nor would it require the acquisition of lands or waters specifically for mitigation of fish and wildlife values. It therefore appears that the Modified Central City Project does not require additional Congressional Authorization and would be within the discretionary authority of the Chief of Engineers.

Irreversible or Irretrievable Commitment of Resources

The Council on Environmental Quality (CEQ) regulations for implementing NEPA requires consideration of irreversible and irretrievable commitment of resources that would result from implementing any of the study alternatives. Irreversible and irretrievable resources are those that cannot be recovered if the project is implemented. Irreversible effects primarily result from use and destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. In addition to the irretrievable commitment of non-renewable energy resources, which would occur as a result of constructing, maintaining, and operating either the No Action or Modified Central City Alternative, other resources which would be impacted are discussed below.

Energy requirements for construction of the No Action Alternative would include those used to relocate the levee at the Riverbend hydraulic and environmental mitigation area, contour the area for drainage, and for long term operations and maintenance of that area. Additional energy requirements would be required to modify University Drive and to construct other valley storage mitigation as identified within the FEIS. Construction of Samuels Avenue Dam, internal dams, and the bypass channel and hauling away of surplus material would also require irretrievable use of energy resources.

As the No Action Alternative also includes development of the Riverside Oxbow, irretrievable use of energy would be used to construct ecosystem restoration and hydraulic mitigation features as required. Energy would be used to open the old oxbow to flows from the West Fork of the Trinity River, to widen the wetlands within the abandoned Sycamore Creek channel within the oxbow area, construct additional wetlands within the Gateway Beach and Gateway East planning reaches, remove and replace the Beach Street bridge crossing of the oxbow, develop the recreation trail, and to plant and improve riparian forests within the study area. Long term operation and maintenance would require energy uses over the life of the project, including mowing and otherwise restricting forest growth within savannahs, pumping water to wetlands and maintenance of other constructed facilities.

The Modified Central City Alternative would not require construction in the Riverbend area, but would require construction of the main elements leading to the Uptown development including construction the Samuels Avenue Dam and support facilities, valley storage mitigation at multiple sites, with the majority of the valley storage being developed by excavation within the Riverside Oxbow area. With exceptions at University Drive and within a portion of valley storage in Site 18a, material excavated would be placed outside of the floodplain in order to meet the valley storage requirements. The Modified Central City Alternative would result in a greater use of energy resources for construction activities than the No Action Alternative.

The No Action Alternative and the Modified Central City Alternative would have an irreversible impact to grassland quality and/or quantity. These grasslands consist primarily of non-native Bermuda grasses, which are mowed and maintained within an urban environment. Some non-managed native grasses occur primarily within the Riverside Oxbow portion of the study area and would be affected by the Modified Central City Alternative if implemented. The value of these grasslands is not considered to be of significance due to their abundance and low value as wildlife habitat and, therefore, impacts to this resource would not require mitigation. The No Action alternative would impact approximately 100 AAHUs of grassland habitat while the Modified Central City Alternative would impact about 185.2 AAHUs of grassland habitat. Some of the acreage and habitat impacts to grasslands with the Modified Project alternative would occur due to planned changes to improve environmental resources by implementing dense riparian forest development over a large area of the Riverside Oxbow area.

Implementation of the No Action Alternative and Modified Central City Alternative would cause an irreversible and/or irretrievable loss to upland woodlands within the study area. The upland woodlands within the overall study area are located within a highly disturbed urban environment and generally would not constitute habitat requiring local, regional, or Federal conservation or protection. However, the upland forests impacted in the Riverbend area are considered of higher quality, and losses to the woodlands associated with No Action Alternative are proposed to be mitigated. Similarly, if the Modified Central City Alternative were implemented, some upland losses associated with the build out of the Trinity Uptown would occur. Some upland forest and shrubland on higher elevations of the Riverside Oxbow area would also be removed with implementation of the Modified Central City Alternative.

While construction activities associated with the Community Based Alternative identified in the FEIS, would initially impact wetlands, the quality and quantity of this resource would ultimately be increased, and therefore, there would be no irretrievable or irreversible impact to wetland resources from implementing the No Action alternative. Initial impacts were similarly identified within the Riverside Oxbow area should the Modified Central City Alternative be implemented. However, as with the No Action Alternative, new wetlands would be developed and managed resulting in higher quality wetlands for fish and wildlife resources uses. The No Action Alternative would result in a net gain of approximately 55.2 AAHUs of wetland habitat and the Modified Central City Alternative would result in a net gain of 47.8 AAHUs over the without a project condition.

With the No Action Alternative, there would be 1875 linear feet of exceptional riffle-pool habitat value within Marine Creek which would be irretrievably lost due to inundation, and 400 linear feet of Lebow Creek that would be irreversibly lost due to fill activities. These aquatic resources are considered significant by both the Corps and USFWS, and mitigation for these losses would be required if the No Action Alternative is implemented. The USFWS has coordinated with the Corps and local sponsors and has approved a mitigation plan for the impacts to Marine and Lebow Creeks. Mitigation measures for the No Action alternative include diverting flows varying by season up to 5 cubic feet-per-second to the mid-reach of Lebow Creek. A gravity flow pipeline from Samuels Avenue Dam impoundment would be possible to a point on the stream where the bottom elevation is approximately 525 NGVD feet, which appears to be near Brennan Avenue. In addition, there is the potential to add additional aquatic habitat by modifying the channel bottom of 1500 feet of Lebow Creek downstream of Brennan Avenue. Additional aquatic mitigation would occur at Ham Branch to fully compensate for adverse stream aquatic impacts. Mitigation at Ham Branch would be completed following studies to determine a stream

configuration that is geomorphically stable based upon hydrology, sediment characteristics and slope. A typical cross-section and plan view of proposed mitigation features are presented in Appendix G of the original Central City FEIS.

With the Modified Central City Alternative, the same exceptional quality riffle-pool complex in Marine Creek would be irretrievably lost due to inundation to an elevation of 516.5 NGVD associated with the in-channel dam. However, relocation of the Samuels Avenue Dam to above the Marine Creek confluence would avoid direct aquatic impacts to Lebow Creek. The proposed aquatic mitigation plan for impacts within Marine Creek include Implementing the Ham Branch mitigation plan as well as development of stream aquatic mitigation within Sycamore Creek as recommended as part of the Modified Central City Alternative. The aquatic habitat compensation plan proposed would fully compensate for identified adverse aquatic impacts.

Cumulative Impact Analysis

The Council on Environmental Quality (CEQ) developed a handbook that contained guidelines for addressing cumulative impacts in analyses prepared under the National Environmental Policy Act in 1997. The CEQ defined cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. The term “reasonably foreseeable” implies that the project may only have a general public knowledge or acceptance at a point in time and that detail of design and project specific impacts are yet to be developed or disclosed by the project proponent.

The Corps has previously addressed cumulative impacts of its various programs and specific project recommendations within the geographic and administrative responsibility of the Fort Worth District. Previous Corps of Engineer documents addressing cumulative impacts in the upper Trinity River basin include the Regional Environmental Impact Statement Trinity River & Tributaries(1988), Programmatic Environmental Impact Statement Upper Trinity River Basin, Trinity River, Texas (2000), Supplement No. 1 to the Environmental Impact Statement for the Dallas Floodway Extension, Trinity River, Texas (2003), and in the Central City EIS (2006). The cumulative impact analysis for this SEIS uses information available at the time this SEIS was prepared to describe these other projects, their respective potential impacts on the environment, and incorporates by reference the cumulative impact assessments as documented from the prior Corps documents. This cumulative impact analysis considers existing conditions to be a result of the past and present projects that have occurred in the study area and serves as a baseline to address impacts of the reasonably foreseeable projects.

Identification of Reasonably Foreseeable Projects

Information for this SEIS was gathered following methodologies adopted for the Central City FEIS. The Corps’ regulatory data base was queried for the period of March 2005 until November 30, 2007 to update the list of reasonably foreseeable projects within the geographic area of the Central City study. In addition, several Corps Regulatory personnel were interviewed based upon their knowledge of reasonably foreseeable projects. Searches of the internet and newspapers were also used to update the list of projects. Energy development was identified as a new source of potential cumulative impacts and information from the Railroad Commission was utilized to identify reasonably foreseeable energy development projects within the study area. Table 4-3 identifies new permit projects and projects that have been modified, or are proposed for modification, in addition to previously identified reasonably foreseeable projects. The cumulative impacts of previously permitted actions were considered and addressed within the Programmatic Environmental Impact Statement, Upper Trinity River Basin, Trinity River, Texas, that was finalized in June 2000 and in the Central City FEIS dated January 2006. Cumulative impacts discussed in both documents are incorporated here by reference.

The study area for social resources was determined to coincide primarily with the general project study area, however, any projects identified as “reasonably foreseeable” for environmental resource impacts were also considered in the cumulative impact assessment. The cumulative impact assessment

study area for hydrology and hydraulics includes the contributing watersheds above the Central City study area and extends downstream to the confluence of West and Elm Forks.

Table 4-3
Reasonably Foreseeable Projects Considered

PROJECT	RESPONSIBLE ENTITY	DESCRIPTION	LOCATION	PHASE
Project Status Updates				
Johnson Creek	USACE/City of Arlington	Referenced in Programmatic EIS (2000), however 90 acres of the restoration was de-authorized with requirement that City substitute 90 acres that would provide equivalent habitat restoration values	City of Arlington, Johnson Creek upstream of de-authorized segment and Village Creek and Rush Creek floodplain downstream of Division Street	Remainder of authorized project not yet constructed being reevaluated.
TCC Campus	Tarrant County College	Develop new downtown campus	East side of N. Main at Trinity River	Seeking Section 408 approval
Section 404, Section 10, Other Permitted Projects				
Fills, Permits, Utilities, and Other Activities	Multiple	15 actions identified by updated search	Upper Trinity Watershed area extending from Benbrook Lake and Lake Worth to confluence of Elm Fork.	Planning to construction
Transportation Projects				
East 1 st Street	Multiple	Street realignment and bridge replacement at West Fork of Trinity	Immediately downstream of combined Central City study area, City of Fort Worth	Awaiting funding
Energy Development				
Natural Gas Exploration	Multiple	Estimated 50 constructed pads and 66 sites permitted by Texas Railroad Commission	West Fork and Clear Fork Floodplains, Tarrant and Dallas Counties	Various stages

The flood damage reduction and ecosystem restoration project on Johnson Creek within the City of Arlington had previously been identified as a Corps of Engineers project that had positive contributions to fish and wildlife habitat and recreation associated with riparian forest development. As originally authorized in 1999, the project would have provided ecosystem restoration on approximately 155 acres providing approximately 117 AAHUs of habitat value. Approximately 11,900 linear feet of recreational trail would have been constructed on restoration and flood damage reduction lands acquired for the Johnson Creek Project.

The authorized Johnson Creek project also provided direct benefits by removing over 144 structures from flood prone areas (25 year floodplain). Ninety acres of the ecosystem restoration between Union Pacific Railroad and Randol Mill Road was subsequently de-authorized by Section 134 of Public Law 109-103 in 2005. That legislation required the City of Arlington to locate substitute lands that would provide the same (estimated to be 65.5 AAHUs) or greater level of national ecosystem restoration benefits as the 90 acres that were de-authorized would have provided. To date Arlington has identified substitute lands, but plans to produce the restoration benefits have not been developed. The project as originally authorized and partially constructed would have provided cumulative benefits to riparian forest as identified in the Programmatic EIS as incorporated by reference into the FEIS. The de-authorization and subsequent legislation to re-evaluate the entire Johnson Creek project, in effect, delays the accumulation of positive benefits for riparian forests to some undefined future date.

Potential projects within the Corps of Engineers Regulatory program that might have cumulative impacts within the geographic area are identified in the original Central City EIS. Since August 2005, there have been 15 new actions identified as reasonably foreseeable. However, only one of these projects would contribute to cumulative impacts in evaluating the Central City project, that being the Tarrant County Campus construction in downtown Fort Worth. This project is currently being evaluated in

an Environmental Assessment (EA) to support a request to the Corps of Engineers for permission to modify a portion of the existing Federal levee system along the West Fork of the Trinity River. Among the impacts identified in the EA for the campus are 5.0 acres of riparian vegetation that has already been or ultimately would be removed. The Corps Regulatory staff has also identified potential adverse effects to historic properties as a result of the project. Other identified permit actions are covered by various nationwide permits or are merely administrative actions such as changing name of responsible individuals for the originally issued permits. Projects having adverse cumulative impacts may not be permitted under a nationwide permit.

The number of permitted gas well exploration sites within the Regulatory area considered for the Central City FEIS was determined by manually comparing sites shown by a map reader available at the Railroad Commission Web Site and Figure 4-4 of the original Central City EIS. This information will be reviewed as it is made available by the Railroad Commission.

Based upon this current review of reasonably foreseeable projects that were not considered within the original Central City EIS, either by direct review or through incorporation by reference from previous documents, it appears that the road crossing at East 1st Street and the extensive network of developed or permitted gas well exploration sites constitute newly identified projects that might have cumulative impacts in association with the proposed project. In addition, the Tarrant County Campus plan is now more fully developed and some additional construction details and potential impacts have been updated and considered in this cumulative impact assessment.

Assumptions

Several key assumptions were made to ensure consistency of this cumulative impact analysis with previous analyses. Key assumptions used, consistent with the Central City EIS, are identified below:

- All Trinity Uptown Features (transportation modifications, levee removal, canals, and land use changes) would occur after implementation of the Community Based Alternative and implementation of the Riverside Oxbow Ecosystem Restoration Project and, therefore, all are considered as part of the No Action Alternative
- All reasonably foreseeable projects listed in Table 4-9 of the FEIS as modified by updated search for projects displayed in Table 4-3 of this SEIS would be implemented and are considered for cumulative impacts for the No Action Alternative as well as the Modified Central City Alternative.
- Only those resources that were impacted by direct or indirect impacts of the No Action or Modified Central City Alternatives were considered for cumulative impacts.

Methodology

Cumulative impact evaluation requires analysis of direct and/or indirect impact of the No Action and Modified Central City alternatives with consideration of past, present, and future reasonably foreseeable projects in such a way to disclose impacts that otherwise might not be identified. To assess the cumulative impacts to economic, environmental, and other resources that could be affected by these alternatives, interdisciplinary Corps team members with technical expertise qualitatively assessed cumulative impacts of reasonably foreseeable projects identified in previous documents along with newly identified projects. The results of the team's inputs and consideration of cumulative impacts are disclosed in Table 4-4 and in within the discussions in the following sections.

Table 4-4
 Cumulative Impact Analysis of Alternatives
 (In consideration of all Reasonably Foreseeable Actions)

Environmental or Economic Resource	No Action Alternative	Modified Project Alternative
Hydrology and Hydraulics (greater than 100-year flood)	◻	◻
Hydrology and Hydraulics (less than 100-year flood)	○	○
Water Quality	◻	◻
Wetlands	◻	◻
Terrestrial Habitat		
Woodlands	◻	◻
Grasslands	○	◻
Aquatic Habitat	○	◻
Cultural		
Archaeological	◻	◻
Architectural	◻	◻
Hazardous, Toxic, Radioactive Waste	◻	◻
Recreation	◻	◻
Socio-economic	◻	◻
Aesthetics	○	○
Air Quality	○	○
Noise	◻	◻
Light	◻	◻
Public Services and Facilities	○	○
Human Health and Safety	○	○

Legend: ○ No Effect ◻ Adverse ◻ Beneficial

Cumulative Impact by Resource

Hydrology and Hydraulics

Cumulative impacts to hydrology and hydraulics will continue to occur in the study area due to the fact that some of the reasonably foreseeable activities will have fills and other floodplain alterations that do not invoke hydraulic mitigation requirements as required by the Corridor Development Certificate (CDC) process adopted by the North Central Texas Council of Governments or Regulatory Programs of the Corps of Engineers. For example, gas exploration pads have been identified as a source of cumulative impacts, and other alterations associated with developments in the floodplain above the 100 year event could also induce impacts. As a result, the effort to provide compensatory valley storage mitigation for reasonably foreseeable projects, where regulated, and for either the No Action alternative or the Modified Central City Project as proposed is deemed necessary and prudent.

