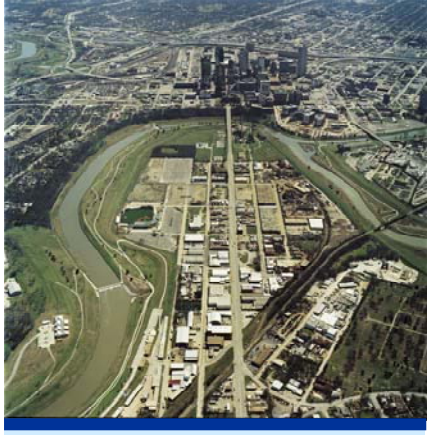

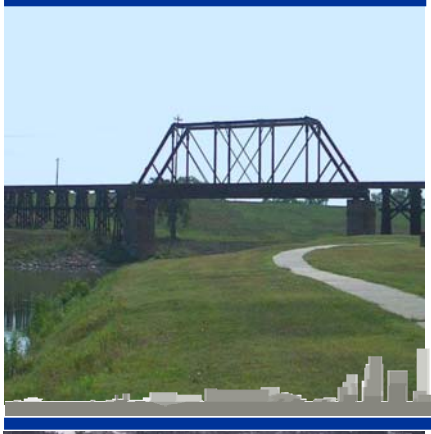

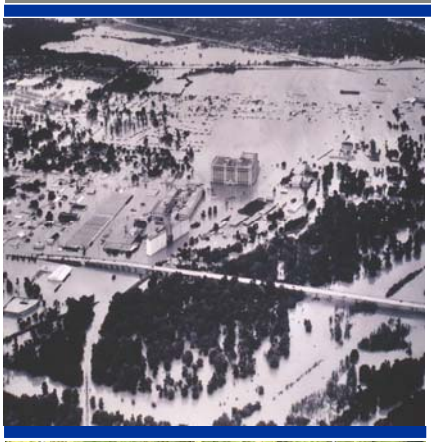

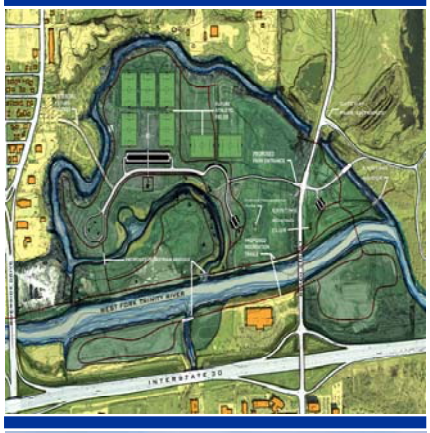

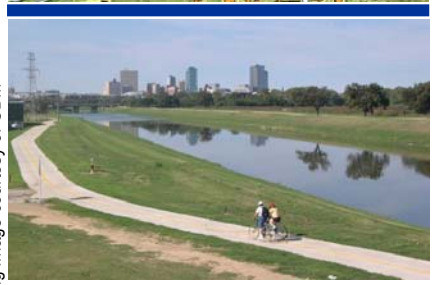

Rendering Image courtesy of CDM

Upper Trinity River
Central City
Fort Worth, Texas

Final Supplement No. 1 to the Final Environmental Impact Statement

Prepared by:
U.S. Army Corps of Engineers
Fort Worth District

March 2008

Interior Drainage

Drainage of the interior area must be provided for conditions when the isolation gates are closed. Approximately 612 acres of land would drain to this interior area; storm sewers and surface grading would be required to convey surface runoff in this area. During normal flow conditions, runoff would drain freely to the West Fork through open isolation gates. During high flow conditions, the isolation gates would be closed and runoff would be confined to the interior area.

