SH 130 DETAILED COMPENSATORY MITIGATION PLAN
PLUM CREEK SITE
CALDWELL COUNTY, TEXAS
USACE PERMIT #199600228

Permittee:
Texas Department of Transportation
Austin, Texas

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INTRODUCTION

On July 17, 2002 an individual permit (#199600228) was issued by the U.S. Army Corps of Engineers (USACE) to the Texas Turnpike Authority (now the Austin District of the Texas Department of Transportation, TxDOT) authorizing discharge of dredged and fill material into waters of the United States in association with the construction of State Highway 130 (SH 130).

During the SH 130 design process maximum efforts were made to avoid adverse impacts to waters of the U.S. where possible, and to minimize unavoidable impacts.

The 404 permit requires that mitigation for the SH 130 project, intended to compensate for unavoidable adverse impacts to waters of the U.S., abide by the conceptual mitigation plan titled *Conceptual Mitigation Plan, Proposed State Highway 130, Texas Turnpike Authority, USACE-Fort Worth District Project #199600228* by the Texas Turnpike Authority, dated March 2002. The following paragraph presents the Compensatory Mitigation Approach as indicated in the Conceptual Mitigation Plan (CMP) (TxDOT, 2002).

> To accommodate the mitigation requirements of the Ultimate Roadway, TTA will purchase 220 acres for potential mitigation needs, of which 175 acres will be developed as mitigation for the Ultimate Roadway. This 175 acres of mitigation includes 131 acres required to compensate for impacts to jurisdictional waters of the U.S. and functioning riparian buffer resulting from the Interim Roadway. The 175 acres of mitigation will be developed concurrently with the construction of the Interim facility. The remaining 44-acre balance of unused mitigation will be held in reserve and used to compensate for additional impacts resulting from design changes to the interim roadway and/or construction of the ultimate roadway. Should construction of the Interim or Ultimate facility cause impacts that require mitigation acres above the 44-acre reserve, additional mitigation will be developed within the surplus 45 acres purchased but not developed as mitigation. If the impacts due to the final designs exceed the threshold impact caps established in the Special Condition a permit amendment may be necessary upon review by the USACE.

The permit states that the conceptual mitigation plan would result in the enhancement and creation of approximately 63 acres of waters of the U.S. on approximately 175 acres of streamside/floodplain habitat and that the entire 175 acres would be protected through management as mitigation areas and natural areas and deed restriction. This document, based on the outline provided in *Mitigation and the Section 404 Regulatory Program, Draft – May 28, 2002* written by the USACE-Fort Worth District, details proposed mitigation activities on a 265-acre site along Plum Creek in Caldwell County, Texas.

The Exclusive Development Agreement (EDA) executed between TxDOT and Lone Star Infrastructure (LSI) states that LSI shall provide a detailed mitigation plan (or plans) and acquire land area suitable for developing a total of 265 acres of compensatory mitigation for waters of the U.S. and riparian buffer impacts. The proposed mitigation site(s) must be acceptable to the USACE. Within the site(s) LSI must develop 175 acres to be used as compensatory mitigation for SH 130 using the approximate percent habitat mix specified in **Table 1**.

MITIGATION PLAN

Special Condition 1 of the 404 permit states "the permittee shall develop, implement, and abide by a more detailed mitigation plan (or plans, if more than one mitigation plan is necessary) consistent with the conceptual mitigation plan. The permittee shall provide the detailed mitigation plan, or the first of multiple mitigation plans, to the U.S. Army Corps of Engineers (USACE) and the Texas Natural Resource Conservation Commission (TNRCC) (now Texas Commission on Environmental Quality or TCEQ) for review by January 1, 2004, and receive USACE and TNRCC approval prior to commencing any ground disturbing activities within the mitigation area(s). If more than one mitigation area is necessary, the applicant shall submit a detailed mitigation plan or plans for the remaining mitigation areas by January 1, 2005 to the USACE and TNRCC for review and approval. Any detailed mitigation plans shall include a determination of waters of the United States and a functional assessment of existing waters of the United States on the mitigation site, as well as a functional assessment for waters of the United States expected after the detailed mitigation plan is applied. The permittee shall implement the mitigation plan(s) approved by the USACE and TNRCC concurrently with construction of the project and complete the initial construction and plantings associated with the mitigation work by March 15, 2007. Completion of all elements of the final mitigation plan(s) is a requirement of the permit." A subsequent permit modification in the summer of 2005 extended the completion dates for the mitigation plantings by two years, until March 15, 2009.

Each proposed mitigation site is intended to include a mosaic of aquatic resource types, which may include perennial and intermittent streams, bottomland hardwood (described as riparian woodland in this mitigation plan) habitat, floodplain detention/retention features, and wetlands. The use of multiple mitigation methods, including restoration, enhancement, creation, and preservation depending upon physical and ecological site conditions may be included in the plan. The majority of the required mitigation will include restoration of bottomland hardwood (described as riparian woodland in this mitigation plan) habitats (wetlands and non-wetlands) in the floodplains adjacent to natural stream channels. Wetlands, including forested, shrub, and emergent areas, will be restored, enhanced, or created within the mitigation areas. However, since the majority of the permitted sites impacted by SH 130 are jurisdictional streams, non-wetland riparian areas will compose the greatest percentage (55-65%) of the mitigation sites to mitigate for the riparian functional aspects of the streams being impacted (TxDOT, 2002).

Table 1: Relative Percentages of Aquatic Resource Types for SH 130 Mitigation

Aquatic Resource Type	Percent*	Functions
Riparian Woodlands (non-wetland)	60	Wildlife Habitat Streambank Stabilization Biodiversity Maintenance Stormwater Retention Erosion Control Nutrient Cycling/Retention
Emergent Wetlands (<2ft depth)	15	Wildlife Habitat Water Quality/Erosion Control Biodiversity Maintenance Stormwater Retention Nutrient Cycling/Retention
Forested/Scrub Wetlands (<2ft depth)	10	Wildlife Habitat Streambank Stabilization Biodiversity Maintenance Erosion Control Nutrient Cycling/Retention
Deepwater Areas (2 to 5 ft depth)	10	Stormwater Retention Flood Control Water Quality/Erosion Control Fish Habitat Biodiversity Maintenance
Streambed/Temporarily Inundated Floodplain Channels	5	Fish & Wildlife Habitat Drainage/Flood Control Biodiversity Maintenance Water Quality Nutrient Cycling
Total	**100**	

* These values are provided as a guide for mitigation planning and development of cost estimates. Final plans may be adjusted for each category as necessary based on site-specific characteristics

Included in the conceptual mitigation plan was a list of nine potential mitigation sites identified by TxDOT (see **Appendix C**). The CMP indicated that some portion of these nine sites, or others identified later, would be used for compensatory mitigation for unavoidable permanent impacts caused by SH 130 (TxDOT, 2002). On August 22, 2002, TxDOT, LSI, and regulatory agency staff conducted a site visit in order to evaluate the nine potential mitigation sites. Informal feedback received during the site visit from the USACE and TCEQ and a subsequent Hicks & Company assessment indicated that Sites 4 & 5 (sites along Plum Creek in Caldwell County just west of US 183) were the preferred sites (see **Figure 1**).

This detailed mitigation plan calls for acquiring approximately 265 acres (see **Appendix A**) adjacent to Plum Creek of which 175 acres will be used for mitigation Habitat within the mitigation site(s) will be created and enhanced in the approximate percentages shown in **Table 1** and discussed in greater detail in **Section 6.0**. The aquatic resource functions summarized in the third column of **Table 1** are discussed in detail in the CMP (TxDOT, 2002).

1.0 AVOIDANCE AND MINIMIZATION

LSI has incorporated a number of impact avoidance and minimization measures into the design process including: 1) review of design by the Environmental Compliance Manager (ECM) and wetland specialists; 2) design protocols for maintenance of stream dynamics as required by Special Condition 2 of the permit; and 3) design of permanent Total Suspended Solids (TSS) controls (that meet the greater than 80% reduction of TSS standard required by the Edwards Aquifer Recharge Zone rules) at perennial crossings per the CMP, EDA, and TCEQ guidance. Due to recent organizational changes within TxDOT, the Austin District of TxDOT will have primary responsibility for the implementation of the SH 130 project. Therefore, all references dealing with current activities will be to TxDOT rather than TTA. TxDOT has established an Environmental Protection Program (EPP), to be administered by the ECM, in order to ensure environmental compliance. One component of that effort is a Construction Monitoring Plan designed to ensure coordination and oversight of the design and construction of SH 130. Efforts to avoid and minimize environmental impacts have been incorporated in all stages of project development, including the use of Environmental Permits, Issues, and Commitments (EPIC) plan sheets in the construction plans. These EPIC plans will be the central vehicle for identifying, communicating, and tracking environmental compliance and mitigation measures, from design through construction and into post-construction phases of the project. Environmental Compliance Inspectors (ECIs) will monitor construction activities in order to ensure that permit requirements are strictly adhered to.

1.1 Alternatives Analysis

A variety of project alternatives were considered and analyzed during the progression leading up to the final design. As part of the Major Investment Study (MIS) completed by the TxDOT-Austin District in 1997, project planners developed recommendations regarding route and design characteristics. The MIS generally recommended that SH 130 be constructed as a six-lane highway from north of Georgetown to Seguin with a median capable of accommodating other transportation facilities such as HOV lanes or rail (FEIS, 2001).

Initially, TxDOT chose to develop the SH 130 as three separate projects known as Segment A, Segment B, and Segment C. Generally, Segment A went from Georgetown south to US 290; Segment B went from US 290 south to just north of Lockhart; and Segment C covered the remainder of the corridor south to Seguin. For each segment, project planners and design engineers conducted route location and environmental studies, and several public meetings were held. The objectives of the route location process included the preservation, to the maximum extent possible, of the quality of the natural environment; the avoidance or minimization of conflict with existing and planned land uses; utilization of existing rights-of-way; compliance with applicable state and federal laws and regulations; and to the extent possible, conformance with the plans and policies of local governments within the study corridor.

