addition, these activities support the development of a 5-year Capital Improvements Plan for review and approval by the LCRA Board of Directors each year as part of the LCRA Business Planning process.

LCRA Design Projects. Project Manager/Engineer of Record. Managed the design of the following projects designed by LCRA water and wastewater engineering staff:

- *Circle Drive 8" Waterline Extension.* Designed approximately 700 linear feet of 8-inch waterline extension to provide additional system reliability in the Bee Cave South Rate District (WTC Region). Design included wet-tap of existing transmission line and a bore of Circle Drive.
- *LCRA 1212 Pressure Plan Elevated Storage Tank Improvement.* Designed re-piping of inflow/outflow piping at the site to improve system reliability and operations.
- *Piping Improvements, Sawyer Ranch Road at Darden Hill Road.* Designed re-piping plan to protect system from potential damage due to Hays County transportation project at this intersection.
- *LCRA/WCID No. 17 Interconnect, Harrier Marsh 8" Waterline.* Designed interconnect piping to the WCID No. 17 potable water system to provide additional reliability to the WTC Water System. Project includes approximately 470 linear feet of C-900 potable waterline, a 6-inch water meter and vault, a 6-inch backflow preventer and vault and a pressure reducing valve and vault. Project included a wet tap of the existing WCID No. 17 water system.
- *Smithwick Surface Water Treatment Plant.* Designed the yard piping for a new water treatment plant (WTP) to serve the LCRA Smithwick Water System. The WTP is a conventional treatment facility with a clarifier, gravity filters, ground storage tanks, backwash water holding tank, and a hydroneumatic tank. Site also included piping for chemical feeds to the process.

LCRA Capital Improvements Projects (CIP). Project Engineer. Provided engineering support on behalf of LCRA for the following CIP projects:

- *Uplands Water Treatment Plant Expansion.* Project Engineer. Project included the expansion of the Uplands Water Treatment Plant (the water treatment plant that provides water to the West Travis County Regional Water System) from 11 million gallons per day (mgd) to 20 mgd treatment capacity; the installation of a second raw water intake to increase the total raw water pumping capacity to 22 mgd, and the evaluation of the raw water pumping system for protection against pressure surges in the system.
- *County Line Pump Station (CLPS) Expansion.* Project Engineer. Project includes the installation of two 1,800 gallon per minute pumps and associated piping and controls for the LCRA CLPS expansion. This pump station provides water to the WTC customers in Hays County including the City of Dripping Springs and the Dripping Springs Water Supply Corporation. The project is currently under construction.
- *WTC Wastewater System, 12-inch Force Main Extension.* Project Engineer. Project includes a routing study, design and construction of approximately 2,100 linear feet of 12-inch force main to the Lake Pointe Wastewater Treatment Plant. The project is currently in the design phase. Construction is expected to start in late 2009.
- *WTC Wastewater System, Regional Lift Station Expansion.* Project Engineer. Project includes a hydraulic capacity review study, design and construction of additional capacity at the existing LCRA Regional Lift Station and will utilize the 12-inch force main to the Lake Pointe Wastewater Treatment Plant. The project is currently in the study phase. Design of the expansion is expected to start in the Fall 2009.

West Travis County Wastewater System Master Plan, 2008. Project Engineer. Assisted in the development of the WTC Wastewater Master Plan. Assisted the project manager and the consultant in developing the master plan for a service area consisting of 8,830 acres which coincides with the Extra-

Territorial Jurisdiction of the City of Bee Cave. The existing wastewater system serves 2,100 LUEs and utilizes 17 lift stations and their associated force mains as well as gravity mains to convey wastewater to a 0.525-million-gallon-per-day wastewater treatment plant. Project included development of LUE projections thru ultimate build out, analyses of the capacity of existing facilities, and development of a capital improvements plan to meet projected wastewater transport and treatment improvements necessary to serve the projected growth in the service area.

West Travis County, Regional Wastewater System Impact Fee Study, 2009. Project Engineer. Assisted in the development of an updated wastewater impact fee study for the West Travis County Wastewater System. Assisted the WTC Regional Manager, LCRA's impact fee study consultant and the LCRA Board appointed Advisory Committee in the development of land use assumptions and associated service demand projections for the service area, development of a capital improvements plan to meet the projected demands of the service area, and calculation of an impact fee as related to projected growth in the ten year study period as per Chapter 395 of the Texas Local Government Code.

Water/Wastewater Systems

City of San Marcos, Texas. Project Engineer. Directed a design team that prepared plans and specifications for approximately 10,000 linear feet of wastewater interceptor. The design included eight bores and/or pipe jacks of 30-inch and 27-inch diameter wastewater interceptor through congested portions of the City. The design included major crossing permit applications for Interstate Highway 35 and UPRR crossings. The design also included approximately 7,500 linear feet of 12-inch reclaimed water pipeline.

Lower Colorado River Authority. Project Manager. Managed a project that included the design of facilities to expand two water systems around Lake Buchanan. Improvements included the design of approximately 17 miles of 4-, 6-, 8-, and 12-inch treated water transmission pipelines (including three trenchless crossings of Lake Buchanan), two elevated storage tanks (150,000 and 100,000 gallons respectively), a new raw water intake for one of the water treatment plants, and the retrofit/expansion of an existing conventional water treatment plant to a 0.5 MGD regional membrane water treatment plant.

Lower Colorado River Authority. Project Engineer. Provided construction administration support for the construction of a new 0.35 MGD submerged membrane bioreactor (MBR) wastewater treatment plant (wwtp) at the existing LCRA Camp Swift WWTP site. Project included the rehabilitation of the existing wastewater treatment plant's headworks, a new MBR treatment system, a new ultraviolet disinfection system, sludge drying beds, an administration/laboratory building, and an effluent lift station with approximately one mile of effluent force main and outfall.

Lower Colorado River Authority. Project Engineer. Provided construction administration support for the construction of a new 0.25 MGD submerged membrane bioreactor (MBR) wastewater treatment plant at the Austin/Bastrop Resort (Hyatt-Lost Pines) near Bastrop, Texas. Project included a new MBR treatment system, a new wastewater lift station and force main at the resort, a new ultraviolet disinfection system, a new administration/laboratory building, and an effluent lift station, pipeline and outfall.

Tenaska Gateway Generating Station, Texas. Project Manager. Prepared a preliminary engineering analysis for a 7.0 MGD raw water transmission system in East Texas. Analysis included: hydraulic analysis of a reservoir intake and pump station, hydraulic analysis of a 42-mile raw water pipeline for 24-inch and 30-inch diameters, and preparation of opinions of probable cost for the intake and pipeline facilities and construction.

Tenaska Gateway Generating Station, Texas. Project Manager. Prepared a preliminary engineering analysis for a 1.5 MGD wastewater transmission pipeline in East Texas. Analysis included: hydraulic analysis of a 32-mile wastewater pipeline for 12-inch and 14-inch diameters, and preparation of opinions of probable cost for the pipeline construction.

City of Clifton, Texas. Project Engineer. Assisted in permitting and preliminary design of a surface water supply project for the City of Clifton, Texas. The project included a 4,200 cubic-yard roller-compacted concrete channel dam on the North Bosque River, a 12 cfs river intake and pump station, 4,500-acre-foot off-channel reservoir, a 1.0 MGD modular water treatment plant, and pipeline transmission systems.

City of Pflugerville, Texas. Project Manager. Prepared plans and specifications for a 16-mile, 30-inch raw water pipeline as part of the Colorado River Water Supply Project. Design tasks included analysis of pipeline hydraulics, surge evaluation, land acquisition, permitting and cost estimation.

City of Jacksboro, Texas. Project Engineer. Prepared permit amendment and renewal application for effluent discharge for the city of Jacksboro. The permit application involved a multi-phased change in the city's wastewater treatment facility to provide the additional capacity needed by a new Texas Department of Criminal Justice facility located in Jacksboro.

City of Jacksboro, Texas. Project Engineer. Prepared an engineering feasibility report to accompany the Texas Water Development Board loan application for the city of Jacksboro. Preparation involved participation in cost estimation and preliminary engineering of a fresh water transmission line and water tower, a force main sewer line, water treatment plant improvements and wastewater treatment plant improvements.

Water Supply Planning

Coastal Bend Regional Water Planning Group. Project Manager. As part of the state-wide regional water planning effort established by the Texas Legislature, sixteen regional water planning groups were established. Mr. Payne served as the Project Manager for the Coastal Bend (Region N) Regional Water Planning Group technical consultant team. Region N, as defined during the SB 1 Regional Water Planning administrated by the Texas Water Development Board, included an 11 county region around the City of Corpus Christi, the major demand and population center for the region. As Project Manager, Mr. Payne managed the efforts of the HDR Austin staff as well as two technical subconsultants and one public relations subconsultant. As part of the planning process, the technical consultants evaluated over 20 water management supply options, developed a groundwater model of the Texas Gulf Coast Aquifer (panning multiple regions), and produced a siting and costing evaluation procedure for analyzing brackish groundwater and seawater desalination along the Texas Coast. The study was a two and one-half year process that resulted in a two volume Regional Water Management Plan that was submitted to the Texas Water Development Board on January 5, 2001.

Tenaska Gateway Generating Station, Texas. Project Manager. Study to perform a reservoir yield and storage projection analyses of Lake Murvaul (45,800 acre-feet) located near Carthage, Texas. Analyses included hydrologic database development, sedimentation rate analysis, firm yield calculation, and water surface frequency analysis under proposed future demand scenarios.

City of Meridian, Texas. Project Engineer. Analyzed three surface water supply alternatives for the City of Meridian as part of a long-term water supply study. Analysis included hydrologic database development, proposed reservoir siting and reconnaissance, reservoir yield analysis, water rights assessment, and preliminary cost estimates for water supply facilities. Assisted in the development of water supply plan alternatives that included combined surface water and ground water systems.

Tarrant Regional Water District. Project Engineer. Acted as the primary modeler for Integrated Water Supply Planning Study. Developed daily reservoir operations models for two reservoirs in the TRWD system and updated input to the TRWD's existing operations model including recent bathymetric survey and reservoir inflow information. Developed two Integrated Water Supply Plans for the TRWD incorporating the analysis of water supply options investigated as a part of this and other studies.

City of Corpus Christi, Texas. Project Engineer. Performed and directed others in updating hydrologic databases for the Nueces River Basin. Updated information included historical Edwards Aquifer recharge, streamflows, precipitation, evaporation, and water use for 30 locations throughout the basin. Previous databases (56 year period of record, 1934-89) were updated to include the 1990-1997 period of record. In addition, a new control point was established and hydrologic data for the entire 1934-97 period of record was compiled. Existing Nueces River Basin and Lower Nueces River Basin and Estuary computer models which are capable of simulating Edwards Aquifer recharge, water rights diversions, reservoir operations, and natural channel losses were updated to include the new period of record. Analysis of the firm yield of the Choke Canyon Reservoir/Lake Corpus Christi System was performed using the new hydrologic data and a new drought of record for the System was established.

San Antonio River Authority. Project Engineer. The following tasks were performed as part of the Trans-Texas Water Study for the West-Central Area. Modified the existing Guadalupe-San Antonio River Basin Model to simulate diversions from the flood storage pool of Canyon Lake to the Edwards aquifer recharge zone. Evaluated the annual average recharge enhancement available assuming a range of pump rates from Canyon Lake. Prepared engineering cost estimates for the range of pump size alternatives, used these costs to compute the unit cost of each alternative, and identified the optimum pumping capacity alternative. In addition, prepared engineering cost estimates for a range of pump rates for diversions from the Guadalupe River near Lake Dunlap to the Edwards aquifer recharge zone. Cost estimates included pump station, pipeline and recharge reservoir costs as well as estimates of power costs. Used the cost analysis to identify the optimum pumping capacity alternative.

Lavaca-Navidad River Authority and City of Corpus Christi, Texas. Project Engineer. Modified existing computer model of the Lower Nueces River Basin to evaluate six water supply alternatives as part of the Trans-Texas Water Program. Modifications included the modeling of diversions from the Nueces River, pipelines between reservoirs, the purchase of existing water rights, changes in operating policies of the existing Choke Canyon Reservoir/Lake Corpus Christi System, and the operation of a proposed reservoir (R&M Reservoir). Additional endeavors included modeling the proposed McFaddin Reservoir in the Guadalupe/San Antonio River Basins involving diversions from the Guadalupe and San Antonio Rivers and calculation of firm yields at the reservoir.

Lavaca-Navidad River Authority and City of Corpus Christi, Texas. Project Engineer. Modified existing computer model of the Lower Nueces River Basin and Estuary to evaluate eleven water supply alternatives as part of the South Central Trans-Texas Water Program Study, Phase II. Modifications in Phase II included modeling groundwater recharge and recovery options, operation of new reservoirs and evaluation of alternative operation policies for the existing Choke Canyon Reservoir/Lake Corpus Christi

System. Evaluation included the computation of summary bay and estuary flow statistics and Nueces Bay salinity statistics.