Three alternative approaches for providing drainage for interior areas were considered, including gravity discharge, storage of flow, or pumping via a stormwater pump station. The Community Based Alternative incorporates a combination of these approaches to provide storm drainage for the interior area. Gravity discharge would be used when the isolation gates are open; however, gravity flow is not feasible during floods because the design maximum water level in the bypass channel would be higher than in the interior area. During these conditions, a combination of storage and pumping would be used. The interior water feature could provide about 270 acre-feet (equivalent to 88 million gallons) of flood storage by allowing the water level to rise up to 528 feet.

City of Fort Worth drainage criteria are based on the ability to convey flow from a 100-year event. To meet these requirements, the interior area footprint would require a pumping capacity of 300 cfs and 250 acre-feet of storage. Based on these requirements, the proposed pumping and storage system would provide more than two feet of free board between the maximum water level and the minimum building foundation construction elevation of 530 feet NGVD.

A stormwater pump station is proposed for construction on the east side of the interior area near the TRWD gate. During major flood events, the isolation gates would be closed and excess interior drainage would be pumped. The pump station would house four pumps with 100 cfs capacity per pump. One pump would be a spare pump, allowing maintenance to be performed without reducing the capacity of the pump station below 300 cfs at any time. Routine inspection of pump capacity and maintenance would be part of the project sponsor's O&M obligations and subject to annual audit by USACE.

Hydraulic Mitigation

Construction of the bypass channel as proposed in the Community Based Alternative would require the mitigation of floodplain storage, referred to as "valley storage" to compensate for the increased hydraulic efficiency of the bypass channel. Valley storage loss caused by the construction of the bypass channel would be comprised of two components. First, routing the existing Clear Fork and West Fork through the bypass channel in comparison to the existing configuration would reduce the total length of river channel, resulting in less in-line floodplain storage. Second, during high flow scenarios (100-year and SPF conditions), the shorter channel length would also create a drawdown effect on water surface elevations in the Clear Fork and West Fork upstream of the bypass channel. This drawdown effect would also effectively reduce the upstream valley storage.

The amount of valley storage mitigation required for the Community Based Alternative was determined by hydraulic modeling analyses and compliance with the criteria established by the regional Corridor Development Certificate guidelines. The hydraulic analyses quantified the approximate volume of valley storage that would be lost as 5,250 acre-feet (8.47 million cubic yards), without mitigation. Of this, an estimated 2,850 acre-feet would be lost due to the creation of the

shorter bypass channel (reduced length versus existing river channel) and approximately 2,400 acre-feet of valley storage would be lost due to drawdown.

Approach and Methodology for Storage Alternatives

Typical options for creating or replacing valley storage include excavating a wider channel or providing an off-line storage basin. Numerous storage mitigation sites were investigated in an effort to determine the most suitable alternatives and storage sites based on cost effectiveness, proximity to the core project, and other factors. The investigation included a review of aerial photography, existing USACE topography, parcel ownership information, and utilities. Site reconnaissance trips were made along the existing levee system to identify, confirm and visually evaluate potential mitigation sites.

Definition of the geographic area considered for valley storage mitigation reflected a detailed understanding of the hydrologic, meteorologic, and institutional parameters affecting project performance. Valley storage mitigation sites located upstream on the West Fork provide effective valley storage mitigation in compliance with the CDC criteria. The vast majority of the valley storage requirement arises from changes on the West Fork so it is appropriate to provide mitigation on the West Fork. In the SPF, the West Fork flow is the dominant flood peak. The watershed of the West Fork is more than four times larger than the Clear Fork, thus storage located on the West Fork is more likely to provide benefit. The West Fork was investigated from downstream of Riverside Drive to upstream of Westworth Boulevard. The Clear Fork was investigated from its confluence with the West Fork to U.S. Interstate 30.

The evaluation of storage mitigation sites included three phases:

1) identification/investigation, 2) ranking, and 3) findings. The following is a summary of the site identification/investigation, ranking rationale, and findings which determined the most suitable storage mitigation sites.