Based on these general criteria, together with engineering and economic considerations, the input of elected officials, and comments made by citizens at the various public meetings, several preliminary alternative alignments were identified (FEIS, 2001). Ten preliminary alignments were identified in Segment A, nine in Segment B, and five in Segment C. In addition, a number of alternatives to constructing SH 130 were examined. Many of these alternatives

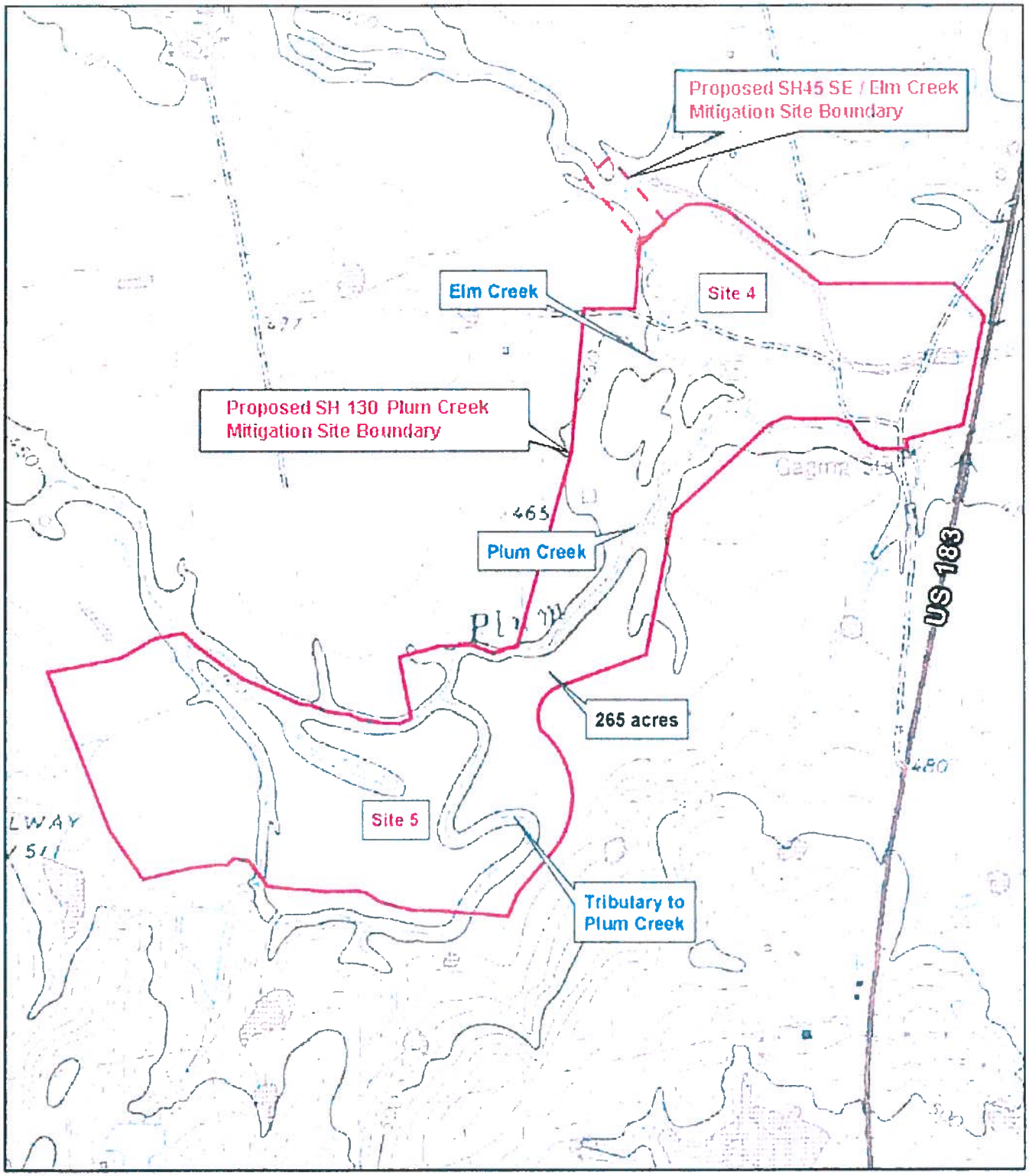

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Figure 1

SH 130 Potential Stream and Wetland Mitigation Sites 4 & 5- Topography

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– such as improvements to existing roadways, construction of new roadways, implementation of TSM and TDM strategies, extensive public transportation improvements, and a HOV lane on IH 35 – are included in the Austin Metropolitan area long-range transportation plan. For the portion of the study corridor that falls outside the boundaries of the Austin metropolitan area long-range transportation plan, improvements such as adding travel lanes to IH 35 or constructing a commuter rail line will provide only minor benefits to IH 35's traffic congestion problem, and will not improve mobility or access in the corridor east of IH 35 (FEIS, 2001). Ultimately, nine primary alternatives were studied, including the no-action alternative.

Five primary considerations resulted in the selection of the preferred alternative; meeting the purpose and need in terms of relieving IH 35 congestion, avoidance of impacting public park land, overwhelming public support, social, economic, and environmental impacts of the build alternatives were roughly the same, and avoidance of direct effects on historic properties that are eligible for the National Register of Historic Places (FEIS, 2001).

Following the approval of a Record of Decision (ROD) for the SH 130 FEIS, the decision was made to proceed with construction as a toll road, to be designed and constructed under an Exclusive Development Agreement (EDA).

2.0 IMPACTS TO WATERS OF THE U.S./WETLANDS

Since approval of the 404 permit for the ultimate schematic, a number of changes have taken place in the project design. Impacts to streams have been refined through the use of a more detailed design, greater access, and the ability to accurately calculate temporary impacts and impacts due to bridge piers. While advocating continued avoidance and minimization of permitted impacts the Environmental Compliance Manager designed a tracking system to monitor changes in impacts and design. The table below shows anticipated impacts as they have been calculated at this stage of design.

Table 2: Jurisdictional Stream and Wetland Impacts by Watershed, Proposed SH 130 Ultimate Roadway*

Watershed	Stream Impacts (Acres)	Stream Impacts (In ft)	Impoundments/On-channel Ponds (Acres)	Jurisdictional Wetland Impacts (Acres)	Total Permanent Impacts (Acres)
San Gabriel River	2.39	11,363	1.64	1.27	5.30
Colorado River	8. 78	46,119	2.57	1.29	12.64
San Marcos River	3.78	21,993	2.44	0.80	7.02
Guadalupe River	0.54	3,267	0.0	0.0	0.54
Total	15.49	82,742	6.65	3.36	25.50

* Based on Appendix J.

2.1 Permanent Impacts

Permanent impacts include fill for roadway embankments and stream channel re-alignment, bridge piers, and secondary permanent impacts. Secondary permanent impacts are permanent impacts that are not direct impacts (e.g., fill) but where construction of the proposed project will impact the hydrologic function of the water of the U.S. in question. These include indirect permanent effects on the remaining undisturbed portion of the jurisdictional waters (such as such as cutting off hydrologic flow to a channel which will not be filled) and/or impacts associated with additional drainage easements (e.g., scraping of the channel).

Table 3: SH 130 Permanent Impacts to Waters of the U.S./Wetlands by Watershed*						
		Watershed				
Type of Water of the U.S.	Impact Type	San Gabriel River	Colorado River	San Marcos River+	Guadalupe River+	Totals
Perennial Stream	Permanent	--	2,000 ln ft/ 0.92 ac	100 ln ft/ 0.05ac	--	2,100 ln ft/ 0.97ac
	Secondary Permanent	--	150 ln ft/0.07 ac	0.0	0.0	150 ln ft/0.07 ac
	Bridge Piers	0.0008 ac	0.0043ac	0.0	0.0	0.0051ac
Intermittent Stream	Permanent	9,684 ln ft/ 2.11ac	24,172 ln ft/ 4.857ac	9,011 ln ft/ 1.99ac	1,850 ln ft/ 0.39ac	44,717 ln ft/ 9.347ac
	Secondary Permanent	375 ln ft/ 0.1ac	750 ln ft/ 0.15ac	0.0	0.0	1,125 ln ft/ 0.25ac
	Bridge Piers	0.0008ac	--	0.0	0.0	0.0008ac
Ephemeral Stream	Permanent	1,304 ln ft/ 0.18ac	18,186 ln ft/ 2.67ac	12,882 ln ft/ 1.74ac	1,417 ln ft/ 0.15ac	33,789 ln ft/ 4.71ac
	Secondary Permanent	--	861 ln ft/ 0.14ac	0.0	0.0	861 ln ft/ 0.14ac
	Bridge Piers	--	--	0.0	0.0	--
On-channel Pond	Permanent	1.635ac	2.57ac	2.44ac	--	6.645ac
	Secondary Permanent	--	--	0.0	0.0	--
	Bridge Piers	0.0003ac	--	0.0	0.0	0.0003ac
Wetland	Permanent	1.27ac	1.19ac	0.8ac	--	3.26ac
	Secondary Permanent	--	0.10ac	0.0	0.0	0.10ac
	Bridge Piers	0.0043ac	--	0.0	0.0	0.0043ac
Totals	Total Permanent	10,988 ln ft/5.195ac	44,358 ln ft/ 12.177ac	21,993 ln ft/ 7.02ac	3,267 ln ft/ 0.54ac	80,606 ln ft/ 24.932ac
	Total Secondary Permanent	375 ln ft/ 0.1ac	1,761 ln ft/ 0.46ac	0.0	0.0	2,136 ln ft/ 0.56ac
	Total Bridge Piers	0.0059ac	0.0043ac	0.0	0.0	0.0102ac

+ Indicates impacts from the permit application were used.
*Based on Appendix J.

2.2 Temporary Impacts

Temporary impacts are primarily due to temporary crossings needed to facilitate construction and pad sites necessary for pier placement. Detail on these crossings is included in Permit Modifications approved by the USACE and summarized in the October 2005 annual compliance report.

Table 4: SH 130 Temporary Impacts to Waters of the U.S./Wetlands by Watershed*					
	Watershed				
Type of Water of the U.S.	San Gabriel River	Colorado River	San Marcos River+	Guadalupe River+	Totals
Perennial Stream	570 ln ft/ 0.54ac	830 ln ft/ 1.2ac	0.0	0.0	1,400 ln ft/ 1.74ac
Intermittent Stream	325 ln ft/ 0.14ac	330 ln ft/ 0.1ac	0.0	0.0	555 ln ft/ 0.24ac
Ephemeral Stream	--	50 ln ft/ 0.02ac	0.0	0.0	50 ln ft/ 0.02ac
On-channel Pond	--	--	0.0	0.0	--
Wetland	120 ln ft/ 1.07ac	220 ln ft/ 0.14ac	0.0	0.0	340 ln ft/ 1.21ac
Totals	1,015 ln ft/ 1.75ac	1,430 ln ft/ 1.46ac	0.0	0.0	2,445 ln ft/ 3.21ac

+ Indicates impacts from the permit application were used.
*Based on Appendix J.

3.0 MITIGATION PLAN GOALS AND OBJECTIVES

The goals of the mitigation plan, as stated in the CMP, are to provide appropriate and adequate compensatory mitigation (for the unavoidable impacts associated with SH 130) on mitigation sites with a high probability for successful establishment and sustainable ecological value (TxDOT, 2002). The table below, as taken from the CMP and updated using latest design information, shows the impacts, average functional index value, and proposed mitigation acreages for jurisdictional waters impacted by SH 130.