Edwards Underground Water District. Project Engineer. Developed recharge rate relationships for four dam sites in the Guadalupe-San Antonio River Basins over the Edwards Aquifer Recharge Zone. Made modifications to the existing Guadalupe-San Antonio River Basin model to operate these potential recharge structures simultaneously on a daily time step. Daily recharge reservoir operations included simultaneous solutions for reservoir recharge, spills and releases, and evaporation. Daily simulations were used to refine estimates of recharge enhancement to the Edwards Aquifer due to the proposed projects.

Edwards Underground Water District. Project Engineer. Developed recharge rate relationships for six potential recharge dam sites in the Nueces River Basin over the Edwards Aquifer Recharge Zone. Existing structures in the watersheds for Salado, Parkers, San Geronimo, and Middle Verde creeks were analyzed and used to refine methodologies applied in computing recharge rates for the proposed sites. In addition, modifications were made to the existing Nueces River Basin Model to operate five potential recharge sites on a daily time-step. Daily reservoir operations included simultaneous daily solutions for reservoir recharge, spills and releases, and evaporation. Daily simulations were used to refine estimates of recharge enhancement to the Edwards Aquifer due to the proposed projects.

Edwards Underground Water District. Project Engineer. Updated the existing Nueces River Basin Model to operate multiple recharge reservoirs simultaneously on a daily time-step. Results were used to refine estimates of the impact of the proposed recharge reservoir program to the city of Corpus Christi's water supply lake system downstream.

Edwards Underground Water District. Project Engineer. Performed statistical analysis on streamflow, precipitation, and well level data to investigate correlations between streamflows in the Nueces and Frio Rivers and Edwards Aquifer levels. Results helped to better define the volumes of recharge that the Aquifer can accept.

City of Corpus Christi. Project Engineer. Modified existing computer model of the Lower Nueces River Basin to evaluate the impacts of various alternative operating policies for the Choke Canyon/Lake Corpus Christi System. Comparison of bay and estuary flows were made in an effort to find a policy that meets bay and estuary inflow needs while increasing firm yield of the system. Work ultimately lead to new bay and estuary releases agreement between the City of Corpus Christi and the governing state agencies.

San Patricio Municipal Water Supply District. Project Engineer. Developed hydrology, e-a-c tables for existing and proposed water supply ponds, net pond evaporation sets, and demand distributions for the analysis of water supply alternatives for the Northshore Country Club (NSCC) in San Patricio County, Texas. Daily reservoir operations were simulated for a number of alternatives involving the system operations of Green Lake, existing NSCC water supply ponds, and proposed ponds under a variety of flow scenarios. In addition, the effects to the Choke Canyon/Lake Corpus Christi System of diverting wastewater from Nueces Bay were evaluated. (See summary in Hydraulics and Hydrology section for additional work performed in this project.)

Groundwater/Surface Water Interactions

Texas Water Development Board. Project Manager. Developed surface water data for use in the development, verification, and demonstration of the applicability of a numerical groundwater flow model (Modflow), which simulates hydrologic variations historically observed in the Carrizo-Wilcox Aquifer, in South Texas. Used surface water models to demonstrate how stream flow responds to these changes in aquifer levels; and finally demonstrate how water availability to water rights, in-stream flows and fresh water inflows to estuaries are affected by aquifer pumpage. Additionally, developed estimates of historical recharge to the Carrizo and Wilcox aquifers.

Water Rights

San Antonio River Authority. Project Engineer. Evaluated the availability to existing water rights permit holders in the Nueces River Basin as part of the Trans-Texas Water Study for the West-Central Area. Tabulated water rights availability versus priority date information for Uvalde, Zavala, Frio, Medina and Atascosa Counties.

City of Corpus Christi. Project Engineer. Modeled Calallen Reservoir near Calallen, Texas, to analyze water rights in the Calallen pool. Historic use was simulated to evaluate possible violations in water consumption and recommendations were made concerning potential procurement of water rights at Calallen.

City of Corpus Christi. Project Engineer. Conducted a channel loss study to determine the losses accrued by diversion of water from the Colorado River to Lake Texana by way of Pinoak and Sandy creeks. Study included field data collection and calculation of losses for the three reaches studied. Data collection included two weeks of intensive stage and discharge measurements at seven sites and miscellaneous discharge measurements at approximately 20 other sites.

San Antonio River Authority. Project Engineer. Created a computer model to evaluate the availability of flows for water supply on a daily simulation time step as part of the Trans-Texas Water Program south-central study area. Evaluations were made using monthly water availability, as computed using the Guadalupe-San Antonio River Basin Model, and daily gaged flows, as reported by the U.S. Geological Survey, in the Guadalupe River near Cuero, Texas. A range of pumping rates was simulated more than 26 years.

Hydrology and Hydraulics

City of Austin. Project Manager. Evaluated the impacts of providing additional capacity at the Joe Tanner Lane Low Water Crossing at Williamson Creek. The analyses included coordination with TxDOT and their planned improvements to Williamson Creek in conjunction with the U.S. 290 expansion.

City of Jacksboro. Project Engineer. Developed a reservoir operations model of Johnson Lake, near Jacksboro, Texas. Developed e-a-c tables, evaporation sets, streamflow sets, and spillway rating tables for the existing lake. Analyzed a number of scenarios to provide a basis for determining the impacts of a new wastewater treatment plant discharge permit on the lake. Developed stage frequency curves for each of the scenarios.

Atchison, Topeka, and Santa Fe Railway Company. Site manager. Performed hydrologic and hydraulic studies of 21 railroad bridges in Texas and 7 sites outside Texas scheduled to be replaced as part of the 1994, 1996, and 1997 Bridge Renewal Programs. Studies included site reconnaissance, survey coordination, flood frequency analysis, ungaged watershed hydrologic analysis, and the computation of water surface profiles using HEC-2, WSPRO, or HEC-RAS. Also, provided surveying support operating a data collector and total station on 18 ATSF sites to provide information necessary to perform hydraulic analysis and produce top-of-rail drawing.

Texas Department of Transportation, District 15. Site manager. Performed bridge scour studies of four sites (including 17 bridges) on Leon Creek around the San Antonio, Texas, area. Studies included site reconnaissance, survey coordination, hydrologic analysis, computation of water surface profiles and hydraulic properties using WSPRO, and calculation of contraction, pier, and abutment scour at each bridge.

Union Pacific Railroad Company. Site manager. Performed hydrologic and hydraulic studies for eight railroad bridges in Texas. Analysis included computing 50-year and 100-year flood flows and evaluating the existing hydraulic conditions at the site. A replacement structure was recommended which would provide an economical design and satisfy Union Pacific Railroad (UPRR) hydraulic criteria. The hydraulic analyses were performed using HEC-2 and WSPRO. In addition, initial permitting contacts were made on behalf of the UPRR to the appropriate agencies. Provided surveying support operating a data collector and total station on more than 20 UPPR sites to provide information necessary to perform hydraulic analysis and produce top-of-rail drawing.

Edwards Underground Water District. Project Engineer. Developed the areal precipitation data sets for the Guadalupe-San Antonio River Basin model. Performed a literature review and compiled the data on low-flow studies and miscellaneous measurements made in the basins by the U.S.G.S.

Stormwater Management

Tenaska Gateway Generating Station, Texas. Project Manager. Prepared a 100-year flood plain delineation of Billy Ditch and a major tributary on the proposed site of a new 840MW power generating station in East Texas for Tenaska, Inc. The project involved the development hydrology and a hydraulic model as well as preparation of 100-year flood plain boundary delineations on electronic aerial topographic maps.

City of Temple, Texas. Assistant Project Manager for a drainage basin study for the City of Temple, Texas. The project involved the development of a Drainage Criteria and Design Manual for the City of Temple and a study of existing and future drainage problems associated with stream flooding in the Temple area. Provided coordination of hydrology development for nine watersheds in the study area. Evaluated historical rainfall data and runoff patterns to calibrate the hydrologic models to the historical rainfall temporal distribution patterns for the Temple Area.

South Texas Water Authority. Project Engineer. Developed areal daily precipitation data sets for the Lower Nueces River Basin and used these data to develop runoff using the Texas Water Development Board's rainfall/runoff model, TxRR. This simulated runoff was used to evaluate the potential effects of storm water diversion into the Nueces Delta area on the firm yield of the Choke Canyon Reservoir/Lake Corpus Christi System.

San Patricio Municipal Water Supply District. Project Engineer. Developed a hydrologic model of the Green Lake drainage area near Portland, Texas, in San Patricio County using HEC-1. Evaluated the rainfall/runoff characteristics of the Green Lake watershed under current and future development conditions. Developed e-a-c tables for Green Lake and used them to evaluate flood control and water supply options. Performed flood frequency analysis on the Green Lake spillway modification options and provided support in the computation of alternative spillway ratings. (See summary in Water Supply section for additional work performed in this project.)

Lake Leon Flood Control Group. Project Engineer. Performed hydrologic and hydraulic study on Leon Reservoir in Eastland County, Texas. Developed historical inflow hydrographs to the reservoir, performed frequency analyses on reservoir storage, and routed the historical inflow hydrographs through the reservoir to evaluate the impact of several spillway capacity improvement scenarios on reservoir peak stage.

Employment History

Lower Colorado River Authority, Austin, Texas
- Senior Engineer, W/WW Planning and Engineering, 2006 to present

Alan Plummer Associates, Inc., Austin, Texas
- Senior Engineer, 2004 to 2006

HDR Engineering, Inc., Austin, Texas
- Management Team Member, 2000 to 2004
- Project Manager, 1997 to 2004
- Assistant Project Manager, 1995 to 1997
- Graduate Engineer, 1992 to 1995

Cornell University, Ithaca, New York
- Graduate Assistant, 1989 to 1991

E20 Consultants, College Station, Texas, 1988 to 1989

Kimley-Horn and Associates, Inc. (formerly PAWA-Winkelman and Associates, Inc.), Dallas, Texas
- Summer Intern – Drafting, 1988
- Summer Intern – Surveying, 1985 to 1987

Publications and Presentations

Payne, K.D., "Characterization of Emergency Response Times to Highway Accidents For Use In Hazardous Materials Routing Analysis," Master's Thesis, Cornell University, 1995.

Payne, K.D., "Regional Wastewater Reuse in the Nueces Estuary," American Society of Civil Engineers, Water Resources Planning and Management, Proceedings of the 21st Annual Conference, May 1994.

Payne, K.D., "Membrane Bioreactor Wastewater Treatment Plants In Texas, Lesson's Learned," presentation to the Central Texas Section of the Water Environment Association of Texas, November 18, 2008.

Professional Activities

American Society of Civil Engineers

Austin Branch
- Vice President 1993 to1995
- President 1996 to1997
- Engineered Wetlands Shortcourse co-organizer, 1996
- Co-Chair Hosting Committee for Spring 2000 Texas Section Meeting
- Honors Committee Chair, 1997 to 1998
- Practitioner Advisor, Student Chapter, University of Texas, 1995 to 2000

Texas Section
- Board of Directors
  - Vice President-Education, 2003 to 2005
  - Director-at-Large, 1998 to 2000
- Committee for Governmental Affairs, Chair/Co-Chair, 2001 to 2002
- Committee for Student Services
  - Committee Member, 1996 to 2005
  - Committee Chair, 1997 to 2001
- Civil Engineering Brochure Committee
  - Chair, 1997
  - Austin Branch CE Brochure Insert Committee Chair, 1998

National ASCE

- Committee on Student Activities, 1997 to 2002 and 2004 to 2007
  - Zone III Practitioner, 1997 to 2001
  - Committee Chair, 1999 to 2000
  - Liaison from EdAC, 2004 to 2007
- ASCE 150th Anniversary National Student Conference (2002), Conference Co-Chair
- Educational Activities Committee (EdAC), 2003 to 2009
  - Committee Chair, 2004 to 2008
- Committee on Global Principals for Professional Conduct, 2007 to 2009

Water Environment Federation

Water Environment Association of Texas, Central Texas Section

- Vice President, 2007 to 2008
- President-Elect, 2008 to 2009
- President, 2009 to 2010

American Water Works Association

Honors and Awards

American Society of Civil Engineers (ASCE) Awards

- 2002 National ASCE Educational Activities, ExCEEd Leadership Award
- 2002 Austin Branch, Civil Engineer of the Year
- 2001 Texas Section, ASCE, Professional Service to Students Award
- 2000 ASCE Edmund Friedman Young Engineer Award for Professional Achievement

Other Honors and Awards

- 1998 Young Engineer of the Year, Travis Chapter, Texas Society of Professional Engineers
- HDR Pathfinders Awards (peer driven recognition program)
  - 2000 Pathfinders Award for Community Service (Austin Office)
  - 1999 Pathfinders Team Award for South Central Texas (Region L) Water Planning Team (Crystal Award, National)
  - 1994 Pathfinders Team Award for City of Jacksboro Design Team (Austin Office)
- Full Research/Teaching Assistantship, Cornell University, College of Engineering Graduate Program, 1989-1991
- Graduated Magna Cum Laude from Texas A&M University, 1989
- Tau Beta Pi, national engineering honor society, 1988
- Chi Epsilon, national civil engineering honor society, 1987