Site Identification/Investigation

The primary emphasis during the site identification and investigation was to select undeveloped sites in the immediate vicinity of the Trinity River. Aerial photographs and existing site topography were used to develop a set of preliminary valley storage mitigation sites which could be investigated by the project team. Property ownership and existing site utilities were researched and identified for each of the potential sites. A total of forty (40) individual sites were identified and subsequently investigated to estimate the potential amount of valley storage that could be created on each site. The amount of valley storage was then compared to the cost to acquire the property and the cost of necessary site improvements to create the additional storage. The valley storage mitigation sites were divided into two groups and referred to as the Valley Storage Mitigation Sites - Lower West Fork and Upper West Fork as shown on Figures 2-5 and 2-6, of Appendix C respectively.

Site visits were conducted by both CDM and TRWD personnel to further quantify the viability and desirability of each of the sites. The following is a summary of the steps taken in determining the total site improvement costs for each of the preliminary sites.

Site Improvements

Each valley storage mitigation site was investigated for its potential storage capacity based on 100-year and SPF water surface elevations from the hydraulic modeling and USACE topographic data. Based upon this information, each site was evaluated for cuts and fills to determine the potential valley storage volumes on a balanced site basis. Balancing the site meant that all excavation cut materials would be retained on-site, considered to be the most economically favorable alternative, if feasible. The existing topography initially determined which sites could be balanced or required haul-off. Excavation is required below the SPF water surface elevation and fill limited to above SPF on each site to create a net gain in valley storage. A majority of the valley storage mitigation sites did not provide substantial benefit from balancing the excavated material and were subsequently investigated as haul-off sites. After evaluating sites as either balanced, haul-off or a combination, the preliminary excavation and valley storage volumes were tabulated for each of the sites. These volume quantities and respective areas impacted by the various cut and fill operations were tabulated and units prices assigned for each element of work.

Parcel Ownership

Initial parcel ownership identification was performed using parcel ownership information provided by the TRWD geographical information system. Parcel queries were performed on an individual site basis to determine ownership and the current assessed parcel value including site improvements if applicable. Valley storage sites that share off-site fill sites had the parcel costs prorated based on the approximate volume of material to be disposed of at each site.

Additional parcel ownership checks were made through the Tarrant Appraisal District (TAD) website if the initial query did not cover the full extents of the valley storage mitigation sites. Parcel acquisition costs were then tabulated and grouped as either public or private.

Utilities

Public and private utilities conflicts and impacts were initially screened using available City-wide data from the geographical information system. Once the initial screening was completed and the most suitable sites were identified, public and private utility carriers were contacted to confirm the extent and nature of utilities on the preferred sites. Utilities were considered either regional or local depending on the service area they covered. Regional utilities serve larger service areas than that of each individual valley storage mitigation site or serve as major transmission facilities. If the utilities only serve the immediate area of the valley storage mitigation site, then they are considered local.

For estimation purposes local, utility facilities were considered to not require replacement since they could be abandoned or removed at minimal cost without significantly impacting the overall utility service grid. Regional utility facilities given their system-wide importance were assumed to be fully replaced or protected if within the impact limits of each of the valley storage mitigation sites.

Ranking Rationale

The site improvements, costs, parcel ownership and values, and utility relocation costs were tabulated for each site and are shown on Table 2-3 of Appendix C. The sites were then ranked using the ratio of total cost versus storage ($/ AC-FT) with the intent of identifying the most economical sites. These rankings are shown on Table 2-4 of Appendix C.

Site Findings

Cost was one component in the overall evaluation of the storage mitigation sites. Other factors, such as proximity to other improvements, project staging, impacts to existing vegetation, implementation, and ecosystem improvement opportunities were also considered in the final findings. Based on this evaluation, several potential valley storage mitigation sites were identified as favorable to include the Community Based Alternative. The largest site is located approximately three miles upstream of University Drive on the West Fork, and is referred to as the Riverbend site (See Figure 3-13). Through a combination of partial levee removal and excavation, it is estimated that approximately 3,200 acre-feet of valley storage could be created in the Riverbend area. Development of the specific grading plan for this area incorporates opportunities to develop ecological value in conjunction with meeting valley storage requirements. This is described in more detail in subsequent sections. Additional sites located downstream of the proposed Samuels Avenue Dam, between the dam and Interstate Highway 35 were also identified as suitable sites for additional valley storage mitigation.