Either alternative, No Action or the Modified Central City Project, in and of themselves, would have a neutral effect on hydraulics and hydrology of the Upper Trinity River Basin. The requirement of 5,250 acre-feet of valley storage can and will be met by either alternative in accordance with the CDC process to which the Corps will adhere. Detailed design of either alternative will assure that there will be no net loss of valley storage and that elevations and velocities in areas both upstream and downstream of the projects will not be adversely affected. Although the cumulative effects with either alternative in conjunction with all reasonably foreseeable activities has the potential to be adverse, the modified project alternative appears to have slightly greater flexibility in meeting hydraulic criteria and an additional cumulative benefit of the Modified Central City project alternative is that, based use of primary valley storage sites within the Riverside Oxbow area allows for use of roughness coefficients that are associated with development of additional riparian woodland habitat outputs compared to what could be obtained with the No Action alternative.

The extensive development of valley storage in the Riverside Oxbow area with the Modified Project alternative might pose problems to future considerations for providing additional flood risk management benefits in the vicinity of Riverside Drive, which contains areas that are not protected from the 100-year event at present. Earlier studies have shown that area lacks economic justification from a

Corps of Engineers perspective for developing a feasible flood damage reduction project. However, non-federal interests may find it necessary to be creative in attempting to provide valley storage mitigation should they desire to remove some of the residual areas from the 100-year floodplain in the future. In comparison, the Riverside Oxbow Project as a component of the No Action alternative would cause minimal adverse impacts to valley storage requiring mitigation and would leave excavation options open for future creation of valley storage in that area.

Water Quality

Increases in impervious surface area associated with land use intensification within the Central City project area under the No Action Alternative or the Modified Central City Project Alternative combined with projected Trinity Uptown Features would be expected to contribute cumulatively to nonpoint source water quality issues, along with similar increases in impervious cover associated with other downtown/uptown development projects. These impacts can be extensively ameliorated through the consistent application of innovative Best Management Practices to minimize or eliminate pollution loadings due to storm water runoff during construction. The City of Fort Worth is currently performing a comprehensive evaluation of the existing stormwater management practices with the intent of improving the quality of urban stormwater runoff on a city-wide basis. These improvements have the potential to reduce or eliminate cumulative water quality impacts. With both the No Action and the Modified Central City project alternatives, the extensive riparian woodland and emergent wetland restoration measures within the Riverside Oxbow and Gateway Park areas are expected to contribute substantially and positively to water quality of the Upper Trinity River basin over the long term. The positive contribution of riparian buffer zones and wetlands to long-term water quality by slowing flow, uptake of nutrients, and through binding and converting other pollutants is documented and discussed in the Programmatic EIS for the Upper Trinity River Basin and in the Riverside Oxbow Ecosystem Restoration Report and EA.

Wetlands

The original Central City Project would result a net increase of about 6 acres of emergent wetlands and the Riverside Oxbow project would create, restore, or manage about 49 acres of emergent wetlands. A significant feature of the Riverside Oxbow project would be to create an emergent wetland in the remnant Sycamore Creek channel with a pumping system from the West Fork and control structures to manage soil saturation and water depths. The net effect of the two projects would be the creation and management of about 55 acres of emergent wetlands. The Modified Central City Project alternative proposes to restore the Sycamore Creek channel as stream aquatic habitat by reconnecting the remnant channel to the West Fork at the current water surface elevation of the mainstem channel, rather than creating operationally intensive wetlands. The Modified Central City Project alternative would utilize the valley storage area in the southern part of Gateway Park where sludge beds will be remediated by the City of Fort Worth to establish a water body with emergent wetlands. The Modified Central City project would also convert some open-water areas in the northern part of Gateway to emergent wetlands. Total acreage of emergent wetlands to be established and managed under the Modified Central City Project alternative would be about 58 acres. Given the importance of emergent wetlands to migrating waterfowl and other wildlife resources, and given the historic losses of wetland resources over the last century, the cumulative effects of either alternative on wetlands within the Upper Trinity River Basin are considered to be significant and beneficial.

Terrestrial Habitat

Effects of the No Action alternative on vegetative cover and wildlife habitat values would be a relatively small but positive contribution in consideration of all reasonably foreseeable activities in the upper Trinity River basin. The original Central City Project would be essentially neutral in that fairly substantial habitat mitigation measures would be required to offset adverse impacts caused by creation of required valley storage. These improvements would occur within a 9.6 mile reach of the West Fork and a 2.3 mile reach of the Clear Fork Trinity River. A primary component of the Riverside Oxbow Project is reconnection of the upstream end of a historic river remnant with the mainstem of the Trinity River. The original Central City Project includes measures which would also reconnect two remnant oxbow channels

to the mainstem. Re-establishing the riverine function to these remnant stream channels would provide beneficial cumulative impacts for bird species which rely upon these types of communities, which can be scarce in an urban environment. Removal of exotic and invasive species within both project areas would provide beneficial cumulative impacts for downstream riparian communities. The net effect of the two projects would be restoration, management, or improvement of 363 acres of riparian woodland habitat with a loss of about 218 acres of grassland habitat that is mostly in manicured grasses.

As with the No Action alternative, the cumulative effects of the Modified Central City Project alternative on vegetative cover and wildlife habitat values would be relatively small but the net effect would be positive when considered in the context of the Upper Trinity River Basin. The modified central city project would result in the establishment, preservation, and management of about 419 acres of riparian woodlands. A larger proportion of the riparian woodland habitat outputs of the Modified Central City Project alternative would be the result of restoration of woodlands in areas that are now primarily disturbed areas and grasslands as opposed to preservation and management of existing resources. Much of the area that would be restored to riparian woodlands would be excavated to create required valley storage prior to riparian restoration. These sites, however, have been configured to avoid adverse impacts to riparian woodlands and upland woodland prior to excavation and then restoration. The Modified Central City Project alternative also includes improvement and management measures for essentially all of existing riparian woodlands in the combined project area. The cumulative impact of the Modified Central City Project alternative would be slightly more beneficial than that of proceeding with the two projects independently.

Aquatic Habitat

The No Action alternative would result in the restoration of about 5.1 acres of oxbow aquatic habitat in the Rockwood Park ecosystem improvement area of the original Central City Project. The original Central City project, however, would have adverse effects on the stream aquatic habitats of Marine Creek and Lebow Creek for which mitigation measures have been formulated. Mitigation for stream losses along Marine and Lebow creeks include stream habitat improvement measures along Ham Branch and within the upper reaches of Lebow Creek, which would offset the losses due to inundation. Additionally, in the event that the two projects do proceed to construction, it is likely that the Samuels Avenue damsite would be relocated to avoid adverse impacts to Marine and Lebow Creeks, while retaining the Ham Branch stream habitat improvements.

The Modified Central City Project alternative would retain the oxbow habitat improvements in the Rockwood Park area and would avoid most of the adverse impacts to Marine and Lebow Creeks with the relocation of the Samuels Avenue damsite to just upstream of the West Fork confluences with the two creeks. The Modified Central City Project alternative would also retain the stream habitat improvement measures along Ham Branch as well as the Riverside Oxbow restoration measures. The main additional benefit of the Modified Central City Project alternative over the No Action alternative, other than avoidance of most of the adverse impacts to Marine and Lebow creeks, would be the restoration of about 1.3 acres of the severed Sycamore Creek channel within the Riverside Oxbow area. The net positive effect of the Modified Central City Project alternative would therefore be the restoration of about 10.9 acres of stream and oxbow aquatic habitats.

While these stream restoration acreages and habitat values of either alternative are relatively small when considered in the backdrop of the Upper Trinity River Basin, they do represent a positive cumulative contribution to aquatic resources of the larger area.

Cultural Resources

The Modified Central City project will result in increased impacts to cultural resources. Impacts to known archeological resources were avoided by design in the Riverside Oxbow project. Under the original Central City Project, these resources cannot be avoided. Excavation will be conducted, in consultation with the SHPO, to mitigate for the impacts by extracting relevant information and data from the sites prior to project implementation.

Either alternative has the potential to adversely impact buried archeological resources, as many of the key project features require extensive excavation of culturally sensitive river bank locations. In addition, many of the reasonably foreseeable projects could be done by private developers and would not be required to follow Federally mandated legal mitigation procedures. However, due to Federal involvement, a legal requirement exists that would ensure impacts to resources identified as significant would be mitigated prior to impact. Thus, the No Action and Modified Project alternatives would not be expected to contribute to the cumulative loss of archeological data which could result from the actions of others which do not have Federal involvement and which might engender unmitigated impacts to archaeological resources.

The No Action alternative and the Modified Project alternative could have impacts, some possibly adverse, on architectural properties eligible for the National Register of Historic Places. In accordance with legal requirements, any adverse impacts would be avoided, reduced or fully mitigated through NHPA Section 106 consultation when meeting the definition of a federal undertaking under 36 CFR Part 800. In conjunction with projects of others including, but not limited to, the 7th Street Bridge, North Main Corridor Project, Hemphill Underpass, Trinity Bluffs Housing Project, Bluff Street Housing Project, TCC Campus, Radio Shack Headquarters, TRWD Trailhead Improvements, and various improvements to the Trinity Trail System, significant modifications to the setting and context of historic resources may be identified.

If Federal funds or approvals are involved, those historic properties adversely affected within the area of potential effect of the proposed action would have to be avoided, reduced or mitigated through an agreement developed in consultation between the Corps, the Texas Historical Commission, and other consulting parties.

Hazardous, Toxic, and Radioactive Waste

Construction of the Central City project features under either the No Action or the Modified Central City Project alternative will likely require HTRW remediation at several locations. As a precursor to use or future development of the area currently occupied by abandoned sludge drying beds within the Riverside Oxbow area, the City of Fort Worth will be removing soils contaminated by PCBs and metals.

The City of Fort Worth has also applied for and received from the TCEQ a Municipal Setting Designations (MSD) for groundwater within the Trinity Uptown area, encompassing the Central City project area. MSDs complement efforts of the TCEQ Voluntary Cleanup Program to encourage reuse and redevelopment of urban properties, rather than have the economic development occur in more 'pristine' environments on the outskirts of the urban area, i.e. urban sprawl, and its attendant negative environmental impacts. Groundwater remediation is typically the most intractable, difficult, and costly environmental media to remediate. In areas where ubiquitous, low-level contamination of groundwater is present with little chance of identifying a primary source or enforcing groundwater remediation, MSDs can foster contaminated soil remediation by relieving businesses or potential property owners from the burden and liability of groundwater remediation.

Groundwater within an MSD is restricted from use as a potable water or irrigation supply, so surface water quality should marginally benefit from the MSD. Considering the additional contaminated soil remediation and Brownfields redevelopment the project will catalyze, either alternative is anticipated to have a beneficial cumulative effect with respect to HTRW.

Recreation Resources

Features of the recreation plan developed in conjunction with both the No Action Alternative and the Modified Central City alternative were expressly intended to interact with other ongoing projects to produce cumulative benefits. Enhancing connectivity to neighborhoods throughout the City, existing trails, environmental education opportunities, and recreation resources associated with the Riverside Oxbow area, TRWD trailhead improvements, and various Trinity Trail improvements proposed by others were driving forces in formulation of the recreation components of both alternatives. Recreational

features specified in the original Riverside Oxbow interim feasibility report include pedestrian and equestrian trails, recreation access points with parking, and restroom facilities. The draft concept recreation master plan, which is currently being updated by the City of Fort Worth for Gateway Park depicts the following amenities.

- Soccer and baseball fields
- Mountain bike course
- Amphitheater and river education center
- Dog park
- Hiking and equestrian trails
- Equestrian center
- Skate park
- Boat house with canoe launch
- Picnic/playground areas
- Basketball courts
- Splash park

These facilities are considered viable opportunities with either the No Action or the Modified Central City Project alternative. While all of these amenities may not be realized, this concept demonstrates the ability to accommodate valley storage requirements while providing environmental restoration components. In assessing the balance between the short-term impacts of construction versus the longer-term beneficial impacts of the recreational amenities and environmental restoration features of the Modified Central City Project, depending on the level and amount of recreation amenities, potentially impacted neighborhoods should benefit significantly from the recreational opportunities and the improved environmental quality afforded by the Modified Project alternative. These locally beneficial long term impacts to open space, environmental quality, and recreational amenities would have incrementally beneficial impacts, on a cumulative basis, to the broad Upper Trinity River basin study area.

Socio-Economic Variables, Environmental Justice, Community Structure

There are numerous public, residential, and commercial and mixed-use development projects evolving in proximity to the project area. Major new developments are planned, or are in place, for the area immediately to the west of the Central City (e.g. Montgomery Ward), to the south (e.g. Pier One, Radio Shack, and the TCC campus), to the east (e.g. Trinity Bluffs), and to the north (The Mercado, North Main Streetscape Improvements, Stockyards Hotel.) A clear sentiment in the local business community is that the No Action Alternative, particularly related to the original Central City plan with Trinity Uptown Features, would create significant synergy with these projects and provide an impetus for major shifts in economic activity and land use patterns. The cumulative effect of this growth and economic activity is predicted to be major increases in employment, households, property values, and tax revenues. A significant portion of the increase in tax revenues would be initially diverted through the Trinity River Vision Tax Increment Financing District to finance the Central City infrastructure. However, 20% of the increase in tax revenues generated by the increase in tax base would be immediately available to augment the City's General Revenues and thereby support public initiatives throughout the City. The fiscal analysis suggests that the City of Fort Worth would recoup its initial investment of general revenue funds within 25 years; after that time, the TIF would be phased out and the full value of the \$1.1 billion dollar increase in tax base would be available to the general revenue fund.

In addition to the Trinity River Vision Tax Increment Financing District, the City of Fort Worth has established eight other TIF Districts, each supporting major city infrastructure initiatives. These include TIF's for the Speedway, Downtown, the Southside/Medical District, Riverfront, North Tarrant Parkway, Lancaster, Lone Star, and Southwest Parkway. These additional TIF's should adequately address the concerns that public investment in the Central City project area will not disproportionately impact the economic development of other sectors of the City.

The net effect of the cumulative changes to land use and patterns of economic activity on minority populations within the study area is strongly dependent on the actions of local governments, primarily the City of Fort Worth to ensure the provision of affordable housing. The City has achieved affordable housing goals in association with other downtown development projects such as the Hillside Apartments, the Historic Electric Building and others through the use of affordable housing set-asides. Similar institutional tools are envisioned to be incorporated into the Trinity Bluffs project and other development projects in the study area in order to maintain diversity in the area's population and avoid adverse impacts to minority populations. Riverside Oxbow project would provide increased opportunities for a variety of recreational pursuits, nature study and other environmental enjoyment opportunities based upon improvements to the ecosystem as described in detail in the project report (2005).