Hobbies and Additional Interests

Lake Travis Youth Sports Association (LTYA), Lacrosse Program

- Board of Directors, 2008 to present

Oak Hill Youth Sports Association

- Baseball Coach, 1997 to 2008
- Board Member, 2003 to 2007

LTYA Basketball Program

- Coach, 2004 to 2008

Pop Warner Football

- Coach (LTYA and West Austin), 2004 to 2006

YMCA Youth Basketball

- Coach, 2003 to 2004

Cub Scouts, Pack 71

- Cubmaster, 2000 to 2003
- Assistant WEBELO's Den Leader, 2002 to 2003

Austin Foundation for the Homeless, Christmas Eve Brunch

- Volunteer, 1995 to 2003
- Host Committee, Chair and/or Co-chair, 1996 to 2000

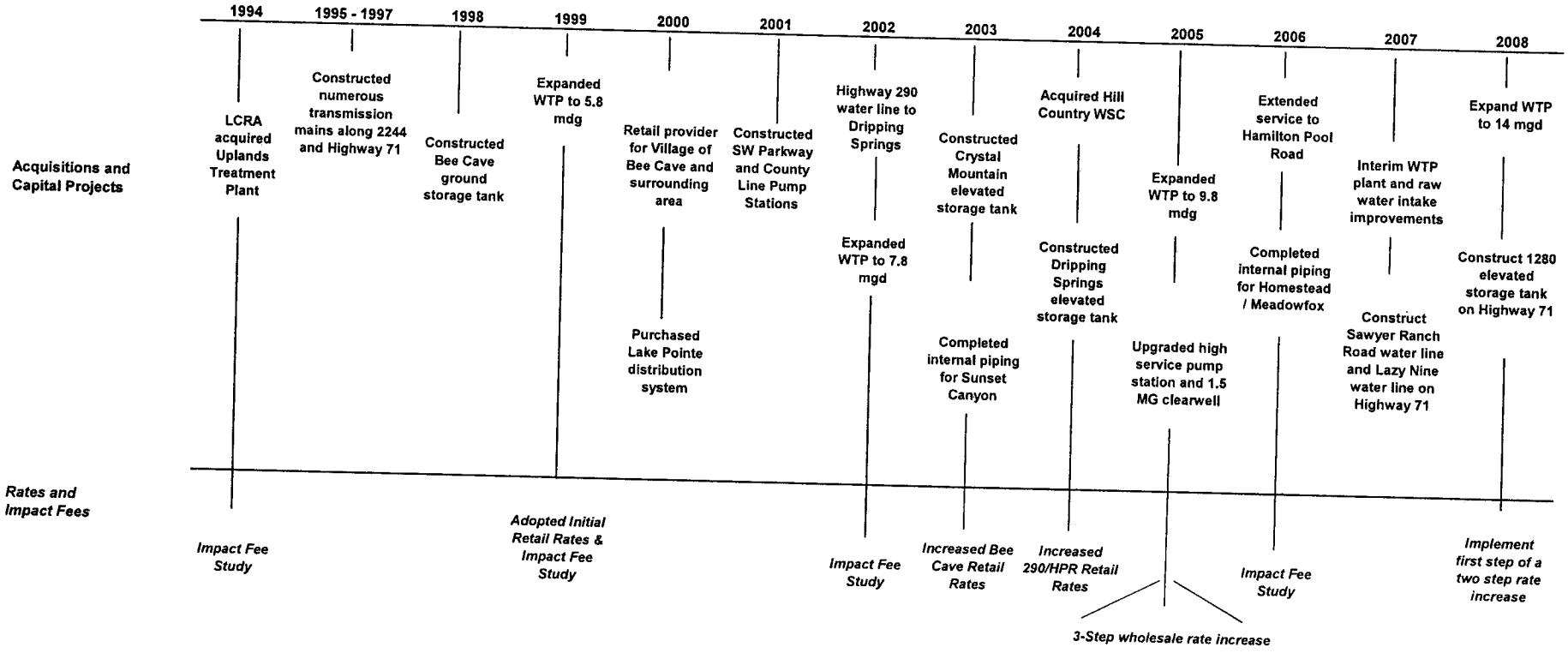
Austin Habitat for Humanity

- Frequent participant in ASCE sponsored workdays
- Provided topographic land surveying services for 3 habitat lots and a 7 acre development tract

Member of The Lakeway Church, Lakeway, Texas

KP-2

West Travis County Regional Water System Time Line
June 2007



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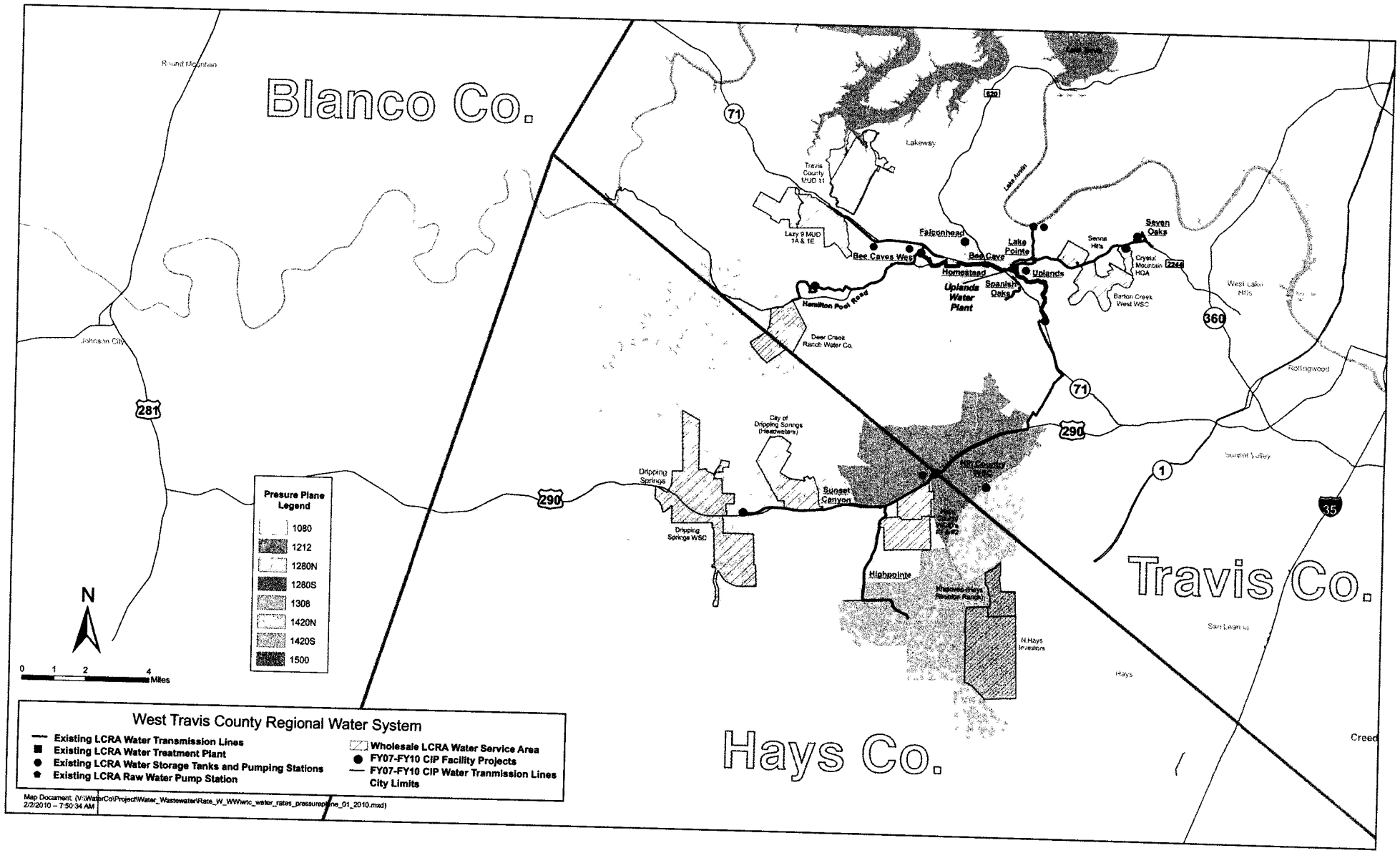
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Travis Co.
Round Mountain
Johnson City
Lakeway
Travis County MUD 11
Lazy 9 MUD 1A & 1E
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Bee Caves
Lake Pointe
Uplands
Seven Oaks
Senna Hills
Crystal Mountain HOA
2244
Homestead
Uplands Water Plant
Spanish Oaks
Barton Creek West WSC
West Lake Hills
Rollingwood
Hamilton Pool Road
Deer Creek Ranch Water Co.
City of Dripping Springs (Headwaters)
Dripping Springs
Dripping Springs WSC
Sunset Canyon
Hill Country WSC
Highpointe
Rawhide Creek Ranch
N Hays Investors
Sunset Valley
San Leanna
Hays
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Presure Plane Legend
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1308
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West Travis County Regional Water System
Existing LCRA Water Transmission Lines
Existing LCRA Water Treatment Plant
Existing LCRA Water Storage Tanks and Pumping Stations
Existing LCRA Raw Water Pump Station
Wholesale LCRA Water Service Area
FY07-FY10 CIP Facility Projects
FY07-FY10 CIP Water Tranmission Lines
City Limits
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KP-4

West Travis County
Regional Water System:
Capital Improvements Plan and Impact
Fee Calculation for Development
between 2006 and 2015

PBS&J

An employee-owned company

PBS&J Job No. 441587.00

WEST TRAVIS COUNTY REGIONAL WATER SYSTEM: CAPITAL IMPROVEMENTS PLAN AND IMPACT FEE CALCULATION FOR DEVELOPMENT BETWEEN 2006 AND 2015

Prepared for:

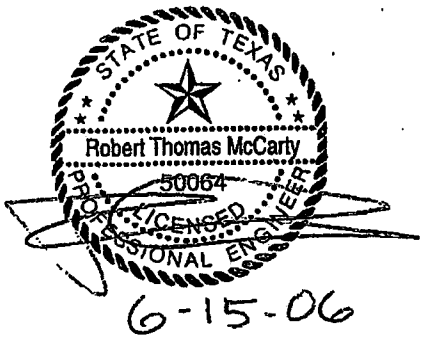
Lower Colorado River Authority
3700 Lake Austin Boulevard
Austin, Texas 78703

Prepared by:

PBS&J
6504 Bridge Point Parkway
Suite 200
Austin, Texas 78730-5091

June 2006

Printed on recycled paper



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1.0 EXECUTIVE SUMMARY

The purpose of this report is to present a capital improvements plan (CIP) for the West Travis County Regional Water System (WTCRWS) for the next 10-year period (2006 to 2015), which will then be used in calculating the maximum allowable impact fees for future connections to the system. The impact fee study summarized in this report has been conducted in accordance with the guidelines established in Chapter 395 of the Texas Local Government Code "Financing Capital Improvements Required by New Development in Municipalities, Counties, and Certain Other Local Governments".

In previous impact fee studies, the WTCRWS has been comprised of two areas, the Bee Cave area and the Dripping Springs area. This impact fee study covers the previous two areas and introduces an additional area, the new Hamilton Pool Road area. The system currently serves existing homes and businesses in the Bee Cave and Dripping Springs areas and will begin serving primarily residential areas in the Hamilton Pool Road area in 2006. In January 2006, there were 3,196 living unit equivalents (LUEs) in the Bee Cave area and 2,278 LUEs in the Dripping Springs area. Over the next ten years the service area of the WTCRWS is projected to increase with the addition of the Hamilton Pool Road area, and the growth of existing and new developments in the Bee Cave and Dripping Springs areas. For the purpose of preparing a capital improvements plan, growth rate projections provided by Lower Colorado River Authority (LCRA) have been assumed. These projections assume that approximately 9,401 additional LUEs will be connected to the WTCRWS between 2006 and 2015. Thus, approximately 14,874 LUEs will be served by the WTCRWS in 2015.

Approximately $19.3 million of the costs of the CIP projects constructed prior to this Impact Fee Study are attributable to the development anticipated between the years 2006 and 2015.

Potential future capital improvements required to accommodate the growth include expansion of the raw water intake for the Uplands Water Treatment Plant (Uplands WTP), increasing the Uplands WTP treatment capacity to a total capacity of 18 mgd, construction of the Lake Travis Water Treatment Plant and the associated raw water systems, pump station upgrades, two elevated storage tanks, one ground storage tank, and two hydro systems, as well as several water transmission main projects. The future capital improvements have been estimated at $87.2 million in 2006 dollars of which $56.7 million is attributable to development between 2006 and 2015.

Separate impact fees were calculated for each area. According to the projections and distribution of costs for existing and projected CIP projects, the maximum allowable impact fee is $4,120/LUE for the Bee Cave area, $5,221/LUE for the Dripping Springs area, and $5,028/LUE for the Hamilton Pool Road area.