Table 5: Proposed Compensatory Mitigation for Section 404 Permitted Crossings

Resource	Linear Feet of Impacts	Acres of Impacts	Riparian Functional Category (Ave.)	Impacts (ac) X Riparian Functional Category *
Perennial Streams	2,250	1.05	3	2.99
Perennial Stream Riparian Corridor (wooded)	/	10.61	2.67	31.83
Intermittent Streams	45,842	9.6	2	14.38
Intermittent Stream Riparian Corridor (wooded)	/	29.63	1.52	66.62
Ephemeral Streams	34,650	4.85	1	6.59
Ephemeral Stream Riparian Corridor (wooded)	/	13.85	1.26	29.40
On-channel Ponds	/	6.65	2	8.08
Wetlands	/	3.36	1.82	7.9
Totals	82,742	127.50	/	167.79

* The cumulative total for the impacts at each site multiplied by the site-specific functional index value.
** Based on Appendix J.

The CMP states:

> Based on meetings with the USACE, Fort Worth Regulatory Branch, TTA developed a three-level functional assessment methodology for streams and wetlands within the corridor. All waters of the U.S., including wetlands, within the project corridor were evaluated based on their functional characteristics as compared to other aquatic resources in the region.... The assessment resulted in mitigation ratios based on function for selected habitat types. These functional-based mitigation ratios were applied to the project impacts to determine compensatory mitigation requirements. These ratios will also be used to determine mitigation requirements should there be a change in impact levels between the schematic and final designs (TxDOT, 2002).

The functional assessment description mentioned in the above paragraph is included in **Appendix D** of this document. Generally, impacts to jurisdictional waters located within the SH 130 right-of-way are translated into Linear Functional Impacts/Credits. This value is used in determining the amount of mitigation necessary to compensate for the functional impact to streams. In order to derive a linear functional impact for an individual crossing, several qualitative values for each crossing, are defined. The first of these is a Riparian Functional Category. The Riparian Functional Category (1, 2, or 3) is based on 1) channel functioning condition (channel stability and floodplain characteristics), and 2) native riparian habitat status. Once the Riparian Functional Category has been designated, a Stream Functional Index (SFI) can be determined. The SFI is based on the stream type (ephemeral, intermittent, or perennial), and the Riparian Functional Category. The indices are weighted to provide a higher functional value to waters that have longer hydroperiods and

native wooded riparian buffers. A table/flowchart constructed during discussions with the USACE (**Appendix E**, Linear Impact Calculation table of Stream Functional Indices (SFI) for Stream Types) uses the combination of these two components to provide a Stream Functional Index. Lastly, a Riparian Width Index (RWI) based on the width of native riparian habitat adjacent and within the floodplain of the channel, is determined using the table of Riparian Width Indices (RWI) Values for Stream Corridors (**Appendix E**). The RWI is also used to allow the correlation between impacts and mitigation credits in evaluating potential compensatory mitigation sites and plans. Once these qualitative values have been assigned, the Linear Functional Impacts/Credits per individual crossing is determined by multiplying the linear feet of fill by the SFI and RWI. In order to fulfill the required mitigation requirements, the proposed stream and wetland mitigation site was evaluated based on these same calculations. Potential linear mitigation for the site was determined using the same formula presented above for calculation of linear functional impacts. Linear mitigation credits were developed based on the linear feet of streams and riparian habitats described in the Conceptual Mitigation Plan. The proposed mitigation consisting of a mosaic of aquatic resource type restoration/creation will also compensate for the acreage impacts to jurisdictional water resources. Impacts, required mitigation, and functional credits are constantly being re-calculated and updated, and are reported to the USACE annually based on current project design.

The specific goals of this mitigation site are (as discussed in **Section 6.0**) to preserve, enhance, restore and create 175 acres of five different aquatic resource types in the approximate ratios indicated in **Table 1**. Approximately 108 acres are to be Riparian Woodlands (non-wetland) both Preserved and Planted, 25.6 acres are to be Emergent Wetlands, 17.5 acres Forested/Scrub Wetlands, 17.6 acres Deepwater Areas, and 6.4 acres Streambed/Temporarily Inundated Floodplain Channels. Aquatic resource types where woody species plantings take place are Planted Riparian Woodlands, Forested/Scrub Wetlands, and adjacent to Streambed/Temporarily Inundated Floodplain Channels and Deepwater Areas. Planted Riparian Woodlands and Forested/Scrub Wetlands have a target survival rate for planted trees (seedlings) of 50 percent and a target density of 240 trees and/or shrubs per acre three years after planting; shrub/understory species will make up approximately 13.5% of the plantings, and have a target survival rate of 80 percent three years after planting. Planted areas adjacent to Streambed/Temporarily Inundated Floodplain Channels and Deepwater Areas have a target survival rate for planted trees (seedlings) of 50 percent and a target density of 100 trees per acre three years after planting. The goal for the Emergent Wetland habitat type is that it be dominated (>75% cover) by native non-invasive species. An additional goal for the two wetland aquatic resource types is that they meet the USACE criteria for wetlands.

4.0 PROPOSED MITIGATION AREA

This section provides existing condition information on vegetation, wildlife habitat, geology/ soils, and hydrology at the proposed Plum Creek mitigation area. This information was collected from available databases and field visits.

4.1 VEGETATION

The proposed Plum Creek mitigation area lies in the Blackland Prairies vegetational area as described by Gould (1962). This area has a gently rolling to nearly level topography, with dark-colored calcareous clay soils developed under prairie grass-forb vegetation. Average annual rainfall varies from about 30 inches on the west to slightly more than 40 inches on the east (Gould, 1962). Texas Parks and Wildlife Department has further divided the state into vegetation types (McMahan et al, 1984). The proposed mitigation area lies in the "Crops" vegetation type. This type is described as consisting of cultivated cover crops or row crops providing food and/or fiber for either man or domestic animals. It may also portray grassland associated with crop rotations (McMahan et al, 1984).

Vegetation specific to the proposed mitigation site consists mainly of pasture and mesquite savannah with a strip of riparian woodland species adjacent to Plum Creek and its tributaries (see photos in **Appendix F**). The pasture areas are dominated by bermudagrass (*Cynodon dactylon*), Texas wintergrass (*Nasella leucotricha*), little barley (*Hordeum pusillum*), wild oats (*Avena fatua*), and annual ryegrass (*Lolium perenne*) in the upper areas and by bermudagrass, curly dock (*Rumex crispus*), and greenish-white sedge (*Carex albolutescens*) in the lower areas (swales, and old stream meanders). Mesquite (*Prosopis glandulosa*) saplings are scattered throughout most of the pasture and cedar elm (*Ulmus crassifolia*) fringes some of the old stream meanders.

The mesquite savannah area is dominated by multi-stemmed mesquite, bermudagrass, and Texas wintergrass.

The riparian woodland vegetation adjacent to the streams has an overstory dominated by American elm (*Ulmus americana*), cedar elm (*Ulmus crassifolia*), eastern cottonwood (*Populus deltoides*), pecan (*Carya illinoensis*), green ash (*Fraxinus pennsylvanica*), boxelder (*Acer negundo*), and Osage orange (*Maclura pomifera*). The midstory is dominated by saplings of the overstory species, chinaberry (*Melia azederach*), western soapberry (*Sapindus saponaria*), black willow (*Salix nigra*), and gum bumelia (*Bumelia lanuginosa*). Various species of greenbrier (*Smilax* spp.) are the common vines on the site. Dominant herbaceous species include most of those found in the pasture areas along with Canada wildrye (*Elymus canadensis*) and inland wood-oats (*Chasmanthium latifolium*).

4.2 WILDLIFE HABITAT

The proposed mitigation area lies within the Texan biotic province as described by Blair (1950). This province is a broad ecotone of the forests of east Texas and the grasslands of the west. Blair states that there are no endemic species of vertebrates and that the outstanding biogeographic phenomenon is the interdigitation of forest and grassland associations. Blair counts 49 species of

mammals as occurring in the province, 2 species of *Terrapene*, 16 species of lizards, 39 species of snakes, five species of urodeles, and 18 species of anurans.

The existing wildlife habitat (bermudagrass/mesquite pasture) has very low vegetative diversity and thus has low wildlife habitat potential. The fringe woodlands along the streams have greater diversity but at present they make up a small portion of the total area of the tract.

4.3 GEOLOGY AND SOILS

Geology

The geologic material of the proposed mitigation area is mapped as alluvium (BEG, 1974). Alluvium consists of floodplain deposits made up of clay, silt, sand, gravel, and organic matter. The silt and clay are dark gray to dark brown and calcareous. The sand is largely quartz. The gravel is siliceous, mostly chert, quartzite, and petrified wood. Fluviatile morphology is well preserved with point bars, oxbows, and abandoned channel segments (BEG, 1974).

Soils

The proposed mitigation area lies primarily on Trinity clay and Trinity soils, frequently flooded soil types (see **Figure 2**). These are deep, nearly level soils that formed in calcareous, clayey, alluvial sediment. They are moderately well drained, permeability is very slow, and available water capacity is high (see **Section 9.1**). Suitability of Trinity soils for wildlife and wildlife habitat elements including; shrub growth, wetland food and cover plants, shallow water developments and wetland wildlife is fair.

Additionally, small portions of the proposed mitigation area are located on Branyon clay, 1-3% slopes; Heiden clay, 3-5% slopes, eroded; and Heiden-Ferris complex, 5-20% slopes, severely eroded. The site contains approximately 10 acres of the total 265 acres and are located primarily along the upland buffer zone. The information in the table below was taken from *Table 3. – Suitability of the soils for elements of wildlife habitat and for kinds of wildlife* in the Caldwell County Soil Survey (NRCS, 1978).

Table 6: Soil Suitability for Wildlife and Wildlife Habitat Elements

	Elements of wildlife habitat						Kinds of wildlife		
Soil series	**Grain and seed crops**	**Grasses and legumes**	**Wild herbaceous upland plants**	**Shrubs**	**Wetland food and cover plants**	**Shallow water developments**	**Open -land**	**Range-land**	**Wet-land**
Branyon clay, 1-3% slopes	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Heiden clay, 3-5% slopes, eroded	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Heiden-Ferris complex, 5-20% slopes, severely eroded	Fair/ Fair	Fair/Fair	Fair/Fair	Fair/ Poor	Very poor/ Very poor	Very poor/Very poor	Fair/ Fair	Fair/ Poor	Very poor/ Very poor
Trinity clay	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair
Trinity soils, frequently flooded	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair

A rating of *good* indicates that habitat is generally easily created, improved, and maintained. The soil has few or no limitations that affect management, and satisfactory results can be expected when the soil is used for the prescribed purpose. A rating of *fair* indicates that habitat can be created, improved, or maintained in most places, but the soil has moderate limitations that affect management or development. A moderate intensity of management and fairly frequent attention may be required for satisfactory results. A rating of *poor* indicates that habitat can be created, improved, or maintained in most places, but the soil has severe limitations. Management is difficult, expensive, and requires extensive effort. Results are questionable. A rating of *very poor* indicates that it is either impossible or impractical to create, improve, or maintain habitat on soils in this category. Soil conditions are very severe, and unsatisfactory results are probable.