Lands required for the Riverside / Gateway area valley storage sites and subsequent habitat development with the Modified Central City Project alternative would be essentially the same lands that would be required for the Riverside Oxbow Project. If eminent domain would be required in the study area considered for Environmental Justice issues, the issues would be the same whether considering acquisition requirements for the Riverside Oxbow as part of the No Action alternative or the Modified Central City Project alternative. Community input from the Riverside/Gateway communities to date, however, indicates that the affected communities are in favor of increased open space, natural habitat development, and compatible recreation development.

The primary concern of environmental justice is to address adverse and disproportionate effects that might result from the construction and associated development of the project on those populations and businesses that could be potentially impacted, namely minority populations and minority-owned businesses. Appendix D identifies two census blocks that intersect the Riverside Oxbow study area, both of which contain significant numbers of Hispanics to warrant consideration under EO 12898. These populations do not however warrant consideration on the basis of income. Specific details regarding the socioeconomic characteristics of the Original Central City and the Modified Central City project including descriptions of racial composition, income, and employment can be found in Appendix D. Based upon consideration of the No Action alternative and known reasonably foreseeable projects, there would be a net benefit in the socio-economic condition of those populations given special consideration under EO 12898. While the potential exists for adverse short-term impacts from construction related air emissions and noise, the analyses mentioned earlier in this chapter indicates that any impacts to potentially impacted populations can be minimized by utilizing Best Management Practices with no expected long-term impacts.

A number of activities were undertaken to elicit comments and concerns from the public regarding the Modified Central City project including public meetings, distribution of the Notice of Intent, and a public meeting held during the 45-day public comment period. The concerns of those potentially impacted populations were initially addressed during the scoping phase for the original Riverside Oxbow project beginning with a series of public meetings held with local residents and interest groups regarding the future of the Trinity River and its tributaries. Two public meetings were held at the local library branch with citizens interested in the river segment that includes the Riverside Oxbow area. The city also conducted public meetings regarding for citizens interested in updates to the Gateway Park Master Plan. Additionally, dissemination of the Draft SEIS was coordinated with the Hispanic Chamber of Commerce. Comments from the public meeting, both written and oral were overwhelmingly in favor of the project including those from both the Black and Hispanic Chambers of Commerce. No comments regarding impacts to protected populations were submitted. Specifics regarding public involvement and outreach are discussed in Chapter 5. The Public Meeting was held on January 24, 2008 during the 45-day public comment period and conducted at a location approximately one mile from those identified neighborhoods providing another opportunity for those residing around the Riverside Oxbow area to articulate potential concerns.

Aesthetics

Aesthetics are subjective and dependent upon individual or societal preferences. Within the modified study area for the Central City project, aesthetic resources range from man-made features such as river channels, low-water dams, manicured grasses, and high-rise buildings of downtown to natural features such as those found in Gateway Park and the remnant riparian woodlands associated with relatively unaltered stretches of the Trinity River and its tributaries. Those preferring the linear predictability of man-made and man-maintained features will find more aesthetic value in features such as the bypass channel and the structural formality of the Samuels Avenue dam and spillway. That aesthetic would be similar to the area where the water surface elevation of the man-made channel was recently increased by construction of the Beach Street Low-Water Dam, with an accompanying downstream riffle complex. Individuals preferring the randomness of natural systems will find aesthetic value and an emotional connection to preserved and restored natural riverine ecosystems. The West Fork Channel, which flows through Gateway Park remains in a natural condition providing natural visual values to that area. Riparian woodland preservation and restoration associated with either the No Action Alternative or the Modified Central City Project Alternative would incrementally add to that type of aesthetic value over the long term. In reality, many individuals living and working in the highly urbanized Metroplex will likely find a positive aesthetic experience in a harmonious blending of man-made structural features with natural riparian ecosystems.

Both the No Action and Modified Central City Project alternatives would provide the same man-made features of a bypass channel, dam and stilling basin, bridges, and trail and access facilities within the core Central City area, as well as essentially the same compatible recreation development in the Riverside/Gateway area. The No Action Alternative would include riparian habitat mitigation and some measures within the Riverbend valley storage site and would provide relatively limited preservation and restoration of riparian woodland values within the Riverside Oxbow project area. The Modified Central City Project Alternative would preserve essentially all existing high quality natural resource values in the Riverside Oxbow and Gateway Park areas and would provide for significantly greater riparian woodland restoration and open space than the Riverside Oxbow project. Considering the broad perspective of aesthetic resources associated with the No Action and Modified Central City alternatives under and other reasonably foreseeable projects, it was determined that no cumulative effects would occur.

Air Quality

An expressed purpose of the No Action alternative as well as the Modified Central City Project alternative is to encourage the development of high-density residential neighborhoods in the Central City area. At full build-out some 10,000 additional households are predicted to be located in the project area. Additional developments planned by others have the similar goal of expanding the residential component of the downtown land use mix. Cumulatively, these households would be expected to include automobiles, with a net increase in automobile traffic and associated discharges. However, the cumulative impacts of the Central City component of the project on air quality would be mitigated by the project's emphasis on high-density development, where non-motorized methods of transportation are feasible, with emphasis on public transportation infrastructure. Where such conditions exist, automobile density on a per-household basis is significantly less than that associated with more typical low-density suburban environments. Results of the carbon monoxide (CO) model analysis of the street intersection to be most affected by increased traffic indicate infrastructure modifications and urban development associated with the Central City project will not result in exceedance of CO standards. Further details are discussed in the *Air Quality Assessment Report Fort Worth Central City Project, Fort Worth, Texas* (February 2005) in Appendix G.7 of the Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006 and General Conformity Analysis, Fort Worth Central City Riverside Oxbow/Gateway Park Site dated 4 October, 2007.

Noise and Light

Both the No Action alternative and the Modified Central City Project alternative would be expected to contribute cumulatively to minor increases in noise and light levels in the Central City and the

Riverside Oxbow areas. However, since a substantial part of the Central City project area is currently within and surrounded by a dense urban fabric, and the Riverside Oxbow area would have only temporary disturbances related to construction of the project features the implications of this increase are predicted to be minor for the No Action condition.

The adverse effects of construction noise upon a community have historically been considered to be an inevitable, short-term, and unavoidable impact. Best practice mitigation measures are employed and then adjusted once construction begins in order to ensure ongoing mitigation of noise impacts. Such analysis was conducted for the features of the Central City Project and are addressed in the FEIS for that project. The discussion below addresses the changes in noise impacts that would occur with implementation of the Modified Central City Project alternative with its associated changes in location of valley storage areas.

Heavy machinery, the major source of noise in construction, will be constantly moving in unpredictable patterns. However, construction will normally occur during daylight hours when occasional loud noises are more tolerable. Potential noise receivers in the Riverside and Gateway areas include commercial, residential, and industrial sites mainly to the north and west of the project area. Background noise includes nearby Interstate 30 as well as commercial and light industrial sources. Noise impacts will be significantly mitigated by the extended distance between construction activity and sound receptors, trees and vegetation along the Trinity River bottom area and elsewhere between the construction area and noise receptors, the depressed elevation of the construction area due to excavation, and the addition of an elevated excavation deposit area southeast of the intersection of North Beach Street and 1st Street. It is expected that these mitigating factors will be effective in reducing noise impacts. Overall, the excavation and grading activities are expected to be consistent with typical noise levels associated with normal urban development activities.

Excess material excavated from the construction area is expected to be hauled via truck to designated disposal areas and, as a result, there will be a noise impact from the hauling activity. Potential haul routes were identified based on the approximate excavation volumes and potential deposit sites. Each of the potential haul routes was driven prior to being selected to determine approximate route time and other considerations including left hand turns (cross traffic), stop signs, traffic lights, and railroad crossing. Sensitive noise receptors, load restrictions on bridges, and construction sequencing were also considerations in determining the preferred haul routes. A directory search indicates there are no hospitals in the area of the Riverside Oxbow and Gateway Park areas or the associated haul routes. The nearest school is Meadowbrook Elementary, which is located one quarter-mile off of the Riverside Drive haul route. Mitigation of haul truck noise could be accomplished by ensuring trucks have working muffler systems installed, managing haul truck speed and acceleration, and limiting haul truck activity to daytime hours. The noise impact from the haul trucks will be temporary. With appropriate mitigation measures it is expected that noise impacts would be minimized to the greatest extent possible.

Based on analysis of noise receptors, background noise levels, disposal haul routes, and appropriate mitigation measures, implementation of the Modified Central City Project alternative will result in only temporary, construction-related impacts to noise levels. No long-term adverse impacts will occur within or adjacent to the Riverside or Gateway sites given that the designated land use will not change. The temporary impacts would occur for the duration of the estimated 3 year construction period. Cumulatively, noise impacts of the Modified Central City Project alternative would not be significantly different than noise associated with implementation of the Central City and Riverside Oxbow projects separately. With the Modified Central City Project, however, those impacts would be more likely to occur during the same construction period.

Public Services and Facilities

Estimates based on construction activities of the original Central City project and the associated residential and commercial development and recurring business will generate \$4.3 billion in economic activity and employ almost 42,000 over a 40-year period. While the majority of this anticipated economic activity is expected to directly benefit those parts of the city in close proximity to Trinity Uptown, the

beneficial impacts from the Modified Central City Project to be realized by those neighborhoods close to the Riverside Oxbow area will generally come in the form of recreational amenities and improved environmental quality. Growth of infrastructure related to public services will be required and must be funded through the projected direct and indirect economic benefits of either alternative.

Environmental Compliance

Endangered Species

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

Section 404 Clean Water Act

The Corps of Engineers regulates the discharge of dredged and fill material into all waters of the United States, including wetlands. Although the Corps of Engineers does not issue itself permits for construction activities that would affect waters of the United States, the Corps must meet the legal requirement of the Clean Water Act. A Section 404 (b)(1) analysis has been completed and is presented as Appendix F to this SEIS. The Modified Central Project Alternative fulfills the overall objective of the sponsor and is the least damaging practicable alternative. Corps participation is a component of this plan. As such all discharge activities were reviewed in the analysis to address the cumulative impacts. This evaluation also forms the basis of future coordination with the Texas Commission on Environmental Quality in order to obtain a State Water Quality Certificate prior to the initiation of construction activities involving discharges to waters of the United States.

Construction activities that disturb upland areas (land above Section 404 jurisdictional waters) are subject to National Pollutant Discharge Elimination System (NPDES) requirements of Section 402(p) of the Clean Water Act (CWA). Within Texas, Texas Commission of Environmental Quality (TCEQ) is the permitting authority and administers the federal NPDES program through its Texas Pollutant Discharge Elimination System (TPDES) program. Construction activities that disturb one or more acres are subject to complying with TPDES requirements. Operators of construction activities that disturb 5 or greater acres must prepare a Storm Water Pollution Prevention Plan (SWPPP), submit a Notice of Intent to TCEQ, conducting onsite posting and periodic self-inspection, and accordingly follow and maintain the requirements of the SWPPP. In accordance with these requirements, during construction, the operator will assure that measures are taken to control erosion, reduce litter and sediment carried offsite (silt fences, hay bales, sediment retention ponds, litter pick-up, etc.), promptly clean-up accidental spills, utilize best management practices onsite, and stabilize site against erosion before completion. The operator of Modified Central City Project will be required to comply with these construction storm water permits requirements.

Sections 9 and 10 Rivers and Harbors Act

Navigability extends up the West Fork of the Trinity River to Riverside Drive. Therefore the project has been reviewed for compliance with Section 10. Stream flow diversion from the impounded section of the channelized West Fork would be diverted for stream restoration within Riverside Oxbow. During mean low flow events the diversion would be approximately 10 cubic feet per second or approximately 33% of the flow in the West Fork during those events. However, because of the existing dam structure below Beach Street on the channelized segment, no modification to depths or navigability would result. The proposed restoration activities would not affect navigability and therefore the project is in compliance with Section 10

Executive Order 11988 - Flood Plain Management

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

Executive Order 11990 - Protection of Wetlands

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

Executive Order 12898 - Environmental Justice

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

Section 106 of the National Historic Preservation Act

Consultation with the Texas SHPO, in accordance with Section 106 of the National Historic Preservation Act, is currently underway concerning cultural resources compliance issues for the Modified Central City Project. In the original Central City project, historic architectural properties were found to be adversely affected and those impacts were mitigated through stipulations defined in an August 2006 Programmatic Agreement between the Army, the City of Fort Worth and the Texas Historical Commission. Architectural properties have been identified in the Riverside Oxbow area that are within the area of potential effect of the Modified Central City. The Corps determination of effects is being coordinated with the THC.

Separate, on-site investigations conducted during the feasibility study for the Riverside Oxbow Project resulted in the identification of archeological properties that would be impacted by excavations associated with the Modified Central City Project. As a result of that finding, this site will be excavated in accordance to a mitigation plan designed in consultation with the SHPO prior to project construction. Site specific investigations for archeological sites in the Central City project area will be conducted before project implementation. Any NRHP-eligible sites located during those studies will be excavated in accordance to a mitigation plan designed in consultation with the SHPO prior to project construction.

Cumulative Impacts

In addition to the Cumulative Impact assessment included in this document, the Corps of Engineers prepared a Programmatic Environmental Impact Statement (PEIS) in 2000 that addresses cumulative impacts of Corps of Engineers proposed activities associated with the Upper Trinity River Basin. That document identified concern related to the continued loss of riparian or bottomland forests and wetlands within the study area. The Modified Central City Project would not result in adverse cumulative impacts to the resources identified as important in the PEIS. The project would provide improvement to most resources. The hydraulic and hydrologic impacts would be mitigated as identified in the plan and therefore would also be in compliance with criteria identified during a previous Trinity Regional EIS for the Corps Regulatory program. It has been determined that the Modified Central City

Project would not cause negative cumulative impacts to resources of significance as identified during this and past studies.

Hydrology and Hydraulics

The Record of Decision (ROD) for the Trinity Regional EIS applies to all project actions requiring a permit under Section 10 or Section 404 within the Standard Project Flood (SPF) floodplain of the study area. The ROD established criteria for minimizing cumulative impacts to hydrology and hydraulics and compliance with its intent was the fundamental consideration in evaluations leading to the proposed Modified Central City Project. To help assure continued long term compliance with the ROD, the TREIS raised awareness that a large area of floodplain lands within the Upper Trinity River could be developed outside the jurisdiction of the Corps of Engineers and that if developed following only FEMA requirements, significant increases in flooding frequency and extent would continue to occur in adjacent and downstream areas. Subsequently, the Corridor Development Certificate (CDC) process was developed as a means to address those floodplain actions that were not within the jurisdictional areas administered by the Corps of Engineers. The CDC process is a joint effort of the North Central Texas Council of Governments (NCTCOG), the Corps of Engineers and member NCTCOG cities with jurisdiction over the Trinity River floodplain. The purpose of the CDC process is to affirm local government authority for local floodplain management while establishing a set of common permit criteria and procedures for development within the Trinity River Corridor. The CDC process, administered by member cities, ensures that a proposed development's effect on future flooding will be considered in floodplain permitting decisions. Emphasis is placed on preservation of valley storage. After a public review by all other cities within the CDC, the proponent city decides on whether to allow the floodplain alteration. It should be noted, however, that the CDC process does not require consideration of environmental issues within the decision-making process.