Another option for rate area delineation would be to combine the Dripping Springs and Hamilton Pool Road areas into one rate area. Based on the similarities of the land use and customers served in these areas, the combination of these two areas would be logical. Using the costs and LUEs developed for the separate Dripping Springs and Hamilton Pool Road areas, the resulting maximum allowable impact fee for the combined area, which could be known as the 290/HPR Area, would be $5,180/LUE.

2.0 BACKGROUND AND SCOPE

2.1 BACKGROUND

The WTCRWS serves commercial and residential developments in West Travis County and North Hays County. Originally the system only served Barton Creek West and two schools of the Eanes Independent School District, but the service area has since grown to include a few commercial areas and more than 20 residential subdivisions including larger developments such as Uplands, Serrna Hills, Lake Pointe, Spillman Ranch, and Belterra. The WTCRWS service area also includes the Village of Bee Cave corporate limits and its one-mile extraterritorial jurisdiction (ETJ), and the service areas defined by the CCNs (Certificate of Convenience and Necessity) of the Dripping Springs Water Supply Corporation (Dripping Springs WSC) and Hill Country Water Supply Corporation (Hill Country WSC).

The ongoing development in West Travis and North Hays Counties and the associated increase in water demand has resulted in the expansion of the WTCRWS. With this impact fee study, an additional area known as the Hamilton Pool Road area is introduced to the service area of the WTCRWS. The Hamilton Pool Road area straddles the Travis/ Hays county line and covers the expanse between the Bee Cave and Dripping Springs areas currently served by the WTCRWS. Major residential developments occurring in this area, and requiring water supply from the WTCRWS include Belvedere, Rocky Creek Ranch, and Deer Creek.

Prior to this study the most recent impact fee study (2003-2012) divided the WTCRWS service area into two impact fee areas, Bee Cave and Dripping Springs. The Bee Cave area covered the Village of Bee Cave and its surrounding areas and the Dripping Springs area included mainly the Hays County portion of the WTRWS service area. In this impact fee study a third impact fee area was established to represent the recently added Hamilton Pool Road area.

2.2 SCOPE OF THIS STUDY

The following tasks are included in the scope of this study:

- Obtain Land Use Assumptions (LUAs) and future projections from the LCRA;
- Prepare maps of the WTCRWS service area illustrating the three impact fee areas along with the tracts, planning zones, areas and subdivisions represented in the LUA tables;
- Based on LUAs and projections, develop a ten-year capital improvements plan (CIP) necessary to provide water to the future demand of the WTCRWS service area;
- Calculate a maximum allowable impact fee by area for future connections to the system using costs included in the CIP;

- Provide technical support to the LCRA throughout the impact fee approval process specified by the Texas Local Government Code.

3.0 SYSTEM PLANNING CRITERIA

3.1 LAND USE ASSUMPTIONS

The LUAs and projections used in this report were developed by the LCRA. The LCRA worked closely with developers, city officials, land planners, and engineers in order to obtain accurate and up to date information regarding development in the WTCRWS service area. These LUAs and projections were organized by impact fee area and presented to and approved by the LCRA Board at the February 2006 board meeting.

3.1.1 DEVELOPMENT PROJECTIONS

Table 3-1 presents the LUEs and projected growth for the WTCRWS Service Area by tract, subdivision, area, or planning zone for years 2006 through 2015. The table is divided into three sections to represent LUEs and land use descriptions for each tract included in the Bee Cave, Dripping Springs and Hamilton Pool Road impact fee areas. Total LUEs for each area, as well as the overall totals for the entire WTCRWS service area, are presented for each year of the impact fee study period. The total acreage of each impact fee area is also provided in Table 3-1. Figure 3-1 presents a map of the WTCRWS service area and the three impact fee areas.

As indicated by Table 3-1, the WTCRWS is estimated to be serving 14,874 LUEs by the year 2015, which represents an increase of 9,401 LUEs between the years 2006 and 2015. The Bee Cave impact fee area is projected to grow by 3,925 LUEs in the next ten years. A significant part of the growth in the Bee Cave area is attributable to the residential growth along the Highway 71 corridor, which is expected to connect 1,370 LUEs to the WTCRWS in the next ten years. The Dripping Springs impact fee area is estimated to grow by 4,300 LUEs over the next ten years. A considerable amount of this increase in LUEs is expected to result from the growth of the Hill Country WSC service area and the residential developments of Belterra, Highpointe (Sawyer Ranch), and Rutherford Ranch. These developments combined represent a total increase of 3,132 LUEs from 2006 to 2015. The newly added Hamilton Pool Road impact fee area is projected to have a total of 1,175 LUEs by the year 2015 with a majority of this growth occurring in the residential developments of Deer Creek, Rocky Creek Ranch, and Belvedere.

TABLE 3-1
LCRA West Travis County Regional Water System - Impact Fee Study
Current and Projected LUEs - 2006 to 2015

Bee Cave Impact Fee Area	Land Use	Jan. 2006	Jan. 2007	Jan. 2008	Jan. 2009	Jan. 2010	Jan. 2011	Jan. 2012	Jan. 2013	Jan. 2014	Jan. 2015
RM 2244 Area											
Uplands	Residential	170	170	170	170	170	170	170	170	170	170
Barton Creek West WSC	Residential	428	428	428	428	428	428	428	428	428	428
Lake Pointe	Residential	997	1000	1000	1000	1000	1000	1000	1000	1000	1000
Seven Oaks	Residential	30	40	50	60	70	80	90	100	110	120
Seven Oaks Non-Residential	Non-Residential	10	16	22	28	34	40	40	40	40	40
Senna Hills	Residential	219	219	230	241	254	266	280	293	308	324
Crystal Mountain	Residential	46	46	46	46	46	46	46	46	46	46
Patterson	Residential	45	47	48	50	51	51	52	52	53	53
Crystal Creek	Residential	62	62	62	62	62	62	62	62	62	62
EISD	Non-Residential	35	35	35	35	35	35	35	35	35	35
Non-Residential on 2244	Non-Residential	116	120	123	126	126	126	126	126	126	126
Bee Cave West											
Bee Cave West	Residential	43	47	50	50	50	50	50	50	50	50
Area 1B Non-Residential	Non-Residential	0	11	22	33	44	55	66	77	88	99
Area 1A Residential	Residential	23	46	70	93	116	139	162	186	209	232
Area 1A Non-Residential	Non-Residential	0	0	19	37	56	74	93	112	130	149
Bee Cave Central & East											
Previous WCID #14	Residential	19	19	19	19	19	19	19	19	19	19
Homestead, Meadowfox	Residential	165	175	185	195	205	210	210	210	210	210
Spanish Oaks Residential	Residential	74	98	122	146	170	194	218	242	266	290
Spanish Oaks Non-Residential (CCNG)	Non-Residential	10	41	73	104	135	167	198	229	261	292
Shops at Galleria	Non-Residential	173	173	173	173	173	173	173	173	173	173
Barton Bluffs	Residential	27	27	27	27	27	27	27	27	27	27
Preserve at Barton Creek	Residential	44	48	50	50	50	50	50	50	50	50
Town Center	Non-Residential	13	89	164	240	275	310	345	380	415	450
Central North of Hwy 71 - Area 2 Residential	Residential	11	22	33	44	55	66	77	88	99	111
Central North of Hwy 71 - Area 2 Non-Residential	Non-Residential	25	42	58	75	91	107	124	140	157	164
PZ 16 (Wong)	Non-Residential	0	0	0	0	0	0	0	0	0	0
Portion of PZ 14	Residential	0	0	0	0	0	0	0	0	0	0
Bee Cave Hwy 620 Area											
Spillman Residential	Residential	273	343	457	522	564	579	579	579	579	579
Spillman Non-Residential	Non-Residential	10	60	110	135	135	135	135	135	135	135
Home Depot, Outparcels	Non-Residential	50	50	50	50	50	50	50	50	50	50
Area 3A Residential	Residential	12	20	28	36	45	53	61	69	77	85
Area 3A Non-Residential	Non-Residential	35	45	55	65	75	85	95	105	109	109
Area 3B Residential	Residential	24	28	32	36	40	43	47	51	55	59
Area 3B Non-Residential	Non-Residential	6	7	8	9	10	11	12	13	14	15
Highway 71 Corridor											
Davenport Residential	Residential	0	50	185	321	456	591	727	862	997	1133
Davenport Irrigation Land	Non-Residential	0	1	1	1	2	2	3	3	4	4
Lakeway West	Residential	0	0	0	0	0	0	54	108	162	216
Portion of PZ 13	Residential	0	0	0	0	0	5	10	13	15	17
Bee Cave Area Total LUEs		**3,196**	**3,625**	**4,205**	**4,706**	**5,117**	**5,501**	**5,913**	**6,324**	**6,729**	**7,121**
Bee Cave Area Total Land Area (Acres)					**18,809**						

Hamilton Pool Road Impact Fee Area	Land Use	Jan. 2006	Jan. 2007	Jan. 2008	Jan. 2009	Jan. 2010	Jan. 2011	Jan. 2012	Jan. 2013	Jan. 2014	Jan. 2015
Area 1D	Residential	0	0	0	0	14	28	42	56	70	84
Rocky Creek Ranch	Residential	0	24	49	73	97	121	146	170	194	218
Belvedere	Residential	0	23	46	69	92	115	138	161	184	207
Portion of PZ 13	Residential	0	0	0	0	0	20	40	62	85	108
Deer Creek/West Cave Estates	Residential	0	0	250	280	310	340	370	400	430	460
PZ 12	Residential	0	0	0	0	0	0	0	5	11	16
PZ 19	Residential	0	0	0	0	0	0	0	15	30	45
PZ 20	Residential	0	0	0	0	0	0	0	7	13	20
Saddle Tree Ranch	Residential	0	0	0	0	0	0	0	0	0	0
PZ 21	Residential	0	0	0	0	0	0	0	0	0	16
Portion of PZ 18	Residential	0	0	0	0	0	0	0	0	0	0
Hamilton Pool Road Totals LUEs		**0**	**47**	**345**	**422**	**513**	**624**	**736**	**876**	**1,017**	**1,175**
Hamilton Pool Road Area Total Land Area (Acres)					**34,212**						

Dripping Springs Impact Fee Area	Land Use	Jan. 2006	Jan. 2007	Jan. 2008	Jan. 2009	Jan. 2010	Jan. 2011	Jan. 2012	Jan. 2013	Jan. 2014	Jan. 2015
PZ 24	Residential	0	0	0	0	0	0	14	28	41	55
PZ 25	Residential	169	169	169	169	191	212	235	257	281	304
PZ 26	Residential	91	91	91	91	109	128	147	166	185	205
Sunset Canyon North	Residential	242	254	266	280	294	308	324	340	357	375
Portion of PZ 27	Residential	0	11	23	34	47	61	75	88	102	115
Sunset Canyon South	Residential	67	71	74	78	82	86	90	95	99	104
Portion of PZ 30	Residential	0	0	0	14	29	43	57	71	86	100
PZ 31	Residential	117	117	117	117	123	129	136	142	150	157
PZ 32	Residential	56	56	56	56	59	62	65	69	72	76
Hill Country Water Supply Corp Service Area	Residential	1240	1302	1367	1436	1507	1583	1662	1745	1832	1924
Rutherford Ranch	Residential	0	0	0	0	63	125	188	250	313	375
Hays Reunion Ranch	Residential	0	0	24	48	72	96	120	144	168	192
Preserve Land (PZ 40)	Non-Residential	0	0	0	0	0	0	0	0	0	0
Belterra	Residential	280	380	480	580	680	780	880	980	1080	1180
Highpointe (Sawyer Ranch)	Residential	5	105	205	305	405	505	605	705	805	905
Portion of PZ 29	Residential	0	0	0	11	23	34	45	57	68	79
Rimrock, Rutherford West	Residential	10	40	71	101	132	162	192	223	253	283
Portion of PZ 16	Residential	0	0	0	0	20	41	61	82	102	123
PZ 33	Residential	0	0	0	0	0	0	7	13	20	26
PZ 37	Residential	0	0	0	0	0	0	0	0	0	0
Goldenwood/ Goldenwood West/ Radiance	Residential	0	0	0	0	0	0	0	0	0	0
Planning Zone 18A	Residential	0	0	0	0	0	0	0	0	0	0
Dripping Springs Total LUEs		**2,278**	**2,597**	**2,944**	**3,321**	**3,835**	**4,355**	**4,901**	**5,454**	**6,013**	**6,578**
Dripping Springs Area Total Land Area (Acres)					**76,956**						

OVERALL TOTAL LUEs		**5,473**	**6,270**	**7,493**	**8,448**	**9,465**	**10,480**	**11,550**	**12,654**	**13,759**	**14,874**
OVERALL TOTAL LAND AREA (Acres)					**129,997**						

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3.2 WATER SYSTEM PLANNING CRITERIA

In order to develop a CIP to accommodate development in the service area over the next 10 years, it is first necessary to institute water system planning criteria for the system. The planning criteria establish a means of determining the capacity of the water system components with respect to the amount of water demand of the service area. Rates of water consumption are system-specific and vary based on many factors, including population, population density, time of day/year, and land use type. Before planning improvements to a water distribution system, it is important to establish water consumption rates based on the characteristics of the service area. In order to accomplish this, historical water use provided by water records of the area is typically used to define the system planning criteria. Of the planning criteria defined, the following are the most important in water system planning:

- Max Day (MD) Demand;
- Peak Hour (PH) Demand;
- Velocity in Pipelines;
- Total Storage;
- Elevated Storage; and
- Clearwell Storage.