4.4 HYDROLOGY

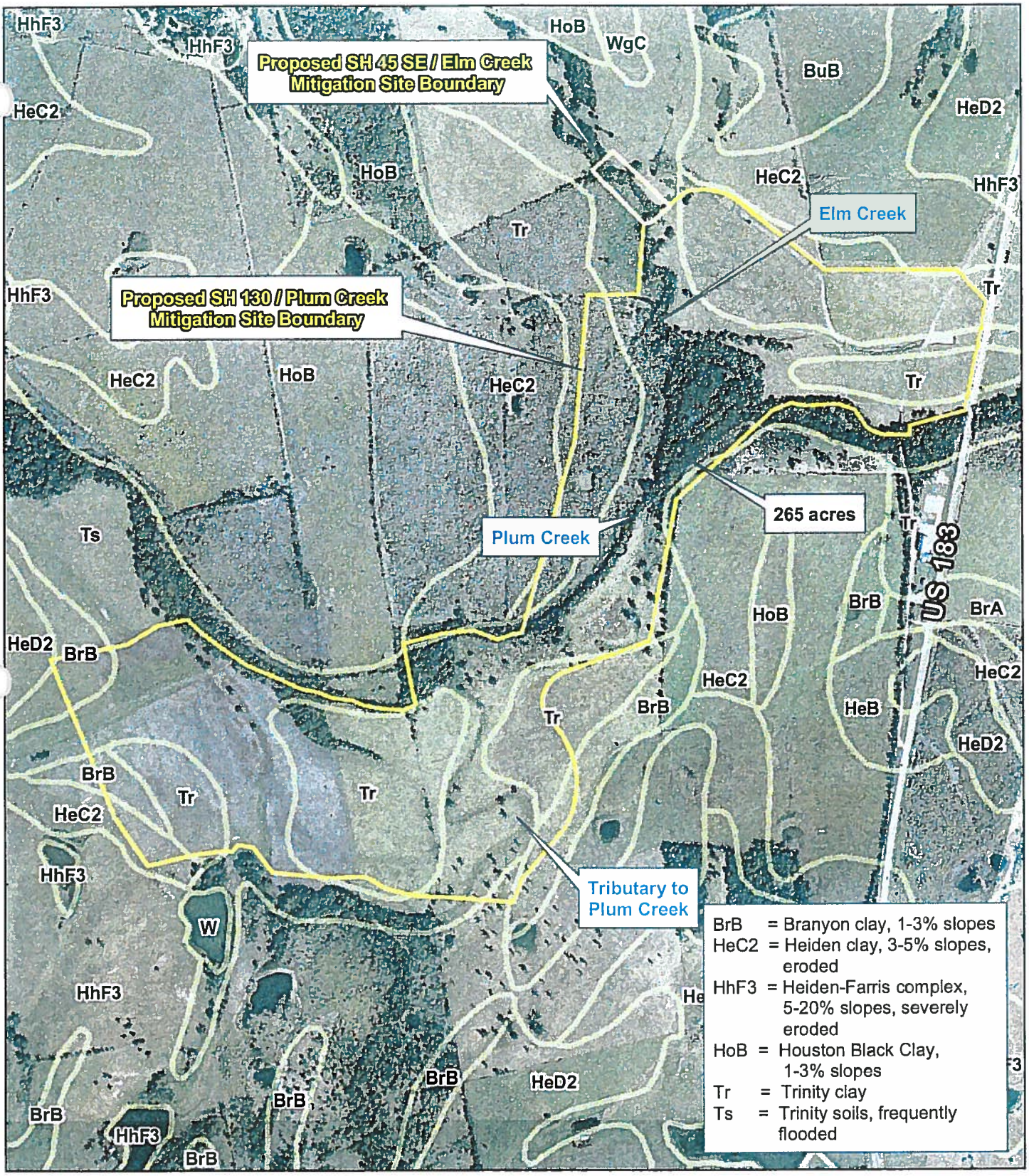
The entirety of the proposed mitigation area lies within the 100-year floodplain of Plum Creek and two of its tributaries, one of which is Elm Creek (see **Figure 3**). Surface water flow is to the east-southeast (see topography in **Figure 1**). Between 1960 and 1975 the NRCS constructed 18 flood control dams in the Plum Creek watershed. However, even with these flow restrictions, anecdotal information from one of the landowners indicates that the area has flooded to a depth of approximately 8 feet in three of the last five years. A gage installed by the United States Geological Survey (USGS) on Plum Creek within the proposed mitigation site gives more accurate data (see **Section 9.1**). Creation of a mitigation area at this site is consistent with regional flood control efforts.

For purposes of monitoring water quality, the TCEQ has divided each of the state's river basins into segments. The proposed project area is located within Segment 1810 of the Guadalupe River Basin. Designated water uses within the segment include aquatic life use, contact recreation general use, and fish consumption. Water quality in the Segment is limited due to the need for advanced waste treatment and water quality standards violations (TCEQ, 2002).

This segment is not designated as either threatened or impaired in the 2002 Clean Water Act Section 303(d) list, and the project is not within 5 miles upstream of a threatened or impaired water segment.

4.5 LAND USE HISTORY

Evidence noted during field visits, interviews with landowners and lessees and study of historical aerial photography (including the 1974 imagery in the Caldwell County Soil Survey) indicates that the site has primarily been used for agriculture (primarily pastureland) for many years. No large areas of earthwork are apparent on the site with the exceptions of an excavated stock tank and an abandoned roadway.



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Permit # 199600228

June 2006

Figure 2

SH 130 Proposed Plum Creek Stream and Wetland Mitigation Site Soils

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LONE STAR INFRASTRUCTURE

5.0 PRELIMINARY JURISDICTIONAL DETERMINATION

5.1 SITE DESCRIPTION

Field visits indicate the presence of two jurisdictional waters of the U.S. (Sites 1 and 2) along with two jurisdictional wetlands (Sites 3 and 4) lying within the boundaries of the proposed mitigation area (see **Figure 4**). Routine wetland determination data forms were completed at the locations of each of the jurisdictional areas (see **Appendix I**). Jurisdictional determination for areas of the site for which access was not available will be conducted and addressed (as needed) once access is gained prior to construction. Although Site 3 is separated into five areas by higher ground, elevation and vegetation are similar enough to be described by one data form. The waters of the U.S. include Plum Creek and Elm Creek. The wetlands appear to be old stream meanders that might have been excavated at some time in the past and hold water for long periods of time following rain/flood events. Dominant overstory species include American elm, cedar elm, eastern cottonwood, pecan, green ash, boxelder, and Osage orange. Saplings of the overstory species, chinaberry, western soapberry, black willow, and gum bumelia dominate the midstory. Various species of greenbrier are the common vines on the site. Dominant herbaceous species include most of those found in the pasture areas along with Canada wildrye and inland wood-oats.

5.2 SUMMARY OF FINDINGS

The table below summarizes the existing waters of the U.S. located within the proposed Plum Creek mitigation area.

Table 7: Waters of the U.S. Within the Proposed Plum Creek Mitigation Area

Site Number	Description of Site	Type of Water of the U.S.	Ordinary High Water Mark (feet)	Routine Wetland Determination Data Form Plot ID Number
1	Plum Creek	Perennial stream	20	7
2	Elm Creek	Intermittent stream	15	8
3	Overbank Wetland	Jurisdictional Wetland	NA	2
4	Overbank Wetland	Jurisdictional Wetland	NA	1

Two of these sites will be impacted slightly by construction of the proposed mitigation site. Site 2 will be crossed by one of the access roads. This will require placement of some fill in the creek channel (less than 25 cubic yards within the plane of the OHWM). Site 3 will be expanded by placement of berms in non-jurisdictional areas and expansion of the old stream meanders outside the jurisdictional limits. Placement of fill in Jurisdictional Waters associated with the Elm Creek Crossing will be accounted for in a Permit Modification request and will be debited against the project mitigation credits.

6.0 PROPOSED COMPENSATORY MITIGATION ACTIVITIES/ WORK PLAN

Appendix A shows the surveyed boundaries and existing elevations of the proposed mitigation area along with proposed mitigation activities (excavations, placement of berms, and plantings). Note that survey data are lacking for a portion of the site due to right-of-entry limits. **Table 8** indicates the percentages of five aquatic resource types that were proposed to be present for the mitigation area(s) in the CMP, while **Table 9** shows the approximate acreage of each proposed for the Plum Creek site.

Table 8: Relative Percentages and Approximate Acreages of Aquatic Resource Types for Mitigation SH 130 (Total for All Mitigation Sites)

Aquatic Resource Type	Relative Percent	Approximate Acreages
Riparian Woodlands (non-wetland)	60	108 ac
Emergent Wetlands (<2ft depth)	15	25.6 ac
Forested/Scrub Wetlands (<2ft depth)	10	17.5 ac
Deepwater Areas (2 to 5 ft depth)	10	17.6 ac
Streambed/Temporarily Inundated Floodplain Channels	5	6.4 ac
Total	**100**	**175.1 ac**

Riparian Woodlands (Non-Wetland)