Chapter 5 - Public Involvement

A Notice of Intent (NOI) to prepare a Draft Supplemental No. 1 to the Final EIS for the Central City Project was published in the Federal Register on February 16, 2007. The NOI provided background information related to the proposal to modify the Central City Project, current status of ongoing studies and the rationale for preparing the SEIS. A formal public Scoping meeting was not held, but a Public Notice was mailed to the known interested public with more than 2,000 notices being mailed concurrently with publication of the NOI in the Federal Register.

Scoping

As a result of the NOI and Public Notice, total of 11 telephone contacts or visits to Corps offices and five letters were received in response to the NOI and Public Notice. Two of the phone calls were from the local media seeking interviews with the Corps' Project Manager regarding the proposed study of modification of the Central City Project. Three calls or visits were by individuals seeking to determine whether their property would be affected. Four calls were to either correct mailing addresses or to obtain digital copies of the Public Notice. One call was from a State Representative's office to clarify that the local cost of the proposal was not from State general funds, but from the Tarrant Regional Water District's flood operation funding. The three additional telephone contacts were to inquire about status of the study and Supplemental EIS.

Of the five letters received, three were from land owners or attorneys representing land owners in the combined project study area. One individual, although in support of re-opening the oxbow to flows, was not in favor of combining the projects because funding has not been authorized, and he was opposed to restoring riparian woodlands on his property. Another individual expressed concerns regarding the taking of private lands for public purposes, health hazards, increased flooding in the Riverside Oxbow area for political expediency, project costs, and questioned whether the Corps could participate in small canals that are "essential for a water theme". An attorney representing two land owners suggested that the Supplement to the EIS offered an opportunity to correct flaws in the Final EIS for Central City and to address additional hydraulic storage alternatives, including possible additional valley storage that could be achieved with design of the Samuels Avenue dam site. A scoping letter was received from the US Fish and Wildlife Service, which indicated that changes have occurred within the study areas of the two projects that warrant additional field verification, and that opportunities exist to avoid adverse impacts that would occur with the original Central City Project. The League of Women Voters expressed support for the study as an opportunity to improve Gateway Park and to preserve riverbank trees and restore previously damaged or destroyed forest areas. The League suggested maximizing reforestation in the Oxbow area as a fair balance to the dense urban development expected in the main Trinity Uptown area.

Review of the Draft Supplemental EIS

The draft Supplement No. 1 to the Final EIS for the Central City project was filed with EPA and a Notice of Availability was published in the Federal Register on January 4, 2008. Approximately 3000 Notices of Availability were mailed to interested citizens and the document was made available on the Corps' Fort Worth District website, at local libraries, and on CD's available upon request. A Public Meeting was held on January 24, 2008 during the 45-day public comment period which ended on February 19, 2008. Approximately 200 people attended the public meeting which was a combined "open house" for the first hour followed by a formal hearing of comments. Kiosks, presenting information on Habitat Development, Recreation, Valley Storage Sites, and Samuels Avenue Dam features, were staffed by Corps and sponsor team members to answer questions. Approximately 200 people attended the meeting of which 25 provided verbal statements and 48 provided written comments. Twenty-six additional letters were received during the comment period.

Comments from the Public Meeting, letters received in review of the Draft SEIS, and the Corps' response to these comments are included in Appendix H. The majority of comments received were in

support of the Modified Central City project, specifically supporting the recreational and habitat improvements in the Riverside Oxbow and Gateway Park areas. Some comments were received that expressed concern regarding the effects of the valley storage mitigation sites on existing recreation facilities, neighborhood roads, and public use in the Riverside Oxbow and Gateway Park areas. Comments from agencies such as the Department of Interior, Texas Council on Environmental Quality, and Texas Parks and Wildlife were primarily concerned with avoiding impacts to important ecological resources during detailed design and provided specific recommendations regarding habitat development and mitigation design.

Extensive coordination has occurred with the U.S. Fish and Wildlife Service, Texas Parks and Wildlife, and the Texas Council on Environmental Quality regarding the planning of habitat development and ecological mitigation. This coordination will continue during the preparation of construction plans and specifications for these features to address their recommendations. Coordination will also continue with the Texas Council on Environmental Quality in order to obtain Water Quality Certification of the project prior to construction and with the Texas Historic Commission to complete Section 106, NHPA compliance.

Conclusions and Recommendations

Conclusions

The Central City Project is located within the immediate vicinity of the downtown area of Fort Worth, Texas, along the West Fork and Clear Fork of the Trinity River. The river is currently channelized with levees along the entire project area as part of the original Fort Worth Floodway. The approved Central City project consists of a bypass channel, levee system, and associated improvements to divert flood flows around a segment of the existing floodway system adjacent to downtown Fort Worth. Water levels in the bypass channel and adjacent waterways would be controlled by a downstream dam with crest gates. The dam would be located on the West Fork of the Trinity River just east of Samuels Avenue with three isolation gates used to protect the interior area east of the bypass channel from flood flows during large events. Two miles of the existing West Fork would function as a controlled, quiescent watercourse with a water feature or urban lake approximately 900-feet long in the interior area. Land acquisition and excavation would be required in the Riverbend area along the West Fork Floodway just west of downtown, and existing levees would be modified to provide hydraulic mitigation for the downtown features. Six bridges, four vehicular and two pedestrian, are proposed for the project.

The Corps component of the approved Central City project includes the bypass channel the isolation gates, the Samuels Avenue Dam, and real estate, business and property owner relocations, and soft costs associated with these features. Included in the Corps project are all hydraulic (valley storage) mitigation requirements as well as habitat mitigation and certain cultural resources mitigation. Section 116 of Public Law 108-447, dated 8 December 2004 authorizes construction of the Corps of Engineers component of the Central City Project. Corps participation is limited to \$110 million with a total project cost \$220 million for that portion of the infrastructure plan in which the Corps can participate. A Final Environmental Impact Statement (FEIS) was completed for the Central City Project in January 2006 and the Project Report was completed in March 2006. The Record of Decision (ROD) was signed, and the Project Report recommending the Community-Based Alternative was endorsed as being technically sound and environmentally acceptable, by the ASA(CW) on 7 April 2006.

The Riverside Oxbow project area encompasses about 1,060 acres just east of downtown Fort Worth, Texas, on the West Fork of the Trinity River. The project area is located downstream of Riverside Drive (the downstream end of the Fort Worth Floodway) and extends to the East 1st Street bridge crossing of the West Fork. This 3-mile reach includes a portion of the old natural channel of the West Fork, which was severed as a cut-off oxbow when the channel was realigned, the West Fork and Sycamore Creek confluence, and a low water dam downstream of Beach Street. Corps of Engineers participation in the Riverside Oxbow Project consists of reestablishment of low flows through the old river oxbow, including replacement of the Beach Street bridge; creation emergent wetlands, open water, and vegetative fringe habitat; habitat improvement of existing forest tracks; establishment of native grasses and forbs buffer zones; reforestation of 67 acres; and preservation and habitat improvement to about 207 acres of native floodplain grasslands. Corps participation also includes linear recreation along 9,000 feet of concrete trail, 1,400 feet of crushed aggregate trail, 7,600 feet of wood mulch equestrian trail as well as associated access points, and parking and restroom facilities. An Interim Feasibility Report and Integrated Environmental Assessment was completed in April 2003 for the Riverside Oxbow Project. A Finding of No Significant Impact (FONSI) was signed by the Acting Fort Worth District Commander on 22 May 2003. On 29 May 2003 the recommended Plan for the Riverside Oxbow was approved by the Chief of Engineers. An addendum, dated April 2005, was completed which resulted in revised cost estimates including a total cost of about \$20,800,000 with a Federal cost of about \$8,300,000 (in October 2002 dollars). Neither construction funding nor authority for implementation of this project has been provided by Congress and it was not included in the projects authorized in the Water Resource Development Act enacted on 8 November 2007.

In June of 2006 the City of Fort Worth requested that the Corps of Engineers evaluate the potential benefits of modifying the Central City Project to incorporate the Riverside Oxbow project. In response to that request, the Fort Worth District Corps of Engineers performed an initial evaluation and confirmed that merging features of the two projects had the potential to increase hydraulic efficiency, provide additional environmental restoration outputs, reduce acquisition of private lands, and lower overall project costs relative to proceeding separately with each of the two projects. The result of those initial evaluations led to the detailed evaluations presented in this Supplement No. 1 to the Final EIS for the Central City Project.

Alternatives considered during more detailed evaluation include the No Action Plan, which assumes that each project would proceed separately as currently approved and a Modified Central City Project alternative. The total hydraulic system was evaluated in an iterative process resulting in the identification of 22 primary valley storage sites that could meet the valley storage requirement of 5,250 acre-feet. The analysis also considers five contingency valley storage sites that could be used in the event that more detailed hydraulic analyses conducted during the detailed design phase of the project indicate that the primary storage sites are not sufficient to achieve the required valley storage.

Major categories for comparison of the No Action and Modified Central City Project alternatives are Technical Soundness, Habitat Mitigation Required, Habitat Outputs, Recreation, Real Estate, Total Project Costs, and Other Considerations. In regard to Technical Soundness, it has been determined that implementation of the Modified Central City Project would more efficiently accommodate the valley storage requirements of the Central City Project by using existing lands within the Riverside Oxbow restoration area rather than new lands upstream of the project. The identification of potential contingency valley storage sites helps to assure that valley storage requirements can be met while still providing for the roughness coefficients that would be attributable to extensive riparian woodland restoration.

Habitat mitigation requirements of the Modified Central City Project alternative for riparian woodland would be decreased with utilization of valley storage sites within the Riverside Oxbow area, relative to the upstream Riverbend site, due to the fact that much of the land that would be excavated for valley storage and then restored to riparian woodland is currently disturbed or in grassland. Relocation of the Samuels Avenue damsite to just upstream would reduce the adverse effect on the riparian and aquatic systems along Marine and Lebow Creeks. However, creation of a boat channel from the Central City bypass channel to Marine Creek associated with relocation of the damsite would still require some mitigation for adverse impacts to riparian and aquatic habitats

The Modified Central City Project alternative would result in increased outputs for riparian woodland and acreage of emergent wetland relative to proceeding with each project independently. These increased ecosystem outputs are due to the lower elevations created by excavations within the Riverside Oxbow project area associated with relocation of the valley storage component of the Central City project. By relocating the valley storage areas to the downstream Riverside Oxbow location the hydraulic roughness can be increased, thereby allowing for increased density of riparian woodland plantings, further increasing those outputs.

Land acquisition costs would be reduced with implementation of the Modified Central City Project alternative due to the fact that much of the land within the Riverside Oxbow project area that would be used for valley storage and habitat development is already in public ownership or would be acquired for that project. Recreation outputs consistent with the Federal purposes of Flood Damage Reduction and would be somewhat increased with the Modified Central City Project alternative.

Authorizing language for construction of the Central City Project limits the total cost of those features in which the Corps can participate to \$220,000,000, with a Federal cost of \$110,000,000. Those limitations would still apply to the Modified Central City Project alternative. By contrast, total costs of the two Corps projects proceeding independently would be \$243,625,413 with Federal costs of \$119,426,540 based on 2005 dollars. Overall, implementation of the Modified Central City Project alternative would not have any adverse effects to flood protection, habitat mitigation, outputs, land acquisition, or project cost requirements relative to the No Action alternative of proceeding with each project independently.

Recommendations

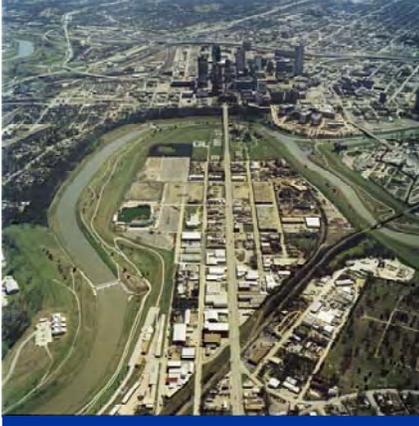
Based upon detailed evaluations presented in this Supplement No. 1 to the Final EIS for the Central City Project, and prior to public coordination under the National Environmental Policy Act, the Fort Worth District has selected the Modified Central City alternative for recommendation, pending receipt of any substantial comments that would lead to a decision to the contrary. The major differences between the Modified and original Central City Projects are in location of valley storage sites required to accommodate the increased hydraulic efficiency of the bypass channel, a primary component of the approved project. The Modified Central City Project alternative retains the major physical components and features of the Central City Project but utilizes existing public lands and minimizes use of private lands to a greater extent to accommodate the valley storage requirement. The Recommended Plan also involves relocation of the Samuels Avenue Dam to a location slightly upstream of the dam site in the approved plan.

The net effect of the recommended changes in the original Central City Project that would result from the Modified Central City Project alternative are considered beneficial. The Modified Central City Project alternative would not add or delete any project purpose, nor would it require the acquisition of lands or waters specifically for mitigation of fish and wildlife values. Pending public review of this Supplement No. 1 to the FEIS, and pending receipt of any comments to the contrary, the Fort Worth District also recommends that a formal report be prepared and submitted to the Chief of Engineers seeking approval of the proposed project modifications.

List of Preparers

The people primarily responsible for contributing to the preparation of this Draft Supplement #1 to the Final Environmental Impact Statement for the Central City Project are listed below.

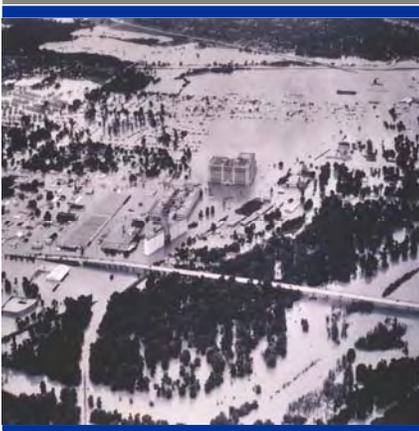
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Jock A. Blackard	Geographic Information System Specialist	2 years Corps of Engineers	Resource analysis and Mapping (Corps)
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Fort Worth Central City Preliminary Design



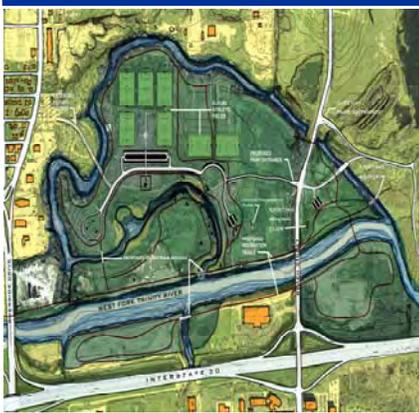
Hydrology and Hydraulics



Final Supplement No. 1 to the Final Environmental Impact Statement

Appendix A

March 2008



Rendering Image courtesy of CDM



Fort Worth Central City Preliminary Design

Hydrology and Hydraulics

Final Supplement No.1 to
the Final Environmental
Impact Statement

Appendix A

March 2008

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FORT WORTH CENTRAL CITY Preliminary Design Supplement

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Appendix A

Hydraulics and Hydrology

1.0 Hydraulics and Hydrology

This appendix summarizes the development of the hydrologic and hydraulic models and associated hydrologic and hydraulic analyses for the modified Fort Worth Central City (FWCC) Project. These analyses were completed by CDM on behalf of the U.S. Army Corps of Engineers (USACE) in collaboration with the Tarrant Regional Water District (TRWD), and the City of Fort Worth.

1.01 Background

Hydraulic analyses included revisions to the previously approved HEC-RAS proposed conditions model to reflect the changes resulting from combining the approved Central City project and the Oxbow Ecosystem Restoration project. The essential components of the modified Central City project are shown in Figure 1-1.