In March 2002, the LCRA published the "Water & Wastewater Utilities Design Criteria", which addresses most of the above criteria. The criteria established in the "Water & Wastewater Utilities Design Criteria" were utilized in this impact fee study and are discussed further in the following sections.

3.2.1 MAXIMUM DAY DEMAND

MD demand is the maximum amount of water pumped on a given day and is determined using the historical records of the water system. MD demand is generally used to size the raw water delivery and treatment components of the system. In the event that a system has sufficient elevated storage to meet peak hour demand and fire flows, the MD demand is used to size pumping components.

The LCRA design criterion for MD demand includes separate values for urban and rural systems. According to LCRA's design criteria urban MD demands are 1.3 gpm/LUE and rural MD demands are 0.8 gpm/LUE. In this study, the Bee Cave impact fee area is considered to be an urban system, while the Dripping Springs and Hamilton Pool Road impact fee areas are classified as rural systems.

3.2.2 PEAK HOURLY DEMAND

The maximum rate of water use that can be expected to occur within a water distribution system over a continuous 60-minute period is the PH demand. This criterion is specific to every system and is generally established using the water use patterns of a system. PH demand is used to determine the required sizes of transmission and distribution lines and to determine the required capacity of potable water pumping stations if no elevated storage is provided.

As with MD demands, the LCRA criteria include PH demand values for both urban and rural systems. The criteria establish a PH demand of 2.2 gpm/LUE for an urban system and 1.6 gpm/LUE for a rural system.

3.2.3 VELOCITY IN PIPELINES

Velocity in pipelines refers to the speed at which water moves through the pipes of the water distribution system. For the purposes of this study, it was decided that the maximum allowable velocity through transmission mains and distribution lines would be 5 fps at max day demand.

3.2.4 TOTAL, ELEVATED AND CLEARWELL STORAGE

Storage requirements of water distribution systems vary in part with land use type and population density (among other factors). As per Chapter 290 of TCEQ's Rules and Regulations pertaining to the standards of "Public Drinking Water", surface water supplies are required to meet a total storage capacity of 200 gallons per connection and an elevated storage capacity of 100 gallons per connection (or pressure tank storage of 20 gallons per connection). Also under Chapter 290 regulations, it is required that a water treatment plant have clearwell storage of a minimum of 5% of the daily plant capacity.

The LCRA criteria did not address requirements of total, elevated and clearwell storage, thus the storage criteria used for this study are based on past storage needs of the WTCRWS. The storage criteria utilized in this study are as follows:

Type of Storage	Criteria
Total Storage	500 gallons/ LUE
Elevated Storage	250 gallons/ LUE
Clearwell Storage	130 gallons/ LUE

4.0 CAPACITY OF THE EXISTING SYSTEM

This section presents the capacities of the existing WTCRWS facilities, the utilization of these facilities over the next ten year period, and the associated percentage of the project costs, based on utilization, that can be applied in the calculation of impact fees. The capacities of the existing system components are determined using the system planning criteria outlined in Section 3.0 and the current and projected utilization of the components are based on the LUE projections presented in Table 3-1.

The existing facilities presented in this section incorporate the most recent facility expansions and system extensions as of the year 2005. Impact fee eligible projects completed since the previous impact fee study include: an increase in pumping capacity and the addition of a 1.5 million gallon clearwell at the Uplands WTP; the addition of a 16-inch parallel line around the Senna Hills subdivision in the 1080 pressure plane (PP); the addition of a 12-inch, 16-inch, and 20-inch mains in the 1280 PP; an increase in pumping capacity at the Southwest Parkway Pump station in the 1308 PP; the addition of a pump station in the 1308 PP at the County Line site; and the addition of a 1.0 million gallon elevated storage tank in Dripping Springs in the 1420 PP.

Table 4-1 summarizes the capacity of the existing facilities at the Uplands Water Treatment Plant and the existing system components of each pressure plane (1015, 1080, 1280, 1308, and 1420) in gpm, gallons, or LUEs. The design criteria utilized to calculate each of these capacities is also provided in Table 4-1. The facility capacities in Table 4-1 reflect the total available capacity of the system components, including capacity currently utilized and capacity available for future connections.

Based on the project costs and the percentage of used and remaining capacity of the existing system components, expenses eligible to be charged in this impact fee are calculated and presented in Table 4-2. Information provided for each existing facility in Table 4-2 includes the total project cost, total capacity, capacity used prior to 2006, cost attributed to capacity used prior to 2006, capacity projected for 2006-2015 and cost attributed to 2006-2015 development. The table is divided into the following four sections: System Costs, Bee Cave Costs, Dripping Springs Costs, and Hamilton Pool Road Costs. Each facility represented in Table 4-2 is designated as being part of one of the four categories. The System Costs refer to the facilities utilized by the entire service area such as raw water and treatment plant improvements, transmission mains between plants and studies for the whole system. The facilities listed under the Bee Cave, Dripping Springs, and Hamilton Pool Road Impact Fee Area Costs are considered to be utilized only by customers in these areas, thus the costs are applied accordingly. The facilities assigned to the individual areas include tanks, pumping stations and transmission mains that affect only their area. A full size map of all existing and proposed facilities is provided as Figure 4-1 in a map pocket at the end of this report.

Table 4-1
CAPACITIES OF EXISTING SYSTEM COMPONENTS

System Component	Existing Capacity	Design Criteria [1]
Uplands Water Treatment Plant		
Raw Water Intake	6,801gpm	Max Day
Raw Water Pumps (Firm Capacity)	6,801gpm	Max Day
30" Raw Water Transmission Main [2]	12,499 gpm	Max Day
Uplands Water Treatment Plant	6,801 gpm	Max Day
Clearwells (2)	500,000 gallons	130 gal/LUE
Additional 1.5 MG Clearwell	11,539 LUEs	130 gal/LUE
1015 Pressure Plane[5]		
Treated Water Pump Station	2,778 gpm	Max Day
16-in Transmission Main from WTP to 1015 Storage Tank	3,133 gpm	Max Day
12-in Line to Barton Creek WSC	1,763 gpm	Max Day
1015 Storage Tank at Southwest Parkway	750,000 gallons	Elevated Storage
1080 Pressure Plane		
Treated Water Pump Station	5,555 gpm	Max Day
16-in Line from WTP through MUD 5	3,133 gpm	Max Day
16-in Line from MUD 5 to Senna Hills	3,133 gpm	Max Day
16-in Parallel Line Around Senna Hills	3,133 gpm	Max Day
12-in Line through Senna Hills [3]	1,057 gpm	Max Day
16-in Transmission Main east from Senna Hills along Bee Cave Rd.	3,133 gpm	Max Day
24-in Transmission Main from WTP to Hwy 71	4,230 gpm	Max Day
16-in Line south on Hwy 71 to Spanish Oaks subdivision	3,133 gpm	Max Day
16-in Line from Hwy 71 at 620 to the creek in Spanish Oaks	3,133 gpm	Max Day
12-in Line through Shops at Galleria	1,760 gpm	Max Day
16-in Line from 2244 and Highway 71 to Bee Cave West Tank (along Hwy 71)	3,133 gpm	Max Day
Ground Storage Tank at Bee Cave West [4]	367,000 gallons	Elevated Storage
Elevated Storage Tank at Crystal Mountain	750,000 gallons	Elevated Storage

Table 4-1 (Cont.)
CAPACITIES OF EXISTING SYSTEM COMPONENTS

System Component	Existing Capacity	Design Criteria
1280 Pressure Plane		
Hydropneumatic Pumping System at Bee Cave West Tank	10,000 gallons	20 gal/LUE
Pump Station at Bee Cave West Storage Tank	1,400 gpm	Max Day
Hydropneumatic Pumping System at Home Depot	10,000 gallons	20 gal/LUE
Pump Station at Home Depot	1,500 gpm	Max Day
24-in Transmission Main from Bee Cave West Storage Tank to Hamilton Pool Rd.	4,222 gpm	Max Day
20-in Transmission Main from Bee Cave West Storage Tank to Highway 71	4,887 gpm	Max Day
20-in Transmission Main on Highway 71 to Spillman drop-off	4,887 gpm	Max Day
16-in Line through Spillman	3,133 gpm	Max Day
12-in Transmission Main - Homestead Phase II	1,760 gpm	Max Day
20-in/ 16-in Transmission Main - Homestead Phase I	3,133 gpm	Max Day
1308 Pressure Plane		
Southwest Parkway Pump Station	1,967 gpm	Max Day
24-in Transmission Main from Southwest Parkway Pump Station to County Line Pump Station	7,050 gpm	Max Day
1308 Pump Station at County Line LS Site	1,800 gpm	Max Day
1420 Pressure Plane		
County Line Pump Station	1,800 gpm	Max Day
20-in Transmission Main from County Line Pump Station to Dripping Springs	2,938 gpm	Max Day
1.0 MG Elevated Storage Tank east of Dripping Springs	4000 LUEs	250 gal/LUE

Notes:

1 The Max Day demand is 1.3 gpm/LUE for the Bee Cave area and 0.8 gpm/LUE for the Dripping Springs area. The Peak Hour demand is 2.2 gpm/LUE for the Bee Cave area and 1.6 gpm/LUE for the Dripping Springs area. The capacities of transmission mains and distribution lines are based on a maximum velocity of 5 fps for Max Day.

2 Capacity of the 30" raw water transmission main is based on a maximum velocity of 5.67 fps.

3 The 12" transmission main through Senna Hills is not owned by the WTCRWS but was included since it limits the system capacity.

4 The Bee Cave Storage Tank has a total capacity of approximately 471,000 gallons but the capacity usable to the 1080 pressure plane is 367,000 gallons.

5 The 1015 Pressure Plane was combined with the 1080 Pressure Plane in 2003.

TABLE 4-2
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Past Capital Improvement Projects and Usage of Each Project

CIP Project	Year Completed	Project Cost	Capacity (in gpm, gal or LUEs)	Capacity used prior to 2006 (in gpm, gal or LUEs)		Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm, gal or LUEs)		Cost Attributed to 2006-2015 Development[A]
SYSTEM COSTS									
Uplands Water Treatment Plant									
Uplands Water Treatment Plant to 7.8 mgd (3rd unit)	2002	$1,040,000	5,416 gpm	5,316	gpm	$1,020,798	100	gpm	$19,202
Treated Water Pump Station to 8 mgd	2002	$60,000	5,555 gpm	5,413	gpm	$58,466	142	gpm	$1,534
Upgrade Uplands WTP from 7.8 to 9.8 MGD & RWI upgrade	2005	$1,350,616	1,338 gpm	0	gpm	$0	1,338	gpm	$1,350,616
Build 1.5 MG clearwell	2003	$681,600	11,539 LUEs	1,145	LUEs	$67,634	10,394	LUEs	$613,966
Upgrade High Service PS from 8 mgd to 14 mgd	2005	$3,720,000	4,164 gpm	0	gpm	$0	4,164	gpm	$3,720,000
SYSTEM COST Totals		**$6,852,216**				**$1,146,898**			**$5,705,318**

[A]: A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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TABLE 4-2
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Past Capital Improvement Projects and Usage of Each Project

BEE CAVE IMPACT FEE AREA									
CIP Project	Year Completed	Project Cost	Capacity (in gpm, gal or LUEs)	Capacity used prior to 2006 (in gpm, gal or LUEs)		Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm, gal or LUEs)		Cost Attributed to 2006-2015 Development[A]
BEE CAVE IMPACT FEE AREA COSTS									
1080 Pressure Plane									
16-in Transmission Main from WTP through MUD 5	1996	$592,000	2,410 LUEs	2,023	LUEs	$496,936	387	LUEs	$95,064
16-in Transmission Main from MUD 5 to Senna Hills	1996	$540,000	2,410 LUEs	2,023	LUEs	$453,286	387	LUEs	$86,714
16-in Transmission Main east from Senna Hills along Bee Cave Rd.	1999	$1,025,000	2,410 LUEs	2,023	LUEs	$860,405	387	LUEs	$164,595
24-in Transmission Main from WTP to Hwy 71	1997	$134,000	4,230 gpm	1,143	gpm	$36,209	3,087	gpm	$97,791
16-in Transmission Main south on Hwy 71 to Spanish Oaks subdivision	2000	$608,447	3,133 gpm	114	gpm	$22,139	1,263	gpm	$245,282
16-in Transmission Main from Hwy 71 at 620 to the creek in Spanish Oaks	2001	$245,000	3,133 gpm	33	gpm	$2,581	1,263	gpm	$98,766
16-in Transmission Main from 2244 and Highway 71 to BC West Tank	1998	$1,612,000	3,133 gpm	1,143	gpm	$588,100	1,990	gpm	$1,023,900
Elevated Storage Tank at Crystal Mountain	2001	$1,330,700	3,000 LUEs	1,236	LUEs	$548,248	1,704	LUEs	$755,838
Ground Storage Tank at Bee Cave West	1998	$723,000	1,468 LUEs	680	LUEs	$334,905	788	LUEs	$388,095
16-in Parallel Line around Senna Hills (2800 LF)	2003	$579,600	2,410 LUEs	2,023	LUEs	$486,527	387	LUEs	$93,073
12-in Line through Shops at Galleria (4000 LF)	2005	$585,600	1,760 gpm	0	gpm	$0	1,760	gpm	$585,600
1015 demand supplied from 1080 plane	2003	$120,000	N/A	N/A		$0	N/A	N/A	$120,000