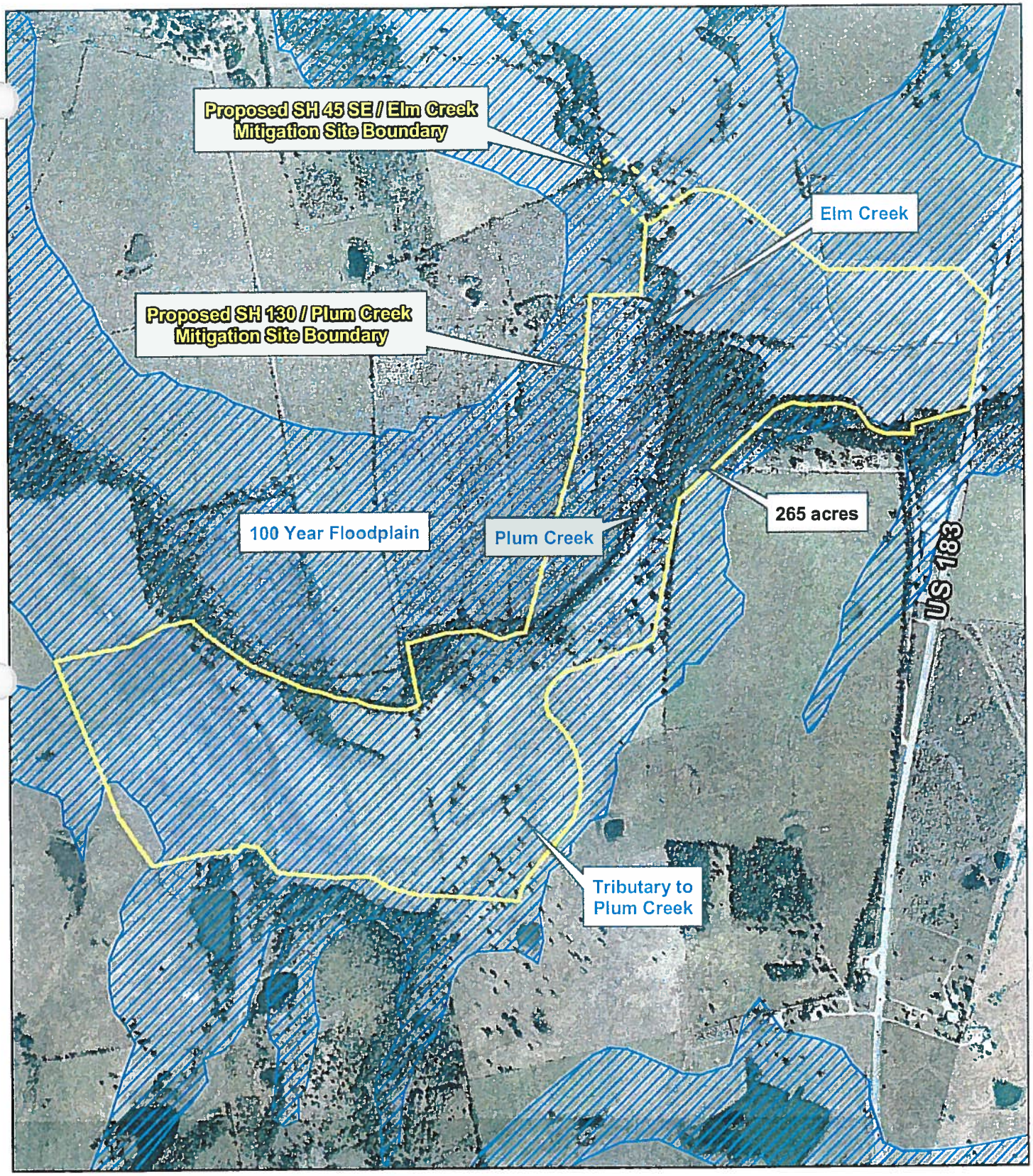
Area A (Riparian Woodlands--see **Appendix A**) will consist of 15.3-acres (Area A1) of existing hardwood bottomland to be preserved and 92.7-acres (Area A2) to be planted with hardwood bottomland species along approximately 9,950 linear ft (ln ft) of both Elm and Plum Creek within the proposed mitigation site as described in the planting plan in **Section 11.0**. Trees and shrubs shall be planted using 9X11 foot spacing (approximately 444 trees per acre).

Emergent Wetlands

Area B (Emergent Wetlands) will be made up of four locations of 9.2, 7.7, 7.1, and 1.2 acres on the site totaling 25.6 acres that will be excavated to a depth necessary to create a shallow (approximately 18 inches deep) basin in order to create persistent hydrology. This excavated area will be planted with emergent species (see **Section 11.0**). Typical cross sections of this excavated area are provided in **Appendix B – Detailed Plan Sheets**.

Forested/Scrub Wetlands

Area C (Forested/Scrub Wetlands) will consist of two locations, one approximately 2.5 acre and one approximately 15-acres, on the site that will be excavated to a depth necessary to create a shallow (approximately 18 inches deep) basin in order to provide persistent wetland hydrology. This excavated area will be planted with wetland-adapted woody trees and shrubs (with an indicator status of FACW or wetter and as identified in the Planting Plan in **Section 11.0**). Trees and shrubs shall be planted using 9X11 foot spacing (approximately 384 trees and 60 shrubs per acre). See Table 9 for additional details. Cross sections of the excavated wetland area are provided in **Appendix B**.



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Permit # 199600228
June 2006

Figure 3

SH 130 Proposed Plum Creek Stream and Wetland Mitigation Site - Floodplain Map

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Deepwater Areas

Area D (Deepwater Areas) will be made up of nine excavations (one approximately 2.5-acre, seven approximately 2-acre and one approximately 1-acre, totaling 17.6 acres) to be constructed to a ponded depth of 2 to 5 feet. No vegetation plantings are planned for this habitat type within the excavated areas. Pond cross sections are shown in **Appendix B**. An assortment of high quality, hydrophytic trees (such as bald cypress, pecan and oak) will be planted adjacent to these excavations at a density of approximately 200 trees/acre, in order to encourage the growth of large trees.

Streambed/Temporarily Inundated Floodplain Channels

Area E (Streambed/Temporarily Inundated Floodplain Channels), will consist of hydrologic and vegetative enhancements along three old stream meanders (some of which may be excavated slightly) totaling 6.4 acres, with berms constructed across them to slow and spread runoff and create areas where water will pool. These small earthen dams will not inhibit essential drainage during large storm events, but will be constructed to withstand these occurrences while enhancing the habitat value of these areas by creating small perennial pools sustained by typical storm events. These additional pools will be capable of supporting important aquatic species relative to the enhancement of the site. Without the proposed earthen structures, hydrology associated with these channels would not be expected to persist due to the relatively quick drainage of these areas and low water-holding potential. A typical cross section of these earthen berms is provided in **Appendix B**. An assortment of high quality, hydrophytic trees (such as bald cypress, pecan and oak) will be planted along the approximately 8,500 linear feet of these channels (within the proposed mitigation site) at a planting density of approximately 200 trees/acre, in order to encourage the growth of large trees.

Table 9 summarizes proposed acreages of the various aquatic resource types for the Plum Creek mitigation site.

Table 9: Approximate Acreages and Relative Planting Rates of Aquatic Resource Types for Proposed Plum Creek Mitigation Site

Habitat Type	Area*	Approximate Acreages	Planted Stems/Acre (maximum)	Proposed Number of Seedlings (sdlgs)/Shrubs #	Survival Rate** (# total)
Preserved Riparian Woodlands (non-wetland)	A1	15.3	/	/	/
Planted Riparian Woodlands (non-wetland)	A2	92.7	444	35,603 sdlgs/5,559 shrubs	17,801 sdlgs/4,447 shrubs
Emergent Wetlands (<2ft depth)	B	25.6	/	/	/
Forested/Scrub Wetlands (<2ft depth)	C	17.5	444	6,457 sdlgs/ 1,313 shrubs	3,150 sdlgs/1,050 shrubs
Deepwater Areas (2 to 5 ft depth)	D	17.6	200	3,520 sdlgs	1,760 sdlgs
Streambed/Temporarily Inundated Floodplain Channels	E	6.4	200	1,280 sdlgs	640 sdlgs
Total	/	**175.1**	/	**46,860 sdlgs/ 6,872 shrubs**	**23,430 sdlgs/ 5,497 shrubs**

* As shown on aerial in Appendix A.
** Assumes 50% survival rate for seedlings and 80% for shrubs (container grown)

Note that at present no discharges of material into waters of the U.S. are proposed, other than a small access road crossing of Elm Creek (see **Section 5.2**). At present, it's the intent of LSI to negotiate the disposal of excavated material (approximately 175,000-200,000 cubic yards) on adjacent non-wetland properties, as an amenity to landowners. If that option proves to be infeasible, additional property adjacent to the site will be acquired for disposal of excavated material.

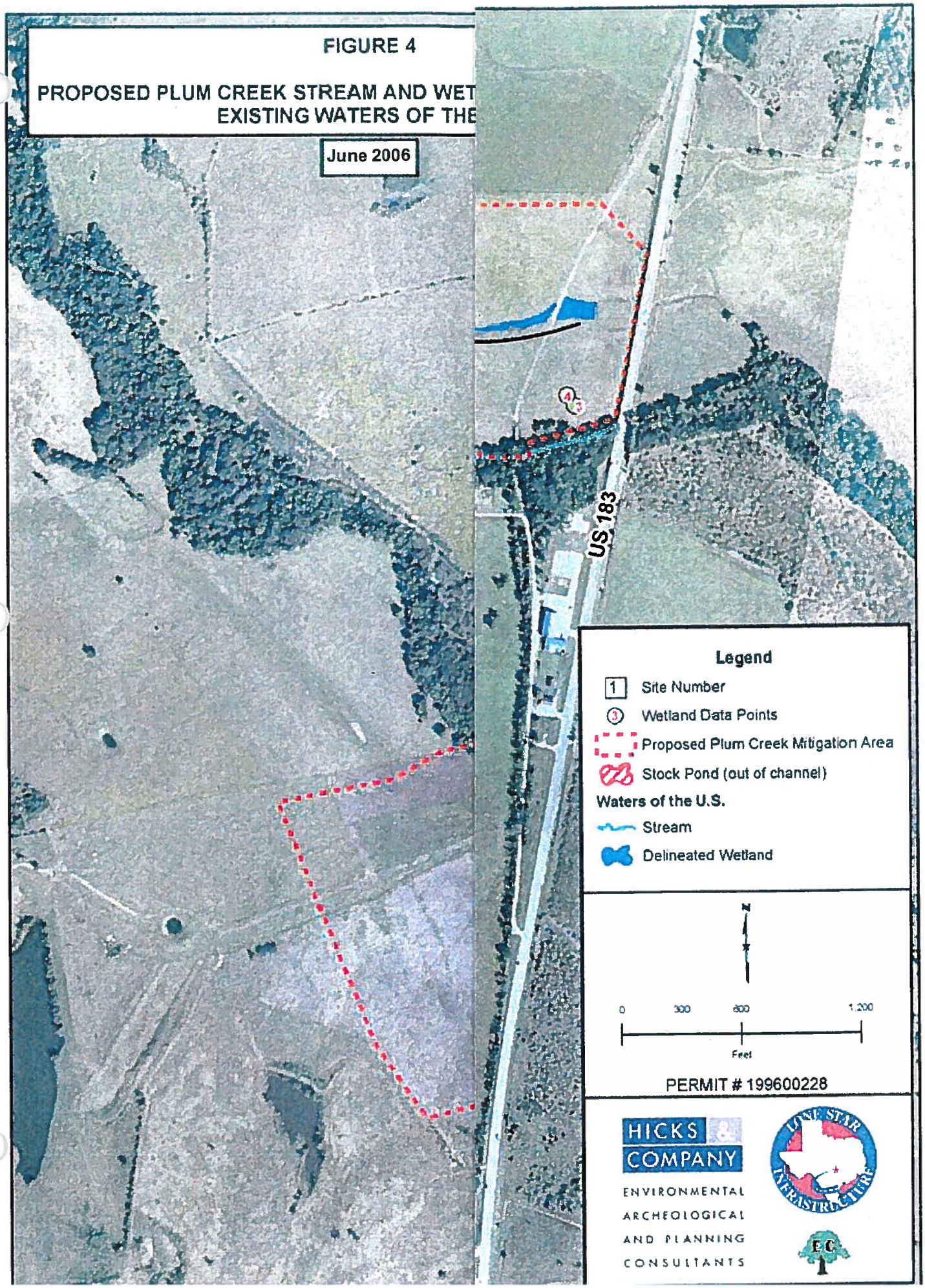
FIGURE 4
PROPOSED PLUM CREEK STREAM AND WET
EXISTING WATERS OF THE
June 2006
US 183
Legend
1 Site Number
3 Wetland Data Points
Proposed Plum Creek Mitigation Area
Stock Pond (out of channel)
Waters of the U.S.
Stream
Delineated Wetland
N
0
300
600
1,200
Feet
PERMIT # 199600228
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AND PLANNING
CONSULTANTS
LONE STAR INFRASTRUCTURE
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7.0 EXISTING LIENS AND ENCUMBRANCES ON THE SITE