2.0 Regulatory Constraints

2.01 USACE Record of Decision

In the mid-1980's, USACE prepared a regional programmatic environmental impact statement (EIS) to establish a floodplain development permitting strategy for the Upper Trinity River and its tributaries. USACE issued a Record of Decision (ROD) in April 1988 specifying criteria the USACE would use to evaluate permit applications in the Upper Trinity River Corridor. The Record of Decision sets forth various criteria for hydraulic impacts, level of protection, habitat mitigation and other considerations related to the Regional EIS.

2.02 Corridor Development Certificate

As a result of the 1988 Record of Decision, the cities and counties in the Upper Trinity River Corridor formed the Trinity River Steering Committee, facilitated by the North Central Texas Council of Governments. The Steering Committee developed and is responsible for implementing the Corridor Development Certificate (CDC) process to meet the 1988 Record of Decision.

Criteria

The CDC process has adopted a common set of permit criteria based on the Record of Decision which describe a consistent design level of protection that should be met for all projects unless granted a variance. These criteria applicable to the Central City project include:

1. Water Surface Elevations. No rise in the 100-year flood or significant rise in the Standard Project Flood water surface elevations for the proposed condition will be allowed.
2. Valley Storage Capacity. The maximum allowable loss in storage capacity for projects in the regulatory zone for the 100-year flood and Standard Project Flood discharges will be 0% and 5%, respectively. The decrease in allowable storage is computed with respect to the amount of storage originally available in the proposed project tract. The loss in storage capacity will be determined on a project-by-project basis.
3. Velocities. Alterations of the floodplain may not increase erosive water velocity on-site or off-site.
4. Conveyance. Alterations of the floodplain must be modeled using equal conveyance reductions on both sides of the channel.

2.03 Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) maintains maps of local floodplains as a part of its administration of the National Flood Insurance Program. For the Central City Project area, Figure 2-1 illustrates the existing 100-yr and 500-yr floodplains as maintained by FEMA. The floodplains shown in Figure 2-1 were obtained from FIRM Panels 48439C0290J, 48439C0295J, 48439C0270J, and 48439C0410J, all effective August 23, 2000.

3.0 Analysis

The baseline conditions hydraulic model used for the initial study was the current CDC model which was developed and is maintained by the USACE. The CDC model was originally developed using the hydraulic step-backwater software program HEC-2 Water Surface Profiles which calculates water surface elevations and computes resulting river reach storage (usually referred to as valley storage) and flow velocities. The model was subsequently converted to HEC-RAS River Analysis System version 3.1.3 by the USACE.

The West Fork Trinity River CDC model limits are the confluence of the West Fork and the Elm Fork in Dallas County on the downstream side and the confluence to Lake Worth Dam on the upstream side, a distance of 58.08 miles.

The original CDC West Fork hydraulic models were developed by extensive use of digitized 2-foot contour interval topography. The topographic data in the channel and overbank areas above the water surface was developed from February/March 1991 aerial photography. The majority of the cross-section data was supplied by the surveying contractor and generated from the topographic data, with cross section locations developed by the USACE. Channel data below

the water surface originated from 1975 field surveys. Additional cross sections were developed from the topographic files and included in the models as necessary. Other information used in the development of the CDC models originated from bridge plans, bridge surveys, field reconnaissance, and levee surveys. Aerial photographs and field reconnaissance were used to determine roughness coefficients.

The hydraulic evaluation of the proposed bypass channel alignment for the FWCC Project was performed using the latest version of U.S. Army Corps of Engineers (USACE) HEC-RAS version 3.1.3. In order to demonstrate compliance with the CDC criteria, the steady-flow capabilities of HEC-RAS were employed and flow inputs were obtained from the HEC-1 hydrologic analysis developed for the regional CDC process.

3.01 FWCC Baseline Conditions

Hydrologic and Hydraulic Models

The hydrologic and hydraulic analyses of the Fort Worth Central City Project were based upon models of the Upper Trinity River system provided by the USACE. The models were developed for the regional CDC process and are maintained by the USACE Fort Worth District. These models are the basis for the baseline conditions and proposed conditions models for the project area.

The baseline HEC-1 model was developed to provide the best available representation of Year 2050 flows in the existing configuration of the floodway. Discussion of the hydrologic and hydraulic baseline condition models was previously presented and approved in Appendix A to the Final EIS for the authorized Central City project. No changes were made to the baseline conditions models due to the merged projects. Therefore, no further discussion is presented.

3.02 Modified Central City Proposed Conditions

The hydraulic evaluation of the proposed valley storage changes to the Modified Central City Project was performed using the U.S. Army Corps of Engineers (USACE) HEC-RAS version 3.1.3. The hydraulic elements of the modified valley storage sites and features were incorporated into the previously approved proposed conditions model to create the modified proposed conditions model. Valley storage sites no longer used in the modified project were removed.

The revised dam location was also incorporated into the modified proposed conditions model. The gate opening, crest elevation, and dam configuration remained the same as in the approved project. The dam was modeled assuming the gates were in the fully open position for both the 100-year and the SPF flood events.

Construction of the proposed bypass channel effectively shortens the West Fork by approximately 7,000 feet and is estimated to cause a net loss of approximately 2,850 acre feet of valley storage under SPF conditions. An estimated additional 2,400 acre-feet would be lost due to drawdown if no action is taken to reduce drawdown. The drawdown on the West Fork is caused by a combination of this shortening of the river as well as the efficient conveyance of the bypass channel, which has a steeper slope and higher velocity than the existing West Fork channel it bypasses. Figure 3-1 shows an overview of proposed valley storage mitigation sites in relation to the HEC-RAS cross sections. Mitigation of valley storage loss is proposed to be provided by:

- Riverside Oxbow – Gateway Park storage mitigation site;
- Off-line storage within the existing Gateway Park ball field levees;
- Two in-line, overbank sites downstream of Samuels Avenue;
- One in-line, overbank site in Riverside Park upstream of Belknap Avenue;
- One in-line, overbank site in Rockwood Park West;
- Ham Branch (West Fork Sump 31) off-line storage mitigation site;
- Drawdown mitigation by raising University Drive; and
- Utilization of the interior water feature for valley storage.

The Riverside Oxbow – Gateway Park valley storage mitigation site is located adjacent to the West Fork between Station 2063+40 and 2228+96 in the HEC-RAS model. This site would provide an additional 1,975 acre feet of storage in the 100-year flood and an additional 1,845 acre feet in the SPF. Figure 3-2 shows the proposed Riverside Oxbow – Gateway Park storage sites in relation to the HEC-RAS cross sections. Refer to Appendix C, Volume II – Supplemental Plans for proposed Riverside Oxbow – Gateway Park grading plans. Existing Manning “n” values in the Riverside Oxbow – Gateway Park overbank area vary from 0.04 to 0.20. CDM coordinated with the USACE Ecosystem and Hydrology and Hydraulics branches to determine acceptable Manning “n” values for the areas modified in the proposed restoration plan. The recommended Manning “n” values for the areas to be modified are shown in Table 3-1, Riverside Oxbow – Gateway Park Proposed Manning “n” Values.

**Table 3-1
Riverside Oxbow - Gateway Park
Proposed Manning "n" Values**

n	Description
0.06	Recreation Fields
0.065	Scattered Vegetation
0.085	Light Vegetation - Clusters of Trees, Minimal Shrubs
0.15	Dense Vegetation - High/Low Canopy Trees, Low-Lying Shrubs

In the baseline and proposed HEC-RAS models, the area within the existing Gateway Park ball field levees is modeled as a blocked obstruction, and therefore does not contribute to valley storage. The existing levees provide only partial flood protection. The proposed project will raise the levees to SPF, thus allowing this area to provide approximately 270 acre feet of additional valley storage when constructed with appropriate inlet and outlet structures.

Downstream of Samuels Avenue, two valley storage areas will be developed by excavating overbank areas between Station 2417+08 and 2392+62. These sites were incorporated into the model cross-sections because portions of the facilities can both convey and store flow. The storage volume they provide was calculated in HEC-RAS and is approximately 490 acre feet in the SPF.

Upstream of Belknap Avenue, within Riverside Park, a storage area will be developed by excavating the east overbank between Station 2330+91 and 2317+00. This site was incorporated into the HEC-RAS model cross-sections and provides approximately 147 acre feet of storage volume in the SPF.

An additional overbank excavation area will be developed in the upper West Fork, in the vicinity of Rockwood Golf Course, between Station 2723+77 and 2702+49. The proposed excavation will occur in the west overbank, and provides approximately 58 acre feet of storage volume in the SPF.

The Ham Branch Sump (West Fork Sump 31) is located on the west side of the West Fork downstream of East 4th Street. The proposed project will convert the existing sump near the confluence of Ham Branch and the West Fork to a valley storage area. Under the plan, the sump would serve as a valley storage facility by leaving the existing gate structure open at all times, allowing the sump level to rise and fall with the adjacent river level. The performance of the proposed facility was evaluated in a separate analysis using the proposed conditions unsteady flow HEC-RAS model that was developed to evaluate system operation in the EIS for the authorized Central City project. Based on the analysis, Ham Branch Sump will provide 750 acre feet of valley storage during the SPF event on the West Fork.

University Drive at Station 2625+48 on the West Fork would be raised to return the 100-year and SPF water levels upstream of University Drive to near the levels

of baseline conditions, thereby recovering a portion of the drawdown loss. This site was evaluated and reviewed during the authorized Central City EIS process. No changes are proposed to the approved plan to raise University Drive.

Interior Drainage

The project will require appropriate interior drainage storage and conveyance facilities to prevent structure flooding in interior areas. Three distinct interior drainage areas were evaluated and reviewed during the authorized Central City EIS process. No changes are proposed to the approved interior drainage plan. Based on preliminary operations modeling of the interior area with HEC-RAS, approximately 140 acre feet of valley storage will be available during the SPF event.

3.03 Samuels Avenue Dam Modification

The authorized Central City EIS proposed to site the dam downstream from Samuels Avenue and the adjacent three railroad bridges, approximately 1,300 feet downstream from the confluence with Marine Creek. This location resulted in potential impacts on Marine Creek due to both the high backwater elevation of 525 NGVD as well as additional operations when passing flood flows on the Marine Creek watershed. The original site also impacted the lower segment of Lebow Creek by loss of habitat resulting from rerouting of the creek downstream of the dam. In addition, the geotechnical conditions at this site were not optimal; therefore a review of alternate site locations was conducted.

Alternative sites for the dam were evaluated on the West Fork upstream of the Marine Creek confluence, ranging from immediately at the confluence to just downstream of Northside Drive. Sites south of Northside Drive were eliminated due to impacts on Northside Drive, limited area, and conflicts with the bypass channel. Placing the dam too close to the confluence could introduce scour potential at the Samuels Avenue Bridge, while placing it further upstream towards Northside Drive reduced or eliminated options to maintain hydraulic connectivity with Marine Creek.

The revised location of the dam is proposed on the main stem of the West Fork of the Trinity River just upstream of the confluence with Marine Creek. This dam is still referred to as the Samuels Avenue dam due to its proximity to the Samuels Avenue Bridge. The dam is sited approximately 1,750 feet downstream of Northside Drive, immediately upstream from the confluence of Marine Creek. During normal dry weather operation the dam will maintain the normal water pool level elevation of 524.3. The revised site plan for the dam was incorporated into the modified proposed conditions HEC-RAS model.

The benefits of this dam site include reduced backwater impacts to Marine Creek as well as simplifying the operational requirements of Samuels Avenue Dam by allowing Marine Creek flood flows to pass without affecting the urban lake pool elevation. Hydraulic connectivity is maintained, which satisfies project objectives.

An additional benefit to this dam site is the elimination of impacts to Lebow Creek and associated habitat.

3.04 Marine Creek Baseline Conditions

Marine Creek is a tributary of the West Fork of the Trinity River which enters the river along its north bank just upstream of Samuels Avenue. The baseline condition hydraulic model used for Marine Creek was the current effective FEMA Flood Insurance Study (FIS) model which was provided by the USACE. The FIS model was originally developed using the hydraulic step-backwater software program HEC-2. The model was subsequently converted to HEC-RAS version 3.1.3. Marine Creek is not within the CDC Regulatory Zone, and therefore is only regulated by FEMA criteria.

3.05 Marine Creek Proposed Conditions

A fixed low water dam is proposed on Marine Creek approximately 300 feet upstream of the confluence with the main stem of the West Fork of the Trinity River. Several alternatives were evaluated for the Marine Creek dam including both the use of a gated or fixed structure as well as varying the crest width and height. A fixed structure is recommended on Marine Creek as it is able to meet the design requirements of maintaining existing 100-year water surface elevations on Marine Creek while also reducing construction, operation, and maintenance costs.

The fixed dam will pass lower frequency storms on Marine Creek without operation or controls, which was not possible under the previous Samuels Avenue Dam location downstream of the Marine Creek confluence. This structure will have a crest elevation of 516.5 and a crest length of 200 feet. The Marine Creek channel will need to be widened by approximately 50 feet near the dam site in order to accommodate the 200 feet of crest length needed to pass the 100-year flow without causing adverse impacts to water surface elevations upstream. Table 3-2 shows a comparison of 100-year and 500-year baseline and proposed water surface elevations for Marine Creek based on the HEC-RAS model. While the minor water surface elevation increases shown in Table 3-2 would be reduced or eliminated during final design, they would be allowable under FEMA criteria.

4.0 Results

4.01 Valley Storage

Computed valley storage for baseline and proposed conditions for both the 100-year and SPF events is summarized in Table 4-1. All valley storage volumes were obtained from HEC-RAS models except for the Gateway Park ball field levee sites, which were obtained using MicroStation InRoads software. As indicated in Table 4-1, the valley storage loss in the 100-year flood is mitigated well over 100%. The net gain of valley storage in SPF is approximately 37 acre feet. Therefore the SPF

mitigation is 100% as well. The modeled geometry is expected to change slightly during the design process as field survey data is collected and incorporated into the baseline and proposed condition models. During the design process, the final design will be configured to provide 100% mitigation of valley storage in SPF.

4.02 Water Surface Elevation

Steady-flow baseline and proposed conditions water surface elevations for both 100 year and SPF events are shown in Table 4-2. The project decreases or maintains baseline water levels at all locations with just a few minor exceptions. Water levels increase in the 100-year event at the ten cross-sections between Samuels Avenue Dam and the bypass channel. The maximum water level increase is 0.25 feet immediately upstream of Samuels Avenue Dam. Water levels increase in the SPF a maximum of 0.02 feet at the downstream end of the Clear Fork. The increases are confined to areas that will be purchased and maintained by TRWD, thus would have no impact on private property if the increases actually occur. As new levees will be constructed in the immediate project area, additional levee protection can easily be provided to compensate.

4.03 Head Loss

The construction of the bypass channel effectively shortens the West Fork by approximately 7,000 feet. The drawdown on the West Fork is caused by a combination of this shortening of the river as well as the efficient conveyance of the bypass channel, which has a steeper slope and higher velocity than the existing West Fork channel it bypasses. This results in a reduction in head loss that must be partly restored in order to prevent significant additional loss of valley storage. Head loss has been put back into the system through modification or addition of structures. These include raising University Drive, restrictive bypass channel sections, Samuels Avenue Dam and the two pedestrian bridges. As shown in Table 4-2, the SPF drawdown is 5.39 feet at the confluence of the West Fork and the bypass channel, and this drawdown is reduced significantly upstream of University Drive (RS 262599). Approximately 0.5 feet of drawdown remains at this point, which is then gradually reduced to 0.02 feet at the upstream end of the West Fork model (RS 306246), which is approximately 400 feet downstream of Lake Worth Spillway.