[A]. A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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TABLE 4-2
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Past Capital Improvement Projects and Usage of Each Project

BEE CAVE IMPACT FEE AREA									
CIP Project	Year Completed	Project Cost	Capacity (in gpm, gal or LUEs)	Capacity used prior to 2006 (in gpm, gal or LUEs)		Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm, gal or LUEs)		Cost Attributed to 2006-2015 Development[A]
BEE CAVE IMPACT FEE AREA COSTS (Cont'd)									
1280 Pressure Plane									
Relocation of Hydropneumatic Pumping System to BC West Tank	1999	$195,000	500 LUEs	242	LUEs	$94,380	258	LUEs	$100,620
24-in Transmission Main from BC West Storage Tank to Hamilton Pool	1999	$214,000	4,222 gpm	0	gpm	$0	949	gpm	$48,102
Hydropneumatic Pumping System at Home Depot	2002	$377,197	500 LUEs	243	LUEs	$183,318	257	LUEs	$193,879
20-in Transmission Main from BC West Tank to Highway 71	2002	$650,000	4,887 gpm	631	gpm	$83,927	3,369	gpm	$448,097
12-in and 16-in Transmission Main through Spillman	2002	$573,511	1,760 gpm	391	gpm	$127,411	1,003	gpm	$326,836
Upgrade Bee Cave West Pump Station	2003	$240,000	1,400 gpm	500	gpm	$85,714	900	gpm	$154,286
20-in/16-in Transmission Main - Homestead Phase I (5800 LF)	2002	$1,131,840	3,133 gpm	233	gpm	$84,175	342	gpm	$123,552
12-in Transmission Main - Homestead Phase II (4245 LF)	2005	$636,000	1,760 gpm	223	gpm	$80,584	352	gpm	$127,200
BEE CAVE IMPACT FEE AREA Totals		**$12,112,895**				**$4,568,844**			**$5,277,291**

[A]: A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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TABLE 4-2
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Past Capital Improvement Projects and Usage of Each Project

DRIPPING SPRINGS IMPACT FEE AREA									
CIP Project	Year Completed	Project Cost	Capacity (in gpm, gal or LUEs)	Capacity used prior to 2006 (in gpm, gal or LUEs)		Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm, gal or LUEs)		Cost Attributed to 2006-2015 Development[A]
DRIPPING SPRINGS IMPACT FEE AREA COSTS									
1308 Pressure Plane									
Southwest Parkway Pump Station	2001	$980,778	1,600 gpm	1,600	gpm	$980,778	0	gpm	$0
24-in Transmission Main from SWPPS to CLPS	2001	$4,036,263	7,050 gpm	1,671	gpm	$956,680	3,581	gpm	$2,050,193
Upgrade SWPPS from 1600 to 3567 gpm by adding 2-1967 gpm pumps	2003	$439,800	1,967 gpm	0	gpm	$0	1,967	gpm	$439,800
Altitude valves in Hill Country System	2003	$168,960	N/A	N/A		$0	N/A		$168,960
1308 Pump Station at CLPS site (3-900 gpm pumps with a slot for a fourth pump)	2003	$439,920	1,800 gpm	924	gpm	$0	876	gpm	$439,920
1420 Pressure Plane									
County Line Pump Station (includes hydropnuematic tank and GST)	2001	$1,334,530	1,800 gpm	443	gpm	$328,443	1,357	gpm	$1,006,087
20-in Transmission Main from CLPS to Dripping Springs	2001	$2,667,751	2,938 gpm	726	gpm	$659,220	2,888	gpm	$2,622,350
Build 1.0 MG Elevated Storage Tank east of Dripping Springs	2003	$2,020,800	4,000 LUEs	908	LUEs	$458,722	3,092	LUEs	$1,562,078
DRIPPING SPRINGS IMPACT FEE AREA Totals		**$12,088,802**				**$3,383,842**			**$8,289,389**

[A]: A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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5.0 CAPITAL IMPROVEMENTS PLAN

This section presents a ten-year CIP with projects that are recommended in order for the WTCRWS to provide service to the projected water demands of the future connections outlined in Table 3-1. The projects identified in the CIP include additional transmission mains, storage tanks, improvements to pumping stations, improvements to the Uplands WTP, and construction of a second treatment plant to serve the area.

5.1 POTENTIAL CIP PROJECTS

In order to extend water service to growing areas within the Bee Cave and Dripping Springs existing service areas and to expand facilities to accommodate the additional Hamilton Pool Road area, the projects listed in the CIP presented in Table 5-1 will be necessary. The projects of the CIP include new facilities, as well as improvements to existing facilities, and are delegated to the impact fee areas that they serve in Table 5-1. The projects that all customers will use such as the improvements to the Uplands WTP and the construction of a new treatment plant are incorporated into the System Projects. The Bee Cave impact fee area is assigned four transmission main projects and two additional projects to attain the storage required to meet their projected water demand. In order to meet the demand of the Dripping Springs impact fee area, nine transmission main projects are necessary as well as three storage tank projects and three pump station improvements. The Hamilton Pool Road impact fee area is responsible for three transmission main projects, two pumping station improvements, construction of two new pumping stations and two projects to attain the storage necessary to deliver service. A map of the system showing the proposed CIP projects is included as Figure 4-1 in the map pocket at the end of this report.

5.2 ESTIMATED PROBABLE COST OF CIP

The estimated probable cost of the ten-year CIP developed in this study is presented in Table 5-1. For the most part, the projected project costs are indicative of the cost trends occurring at the time of this study. A limited number of the CIP projects are based on project-specific cost data made available during this study. It is necessary to estimate the costs of these projects in order to calculate the maximum allowable impact fee.

TABLE 5-1
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Future Capital Improvement Projects and Usage of Each Project

Potential CIP Project	Year Scheduled	Estimated Project Cost	Capacity or Increase in Capacity (in gpm or LUEs)	Capacity used prior to 2006 (in gpm or LUEs)	Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm or LUEs)	Cost Attributed to 2006-2015 Development[A]
SYSTEM							
Prepare land use assumptions, CIP and impact fee calculation	2006	$42,000	N/A	N/A	N/A	N/A	$42,000
Raw Water and Treatment Improvements							
Uplands WTP Chemical Building	2006	$1,734,000	N/A	N/A	N/A	N/A	$1,734,000
Upgrade Uplands WTP from 9.8 to 13.8 MGD - Additional Treatment Units and Upgrade to Raw Water Intake/Pumps	2007	$10,959,327	2,778 gpm	0 gpm	$0	2,778 gpm	$10,959,327
Acquire site for Lake Travis raw water intake, line and treatment plant	2006	$2,400,000	N/A	N/A	$0	N/A	$2,400,000
Upgrade Uplands WTP from 13.8 to 17.8 mgd - Additional Treatment Units, Upgrade to Raw Water Intake/Pumps, and Upgrade to High Service Pumps	2009	$3,115,008	2,778 gpm	0 gpm	$0	2,778 gpm	$3,115,008
Build 20 mgd raw water intake and transmission main to Lake Travis WTP	2013	$12,556,800	13,888 gpm	0 gpm	$0	3,053 gpm	$2,760,362
Build 6 mgd Lake Travis WTP	2013	$21,600,000	4,164 gpm	0 gpm	$0	3,053 gpm	$15,836,888
Total Systemwide Costs		**$52,407,136**			**$0**		**$36,847,586**

[A]: A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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TABLE 5-1
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Future Capital Improvement Projects and Usage of Each Project

BEE CAVE IMPACT FEE AREA

Potential CIP Project	Year Scheduled	Estimated Cost	Capacity or Increase in Capacity (in gpm or LUEs)	Capacity used prior to 2006 (in gpm or LUEs)	Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm or LUEs)	Cost Attributed to 2006-2015 Development[A]
BEE CAVE IMPACT FEE AREA							
1080							
Complete 16" loop through Spanish Oaks (8000 LF)	2007	$1,520,640	3,133 gpm	0 gpm	$0	1,263 gpm	$613,013
Build 16-in parallel line on Highway 71 from 620 to Bee Cave PS (12300 LF)	2008	$1,071,576	1,567 gpm	0 gpm	$0	532 gpm	$363,919
1280							
Purchase land for Storage Tank	2008	$72,000	N/A	N/A	$0	N/A	$72,000
Build 1.0 MG Elevated Storage Tank on Highway 71	2008	$2,304,000	4,000 LUEs	0 LUEs	$0	1,668 LUEs	$960,768
Build 24-in TM from Lakeway WTP to End of Lazy 9	2013	$2,020,032	7,050 gpm	0 gpm	$0	3,053 gpm	$874,774
Build 20"/ 24" TM from Bee Cave West Tank to Lazy Nine (15,050 LF)	2006	$3,780,000	4,887 gpm	0 gpm	$0	3,053 gpm	$2,361,436
Total Bee Cave Impact Fee Area Costs		**$10,768,248**			**$0**		**$5,245,910**

[A]: A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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TABLE 5-1
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Future Capital Improvement Projects and Usage of Each Project

DRIPPING SPRINGS IMPACT FEE AREA										
Potential CIP Project	Year Scheduled	Estimated Cost	Capacity or Increase in Capacity (in gpm or LUEs)	Capacity used prior to 2006 (in gpm or LUEs)		Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm or LUEs)		Cost Attributed to 2006-2015 Development[A]
DRIPPING SPRINGS IMPACT FEE AREA									
1080									
Build 20-in line TM from Uplands WTP to SWPPS (12,600 LF)	2010	$2,757,888	4,896 gpm	0	gpm	$0	2,119	gpm	$1,193,620
1308									
Build 750,000 gal Elevated Storage Tank at CLPS	2009	$1,728,000	3,000 LUEs	0	LUEs	$0	1,181	LUEs	$680,256
Build 0.5 MG GST at CLPS	2009	$504,000	3,846 LUEs	0	LUEs	$0	1,181	LUEs	$154,764
Parallel 16" line in Hill Country Zone 1 (along FM 1826, 11020 LF)	2009	$2,094,682	N/A	N/A		$0	N/A		$2,094,682
Upgrade SWPPS from 3567 to 5900 gpm (add 2 - 1967 gpm pumps)	2012	$1,969,093	2,333 gpm	0	gpm	$0	1,428	gpm	$1,205,257
Upgrade 1308 PS at CLPS site (add 1-900 gpm pump)	2009	$181,440	900 gpm	0	gpm	$0	70	gpm	$14,112
Parallel 16" line in Hill Country Zone 1 (along FM 1826, 3800 LF)	2009	$722,304	N/A	N/A		$0	N/A		$722,304
Parallel 10" line in Hill Country Zone 2 (along Kit Carson Rd, 5100 LF)	2011	$785,808	N/A	N/A		$0	N/A		$785,808
Parallel 16" line in Hill Country Zone 2 (along Heritage, 6600 LF)	2012	$1,254,528	N/A	N/A		$0	N/A		$1,254,528
1420									
Build 500,000 gal Elevated Storage Tank	2013	$1,152,000	2,000 LUEs	0	LUEs	$0	527	LUEs	$303,552
Upgrade CLPS from 1800 gpm to 3600 by adding 1-1800 gpm pumps	2013	$1,088,640	1,800 gpm	0	gpm	$0	1,800	gpm	$1,088,640
16" TM - Sawyer Ranch Road, Ph. 1 (Darden Hill Rd., 4,477 LF)	2005	$650,213	1,881 gpm	0	gpm	$0	226	gpm	$78,122
16" & 20" TM - Sawyer Ranch Road, Ph. 2 (12,000 LF)	2006	$2,370,853	1,881 gpm	0	gpm	$0	190	gpm	$239,480
16" TM - Sawyer Ranch Road, Ph. 3 (9,300 LF)	2006	$612,618	1,881 gpm	0	gpm	$0	914	gpm	$297,678
12" TM - Sawyer Ranch Road, Ph. 4 (On FM 1826, 16,100 LF)	2006	$504,000	1,055 gpm	0	gpm	$0	154	gpm	$73,570
Total Dripping Springs Impact Fee Area Costs		**$18,376,068**				**$0**			**$10,186,374**

[A]: A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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TABLE 5-1
LCRA West Travis County Regional Water System - 2006 Impact Fee Study
Future Capital Improvement Projects and Usage of Each Project