There are no known existing liens or encumbrances on any of the properties proposed for inclusion in the mitigation site.

8.0 PROTECTIVE ACTIONS

The goal of this mitigation plan is to increase the ecological value of existing Waters of the U.S., as well as create additional jurisdictional areas and non-jurisdictional areas of high quality habitat to mitigate Waters of the U.S. and wetland values lost from unavoidable construction impacts. The Texas Department of Transportation (TxDOT) shall preserve the mitigation site, as described in section 6.0 of this plan, either through its own efforts or the efforts of an USACE approved conservator, to maintain the quality of wildlife habitat and resulting ecological value through conservation easements or Conservator contractual commitments with TxDOT and USACE acceptable conservation management plan.

Efforts will be made to protect the existence of the Plum Creek Mitigation Site permanently. As required by law, TxDOT, will offer existing property owners a conservation easement, per Texas Statute § 201.617, for land to be used for mitigation purposes. A draft conservation easement agreement is included in Appendix L. If property owners decline a conservation easement property will be obtained via fee-simple or eminent domain acquisition process. There is the possibility that some property owners will accept and others will decline. The conservation easement agreement is intended to reflect the SH 130 Mitigation Site Management Plan so that preservation and management activities will be contiguous throughout the site.

The Lockhart City Council and the Caldwell County Commissioners Court passed resolutions to enter into negotiations with TxDOT for the city and county to assume joint responsibility of preserving and maintaining the Plum Creek Mitigation Site (Appendix M). Property acquired via title transfer will be transferred to the city and county as a public limited use area upon final approval from the USACE following the five year monitoring period. The City and County agree to maintain the Plum Creek Mitigation Site in a way that is consistent with the SH 130 Mitigation Site Management Plan (Appendix N), to achieve long-term preservation of the entire Site. The agreement will also state that the site may not be altered in a way as to reduce the function as a mitigation site and that any changes in use will have to be coordinated with the USACE. TxDOT will retain a 250' transportation easement along the western ROW boundary of US 183 when the title transfer of the Plum Creek Mitigation Site to the City and County occurs, however the easement will continue to be managed by the City/County under the SH 130 Mitigation Site Management Plan.

The permittee will dedicate long-term protection through the processes described above, the approximately 265 acre mitigation area of which 92.7 acres are Preserved Riparian Woodlands, 15.3 acres are Riparian Hardwoods, 25.6 acres are Emergent Wetlands, 17.5 acres are Forest/Scrub Wetlands, 17.6 acres are Deepwater Areas, and 6.4 acres of Streambed/Floodplain Channels which are identified in this detailed mitigation plan. The mitigation area will be used as a limited use area by the City of Lockhart and Caldwell County in a way that would not adversely affect the intended extent, condition, and function of the mitigation area or by those activities specifically provided for in the approved mitigation plan or in the special conditions for this permit. Unless otherwise specified, livestock grazing, logging, mowing, and similar activities are prohibited in the mitigation area, as described in greater detail in the SH 130 Mitigation Site Management Plan provided in Appendix N.

The transportation easement to the Texas Department of Transportation (TxDOT) established upon transfer to the City of Lockhart and Caldwell County will extend out to 250 feet from the existing western ROW line of US Hwy 183, as of July 2005, and will be approximately 5.2 acres of the 265 acres. The easement shall be managed the under the same conditions/restrictions as the remainder of the mitigation site until such time easement rights are exercised. Should TxDOT or its successors construct a transportation project on the easement, following appropriate environmental reviews and considerations, any adverse environmental impacts within the mitigation area shall be mitigated for.

During construction applicable Best Management Practices (BMPs) as required by TCEQ for Tier I projects (projects affecting less than 3 acres of waters in the state) will be used to minimize impacts to Plum Creek and protect water quality.

9.0 HYDROLOGIC INFORMATION

9.1 EXPECTED FUTURE HYDROLOGY

The USGS has installed a gage on Plum Creek within the proposed mitigation area. The gage elevation, or datum, is 431.19 feet above sea level. Historical stream gage data indicate that water levels in Plum Creek have exceeded flood stage (12 feet above gage elevation) at least once in 35 of the last 44 years (see **Table 10**).

Table 10: Peak Annual Stream flow and Gage Height for USGS Station 08172400 Plum Creek at Lockhart, Texas

Water Year	Gage Height (feet)	Streamflow (cfs)	Water Year	Gage Height (feet)	Streamflow (cfs)
1959	15.13	2,670*	1981	19.26	18,000
1960	17.58	11,600*	1982	17.29	9,530
1961	20.62	26,600*	1983	15.94	4,770
1962	14.96	2,250^	1984	5.42	130
1963	14.78	2,180^	1985	16.09	5,260
1964	14.01	1,610	1986	20.89	27,700
1965	17.15	9,300	1987	16.33	6,120
1966	17.57	11,400	1988	7.77	317
1967	13.70	1,860	1989	11.33	696
1968	15.92	4,350	1990	5.66	146
1969	16.00	5,000	1991	15.84	4,450
1970	17.86	12,100	1992	17.48	10,300
1971	8.80	412	1993	15.65	3,860
1972	15.35	3,100	1994	5.06	150
1973	15.20	2,800	1995	16.89	8,020
1974	17.17	9,180	1996	10.13	534
1975	18.87	15,800	1997	16.19	5,480
1976	16.98	8,420	1998	13.96	1,580
1977	15.54	3,560	1999	23.09	47,200
1978	2.35	6.0	2000	7.36	291
1979	15.36	3,130	2001	13.59	1,380
1980	15.08	2,690	2002	16.33	5,180

Source: USGS, 2003.

^ Discharge affected to unknown degree by regulation or diversion.
*Discharge not affected by regulation or diversion.

Although flood control structures were built on the Plum Creek drainage beginning in 1962 (see **Table 10**) this should have little or no effect on the data presented in the table because data collection only began in 1959.

Table 11 shows occurrences of flood events and durations of those events for the period from March 10, 1998 to September 30, 2003. According to the USGS, data for preceding years has been archived and is not immediately available. **Appendix K** is a table showing surveyed elevations for the top of the north bank, channel centerline, and top of the south bank. Elevations at the USGS stream gauge on the north, centerline and south bank respectively are, 443.57, 431.66, and 444.46 ft. Eleven of the highest daily mean flood elevations in Table 11 exceed the lowest one for the top of the south bank while five exceed the lowest elevation for the top of the north bank.

Table 11: Plum Creek Flood Event Table				
Date of Event's Highest Flood Elevation	Length of Event (No. of Days Flood Elevation > 5ft Above Gage Height)	Highest Daily Mean Flood Elevation	Number of Days Daily Mean Flood Elevation >10 ft Above Gage Elevation	Number of Days Daily Mean Flood Elevation > Flood Stage (12 ft)
10/18/1998	33	450.33	13	9
6/10/2000	1	436.61	0	0
11/3/2000	5	439.10	0	0
11/19/2000	1	436.65	0	0
11/24/2000	4	441.86	1	0
12/27/2000	3	439.20	0	0
1/11/2001	2	439.09	0	0
1/19/2001	1	437.20	0	0
1/29/2001	2	440.12	0	0
3/4/2001	1	437.23	0	0
3/15/2001	1	437.17	0	0
11/17/2001	7	440.80	0	0
12/3/2001	4	440.44	0	0
12/16/2001	12	443.17	1	0
1/6/2002	2	436.45	0	0
7/3/2002	8	443.37	2	1
7/17/2002	2	437.96	0	0
10/25/2002	4	441.63	1	0
11/5/2002	9	445.88	2	1
12/10/2002	6	441.15	0	0
12/24/2002	2	437.78	0	0
12/31/2002	2	439.85	0	0
1/13/2003	2	438.68	0	0
2/21/2003	8	444.03	2	1
3/4/2003	1	437.16	0	0

Source: U.S. Geological Survey

Table 12 gives monthly and yearly precipitation averages for Luling, Texas, which is approximately 18 miles south of the proposed mitigation area. Approximately 26.13 inches, or 80%, of the average rainfall occurs during the growing season. The growing season is the portion of the year when soil temperatures at 19.7 inches below the soil surface are higher than biologic zero (5°C) (NRCS, 1985). For ease of determination this period can be approximated by the number of frost-free days (USDI, 1970).

Table 12: Monthly and Yearly Average Precipitation for Luling, Texas	
Monthly Averages	Precipitation (inches)
January	1.99
February	2.62
March	1.77
April	3.73
May	3.56
June	3.91
July	2.03
August	2.08
September	3.89
October	2.88
November	2.28
December	1.91
Yearly Average	**32.65**

Source: USDA-NRCS, Caldwell County Soil Survey

In the original permit (USACE Individual Permit #199600228) Plum Creek is ranked as a perennial stream while Elm Creek is ranked as an intermittent stream. Plum Creek has an average ordinary high water mark (OHWM) within the proposed mitigation site of approximately 20 feet while Elm Creek has an average OHWM of approximately 15 feet. Plum Creek has steep banks ranging from 5 to 12 feet high opening into a broad floodplain. Information from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) indicates that the proposed mitigation area lies within the 100-year floodplain of these two creeks (Panel #4800940100C) which means that it lies below the 100-year flood elevation. The 100-year flood elevation is defined by FEMA as an elevation that has a 1 percent chance of being exceeded each year and in the proposed mitigation area corresponds to an elevation of approximately 460 feet above mean sea level. The elevation at the top of the creek banks ranges from approximately 453 feet to 442 feet while the majority of the site lies below 450 feet above mean sea level.