Table 3-2: Marine Creek Water Surface Elevations - Baseline and Proposed Conditions

100-yr					500-yr					
Reach	River Station	Water Surface Elevation (ft)				Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline				Existing	Proposed	Proposed - Baseline
upper	6080	546.28	546.28	0	upper	6080	547.57	547.57	0	
upper	6010	546	546	0	upper	6010	547.23	547.23	0	
upper	5950				upper	5950				
upper	5890	545.61	545.61	0	upper	5890	546.83	546.83	0	
upper	5810	545.7	545.7	0	upper	5810	546.94	546.94	0	
upper	5730	545.62	545.62	0	upper	5730	546.9	546.9	0	
upper	5500	545.23	545.23	0	upper	5500	546.53	546.53	0	
upper	5410	545.09	545.09	0	upper	5410	546.44	546.44	0	
middle	5370	545.13	545.13	0	middle	5370	546.49	546.48	-0.01	
middle	5330	544.96	544.96	0	middle	5330	546.21	546.21	0	
middle	5280				middle	5280				
middle	5230	541.78	541.77	-0.01	middle	5230	543.2	543.21	0.01	
middle	5180	540.65	540.65	0	middle	5180	542.49	542.49	0	
middle	5130	540.27	540.27	0	middle	5130	542.31	542.31	0	
middle	5030	540.08	540.08	0	middle	5030	542.13	542.13	0	
middle	4990	539.88	539.88	0	middle	4990	541.87	541.88	0.01	
middle	4930	539.72	539.72	0	middle	4930	541.72	541.72	0	
middle	4840	539.44	539.44	0	middle	4840	541.49	541.49	0	
middle	4795	539.68	539.67	-0.01	middle	4795	541.71	541.71	0	
middle	4765	539.84	539.84	0	middle	4765	541.86	541.87	0.01	
middle	4675				middle	4675				
middle	4585	538.88	538.88	0	middle	4585	540.45	540.45	0	
middle	4570	538.92	538.92	0	middle	4570	540.49	540.49	0	
middle	4535	538.51	538.51	0	middle	4535	540.08	540.09	0.01	
middle	4465	538.6	538.6	0	middle	4465	540.19	540.2	0.01	
middle	4455	538.18	538.18	0	middle	4455	539.8	539.8	0	
middle	4450				middle	4450				
middle	4445	538.09	538.09	0	middle	4445	539.73	539.73	0	
middle	4340	537.98	537.97	-0.01	middle	4340	539.64	539.64	0	
middle	4310	537.96	537.96	0	middle	4310	539.62	539.62	0	
middle	4280	537.99	537.98	-0.01	middle	4280	539.64	539.64	0	
middle	4210	537.16	537.16	0	middle	4210	538.87	538.88	0.01	
middle	4160	536.08	536.08	0	middle	4160	538.02	538.03	0.01	
middle	4120	535.73	535.74	0.01	middle	4120	537.83	537.84	0.01	
middle	4090	534.3	534.31	0.01	middle	4090	536.15	536.17	0.02	
lower	4030	534.12	534.12	0	lower	4030	536.03	536.05	0.02	
lower	3970	533.89	533.9	0.01	lower	3970	535.67	535.69	0.02	
lower	3900	533.69	533.69	0	lower	3900	535.52	535.54	0.02	
lower	3840	533.56	533.56	0	lower	3840	535.43	535.45	0.02	
lower	3780	533.54	533.55	0.01	lower	3780	535.4	535.43	0.03	
lower	3725	533.55	533.56	0.01	lower	3725	535.4	535.42	0.02	
lower	3610	533.41	533.42	0.01	lower	3610	535.27	535.29	0.02	
lower	3480	533.28	533.29	0.01	lower	3480	535.13	535.16	0.03	
lower	3385	532.96	532.97	0.01	lower	3385	534.82	534.85	0.03	
lower	3060	532.79	532.8	0.01	lower	3060	534.66	534.68	0.02	
lower	2930	531.08	531.09	0.01	lower	2930	532.71	532.75	0.04	
lower	2890	531.27	531.28	0.01	lower	2890	532.94	532.98	0.04	
lower	2865				lower	2865				
lower	2840	531.02	531.03	0.01	lower	2840	532.66	532.7	0.04	
lower	2790	530.69	530.71	0.02	lower	2790	532.26	532.31	0.05	
lower	2410	529.7	529.72		lower	2410	531.15	531.21		
lower	2360	529.55	529.57	0.02	lower	2360	531	531.06	0.06	
lower	2355				lower	2355				
lower	2350	528.77	528.79	0.02	lower	2350	529.96	530.05	0.09	
lower	2300	528.82	528.85	0.03	lower	2300	530.05	530.14	0.09	
lower	1760	527.53	527.57	0.04	lower	1760	528.63	528.77	0.14	
lower	1710	527.39	527.43	0.04	lower	1710	528.52	528.67	0.15	
lower	1700	527.45	527.49	0.04	lower	1700	528.67	528.83	0.16	
lower	1650	526.89	526.93	0.04	lower	1650	527.63	527.79	0.16	
lower	1480	526.63	526.67	0.04	lower	1480	527.31	527.49	0.18	
lower	1430	526.51	526.56	0.05	lower	1430	527.17	527.35	0.18	
lower	1420				lower	1420				
lower	1410	526.11	526.16	0.05	lower	1410	526.6	526.81	0.21	
lower	1360	525.98	526.03	0.05	lower	1360	526.41	526.64	0.23	
lower	1240	525.91	525.96	0.05	lower	1240	526.32	526.56	0.24	
lower	840	525.33	525.39	0.06	lower	840	525.48	525.77	0.29	
lower	600				lower	600				
lower	550	525.03	525	-0.03	lower	550	525.05	525	-0.05	
lower	500	525	525	0	lower	500	525	525	0	

**Table 4-1
Valley Storage Calculations for Baseline and Proposed Conditions**

Reach	River Station	100-year			SPF		
		Baseline (ac-ft)	Proposed (ac-ft)	Difference (ac-ft)	Baseline (ac-ft)	Proposed (ac-ft)	Difference (ac-ft)
East First St. to Riverside Dr. (Gateway / Oxbow)	206218 - 222998	9709	11681	1972	17890	19733	1843
Riverside Dr. to Bypass Confluence ¹	222998 - 245866	6652	7147	495	12594	13101	507
Lower Bypass	0 - 3656	0	579	579	0	1073	1073
Upper Bypass	3656 - 8421	0	505	505	0	1135	1135
West Fork above Bypass ²	257426 - 306246	9105	8950	-155	18446	17787	-659
Clear Fork above Bypass	3590 - 65616	5382	5313	-69	22529	22587	58
Clear Fork Interior	0 - 3590	584	0	-584	1592	0	-1592
West Fork wf3 Interior	245866 - 254346	1378	0	-1378	2879	0	-2879
West Fork wf4 Interior	255442 - 257426	297	0	-297	608	0	-608
Additional storage areas							
Interior Area (estimated)	-	0	0	0	0	140	140
Gateway Park Ball Field Levees	-	0	0	0	0	270	270
Ham Branch	-	0	0	0	0	750	750
TOTAL		33107	34175	1068	76539	76576	37

¹ Includes Riverside Park and Samuels Avenue Mitigation Sites

² Includes Rockwood West Mitigation Site

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

		100-yr					SPF		
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
wf4	306246	569.28	569.28	0	wf4	306246	574.24	574.22	-0.02
wf4	305256	568.92	568.91	-0.01	wf4	305256	573.78	573.76	-0.02
wf4	304259	567.85	567.84	-0.01	wf4	304259	572.63	572.6	-0.03
wf4	304214	567.79	567.79	0	wf4	304214	572.56	572.53	-0.03
wf4	304213	567.94	567.93	-0.01	wf4	304213	572.74	572.71	-0.03
wf4	304208	567.93	567.93	0	wf4	304208	572.73	572.7	-0.03
wf4	304207	568.06	568.06	0	wf4	304207	572.81	572.78	-0.03
wf4	304157	568.03	568.03	0	wf4	304157	572.77	572.75	-0.02
wf4	303421	567.57	567.57	0	wf4	303421	572.41	572.38	-0.03
wf4	302041	566.6	566.59	-0.01	wf4	302041	571.79	571.75	-0.04
wf4	301177	565.9	565.9	0	wf4	301177	571.26	571.22	-0.04
wf4	300278	564.59	564.58	-0.01	wf4	300278	570.6	570.55	-0.05
wf4	299590	563.86	563.85	-0.01	wf4	299590	570.26	570.2	-0.06
wf4	299546	563.81	563.8	-0.01	wf4	299546	570.23	570.18	-0.05
wf4	299545	563.72	563.71	-0.01	wf4	299545	570.22	570.17	-0.05
wf4	299540	563.71	563.7	-0.01	wf4	299540	570.22	570.17	-0.05
wf4	299539	563.72	563.71	-0.01	wf4	299539	570.21	570.15	-0.06
wf4	299489	563.66	563.65	-0.01	wf4	299489	570.18	570.12	-0.06
wf4	298645	562.5	562.48	-0.02	wf4	298645	569.6	569.53	-0.07
wf4	298300	561.56	561.54	-0.02	wf4	298300	569.38	569.31	-0.07
wf4	298260	561.39	561.36	-0.03	wf4	298260	569.17	569.09	-0.08
wf4	298259	561.24	561.21	-0.03	wf4	298259	569.18	569.11	-0.07
wf4	298249	561.22	561.19	-0.03	wf4	298249	569.18	569.1	-0.08
wf4	298248	561.63	561.61	-0.02	wf4	298248	569.2	569.13	-0.07
wf4	298198	561.6	561.57	-0.03	wf4	298198	569.18	569.11	-0.07
wf4	297822	561.42	561.4	-0.02	wf4	297822	569.07	569	-0.07
wf4	297265	561.01	560.98	-0.03	wf4	297265	568.37	568.3	-0.07
wf4	297146	560.96	560.93	-0.03	wf4	297146	568.16	568.09	-0.07
wf4	297126				wf4	297126			
wf4	297107	560.87	560.84	-0.03	wf4	297107	568.05	567.98	-0.07
wf4	296992	560.68	560.66	-0.02	wf4	296992	568.03	567.95	-0.08
wf4	296125	560.18	560.15	-0.03	wf4	296125	567.76	567.68	-0.08
wf4	295195	559.56	559.52	-0.04	wf4	295195	567.15	567.06	-0.09
wf4	294211	559.14	559.1	-0.04	wf4	294211	566.92	566.83	-0.09
wf4	293744	558.89	558.85	-0.04	wf4	293744	566.91	566.81	-0.1
wf4	293642	558.46	558.42	-0.04	wf4	293642	566.18	566.07	-0.11
wf4	293621				wf4	293621			
wf4	293600	558.35	558.31	-0.04	wf4	293600	566.1	565.99	-0.11
wf4	293499	558.51	558.47	-0.04	wf4	293499	566.42	566.32	-0.1
wf4	292711	557.81	557.76	-0.05	wf4	292711	565.64	565.53	-0.11
wf4	291834	557.27	557.22	-0.05	wf4	291834	565.15	565.03	-0.12
wf4	291282	556.98	556.93	-0.05	wf4	291282	565.36	565.24	-0.12
wf4	290271	556.32	556.27	-0.05	wf4	290271	564.35	564.22	-0.13
wf4	289479	555.84	555.78	-0.06	wf4	289479	563.83	563.69	-0.14
wf4	289442	555.81	555.75	-0.06	wf4	289442	563.8	563.66	-0.14
wf4	289441	555.82	555.75	-0.07	wf4	289441	563.84	563.7	-0.14
wf4	289429	555.81	555.74	-0.07	wf4	289429	563.84	563.69	-0.15
wf4	289428	555.79	555.73	-0.06	wf4	289428	563.69	563.55	-0.14
wf4	289379	555.77	555.7	-0.07	wf4	289379	563.66	563.52	-0.14
wf4	289313	555.58	555.52	-0.06	wf4	289313	563.25	563.1	-0.15
wf4	289274				wf4	289274			
wf4	289236	555.4	555.34	-0.06	wf4	289236	563.03	562.88	-0.15
wf4	289136	555.55	555.48	-0.07	wf4	289136	563.39	563.24	-0.15
wf4	288475	555.19	555.12	-0.07	wf4	288475	562.95	562.79	-0.16
wf4	287615	554.54	554.46	-0.08	wf4	287615	562.51	562.34	-0.17
wf4	286976	554.17	554.09	-0.08	wf4	286976	562.04	561.87	-0.17
wf4	286880	554.08	554	-0.08	wf4	286880	561.73	561.55	-0.18
wf4	286844				wf4	286844			
wf4	286808	553.91	553.83	-0.08	wf4	286808	561.5	561.32	-0.18
wf4	286710	553.81	553.72	-0.09	wf4	286710	561.53	561.34	-0.19
wf4	285970	553.46	553.37	-0.09	wf4	285970	561.23	561.03	-0.2
wf4	284944	552.84	552.74	-0.1	wf4	284944	560.65	560.44	-0.21
wf4	283853	551.97	551.85	-0.12	wf4	283853	559.82	559.58	-0.24
wf4	283400	551.68	551.56	-0.12	wf4	283400	559.5	559.25	-0.25
wf4	282801	551.17	551.03	-0.14	wf4	282801	559.03	558.76	-0.27
wf4	281871	551.28	551.15	-0.13	wf4	281871	559.24	558.98	-0.26
wf4	281832	551.27	551.14	-0.13	wf4	281832	559.23	558.97	-0.26