Utilizing a combination of the Riverbend site and the sites downstream of Samuels Dam would result in valley storage mitigation of approximately 4,050 acre-feet. However, an additional 1,200 acre-feet of valley storage mitigation would be required to fully mitigate valley storage loss associated with the hydraulic elements of the Community Based Alternative.

Drawdown Alternatives

In addition to excavating replacement storage, storage lost due to drawdown can also be mitigated by providing structures or channel roughness to reduce or eliminate the drawdown. However, constricting or otherwise impeding the flow in the bypass channel below the West Fork/Clear Fork confluence is not feasible because it would create unacceptable water surface elevation increases upstream on the Clear Fork. Drawdown mitigation analyses accordingly focus on West Fork sites upstream of the confluence to the bypass channel, and are summarized below.

Channel Dam

A channel dam could be constructed in the West Fork upstream of the confluence with the bypass channel to mitigate or eliminate the drawdown. This concept was rejected because it would impede water craft passage and detract from the aesthetics of the Community Based Alternative.

Large Bridge

A large bridge that would act as a dam during high flows could be constructed on the West Fork upstream of the FW&W Railroad Bridge to mitigate drawdown by allowing water craft passage through restricted flow conveyance openings while impeding flood flows. However, a large bridge would obstruct views of the FW&W Railroad Bridge and Downtown and would require a very wide cross-sectional area for structural integrity. The thickness of the proposed structure would be viewed as an impediment to pedestrian traffic on trails adjacent to the river. This type of bridge would also be extremely expensive to construct.

Channel Obstructions/Modifications

Various combinations of channel modifications to impede flood flows were also considered for the area between University Drive and the FW&W Railroad. Possible obstructions included partially filling the channel, constructing transverse dikes in the floodplain, and installing grade control

structures. These approaches were generally considered to be more aesthetic than the channel dam or bridge described previously.

However, analysis of these approaches indicated that, while it would be possible to eliminate drawdown upstream of University Drive, the channel modifications would require fill in the floodplain resulting in valley storage loss in the area where they are located. The channel obstructions considered in this option were not as effective in mitigating drawdown loss nor were the channel obstructions as cost effective in comparison with other options.

University Drive Modifications

Under existing conditions, a large portion of the 100-year and SPF flows pass over the University Drive embankment north of the bridge over the West Fork. This embankment could be raised to eliminate nearly all of the drawdown upstream of University Drive. About 75 percent of the total West Fork drawdown loss could be mitigated in this way, which is more cost-effective than other alternatives. This option also produces an additional benefit of raising University Drive out of the 100-year flood, allowing additional emergency use of the roadway.

Summary of Hydraulic Mitigation

In summary, valley storage loss associated with the hydraulic elements of the Community Based Alternative would be mitigated by the following:

- Partial levee removal and excavation in the Riverbend site approximately three miles upstream of University Drive;
- Excavation of additional sites immediately downstream of the Samuels Avenue Dam, and adjacent to Interstate Highway 35; and
- Modification of the University Drive roadway embankment, north of the bridge over the West Fork.

In combination, these measures have been verified to fully mitigate for 100 percent of the valley storage inputs, in full compliance with CDC criteria.

Interior Water Feature

The Samuels Avenue Dam would create a backwater impoundment upstream in portions of the West Fork and the Clear Fork, providing the opportunity for inclusion of a focal point, or interior water feature. Community input and stakeholder discussions, both before and after publication of the TRV Master Plan, identified a desire to maintain the location of the existing Clear Fork/West Fork confluence and the associated view corridors. This suggested that the best location for a water feature would generally be between the confluence of the Clear and West Forks and the FW&W Railroad Bridge. A more detailed evaluation of configuration and location for the interior water feature was conducted and is described in the following section.