As discussed in **Section 4.3** approximately 95% of the proposed mitigation area lies on Trinity clay and Trinity soils. Trinity soils are deep, heavy clay textured soils found on flood plains. The A-horizon of Trinity soils is very slowly permeable (less than 0.06 inches per hour) and extends to a depth of 40 to 60 inches. Trinity clay is on a slightly higher elevation than Trinity soils, frequently flooded. Trinity clay floods as often as every year and as infrequently as once every seven years while Trinity soils, frequently flooded are flooded several times a year (NRCS, 1978). The soils have a high shrink-swell capacity, and are well suited for pond construction.

Hydrologic enhancement will occur by excavating shallow basins (approximately 18 inches in depth) at numerous locations within the tract in order to capture and hold water from rainfall and overflow/flooding events. Due to the depth of Trinity soils, the substrate at the depth of excavation should provide a comparable and acceptable medium for planting. Approximately twelve small earthen berms will also be constructed perpendicular to old stream meanders to detain water and provide more persistent on-site hydrology. In addition, compensatory over-planting of trees is proposed in order to address potential mortality associated with drought periods during tree establishment.

10.0 MITIGATION AREA SUBSTRATE

Surface soils within the boundaries of the proposed mitigation area are described in **Section 4.0**. As described in **Section 4.3** the geologic material of the proposed mitigation area is mapped as alluvium (BEG, 1974). Alluvium consists of floodplain deposits made up of clay, silt, sand, gravel, and organic matter. The silt and clay are dark gray to dark brown and calcareous. The sand is largely quartz. The gravel is siliceous, mostly chert, quartzite, and petrified wood. Fluviatile morphology is well preserved with point bars, oxbows, and abandoned channel segments (BEG, 1974). No supplemental soil is to be used in accomplishing the objectives of this mitigation plan.

11.0 PLANTING PLAN

Plantings will be designed for restoration, enhancement, and creation of riparian bottomland and forested stream and wetland mitigation areas. The primary focus will be to establish a diverse native plant community including mast-producing and beneficial trees, fast-growing "diversity" species, and understory or shrub species. The trees, shrubs, and herbaceous plants will be planted according to their habitat requirements as determined by a qualified biologist/native landscape designer (TxDOT, 2002).

In a riparian forested (non-wetland) or forested/scrub wetland stand (Areas A2 and C in **Appendix A**), trees should be planted using 9X11 foot spacing (approximately 444 trees per acre). This means that approximately 46,860 seedlings will be required based on a 50% survival assumption, and 6,872 shrubs will be required based on an 80 % survival assumption. This number does not include trees already on site since approximately 15.3 acres of already existing riparian woodland habitat will be preserved. Up to two years could be required between the date that the seedlings are ordered and the date that they will be available for planting. A list of preferred species is included in **Appendix G**. Additional species may be added to this list, based on availability. Various species of bare root, potted or ball root seedlings will be planted, depending on availability. Planting will be done by machine or by hand to allow more flexibility in species placement and in creating the mosaic effect mentioned in the CMP (TxDOT, 2002). Plantings will, where practicable, be done in January or February when the seedlings are dormant for better establishment and survivability. Seedbed preparation will be accomplished using individual plant application of Remedy™ or Grazon P+D™ herbicide treatment of existing mesquite shrubs in the year before the planting takes place. A band of glyphosate may be applied along planting rows in order to suppress bermudagrass and other competitors. Immediately prior to planting the area will be shredded (mown with a tractor mounted mower) to facilitate access and planting. Other seedbed preparation techniques may be utilized at the discretion of the contractor, and as approved by TxDOT.

No supplemental irrigation or fertilization is planned for the area after planting is completed. Compensatory over-planting of trees is intended to address mortality due to drought and other adverse conditions. At least two sessions of mechanical weed control between rows of planted trees (probably shredding) shall be planned each year during the summer (possibly May and August) to prevent grasses and weeds from choking out the woody plantings. Additionally, the site shall be evaluated each year as to the need for invasive woody species control of Chinese tallow tree (*Sapium sebiferum*) and other non-native or undesirable species. This invasive species control could be accomplished through the individual plant application of Remedy™ or Grazon P+D™. No herbivore control is proposed at present but it will be addressed if it becomes an issue.

Areas planned for emergent wetland creation (Area B in **Appendix A**) will be planted using commercially available seed stock. No supplemental irrigation or fertilization is planned for the area after planting is completed. These areas will be evaluated during the first growing season after planting to see that they meet the wetland vegetation criteria as outlined in the 1987 Corps of Engineers Wetland Delineation Manual for a wetland. Also, the site shall be evaluated each year as to the need for control of invasive non-native or undesirable species. Spot treatment of undesirable species will be accomplished with

appropriate herbicides if necessary. Supplemental plantings of commercially available species (such as smartweed (*Polygonum* spp.), duckweed (*Lemna* spp.), and switchgrass (*Panicum virgatum*)) will be accomplished as necessary, based on the availability and success of seed bank planting.

12.0 PLANTING SUCCESS CRITERIA

The status of the area will be evaluated each year over the 5 years following planting in order to maintain the target densities for the various aquatic resource types. This will be accomplished by performing a partial survey of the property as discussed in **Section 18.0**.

12.1 HERBACEOUS PLANTINGS

Emergent wetland creation areas will be evaluated during the first growing season after planting to see that they meet the vegetation criteria as outlined in the 1987 Corps of Engineers Wetland Delineation Manual for a wetland and the goal in the CMP of greater than 75% non-invasive species. If not, supplemental plantings of commercially available species such as smartweed (*Polygonum* sp.), duckweed (*Lemna* spp.), and switchgrass (*Panicum virgatum*) will be accomplished as necessary.

12.2 TREE AND SHRUB PLANTINGS

The target density three years after planting will be 240 trees and/or shrubs per acre for the planted areas, or a 50% survival rate for trees and an 80% survival rate for shrubs (based on planting 444 trees and shrubs per acre). This will be verified using the method outlined in **Section 18.0**. If there are any planted areas where this target density is not met those areas will have supplemental plantings in order to exceed the required threshold. Shrub/understory species will make up approximately 13.5% of the plantings in the forested/scrub wetlands with a 80% survival rate (container grown). Exceptions to this density (a survival target of 100 trees per acre of the 200 trees per acre to be planted) are proposed for tree plantings adjacent to deepwater areas and streambed/temporarily inundated floodplain channels, as discussed in **Section 6.0**.

13.0 PERFORMANCE STANDARDS

General standards to meet as stated in *Mitigation and the Section 404 Regulatory Program, Draft – May 28, 2002* provided by the USACE-Fort Worth District include:

- Waters of the U.S. meet the definition of a water of the U.S. under the Regulatory Program regulations applicable at the time the project is authorized.
- Both wetland and waters of the U.S. meet the definition of a wetland under the Regulatory Program regulations applicable at the time the project is authorized
- Waters of the U.S. are functioning as the intended type of waters of the U.S. and at the level of ecological performance prescribed in the mitigation plan.
- Buffer and riparian zones and other areas integral to the enhancement of the aquatic ecosystem are functioning as the intended type of ecosystem component and at the level of ecological performance prescribed in the mitigation plan.

14.0 ECOLOGICAL BENEFITS DISCUSSION

In addition to attempting to compensate for impacts to waters of the U.S., wetlands, and riparian woodlands this mitigation area will be helping to preserve/create an area of an ecological type that is fast disappearing in the central Texas area. Along with moderating flooding and helping to improve water quality downstream these areas perform a number of important functions.

The functions that aquatic sites perform depend on a variety of factors including:

- Size and proximity to other natural resources (e.g. woodlands, wetlands, streams with riparian corridors)
- Surrounding land use(s)
- Diversity and richness of native plant communities
- The presence of invasive species, including non-natives
- Past disturbances (i.e. soil disturbance, vegetation clearing, fire, over-grazing) (TxDOT, 2002)

The functions of aquatic resources include:

- Wildlife and fish habitat
- Flood control and drainage
- Stormwater detention/retention
- Water quality enhancement
- Maintenance of biodiversity
- Nutrient cycling
- Groundwater recharge (TxDOT, 2002)

As stated in the CMP, in accordance with Regulatory Guidance Letter No. 01-01 (Section 2. General Considerations), TxDOT proposes to provide compensatory mitigation for the unavoidable impacts on a functional equivalency basis, rather than a strictly "in-kind" basis. The functions performed by stream channels and their associated riparian habitat, including biodiversity maintenance, nutrient cycling, and water quality improvement can be replicated and enhanced in a mosaic of riparian woodlands, wetlands, and deepwater habitats (TxDOT, 2002).

During completion of the wetland delineation and Conceptual Mitigation Plan for SH 130, physical and biological characteristics of impacted stream channels and associated riparian habitat were evaluated to determine a "functional index" for each stream. The two primary stream channel components used to assess the function of stream channels were 1) channel functioning condition (i.e. channel stability, floodplain characteristics), and 2) native riparian habitat status (TxDOT, 2002). Stream channels, associated riparian habitat, and wetlands were assigned functional classifications ranging from 1 to 3 with 3 being the best.

Table U-1 in **Appendix E** (Addendum to the Conceptual Mitigation Plan) indicates that 57,147.4 Linear Function Impacts will occur because of construction of the Ultimate Roadway. However, based on current design (May 2006) approximately 80,323 (see **Appendix J**) Linear Function Impacts will occur because of construction of SH 130. The proposed Plum Creek mitigation site is a combination of Sites 4 and 5, of the nine total sites presented as potential sites in the CMP (TxDOT, 2002). These two sites combined initially totaled 173.6 acres and it was initially calculated that they had 142,080

potential credits based on the functional assessment methodology described in the CMP (TxDOT, 2002).

The 265-acre mitigation site as currently proposed will provide approximately 132,300 credits (see **Table 13**) based on the formula provided in the CMP [Potential Linear Mitigation Credits=Linear Feet (SFI)(RWI)](TxDOT, 2002). Stream lengths within the proposed site were determined to be 2,000 linear feet for Elm Creek and 7,950 linear feet for Plum Creek. Riparian Functional Categories for Plum Creek and Elm Creek were determined and using the table on the first page of **Appendix E** the Stream Functional Index was determined to be 1.5 for Elm Creek and 2 for Plum Creek. The Riparian Width Index (RWI) was then calculated using the Native Riparian Corridor width (700 feet) used in calculating potential credits as shown in the first paragraph on Page 16 of **Appendix H**. The Native Riparian Corridor width of 700 feet represents conditions upon completion of mitigation activities. Using these numbers the potential linear mitigation credits for this site are 132,300 (see **Table 13** below). Thus the potential credit/debit ratio for the Plum Creek mitigation site is 132,300:80,818, or approximately 1.64:1.