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

Reach	River Station	100-yr				Reach	River Station	SPF		
		Water Surface Elevation (ft)						Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline	
wf4	281831	551.21	551.07	-0.14	wf4	281831	559.25	558.99	-0.26	
wf4	281821	551.2	551.06	-0.14	wf4	281821	559.15	558.88	-0.27	
wf4	281820	551.05	550.91	-0.14	wf4	281820	559.11	558.84	-0.27	
wf4	281771	551.02	550.88	-0.14	wf4	281771	558.97	558.7	-0.27	
wf4	281199	550.28	550.13	-0.15	wf4	281199	558.08	557.78	-0.3	
wf4	280042	549.68	549.51	-0.17	wf4	280042	557.55	557.23	-0.32	
wf4	279002	549.2	549.02	-0.18	wf4	279002	557.3	556.95	-0.35	
wf4	278130	548.81	548.61	-0.2	wf4	278130	556.9	556.54	-0.36	
wf4	277391	548.43	548.22	-0.21	wf4	277391	556.56	556.17	-0.39	
wf4	276853	547.8	547.57	-0.23	wf4	276853	555.91	555.49	-0.42	
wf4	276692	547.74	547.5	-0.24	wf4	276692	555.9	555.48	-0.42	
wf4	276627				wf4	276627				
wf4	276562	547.38	547.12	-0.26	wf4	276562	555.62	555.19	-0.43	
wf4	276325	547.08	546.81	-0.27	wf4	276325	555.18	554.73	-0.45	
wf4	275969	546.9	546.62	-0.28	wf4	275969	555.04	554.58	-0.46	
wf4	275461	546.2	545.89	-0.31	wf4	275461	554.51	554	-0.51	
wf4	274754	546.23	545.9	-0.33	wf4	274754	554.74	554.23	-0.51	
wf4	273902	545.43	545.03	-0.4	wf4	273902	554.31	553.76	-0.55	
wf4	273102	544.67	544.17	-0.5	wf4	273102	553.99	553.41	-0.58	
wf4	272377	544.89	544.58	-0.31	wf4	272377	554.06	553.58	-0.48	
wf4	271794	544.71	544.47	-0.24	wf4	271794	553.92	553.49	-0.43	
wf4	271402	544.49	544.35	-0.14	wf4	271402	553.82	553.42	-0.4	
wf4	270730	544.49	544.29	-0.2	wf4	270730	553.88	553.43	-0.45	
wf4	270249	544.07	543.94	-0.13	wf4	270249	553.72	553.27	-0.45	
wf4	269743	544.01	543.8	-0.21	wf4	269743	553.72	553.24	-0.48	
wf4	269070	543.75	543.53	-0.22	wf4	269070	553.62	553.14	-0.48	
wf4	268190	543.46	543.23	-0.23	wf4	268190	553.41	552.92	-0.49	
wf4	267221	542.97	542.71	-0.26	wf4	267221	553.23	552.71	-0.52	
wf4	266213	542.95	542.68	-0.27	wf4	266213	553.27	552.76	-0.51	
wf4	264804	542.87	542.59	-0.28	wf4	264804	553.25	552.74	-0.51	
wf4	263531	542.78	542.45	-0.33	wf4	263531	553.22	552.68	-0.54	
wf4	262705	542.07	541.53	-0.54	wf4	262705	552.99	552.27	-0.72	
wf4	262599	541.38	540.17	-1.21	wf4	262599	553.02	551.42	-1.6	
wf4	262548				wf4	262548				
wf4	262497	540.64	539.7	-0.94	wf4	262497	552.88	548.78	-4.1	
wf4	262394	540.55	539.6	-0.95	wf4	262394	552.88	548.98	-3.9	
wf4	261002	540.7	539.25	-1.45	wf4	261002	552.75	548.77	-3.98	
wf4	260385	540.62	539.07	-1.55	wf4	260385	552.68	548.59	-4.09	
wf4	259657	539.69	537.9	-1.79	wf4	259657	551.76	547.26	-4.5	
wf4	259538	538.93	536.34	-2.59	wf4	259538	551.47	546.51	-4.96	
wf4	259500				wf4	259500				
wf4	259463	538.57	535.4	-3.17	wf4	259463	551.28	546.18	-5.1	
wf4	259337	538.97	535.73	-3.24	wf4	259337	551.59	546.51	-5.08	
wf4	259003	538.98	535.69	-3.29	wf4	259003	551.69	546.63	-5.06	
wf4	258678	539	535.69	-3.31	wf4	258678	551.73	546.65	-5.08	
wf4	258103	539.02	535.72	-3.3	wf4	258103	551.73	546.68	-5.05	
wf4	257654	538.33	535.47	-2.86	wf4	257654	551.4	546.54	-4.86	
wf4	257557	538.21	533.89	-4.32	wf4	257557	551.37	545.96	-5.41	
wf4	257546				wf4	257546				
wf4	257536	538.06	533.38	-4.68	wf4	257536	551.19	545.8	-5.39	
wf4	257535	538.06	533.37	-4.69	wf4	257535	551.19	545.8	-5.39	
wf4	257426	538.01	528.42	-9.59	wf4	257426	551.19	545.8	-5.39	
wf3	245866	526.33	526.41	0.08	wf3	245866	539.26	539.2	-0.06	
wf3	244898	525.84	525.91	0.07	wf3	244898	538.45	538.39	-0.06	
wf3	244798	525.75	525.83	0.08	wf3	244798	538.37	538.32	-0.05	
wf3	244797	525.75	525.83	0.08	wf3	244797	538.37	538.31	-0.06	
wf3	244766				wf3	244766				
wf3	244736	525.62	525.7	0.08	wf3	244736	538.17	538.11	-0.06	
wf3	244735	525.62	525.7	0.08	wf3	244735	538.17	538.11	-0.06	
wf3	244635	525.54	525.62	0.08	wf3	244635	538.05	537.99	-0.06	
wf3	243785	525.24	525.32	0.08	wf3	243785	537.72	537.66	-0.06	
wf3	243471	525.04	525.13	0.09	wf3	243471	537.72	537.7	-0.02	
wf3	242998	525.04	525.29	0.25	wf3	242998	537.95	537.93	-0.02	
wf3	242813	524.98	524.93	-0.05	wf3	242813	537.9	537.78	-0.12	
wf3	242451	524.7	524.36	-0.34	wf3	242451	537.59	537.33	-0.26	
wf3	242363	524.66	524.33	-0.33	wf3	242363	536.89	536.62	-0.27	
wf3	242340				wf3	242340				

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

Reach	River Station	100-yr			Reach	River Station	SPF		
		Water Surface Elevation (ft)					Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
wf3	242318	524.39	524.04	-0.35	wf3	242318	536.58	536.28	-0.3
wf3	242259	524.31	523.95	-0.36	wf3	242259	536.79	536.49	-0.3
wf3	242222	524.35	523.99	-0.36	wf3	242222	536.86	536.56	-0.3
wf3	242121	524.35	524	-0.35	wf3	242121	536.76	536.46	-0.3
wf3	242120	524.35	524	-0.35	wf3	242120	536.76	536.46	-0.3
wf3	242110				wf3	242110			
wf3	242100	524.29	523.94	-0.35	wf3	242100	536.57	536.27	-0.3
wf3	242099	524.29	523.94	-0.35	wf3	242099	536.57	536.27	-0.3
wf3	241948	524	523.63	-0.37	wf3	241948	536.2	535.89	-0.31
wf3	241947	524	523.62	-0.38	wf3	241947	536.19	535.88	-0.31
wf3	241937				wf3	241937			
wf3	241927	523.94	523.56	-0.38	wf3	241927	535.83	535.55	-0.28
wf3	241926	523.94	523.56	-0.38	wf3	241926	535.83	535.55	-0.28
wf3	241839	523.94	523.57	-0.37	wf3	241839	535.86	535.58	-0.28
wf3	241838	523.94	523.57	-0.37	wf3	241838	535.86	535.58	-0.28
wf3	241825				wf3	241825			
wf3	241812	523.76	523.38	-0.38	wf3	241812	535.18	534.9	-0.28
wf3	241811	523.76	523.38	-0.38	wf3	241811	535.18	534.9	-0.28
wf3	241708	523.89	523.5	-0.39	wf3	241708	535.39	535.1	-0.29
wf3	241255	523.8	523.59	-0.21	wf3	241255	535.37	535.26	-0.11
wf3	240517	523.67	523.53	-0.14	wf3	240517	535.14	535.13	-0.01
wf3	239744	523.48	523.31	-0.17	wf3	239744	534.74	534.67	-0.07
wf3	239369	523.34	523.17	-0.17	wf3	239369	534.38	534.35	-0.03
wf3	239262	523.32	523	-0.32	wf3	239262	534.22	533.86	-0.36
wf3	239261	523.32	523	-0.32	wf3	239261	534.22	533.86	-0.36
wf3	239229				wf3	239229			
wf3	239198	523.25	522.93	-0.32	wf3	239198	534.12	533.75	-0.37
wf3	239197	523.25	522.93	-0.32	wf3	239197	534.12	533.75	-0.37
wf3	239095	523.19	522.87	-0.32	wf3	239095	534	533.63	-0.37
wf3	238751	522.99	522.66	-0.33	wf3	238751	534.01	533.62	-0.39
wf3	238508	522.98	522.64	-0.34	wf3	238508	534.1	533.72	-0.38
wf3	238412	523.09	522.76	-0.33	wf3	238412	534.23	533.86	-0.37
wf3	238411	523.09	522.76	-0.33	wf3	238411	534.23	533.86	-0.37
wf3	238401				wf3	238401			
wf3	238391	523.07	522.73	-0.34	wf3	238391	534.19	533.84	-0.35
wf3	238390	523.06	522.73	-0.33	wf3	238390	534.19	533.84	-0.35
wf3	238288	522.91	522.57	-0.34	wf3	238288	534.01	533.64	-0.37
wf3	237615	522.87	522.53	-0.34	wf3	237615	533.88	533.51	-0.37
wf3	236729	522.9	522.56	-0.34	wf3	236729	533.95	533.58	-0.37
wf3	235522	522.68	522.33	-0.35	wf3	235522	533.51	533.13	-0.38
wf3	235413	522.7	522.35	-0.35	wf3	235413	533.52	533.14	-0.38
wf3	235412	522.7	522.35	-0.35	wf3	235412	533.52	533.14	-0.38
wf3	235354				wf3	235354			
wf3	235297	522.66	522.31	-0.35	wf3	235297	533.46	533.07	-0.39
wf3	235296	522.66	522.31	-0.35	wf3	235296	533.46	533.07	-0.39
wf3	235192	522.7	522.35	-0.35	wf3	235192	533.57	533.19	-0.38
wf3	234857	522.65	522.3	-0.35	wf3	234857	533.48	533.09	-0.39
wf3	233994	522.6	522.25	-0.35	wf3	233994	533.36	532.96	-0.4
wf3	233091	522.49	522.18	-0.31	wf3	233091	533.1	532.84	-0.26
wf3	232217	522.21	521.99	-0.22	wf3	232217	532.47	532.4	-0.07
wf3	231700	522.12	521.92	-0.2	wf3	231700	532.29	532.27	-0.02
wf3	231452	522.22	521.95	-0.27	wf3	231452	532.5	532.3	-0.2
wf3	231341	522.01	521.73	-0.28	wf3	231341	532.01	531.8	-0.21
wf3	231340	522.01	521.73	-0.28	wf3	231340	532.01	531.8	-0.21
wf3	231316				wf3	231316			
wf3	231292	521.92	521.64	-0.28	wf3	231292	531.81	531.6	-0.21
wf3	231291	521.92	521.64	-0.28	wf3	231291	531.81	531.6	-0.21
wf3	231242	521.95	521.68	-0.27	wf3	231242	531.9	531.69	-0.21
wf3	231188	522.02	521.75	-0.27	wf3	231188	532.05	531.85	-0.2
wf3	231101	522	521.72	-0.28	wf3	231101	532.01	531.8	-0.21
wf3	231100	522	521.72	-0.28	wf3	231100	532.01	531.8	-0.21
wf3	231025				wf3	231025			
wf3	230950	521.95	521.67	-0.28	wf3	230950	531.84	531.64	-0.2
wf3	230949	521.95	521.67	-0.28	wf3	230949	531.84	531.64	-0.2
wf3	230852	521.94	521.66	-0.28	wf3	230852	531.82	531.62	-0.2
wf3	230254	521.8	521.52	-0.28	wf3	230254	531.41	531.2	-0.21
wf3	229630	521.64	521.36	-0.28	wf3	229630	530.99	530.77	-0.22

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

Reach	River Station	100-yr			Reach	River Station	SPF		
		Water Surface Elevation (ft)					Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
wf3	229527	521.63	521.34	-0.29	wf3	229527	530.91	530.7	-0.21
wf3	229526	521.63	521.34	-0.29	wf3	229526	530.91	530.69	-0.22
wf3	229494				wf3	229494			
wf3	229463	521.59	521.3	-0.29	wf3	229463	530.72	530.52	-0.2
wf3	229462	521.59	521.3	-0.29	wf3	229462	530.72	530.52	-0.2
wf3	229429	521.57	521.28	-0.29	wf3	229429	530.72	530.51	-0.21
wf3	229428	521	520.68	-0.32	wf3	229428	529.59	529.35	-0.24
wf3	229412	520.99	520.67	-0.32	wf3	229412	529.57	529.33	-0.24
wf3	229394	521.34	521.03	-0.31	wf3	229394	530.24	530.02	-0.22
wf3	229360	521.32	521.02	-0.3	wf3	229360	530.26	530.04	-0.22
wf3	228755	521.17	520.86	-0.31	wf3	228755	530.05	529.82	-0.23
wf3	228208	521.1	520.79	-0.31	wf3	228208	529.9	529.66	-0.24
wf3	228106	521	520.68	-0.32	wf3	228106	529.52	529.28	-0.24
wf3	228105	521	520.68	-0.32	wf3	228105	529.52	529.28	-0.24
wf3	228095				wf3	228095			
wf3	228085	520.94	520.62	-0.32	wf3	228085	529.3	529.06	-0.24
wf3	228084	520.94	520.62	-0.32	wf3	228084	529.3	529.06	-0.24
wf3	227980	521.02	520.7	-0.32	wf3	227980	529.66	529.42	-0.24
wf3	227288	521.02	520.71	-0.31	wf3	227288	529.63	529.39	-0.24
wf3	226962	520.99	520.67	-0.32	wf3	226962	529.61	529.37	-0.24
wf3	225923	520.91	520.58	-0.33	wf3	225923	529.47	529.22	-0.25
wf3	225658	520.89	520.57	-0.32	wf3	225658	529.43	529.18	-0.25
wf3	225271	520.89	520.56	-0.33	wf3	225271	529.45	529.21	-0.24
wf3	224594	520.82	520.49	-0.33	wf3	224594	529.34	529.09	-0.25
wf3	223820	520.7	520.36	-0.34	wf3	223820	529.23	528.98	-0.25
wf3	223377	520.29	519.92	-0.37	wf3	223377	528.51	528.22	-0.29
wf3	223089	520.18	519.81	-0.37	wf3	223089	528.19	527.88	-0.31
wf3	222998	520.01	519.63	-0.38	wf3	222998	527.81	527.48	-0.33
wf3	222947				wf3	222947			
wf3	222897	519.35	518.83	-0.52	wf3	222897	526.78	526.44	-0.34
wf3	222896	519.35	518.83	-0.52	wf3	222896	526.78	526.44	-0.34
wf3	222789	519.69	519.1	-0.59	wf3	222789	527.53	526.99	-0.54
wf3	222503	519.7	519.12	-0.58	wf3	222503	527.52	527.02	-0.5
wf3	221820	519.67	519.05	-0.62	wf3	221820	527.57	526.98	-0.59
wf3	221650	519.66	519.07	-0.59	wf3	221650	527.56	526.97	-0.59
wf3	221044	519.65	519.08	-0.57	wf3	221044	527.56	526.99	-0.57
wf3	220594	519.63	519.06	-0.57	wf3	220594	527.52	526.96	-0.56
wf3	220310	519.61	519.01	-0.6	wf3	220310	527.5	526.88	-0.62
wf3	220050	519.59	518.99	-0.6	wf3	220050	527.46	526.83	-0.63
wf3	219536	519.44	518.79	-0.65	wf3	219536	527.32	526.61	-0.71
wf3	218677	519.32	518.7	-0.62	wf3	218677	527.12	526.46	-0.66
wf3	218560	518.84	518.17	-0.67	wf3	218560	526.12	525.37	-0.75
wf3	218528				wf3	218528			
wf3	218496	518.77	518.04	-0.73	wf3	218496	525.45	524.78	-0.67
wf3	218384	518.79	518.11	-0.68	wf3	218384	525.5	525	-0.5
wf3	218000	518.78	518.19	-0.59	wf3	218000	525.59	525.14	-0.45
wf3	217999	518.57	518.19	-0.38	wf3	217999	525.5	525.15	-0.35
wf3	217981.5	518.57	518.18	-0.39	wf3	217981.5	525.49	525.14	-0.35
wf3	217980.5	518.64	518.18	-0.46	wf3	217980.5	525.52	525.11	-0.41
wf3	217780	518.6	518.16	-0.44	wf3	217780	525.48	525.08	-0.4
wf3	217369	518.63	518.09	-0.54	wf3	217369	525.57	525	-0.57
wf3	215762	517.7	517.48	-0.22	wf3	215762	524.8	524.46	-0.34
wf3	214946	517.27	517.01	-0.26	wf3	214946	524.32	523.94	-0.38
wf3	214788	517.13	516.9	-0.23	wf3	214788	524.14	523.78	-0.36
wf3	213435	516.17	516.07	-0.1	wf3	213435	523.26	522.94	-0.32
wf3	212737	515.5	515.11	-0.39	wf3	212737	522.44	522.17	-0.27
wf3	212018	514.97	514.59	-0.38	wf3	212018	521.98	521.65	-0.33
wf3	211133	514.3	513.44	-0.86	wf3	211133	521.5	520.97	-0.53
wf3	210574	513.91	513.4	-0.51	wf3	210574	521.16	520.84	-0.32
wf3	209960	513.3	513.16	-0.14	wf3	209960	520.82	520.65	-0.17
wf3	209288	513.08	513	-0.08	wf3	209288	520.57	520.48	-0.09
wf3	208797	512.92	512.82	-0.1	wf3	208797	520.38	520.31	-0.07
wf3	206439	512.12	512.15	0.03	wf3	206439	519.9	519.92	0.02
wf3	206340	512.16	512.16	0	wf3	206340	519.93	519.93	0
wf3	206327				wf3	206327			
wf3	206314	511.87	511.87	0	wf3	206314	519.8	519.8	0
wf3	206218	511.83	511.83	0	wf3	206218	519.72	519.72	0