HAMILTON POOL ROAD IMPACT FEE AREA									
Potential CIP Project	Year Scheduled	Estimated Cost	Capacity or Increase in Capacity (in gpm or LUEs)	Capacity used prior to 2006 (in gpm or LUEs)		Cost Attributed to Development Prior to 2006	Capacity Projected for 2006-2015 to be Used by this Project (in gpm or LUEs)		Cost Attributed to 2006-2015 Development[A]
HAMILTON POOL ROAD IMPACT FEE AREA									
Transfer Line - Build 16-in parallel line on Highway 71 from 620 to Bee Cave PS (12300 LF)	2008	$1,071,576	1,567 gpm	0	gpm	$0	949	gpm	$649,171
1280									
16" TM - Hamilton Pool Road to Tank (19,267 LF)	2006	$2,062,080	1,880 gpm	0	gpm	$0	950	gpm	$1,042,009
Hamilton Pool Road 250,000 gallon GST	2006	$280,800	1,000 LUEs	0	LUEs	$0	317	LUEs	$89,014
New Bee Cave West Pump Station (1500 gpm, 3-750 gpm)	2006	$1,123,200	1,500 gpm	0	gpm	$0	1,500	gpm	$1,123,200
Upgrade New Bee Cave West Pump Station (3000 gpm, 3-1500 gpm)	2011	$302,400	1,500 gpm	0	gpm	$0	1,500	gpm	$302,400
1420									
16" TM - Hamilton Pool Road, Tank to Signor (7,500 LF)	2006	$936,000	1,880 gpm	0	gpm	$0	695	gpm	$346,021
Hamilton Pool Road Hydro Station (3-750 gpm)	2006	$720,000	500 LUEs	0	LUEs	$0	500	LUEs	$720,000
Hamilton Pool Road Pump Station Upgrade & Hydro Station (New Hydro Tank)	2010	$240,000	500 LUEs	0	LUEs	$0	369	LUEs	$177,120
Total Hamilton Pool Road Impact Fee Area Costs		**$6,736,056**				**$0**			**$4,448,934**

[A]: A credit equal to 50 percent of the total projected cost will be applied when calculating the impact fee.

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It should be noted that the development of a long term master plan for the WTCRWS was beyond the scope of this study. Due to uncertainties about how the service area will actually develop, modifications to the list of projects or their implementation schedule may be required to accommodate the development that actually occurs. Furthermore, each CIP project will require a detailed engineering study to confirm the pipeline diameter, pump capacity or tank volume. Thus, there will be some variation between the potential projects listed above and the facilities actually installed.

6.0 IMPACT FEE CALCULATION

Using the CIP developed in the previous section, the maximum allowable impact fees were calculated for the Bee Cave, Dripping Springs, and Hamilton Pool Road impact fee areas, as well as for overall system improvements. The impact fees for the Bee Cave, Dripping Springs, and Hamilton Pool Road areas were calculated based on costs associated with their specific areas. The impact fee associated with the system improvements incorporates all projects that apply to the entire system and was included in the final calculation of impact fees for the three separate impact fee areas.

The calculation of each of the four impact fees was based on dividing the estimated costs attributed to the growth occurring between 2006 and 2015 by the number of LUEs projected to connect to the WTCRWS during this time period. The project costs attributable over the ten year impact fee period were adjusted based on the year of expense using a 3% inflation rate. These adjusted costs were summarized by year and utilized, along with a 6% interest rate, to calculate the yearly principal plus interest balance remaining after impact fees for new connections were collected. A trial and error approach was utilized to determine an impact fee that would result in a principal plus interest balance of zero (all projects costs recovered) at the end of the ten year period. Tables 6-1A – 6-1D present the detailed impact fee calculations for the overall system improvements and the three impact fee areas (Tables 6-1B – 6-1D). The impact fees per LUE resulting from the calculations in Tables 6-1A through 6-1 D are $5,126 for system improvements, $3,114 for the Bee Cave impact fee area, $5,314 for the Dripping Springs impact fee area, and $4,928 for the Hamilton Pool Road impact fee area.

Based on the results of the study presented in this report, the Dripping Springs and Hamilton Pool Road areas could either be kept as separate entities or combined into one impact fee area. Due to the similarities in the land use and customers to be served in these areas, one impact fee area, called the 290/ HPR impact fee area could be considered. By combining the Dripping Springs and Hamilton Pool Road areas, the number of total impact fee areas in the WTCRWS would remain at two and would avoid any complications caused by incorporating an additional impact fee area to the system. Table 6-1E presents the calculation of the impact fee based on the CIP and interest costs and LUEs for the Dripping Springs and Hamilton Pool Road impact fee areas. The impact fee specific to the 290/ HPR Area was calculated to be $5,234 and the total impact fee, including system costs, was $10,361 (Table 6-2).

The impact fee developed for system improvements ($5,126) is assessed to all impact fee areas in order to calculate the total projected cost associated with each area. Table 6-2 presents the total impact fees that encompass all project costs that can be attributed to each area (system costs plus costs specific to each impact fee area). The total impact fees are as follows: $8,240 for the Bee Cave impact fee area, $10,441 for the Dripping Springs impact fee area, and $10,055 for the Hamilton Pool Road impact fee area.

According to the impact fee law outlined in the Texas Local Government Code there are two methods in which impact fees can be collected: *(1) a credit for the portion of ad valorem tax and utility service revenues generated by new service units during the program period is used for the payment of improvements, including the payment of debt, that are included in the capital improvements plan; or (2) a credit equal to 50 percent of the total projected cost of implementing the capital improvements plan.* The LCRA uses the latter of these alternatives to collect impact fees, thus only 50% of the total impact fees presented in Table 6-2 can be charged to new connections during this impact fee period. This results in a maximum allowable impact fee of $4,120 for the Bee Cave impact fee area, $5,221 for the Dripping Springs impact fee area, and $5,028 for the Hamilton Pool Road impact fee area. As shown in Table 6-2, the maximum allowable impact fee for the 290/ HPR impact fee area (the Dripping Springs and Hamilton Pool Road areas combined) was calculated to be $5,180.

The maximum allowable impact fees per LUE discussed above represent the impact fee for a standard single-family connection. Impact fees for other types of connections such as commercial, multi-family, etc. would be assessed on the basis of the size of meter required for the customer's water service and the number of LUEs associated with that meter size as shown in Table 6-3. This table is based on the maximum rating for each meter size compared with the maximum rating for a 5/8"/3/4" meter which is commonly used for a single-family residential connection. For each potential connection, the developer would be required to determine the instantaneous peak flow rate in order to select the required meter size for that connection. Thus, the equivalent LUEs calculated for water service would be used for wastewater service as well.

Table 6-1A
SYSTEM IMPACT FEE CALCULATION

Assumed inflation rate: 3%

CIP Project	Year of Expense	Estimated Cost Attributed to 2006-2015 development (2006$)	Estimated Cost in Year of Expense
Prepare land use assumptions, CIP and impact fee calculation	2006	$ 42,000	$42,000
Uplands WTP Chemical Building	2006	$ 1,734,000	$1,734,000
Acquire site for Lake Travis raw water intake, line and treatment plant	2006	$ 2,400,000	$2,400,000
	Subtotal for year		$4,176,000
Upgrade Uplands WTP from 9 8 to 13.8 MGD - Additional Treatment Units and Upgrade to Raw Water Intake/Pumps	2007	$ 10,959,327	$11,288,107
	Subtotal for year		$11,288,107
Upgrade Uplands WTP from 13.8 to 17.8 mgd - Additional Treatment Units, Upgrade to Raw Water Intake/Pumps, and Upgrade to High Service Pumps	2009	$ 3,115,008	$3,403,853
	Subtotal for year		$3,403,853
Build 20 mgd raw water intake and transmission main to Lake Travis WTP	2013	$ 2,760,362	$3,394,897
Build 6 mgd Lake Travis WTP	2013	$ 15,836,888	$19,477,374
	Subtotal for year		$22,872,272
Total		$ 36,847,586	
Cost of Past CIP projects constructed attributed to 2006-2015 development (from Table 4-2)		$ 5,705,318	
Total estimated cost of existing and proposed CIP projects attributed to 2006-2015 development		$ 42,552,903	

Estimated Interest Payments

Connection Fee: $5,125
Interest Rate: 6%

Year	CIP Expenditures	New Connections	Impact Fees Collected	Principal & Interest Balance	Annual Interest
Prior to 2006	$5,705,318			$5,705,318	
2006	$4,176,000	483	$2,472,829	$7,408,489	$444,509.32
2007	$11,288,107	796	$4,080,436	$15,060,669	$903,640.12
2008	$0	1224	$6,271,313	$9,692,996	$581,579.73
2009	$3,403,853	955	$4,894,538	$8,783,890	$527,033.42
2010	$0	1017	$5,211,189	$4,099,735	$245,984 09
2011	$0	1015	$5,201,814	-$856,095	-$51,365 73
2012	$0	1070	$5,482,709	-$6,390,170	-$383,410.22
2013	$22,872,272	1104	$5,656,926	$10,441,765	$626,505 91
2014	$0	1105	$5,662,786	$5,405,485	$324,329.10
2015	$0	1115	$5,716,421	$13,393	$803.58
Totals	$47,445,550	9883	$50,650,963		$3,219,609

Total Interest Payments	$3,219,609
Total Estimated Costs Attributed to 2006-2015 Development (CIP Exp. + Interest)	$50,665,160
Estimated Number of LUEs to be Connected between 2006 & 2015	9,883
Impact Fee per LUE	$5,126

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Table 6-1B
BEE CAVES AREA IMPACT FEE CALCULATION

Assumed inflation rate: 3%

CIP Project	Year of Expense	Estimated Cost Attributed to 2006-2015 development (2006$)	Estimated Cost in Year of Expense
Build 20"/ 24" TM from Bee Cave West Tank to Lazy Nine (15,050 LF)	2006	$ 2,361,436	$2,361,436
	Subtotal for year		$2,361,436
Complete 16" loop through Spanish Oaks (8000 LF)	2007	$ 613,013	$631,403
	Subtotal for year		$631,403
Build 16-in parallel line on Highway 71 from 620 to Bee Cave PS (12300 LF)	2008	$ 363,919	$386,081
Purchase land for Storage Tank	2008	$ 72,000	$76,385
Build 1.0 MG Elevated Storage Tank on Highway 71	2008	$ 960,768	$1,019,279
	Subtotal for year		$1,481,745
Build 24-in TM from Lakeway WTP to End of Lazy 9 24-in (8400 LF)	2013	$ 874,774	$1,075,862
	Subtotal for year		$1,075,862
Total		$ 5,245,910	
Cost of Past CIP projects constructed attributed to 2006-2015 development (from Table 4-2)		$ 5,277,291	
Total estimated cost of existing and proposed CIP projects attributed to 2006-2015 development		$ 10,523,201	

Estimated Interest Payments

Connection Fee: $3,113
Interest Rate: 6%

Year	CIP Expenditures	New Connections	Impact Fees Collected	Principal & Interest Balance	Annual Interest
Prior to 2006	$5,277,291			$5,277,291	
2006	$2,361,436	294	$914,454	$6,724,274	$403,456.42
2007	$631,403	430	$1,338,186	$6,420,947	$385,256.82
2008	$1,481,745	579	$1,803,942	$6,484,007	$389,040.42
2009	$0	501	$1,560,224	$5,312,824	$318,769.42
2010	$0	411	$1,279,513	$4,352,080	$261,124.82
2011	$0	384	$1,194,228	$3,418,977	$205,138.65
2012	$0	412	$1,283,365	$2,340,751	$140,445.08
2013	$1,075,862	411	$1,278,432	$2,278,626	$136,717.57
2014	$0	405	$1,260,373	$1,154,971	$69,298.25
2015	$0	392	$1,221,021	$3,249	$194.91
Totals	$10,827,737	4219	$13,133,736		$2,309,442

Total Interest Payments	$2,309,442
Total Estimated Costs Attributed to 2006-2015 Development (CIP Exp. + Interest)	$13,137,180
Estimated Number of LUEs to be Connected between 2006 & 2015	4,219
Impact Fee per LUE	$3,114

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Table 6-1C
DRIPPING SPRINGS AREA IMPACT FEE CALCULATION