Table 13: Potential Linear Mitigation Credits for Plum Creek and Elm Creek

Water of the U.S.	Linear Feet	Riparian Functional Category	Stream Functional Index (SFI)	Riparian Width Index (RWI)	Potential Linear Mitigation Credit
Elm Creek	2,000	Intermittent 3	1.5	7	21,000
Plum Creek	7,950	Perennial 3	2	7	111,300
				Total	132,300

Using the same method described above and shown in **Table 13** current Linear Function was calculated to be 6,000 for Elm Creek and 35,775 for Plum Creek. For this calculation the SFIs were 1.0 for Elm Creek and 1.5 for Plum Creek while 3 was used as the RWI for both streams.

15.0 THREATENED AND ENDANGERED SPECIES EFFECTS ASSESSMENT

A detailed review of the SH 130 project and its vicinity has revealed no potential threatened/endangered species issues (habitat of occurrences) associated with the proposed site. A recent re-check of the TPWD's Biological and Conservation Data System revealed no known occurrences of listed species in the project vicinity, and no impacts are anticipated.

16.0 EFFECTS OF MITIGATION PLAN

16.1 CULTURAL RESOURCES

A cultural resources survey will be completed within the proposed site prior to any earth moving activities taking place. The results of the survey will be provided to the USACE.

It is possible that archeological sites are present within the mitigation area, but no historic structures or buildings are present. Prior to any construction related impacts, compliance and coordination of Section 106 of the National Historic Preservation Act for any archeological concerns will be completed with the USACE, State Historic Preservation Office, and TxDOT, as appropriate. The compliance and coordination will begin with an archeological survey of the mitigation area. The results of the survey will be submitted to the USACE and the State Historic Preservation Office. If archeological sites are found, they will be evaluated for their eligibility for listing in the National Register of Historic Places in accordance with the Protocol for Historic Properties Identification, Evaluation, and Treatment for SH 130 Project. TxDOT and LSI will seek to avoid any mitigation impacts to any site found to be eligible. If avoidance is not feasible, mitigation of the site through data recovery will be completed in accord with the Protocol.

16.2 ECOLOGICALLY SENSITIVE AREAS

A majority of the proposed mitigation site is currently in improved pasture. The only "ecologically sensitive areas" occur along the fringes of Plum Creek and its associated riparian strip, which will not be adversely impacted by wetland and riparian enhancement and creation.

16.3 LOCAL/REGIONAL HYDROLOGY

Local/regional hydrology will not be negatively affected. The aforementioned floodwater retention and nutrient removal attributes of functioning wetlands and riparian woodlands shall contribute beneficial uses to the area's hydrology. Coordination with the Texas State Soil & Water Conservation Board and the newly formed Plum Creek Partnership (a multi agency/organization water quality stakeholder group) has been started and initial response to the plan was positive with identified value in reducing Total Maximum Daily Loads (TMDLs) on non-point source pollution resulting in net increases in Water Quality for the receiving segment of Plum Creek.

17.0 LONG-TERM OPERATION AND MANAGEMENT PLAN

The developer for SH 130 and the SH 130 Plum Creek Mitigation site is responsible for the monitoring and ensuring the establishment of the aquatic resource areas for five years following completion of site construction. During the five year monitoring period the site may be available as a limited public use area for activities that do not hinder the development of aquatic resources. Upon final approval from the USACE that mitigation requirements have been met, the Plum Creek Mitigation Site will be transferred to the City of Lockhart and Caldwell County. Negotiations are ongoing with TxDOT and the City of Lockhart and Caldwell County for the city and county to assume responsibility of maintaining and long-term protection of the Plum Creek Mitigation Site, allowing limited public use in such a way that the intended purpose of mitigation of Waters of the U.S. is not compromised. To ensure the mitigation areas long term operation and management will be performed in a way that the intended purpose of mitigation is met and maintained, a SH 130 Mitigation Site Management Plan has been developed (provided in Appendix N) and will be part of the agreement between TxDOT and the City of Lockhart and Caldwell County.

The SH 130 Mitigation Site Management Plan has been prepared to assure the long-term conservation of the site and wetland habitat improvement and includes the following;

1. Secure property boundaries from encroachment, poaching, and undesirable livestock movement.
2. Control exotic and nuisance species
3. Monitor and prevent habitat degradation caused by wildlife and feral animals.
4. Conduct repairs to access roads to ensure maintenance and emergency access.
5. Maintain area for limited public use.
6. Establish the desired hydrology and wetland areas
7. Establish the desired density of planted vegetation.
8. Management of non-compostable waste.
9. Establishment and enforcement of rules for public use.

Management techniques described in the SH 130 Mitigation Site Management Plan are intended to be compatible with the adjacent SH 45 SE Mitigation Site's Management Plan, and is designed to maintain a mosaic of aquatic resource types, develop the functional characteristics and hydrology of each aquatic type and optimize wildlife diversity.

18.0 MITIGATION MONITORING PLAN

18.1 VEGETATION

Monitoring of woody species survival will be accomplished using one 1/10-acre plot per acre. These plots will be sited randomly each year. Living saplings rooted within each 1/10-acre plot will be counted and total live saplings per acre will be calculated. Monitoring of herbaceous plantings will be accomplished with the quadrat method using quarter-meter quadrats. This method will be used to determine density by species. Monitoring of both woody and herbaceous species will be performed during the summer (June or July).

18.2 SOIL PROFILE CHANGES

Approximately one soil pit per acre will be tested each year in wetland creation areas to document development of hydric soil characteristics in the wetland creation areas. These pits will be dug by hand, in a different location each year, and backfilled immediately after examination of the soil profile. Development of hydromorphic soil characteristics is typically a slow and incremental process. Thus, it is difficult to document the development of such characteristics in a relatively narrow time frame.

18.3 HYDROLOGY

The average length of the freeze-free period for Caldwell County is 275 days (NRCS, 1978). The 1987 Corps of Engineers Field Guide for Wetland Delineation states "generally speaking, areas which are seasonally inundated and/or saturated to the surface for more than 12.5% of the growing season are wetlands" for most years with normal precipitation. For the proposed mitigation area this would mean approximately 35 days. Field observations related to inundation and saturation and USGS stream gage data will be recorded and compiled in the annual report.

19.0 REPORTING PLAN

A reporting plan will be implemented by the Environmental Compliance Manager consisting of periodic reports scheduled to coincide with the required annual report (due October 1 of each year). These reports will clearly detail the following:

1. Updates on planned construction schedule and changes to project design that potentially impact jurisdictional waters.
2. Acreage of jurisdictional waters by resource type (e.g. perennial stream, intermittent stream, wetland, etc.) to be impacted by imminent construction activities (i.e. final designs completed) within each roadway segment and watershed.
3. Status of ongoing mitigation efforts and other actions.
4. Status of ongoing construction efforts documenting "as-built" roadway conditions and associated impacts.

Each report shall include photographs and maps. More frequent reports will be provided if requested by the USACE. Compliance reports are required even if no work is conducted during the reporting period and are to be submitted until the USACE verifies that USACE standards have been met and that all requirements, and all authorized construction, has been completed. The first stream and wetland mitigation area monitoring/compliance report is due to the USACE on October 1, 2008.

20.0 MITIGATION SPECIALIST QUALIFICATIONS

This mitigation plan has primarily been prepared by Larry Cox and Jeff Allen who are employees of Hicks & Company, which is a Team Member of Lone Star Infrastructure.

Mr. Cox is an environmental scientist whose education and professional skills are focused on multidisciplinary environmental project management. Mr. Cox's experience in soil science and rangeland ecology contributes to wetland delineation and permitting, vegetation surveys, threatened/endangered species habitat assessments and surveys, and range management studies. Mr. Cox also serves as a technical editor for environmental reports and has assisted or managed numerous multi-disciplinary environmental projects. His previous work experience includes an internship with TUMCO Mining's Environmental Services Division and employment as an environmental technician for Mariah Associates, Inc. Mr. Cox's recent work has included environmental data collection for a surface lignite mine and reservoir, the preparation of Environmental Assessments and Environmental Impact Statements for numerous roadway and utility projects, completion of numerous wetland delineations and 404 permits, and participation in endangered plant and animal surveys and other biological data collection efforts. Recent projects include preparation of Environmental Impact Statements (EISs) for Loop 49 West in Tyler and SH 45 in Travis and Williamson Counties, successful completion of Section 7 consultations (including Biological Assessment preparation) for the US 183A and SH 45 projects in Travis/Williamson Counties, receipt of individual permits for the US 259 and Loop 49 South roadway projects, preparation of several EIDs on proposed wastewater improvements throughout the Rio Grande Valley, and management of numerous EAs and EISs throughout the State of Texas. He has completed detailed wetland mitigation plans for numerous projects, including the Union Pacific Railroad Coady Yard in Houston, SH 96 in League City, and the Port of Brownsville International Crossing Project.

Mr. Allen is a forester and range scientist whose education and professional skills are focused on multi-disciplinary environmental projects. Mr. Allen's experience in forestry, range science, and wildlife habitat management contributes to wildlife and vegetation surveys, and range management studies. His previous work experience includes planning and conducting several baseline vegetation inventories, wildlife population surveys and habitat assessments. Mr. Allen's recent work has included wetland delineation, 404 permitting, wildlife habitat assessment, endangered species presence/absence survey, and vegetation mapping. Relevant projects include: wetland delineation for Tyler Loop 49 South, US 69 Mineola/Lindale, US 259 Kilgore, US 69 Lumberton to Zavalla; 404 permitting for Tyler Loop 49 South and US 259 Kilgore; Houston toad surveys for two Central Texas projects; Golden-cheeked Warbler survey for one project; and vegetation mapping and wildlife habitat assessment for US 69 Lumberton to Zavalla and US 69 Mineola/Lindale.

21.0 MITIGATION PLAN IMPLEMENTATION SCHEDULE

The mitigation plan(s), after approval by the USACE and TCEQ shall be implemented concurrently with construction of the project adhering to the following general schedule, as feasible:

- Contract for growth of woody species saplings by September 2006.
- Acquire property by September 2007.
- Complete earthwork by November 2007.
- Complete plantings by March 2008.

Initial construction and plantings associated with the mitigation work shall be completed by March 15, 2009.

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