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

Reach	River Station	100-yr			Reach	River Station	SPF		
		Water Surface Elevation (ft)					Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
cf	65616	629.39	629.39	0	cf	65616	636.28	636.28	0
cf	65344	629.39	629.39	0	cf	65344	636.28	636.28	0
cf	64380	629.39	629.39	0	cf	64380	636.28	636.28	0
cf	62953	629.39	629.39	0	cf	62953	636.28	636.28	0
cf	62405	629.39	629.39	0	cf	62405	636.28	636.28	0
cf	61472	629.39	629.39	0	cf	61472	636.28	636.28	0
cf	60451	628.76	628.76	0	cf	60451	635.56	635.56	0
cf	58850	626.31	626.31	0	cf	58850	634	634	0
cf	57021	623.98	623.98	0	cf	57021	632.64	632.64	0
cf	54806	622.09	622.09	0	cf	54806	631.3	631.3	0
cf	53901	620.82	620.82	0	cf	53901	630.46	630.46	0
cf	53352	619.91	619.91	0	cf	53352	629.79	629.79	0
cf	52242	618.54	618.54	0	cf	52242	629.15	629.15	0
cf	52192	618.4	618.4	0	cf	52192	629.13	629.13	0
cf	52140	618.41	618.41	0	cf	52140	629.09	629.09	0
cf	51599	617.88	617.88	0	cf	51599	628.88	628.88	0
cf	50598	616.53	616.53	0	cf	50598	628.32	628.32	0
cf	49420	614.5	614.5	0	cf	49420	627.62	627.62	0
cf	46736	610.62	610.62	0	cf	46736	624.37	624.37	0
cf	46611	610.44	610.44	0	cf	46611	622.77	622.77	0
cf	46610	610.44	610.44	0	cf	46610	622.77	622.77	0
cf	46550			0	cf	46550			0
cf	46490	610.16	610.16	0	cf	46490	621.09	621.09	0
cf	46489	610.16	610.16	0	cf	46489	621.08	621.08	0
cf	46175	610.12	610.12	0	cf	46175	621.3	621.3	0
cf	45544	609.27	609.27	0	cf	45544	620.22	620.22	0
cf	45015	608.02	608.02	0	cf	45015	618.34	618.34	0
cf	44342	607.02	607.02	0	cf	44342	616.16	616.16	0
cf	43324	606.26	606.26	0	cf	43324	615.14	615.14	0
cf	41045	600.93	600.93	0	cf	41045	611.05	611.05	0
cf	40178	597.99	597.99	0	cf	40178	607.63	607.63	0
cf	40064	598.12	598.12	0	cf	40064	607.64	607.64	0
cf	40020.5			0	cf	40020.5			0
cf	39977	597.98	597.98	0	cf	39977	607.46	607.46	0
cf	39879	598	598	0	cf	39879	607.73	607.73	0
cf	39380	597.59	597.59	0	cf	39380	606.93	606.93	0
cf	39101	597.35	597.35	0	cf	39101	607.1	607.1	0
cf	39068	594.87	594.87	0	cf	39068	601.76	601.76	0
cf	39056	593.81	593.81	0	cf	39056	600.69	600.69	0
cf	39023	592.16	592.16	0	cf	39023	601.88	601.88	0
cf	38738	591.15	591.15	0	cf	38738	600.67	600.67	0
cf	38091	590.61	590.61	0	cf	38091	600.28	600.28	0
cf	37449	590	590	0	cf	37449	600.04	600.04	0
cf	36466	588.65	588.65	0	cf	36466	599.07	599.07	0
cf	35969	587.87	587.87	0	cf	35969	598.78	598.78	0
cf	35519	587.4	587.4	0	cf	35519	598.56	598.56	0
cf	35076	586.56	586.56	0	cf	35076	598.27	598.27	0
cf	35016	585.91	585.91	0	cf	35016	598.03	598.03	0
cf	34957	586.3	586.3	0	cf	34957	597.89	597.89	0
cf	34915	585.15	585.15	0	cf	34915	595.77	595.77	0
cf	34896.5			0	cf	34896.5			0
cf	34878	584.56	584.56	0	cf	34878	595.15	595.15	0
cf	34846	584.32	584.32	0	cf	34846	594.81	594.81	0
cf	34830			0	cf	34830			0
cf	34814	583.37	583.37	0	cf	34814	593.47	593.47	0
cf	34699	584.08	584.08	0	cf	34699	594.61	594.61	0
cf	34116	582.55	582.55	0	cf	34116	592.43	592.43	0
cf	33577	581.58	581.58	0	cf	33577	591.32	591.32	0
cf	32940	580.42	580.42	0	cf	32940	590.11	590.11	0
cf	32371	579.68	579.68	0	cf	32371	590.11	590.11	0
cf	31770	578.46	578.46	0	cf	31770	589.02	589.02	0
cf	30913	577.14	577.14	0	cf	30913	587.83	587.83	0
cf	30174	576.01	576.01	0	cf	30174	587.25	587.25	0
cf	29663	574.71	574.71	0	cf	29663	586.56	586.56	0
cf	29638	571.69	571.69	0	cf	29638	584.38	584.38	0
cf	29613	573.35	573.35	0	cf	29613	585.1	585.1	0
cf	29535	573.3	573.3	0	cf	29535	585.59	585.59	0

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

		100-yr					SPF		
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
cf	29485	572.7	572.7	0	cf	29485	585.2	585.2	0
cf	29435	572.83	572.83	0	cf	29435	585.13	585.13	0
cf	28689	571.64	571.64	0	cf	28689	582.4	582.4	0
cf	27364	569.33	569.32	-0.01	cf	27364	579.95	579.95	0
cf	26300	567.98	567.98	0	cf	26300	578.79	578.79	0
cf	25421	567.17	567.17	0	cf	25421	577.86	577.86	0
cf	25371	566.93	566.93	0	cf	25371	577.51	577.51	0
cf	25321	566.88	566.88	0	cf	25321	577.29	577.29	0
cf	24456	565.44	565.44	0	cf	24456	576	576	0
cf	24355	565.58	565.58	0	cf	24355	576.31	576.31	0
cf	24326				cf	24326			
cf	24298	565.42	565.42	0	cf	24298	576.13	576.13	0
cf	24297	565.42	565.42	0	cf	24297	576.12	576.12	0
cf	24198	564.71	564.71	0	cf	24198	575.02	575.02	0
cf	23535	563.57	563.57	0	cf	23535	573.72	573.72	0
cf	22604	562.19	562.19	0	cf	22604	572.11	572.11	0
cf	21844	561.09	561.09	0	cf	21844	570.85	570.85	0
cf	21329	560.47	560.47	0	cf	21329	570.14	570.14	0
cf	21279	559.99	559.99	0	cf	21279	569.66	569.66	0
cf	21239	560.29	560.29	0	cf	21239	570.01	570.01	0
cf	20351	559.26	559.26	0	cf	20351	568.32	568.32	0
cf	19645	558.49	558.49	0	cf	19645	567.22	567.22	0
cf	18867	557.63	557.62	-0.01	cf	18867	566.07	566.07	0
cf	18275	557.08	557.08	0	cf	18275	565.87	565.87	0
cf	17746	556.79	556.79	0	cf	17746	565.72	565.72	0
cf	17302	556.22	556.21	-0.01	cf	17302	565.41	565.41	0
cf	17206	556.15	556.14	-0.01	cf	17206	565.15	565.15	0
cf	17183.5				cf	17183.5			
cf	17162	556.02	556.01	-0.01	cf	17162	564.59	564.59	0
cf	17161	556.02	556.01	-0.01	cf	17161	564.59	564.59	0
cf	17057	555.59	555.58	-0.01	cf	17057	564.57	564.57	0
cf	16746	555.52	555.52	0	cf	16746	564.61	564.61	0
cf	16547	555.3	555.29	-0.01	cf	16547	564.09	564.09	0
cf	16268	555.3	555.29	-0.01	cf	16268	564.23	564.23	0
cf	16161	555.26	555.26	0	cf	16161	563.92	563.92	0
cf	16140				cf	16140			
cf	16120	555.19	555.19	0	cf	16120	563.69	563.69	0
cf	16100	555.26	555.25	-0.01	cf	16100	563.81	563.81	0
cf	16077.5				cf	16077.5			
cf	16054	555.2	555.2	0	cf	16054	563.6	563.61	0.01
cf	15948	555.15	555.14	-0.01	cf	15948	563.67	563.67	0
cf	15613	554.57	554.56	-0.01	cf	15613	562.76	562.76	0
cf	15442	554.45	554.44	-0.01	cf	15442	562.92	562.92	0
cf	14949	554.05	554.04	-0.01	cf	14949	562.17	562.17	0
cf	14297	553.62	553.61	-0.01	cf	14297	561.72	561.72	0
cf	13396	552.71	552.69	-0.02	cf	13396	561.17	561.17	0
cf	13386				cf	13386			
cf	13381	552.66	552.65	-0.01	cf	13381	560.98	560.99	0.01
cf	13376	552.65	552.64	-0.01	cf	13376	560.98	560.98	0
cf	12988	552.37	552.36	-0.01	cf	12988	560.59	560.59	0
cf	12887	552.29	552.28	-0.01	cf	12887	559.47	559.47	0
cf	12886	552.29	552.28	-0.01	cf	12886	559.47	559.47	0
cf	12826				cf	12826			
cf	12766	552.07	552.06	-0.01	cf	12766	559.11	559.11	0
cf	12765	552.07	552.06	-0.01	cf	12765	558.99	558.99	0
cf	12719	552.11	552.09	-0.02	cf	12719	558.94	558.94	0
cf	12703.5				cf	12703.5			
cf	12688	551.93	551.92	-0.01	cf	12688	558.53	558.53	0
cf	12665	551.95	551.93	-0.02	cf	12665	558.6	558.6	0
cf	12626	551.96	551.95	-0.01	cf	12626	558.72	558.72	0
cf	12616				cf	12616			
cf	12565	547.53	547.38	-0.15	cf	12565	557.82	557.83	0.01
cf	12541	547.2	547.05	-0.15	cf	12541	557.46	557.47	0.01
cf	12411	547.09	546.94	-0.15	cf	12411	557.18	557.18	0
cf	12313	546.97	546.81	-0.16	cf	12313	556.94	556.94	0
cf	12287				cf	12287			
cf	12262	546.69	546.52	-0.17	cf	12262	556.41	556.42	0.01

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

		100-yr					SPF		
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
cf	12261	546.69	546.52	-0.17	cf	12261	556.41	556.42	0.01
cf	12131	546.68	546.51	-0.17	cf	12131	556.37	556.37	0
cf	12130	546.67	546.51	-0.16	cf	12130	556.54	556.54	0
cf	12075				cf	12075			
cf	12020	546.48	546.31	-0.17	cf	12020	556.21	556.21	0
cf	12019	546.48	546.31	-0.17	cf	12019	556.21	556.21	0
cf	11918	546.33	546.15	-0.18	cf	11918	555.86	555.87	0.01
cf	11006	545.91	545.72	-0.19	cf	11006	555.83	555.83	0
cf	10956	544.91	544.66	-0.25	cf	10956	555.54	555.54	0
cf	10906	545.51	545.29	-0.22	cf	10906	555.73	555.74	0.01
cf	10175	545.17	544.94	-0.23	cf	10175	555.5	555.5	0
cf	9614	544.9	544.66	-0.24	cf	9614	555.29	555.29	0
cf	9566	544.3	544.02	-0.28	cf	9566	555.16	555.16	0
cf	9515	544.63	544.37	-0.26	cf	9515	555.18	555.19	0.01
cf	9045	544.28	544	-0.28	cf	9045	554.98	554.99	0.01
cf	8293	543.46	543.11	-0.35	cf	8293	554.61	554.62	0.01
cf	8243	542.69	542.12	-0.57	cf	8243	554.67	554.67	0
cf	8200	542.96	542.49	-0.47	cf	8200	554.31	554.32	0.01
cf	8189				cf	8189			
cf	8179	542.78	542.27	-0.51	cf	8179	554.06	554.06	0
cf	8178	542.78	542.27	-0.51	cf	8178	554.06	554.06	0
cf	8073	542.75	542.23	-0.52	cf	8073	554.24	554.24	0
cf	7400	541.96	541.34	-0.62	cf	7400	553.79	553.79	0
cf	6757	541.64	540.95	-0.69	cf	6757	553.69	553.69	0
cf	6707	541.53	540.8	-0.73	cf	6707	553.67	553.67	0
cf	6656	541.65	540.94	-0.71	cf	6656	553.69	553.7	0.01
cf	6258	541.58	540.83	-0.75	cf	6258	553.75	553.76	0.01
cf	6158	541.19	540.33	-0.86	cf	6158	553.62	553.63	0.01
cf	6129.5				cf	6129.5			
cf	6102	541.13	540.26	-0.87	cf	6102	553.59	553.6	0.01
cf	6101	541.13	540.26	-0.87	cf	6101	553.59	553.6	0.01
cf	5990	541.25	540.42	-0.83	cf	5990	553.58	553.59	0.01
cf	5170	540.16	539.12	-1.04	cf	5170	552.33	552.34	0.01
cf	4535	539.81	538.6	-1.21	cf	4535	552.41	552.42	0.01
cf	4433	539.7	538.44	-1.26	cf	4433	552.4	552.41	0.01
cf	4402				cf	4402			
cf	4372	539.58	538.27	-1.31	cf	4372	552.27	552.28	0.01
cf	4371	539.58	538.27	-1.31	cf	4371	552.27	552.28	0.01
cf	4267	539.56	538.25	-1.31	cf	4267	552.19	552.2	0.01
cf	4057	539.67	538.4	-1.27	cf	4057	552.22	552.24	0.02
cf	3803	539.42	538.04	-1.38	cf	3803	552.1	551.98	-0.12
cf	3590	539.4	537.93	-1.47	cf	3590	552.09	551.83	-0.26