Assumed inflation rate: 3%

CIP Project	Year of Expense	Estimated Cost Attributed to 2006-2015 development (2006$)	Estimated Cost in Year of Expense
16" TM - Sawyer Ranch Road, Ph. 1 (Darden Hill Rd., 4,477 LF)	2005	$ 78,122	$75,847
	Subtotal for year		$75,847
16" & 20" TM - Sawyer Ranch Road, Ph. 2 (12,000 LF)	2006	$ 239,480	$239,480
16" TM - Sawyer Ranch Road, Ph. 3 (9,300 LF)	2006	$ 297,678	$297,678
12" TM - Sawyer Ranch Road, Ph. 4 (On FM 1826, 16,100 LF)	2006	$ 73,570	$73,570
	Subtotal for year		$610,728
Build 750,000 gal Elevated Storage Tank at CLPS	2009	$ 680,256	$743,334
Build 0.5 MG GST at CLPS	2009	$ 154,764	$169,115
Parallel 16" line in Hill Country Zone 1 (along FM 1826, 11020 LF)	2009	$ 2,094,682	$2,288,915
Upgrade 1308 PS at CLPS site (add 1-900 gpm pump)	2009	$ 14,112	$15,421
Parallel 16" line in Hill Country Zone 1 (along FM 1826, 3800 LF)	2009	$ 722,304	$789,281
	Subtotal for year		$4,006,066
Build 20-in line TM from Uplands WTP to SWPPS (12,600 LF)	2010	$ 1,193,620	$1,343,430
	Subtotal for year		$1,343,430
Parallel 10" line in Hill Country Zone 2 (along Kit Carson Rd, 5100 LF)	2011	$ 785,808	$910,967
	Subtotal for year		$910,967
Upgrade SWPPS from 3567 to 5900 gpm (add 2 -1967 gpm pumps)	2012	$ 1,205,257	$1,439,140
Parallel 16" line in Hill Country Zone 2 (along Heritage, 6600 LF)	2012	$ 1,254,528	$1,497,972
	Subtotal for year		$2,937,112
Build 500,000 gal Elevated Storage Tank	2013	$ 303,552	$373,331
Upgrade CLPS from 1800 gpm to 3600 by adding 1-1800 gpm pumps	2013	$ 1,088,640	$1,338,890
	Subtotal for year		$1,712,221
Total		$ 10,186,374	
Cost of Past CIP projects constructed attributed to 2006-2015 development (from Table 4-2)		$ 8,289,389	
Total estimated cost of existing and proposed CIP projects attributed to 2006-2015 development		$ 18,475,763	

Estimated Interest Payments

Connection Fee: $5,313
Interest Rate: 6%

Year	CIP Expenditures	New Connections	Impact Fees Collected	Principal & Interest Balance	Annual Interest
Prior to 2005	$8,289,389			$8,289,389	
2005	$75,847	-		$75,847	
				$8,365,236	$501,914.13
2006	$610,728	189	$1,002,829	$8,475,049	$508,502.93
2007	$0	319	$1,695,179	$7,288,373	$437,302.36
2008	$0	347	$1,843,262	$5,882,413	$352,944.77
2009	$4,006,066	377	$2,000,800	$8,240,624	$494,437.45
2010	$1,343,430	515	$2,733,778	$7,344,714	$440,682.85
2011	$910,967	520	$2,763,356	$5,933,008	$355,980.47
2012	$2,937,112	546	$2,902,423	$6,323,677	$379,420.64
2013	$1,712,221	552	$2,935,034	$5,480,285	$328,817.09
2014	$0	559	$2,969,274	$2,839,828	$170,389.65
2015	$0	566	$3,005,227	$4,990	$299.41
Totals	$19,885,759	4,489	$23,851,162		$3,970,692

Total Interest Payments	$3,970,692
Total Estimated Costs Attributed to 2006-2015 Development (CIP Exp. + Interest)	$23,856,451
Estimated Number of LUEs to be Connected between 2006 & 2015	4,489
Impact Fee per LUE	$5,314

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Table 6-1D
HAMILTON POOL ROAD AREA - IMPACT FEE CALCULATION

Assumed inflation rate: 3%

CIP Project	Year of Expense	Estimated Cost Attributed to 2006-2015 development (2006$)	Estimated Cost in Year of Expense
16" TM - Hamilton Pool Road to Tank (19,267 LF)	2006	$ 1,042,009	$1,042,009
Hamilton Pool Road 250,000 gallon GST	2006	$ 89,014	$89,014
New Bee Cave West Pump Station (1500 gpm, 3-750 gpm)	2006	$ 1,123,200	$1,123,200
16" TM - Hamilton Pool Road, Tank to Signor (7,500 LF)	2006	$ 346,021	$346,021
Hamilton Pool Road Hydro Station (3-750 gpm)	2006	$ 720,000	$720,000
	Subtotal for year		$3,320,243
Transfer Line - Build 16-in parallel line on Highway 71 from 620 to Bee Cave PS (12300 LF)	2008	$ 649,171	$688,705
	Subtotal for year		$688,705
Hamilton Pool Road Pump Station Upgrade & Hydro Station (New Hydro Tank)	2010	$ 177,120	$199,350
	Subtotal for year		$199,350
Upgrade New Bee Cave West Pump Station (3000 gpm, 3-1500 gpm)	2011	$ 302,400	$350,564
	Subtotal for year		$350,564
Total		$ 4,448,934	
Cost of Past CIP projects constructed attributed to 2006-2015 development (from Table 4-2)		$ -	
Total estimated cost of existing and proposed CIP projects attributed to 2006-2015 development		$ 4,448,934	

Estimated Interest Payments

Connection Fee: $4,929
Interest Rate: 6%

Year	CIP Expenditures	New Connections	Impact Fees Collected	Principal & Interest Balance	Annual Interest
Prior to 2006	$0			$0	
2006	$3,320,243	0	$0	$3,320,243	$199,214.60
2007	$0	47	$232,895	$3,286,563	$197,193.76
2008	$688,705	297	$1,465,145	$2,707,316	$162,438.98
2009	$0	77	$380,765	$2,488,990	$149,339.40
2010	$199,350	91	$449,771	$2,387,908	$143,274.50
2011	$350,564	111	$548,351	$2,333,396	$140,003.76
2012	$0	111	$548,351	$1,925,048	$115,502.91
2013	$0	141	$693,462	$1,347,089	$80,825.37
2014	$0	141	$695,926	$731,988	$43,919.30
2015	$0	158	$776,465	-$557	-$33.44
Totals	$4,558,863	1,175	$5,791,133		$1,231,679

Total Interest Payments	$1,231,679
Total Estimated Costs Attributed to 2006-2015 Development (CIP Exp. + Interest)	$5,790,542
Estimated Number of LUEs to be Connected between 2006 & 2015	1,175
Impact Fee per LUE	$4,928

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Table 6-1E
290/HPR AREA IMPACT FEE CALCULATION
Assumed inflation rate: 3%

CIP Project	Year of Expense	Estimated Cost Attributed to 2006-2015 development (2006$)	Estimated Cost in Year of Expense
16" TM - Sawyer Ranch Road, Ph. 1 (Darden Hill Rd., 4,477 LF)	2005	$ 78,122	$75,847
	Subtotal for year		$75,847
16" & 20" TM - Sawyer Ranch Road, Ph. 2 (12,000 LF)	2006	$ 239,480	$239,480
16" TM - Sawyer Ranch Road, Ph. 3 (9,300 LF)	2006	$ 297,678	$297,678
12" TM - Sawyer Ranch Road, Ph. 4 (On FM 1826, 16,100 LF)	2006	$ 73,570	$73,570
16" TM - Hamilton Pool Road to Tank (19,267 LF)	2006	$ 1,042,009	$1,042,009
Hamilton Pool Road 250,000 gallon GST	2006	$ 89,014	$89,014
New Bee Cave West Pump Station (1500 gpm, 3-750 gpm)	2006	$ 1,123,200	$1,123,200
16" TM - Hamilton Pool Road, Tank to Signor (7,500 LF)	2006	$ 346,021	$346,021
Hamilton Pool Road Hydro Station (3-750 gpm)	2006	$ 720,000	$720,000
	Subtotal for year		$3,930,971
Transfer Line - Build 16-in parallel line on Highway 71 from 620 to Bee Cave PS (12300 LF)	2008	$ 649,171	$688,705
	Subtotal for year		$688,705
Build 750,000 gal Elevated Storage Tank at CLPS	2009	$ 680,256	$743,334
Build 0.5 MG GST at CLPS	2009	$ 154,764	$169,115
Parallel 16" line in Hill Country Zone 1 (along FM 1826, 11020 LF)	2009	$ 2,094,682	$2,288,915
Upgrade 1308 PS at CLPS site (add 1-900 gpm pump)	2009	$ 14,112	$15,421
Parallel 16" line in Hill Country Zone 1 (along FM 1826, 3800 LF)	2009	$ 722,304	$789,281
	Subtotal for year		$4,006,066
Build 20-in line TM from Uplands WTP to SWPPS (12,600 LF)	2010	$ 1,193,620	$1,343,430
Hamilton Pool Road Pump Station Upgrade & Hydro Station (New Hydro Tank)	2010	$177,120.00	$199,350.12
	Subtotal for year		$1,542,780
Parallel 10" line in Hill Country Zone 2 (along Kit Carson Rd, 5100 LF)	2011	$ 785,808	$910,967
Upgrade New Bee Cave West Pump Station (3000 gpm, 3-1500 gpm)	2011	$ 302,400	$350,564
	Subtotal for year		$1,261,531
Upgrade SWPPS from 3567 to 5900 gpm (add 2 -1967 gpm pumps)	2012	$ 1,205,257	$1,439,140
Parallel 16" line in Hill Country Zone 2 (along Heritage, 6600 LF)	2012	$ 1,254,528	$1,497,972
	Subtotal for year		$2,937,112
Build 500,000 gal Elevated Storage Tank	2013	$ 303,552	$373,331
Upgrade CLPS from 1800 gpm to 3600 by adding 1-1800 gpm pumps	2013	$ 1,088,640	$1,338,890
	Subtotal for year		$1,712,221
Total		$ 14,635,308	
Cost of Past CIP projects constructed attributed to 2006-2015 development (from Table 4-2)		$ 8,289,389	
Total estimated cost of existing and proposed CIP projects attributed to 2006-2015 development		$ 22,924,696	

Estimated Interest Payments

Connection Fee: $5,233
Interest Rate: 6%

Year	CIP Expenditures	New Connections	Impact Fees Collected	Principal & Interest Balance	Annual Interest
Prior to 2005	$8,289,389			$8,289,389	
2005	$75,847	-		$75,847	
				$8,365,236	$501,914.13
2006	$3,930,971	189	$987,729	$11,810,392	$708,623.54
2007	$0	366	$1,916,913	$10,602,102	$636,126.15
2008	$688,705	644	$3,371,017	$8,555,917	$513,355.01
2009	$4,006,066	454	$2,374,922	$10,700,416	$642,024.96
2010	$1,542,780	606	$3,170,125	$9,715,096	$582,905.76
2011	$1,261,531	631	$3,303,918	$8,255,615	$495,336.89
2012	$2,937,112	658	$3,440,892	$8,247,172	$494,830.34
2013	$1,712,221	693	$3,627,071	$6,827,152	$409,629.11
2014	$0	700	$3,663,413	$3,573,368	$214,402.07
2015	$0	723	$3,784,330	$3,440	$206.39
Totals	$24,444,622	5,664	$29,640,331		$5,199,354

Total Interest Payments	$5,199,354
Total Estimated Costs Attributed to 2006-2015 Development (CIP Exp. + Interest)	$29,643,977
Estimated Number of LUEs to be Connected between 2006 & 2015	5,664
Impact Fee per LUE	$5,234

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Table 6-2

Impact Fee for Each Area in the West Travis County Regional Water System

			Maximum Allowable Impact Fee
System Impact Fee (from Table 6-1A)	$5,126		
Bee Caves Area Impact Fee (from Table 6-1B)	$3,114		
Total Impact Fee for Bee Cave Area Customers	**$8,240**	x 50 % =	**$4,120**
System Impact Fee (from Table 6-1A)	$5,126		
Dripping Springs Area Impact Fee (from Table 6-1C)	$5,314		
Total Impact Fee for Dripping Springs Area Customers	**$10,441**	x 50 % =	**$5,220**
System Impact Fee (from Table 6-1A)	$5,126		
Hamilton Pool Road Area Impact Fee (from Table 6-1D)	$4,928		
Total Impact Fee for Hamilton Pool Road Area Customers	**$10,055**	x 50 % =	**$5,027**
System Impact Fee (from Table 6-1A)	$5,126		
290/Hamilton Pool Road Area Impact Fee (from Table 6-1E)	$5,234		
Total Impact Fee for 290/Hamilton Pool Road Area Customers	**$10,360**	x 50 % =	**$5,180**

TABLE 6-3
LUE Equivalencies for Various Types and Sizes of Water Meters

Meter Type	Meter Size	Continuous Duty Maximum Rate (gpm)	Ratio to 5/8" Meter
Simple	5/8"/3/4"	10/15	1.0
Simple	1"	25	2.5
Simple	1 1/2"	50	5.0
Simple	2"	80	8.0
Compound	2"	80	8.0
Turbine	2"	100	10.0
Compound	3"	160	16.0
Turbine	3"	240	24.0
Compound	4"	250	25.0
Turbine	4"	420	42.0
Compound	6"	500	50.0
Turbine	6"	920	92.0
Compound	8"	800	80.0
Turbine	8"	1600	160.0
Compound	10"	1150	115.0
Turbine	10"	2500	250.0
Turbine	12"	3300	330.0

Source: AWWA Standards C700, C701, C702, C703