Control Number: 45151

Item Number: 9

Addendum StartPage: 0

**PUC DOCKET NO. 45151**

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PUBLIC UTILITY COMMISSION
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| **CITY OF CELINA NOTICE OF INTENT TO PROVIDE RETAIL WATER AND SEWER SERVICE TO 494.819-ACRE AREA DECERTIFIED FROM MUSTANG SPECIAL UTILITY DISTRICT IN DENTON COUNTY** | § § § § § § | **BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS** |

**MUSTANG SUD'S APPRAISAL**

TO THE HONORABLE ADMINISTRATIVE LAW JUDGE:

NOW COMES, Mustang Special Utility District ("Mustang SUD") and files this Appraisal as its determination of the compensation for any property rendered useless or valueless to it pursuant to P.U.C. Subst. R. 24.113(j)(1) and Order No. 2 in this proceeding. Exhibit 1 contains the *Analysis and Opinion of Previously Decertified CCN from Mustang Special Utility District in PUC Dockets 45151* prepared by Mustang SUD's consultant, NewGen Strategies & Solutions, on behalf of Mustang SUD (the "Analysis"). The Analysis describes the property rendered useless or valueless as a result of the decertification and demonstrates that the monetary amount of compensation due to Mustang SUD is $1,850,192.

Respectfully submitted,


JACKSON WALKER L.L.P.

By: [signature]
Leonard Dougal - State Bar No. 06031400
Mallory Beck - State Bar No. 24073899
100 Congress, Suite 1100
Austin, Texas 78701
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ATTORNEYS FOR MUSTANG SPECIAL UTILITY DISTRICT




a

## CERTIFICATE OF SERVICE

I hereby certify that on the 13th day of November 2015, a true and correct copy of the foregoing document was served on the individuals listed below by hand delivery, email, facsimile or First Class Mail.

Andrew N. Barrett
Andy Barrett & Associates, PLLC
3300 Bee Cave Rd., Suite 650 #189
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***Attorney for the Public Utility Commission of Texas***

Leonard H. Dougal

# EXHIBIT 1

NewGen Strategies & Solutions

3420 Executive Center Drive
Suite 165
Austin, TX 78731
Phone: (512) 479-7900
Fax: (512) 479-7905

November 12, 2015

Mr. Chris Boyd
Mustang Special Utility District
7985 FM 2931
Aubrey, TX 76227

**Subject:** **Analysis and Opinion of Previously Decertified CCN from Mustang Special Utility District in PUC Docket No. 45151**

Dear Mr. Boyd:

NewGen Strategies & Solutions, LLC ("NewGen") has completed our review of the area, which is the subject of CADG Sutton Fields, LLC's ("Landowner") approved petition for expedited release, previously decertified from the Mustang Special Utility District's ("Mustang SUD") Service Area in Water Certificate of Convenience and Necessity ("CCN") No. 11856 and Sewer CCN No. 20930 in PUC Docket No. 44629.

The City of Celina ("City"), as currently under consideration in PUC Docket No. 45151, has given notice of its intent to serve the subject area previously decertified. Based on our understanding, per Public Utility Commission ("PUC") Substantive Rule § 24.113(i), Mustang SUD must make a determination of the monetary amount of compensation due for the decertified area now that the City has indicated its intent to provide service in the decertified area. NewGen was retained by Mustang SUD to determine the appropriate level of monetary compensation. My qualifications to perform the requested analysis are demonstrated in my professional resume and my testifying resume, included herein collectively as Attachment A.

Specifically, PUC Substantive Rule § 24.113(h) states:

> "A retail public utility may not in any way render retail water or sewer service directly or indirectly to the public in an area that has been decertified under this section unless the retail public utility, or a petitioner under subsection (r) of this section, provides compensation for any property that the commission determines is rendered useless or valueless to the decertified retail public utility as a result of the decertification."

In performing this analysis, NewGen must first determine if there is any property that has been rendered useless or valueless as a result of the decertification in PUC Docket No. 44629. In the event this determination finds such property, then compensation must be determined under PUC Substantive Rule § 24.113(k).

As part of our analysis, the following documents were reviewed and relied on:

- Attachment B - Mustang Special Utility District's August 22, 2014 "Five-Year Capital Improvement Plan"
- Attachment C - Mustang Special Utility District's 2014 Comprehensive Annual Financial Report

- Attachment D – Upper Trinity Regional Water District's ("UTRWD") 2014 Comprehensive Annual Financial Report
- Attachment E - Listing of Mustang Special Utility District's historical Upper Trinity Regional Water District Equity Buy-In Fees
- Attachment F - Listing of Mustang Special Utility District's assets associated with the subject service area
- Attachment G - Engineer's assessment from Steger Bizzell with total Living Unit Equivalent ("LUE") capacities per associated asset and LUE's designed and attributable to the subject service area
- Attachment H – Summary of Legal Costs as of 11/10/15 from Mustang SUD
- Attachment I – Summary of Other Costs as of 11/10/15 from Mustang SUD
- Attachment J – Listing of Mustang SUD's Subscribed UTRWD Capacities and Uncommitted Totals
- Attachment K – Affidavit from Mr. Perry Steger, PE
- Attachment L – Affidavit from Mr. Chris Boyd

Based on our review of the available documentation, NewGen presents the following findings:

- Plans exist and funding has been committed related to Mustang SUD's provision of water and wastewater service to the area in question;
- There does not appear to be any facilities and/or customers located within the immediate area in question; and,
- Off-site improvements have been designed and constructed to serve this area.

<u>Conclusion</u>

Based on the above findings, and in compliance with PUC Substantive Rule § 24.113(h), it is our conclusion that Mustang SUD has property that has been rendered useless or valueless as a result of decertification by the PUC and the provision of service by the City to the area in question. Our determination of monetary compensation, as necessary under the rules, is provided in summary below and is further detailed in the attached exhibits.

Schedules of calculations used in our analysis referenced throughout this letter are listed below:

- Attachment M – Calculation of Value for Stranded Assets
- Attachment N – Connection Growth Projections
- Attachment O – Calculation of Average Weighted Debt Interest for MSUD
- Attachment P – Calculation of Annual Equity Amortization
- Attachment Q – UTRWD Historical and Projected Demand Charges
- Attachment R – Calculation of Demand Charges to UTRWD
- Attachment S – Summary of Valuation Components

It is our opinion that the net present value for compensation to be provided is $1,850,192 or approximately $1,243 per LUE. This valuation, as outlined below, is based on the requirements of PUC Substantive Rule § 24.113(k) and relies on the documentation outlined above and the assumptions further outlined below.

- **Value of Real Property**

  To our knowledge, no real property is changing hands as a result of the decertification. As such, no value has been assigned to this valuation component.

- **The Amount of the Retail Public Utility's Debt Allocable for Service to the Area in Question**

  The value of any related debt was not calculated for inclusion since the proportionate net book value of each stranded asset is assumed to be compensated under our valuation. Any outstanding principal could be defeased after compensation is provided pursuant to this valuation.

- **The Value of Service Facilities of the Retail Public Utility Located Within the Area in Question**

  To our knowledge, there are no facilities in the area in question, so no value has been assigned.

- **The Amount of Any Expenditures for Planning, Design, or Construction of Service Facilities that are Allocable to Service to the Area in Question**

  Mustang SUD has several recorded expenditures associated with planning, design, and construction of facilities associated with the area in question. NewGen's opinion of compensation related to planning, design, or construction of service facilities in total allocable to the area in question is $1,231,312 or approximately $827 per LUE.

  Certain Mustang SUD assets, having a total net book value of $3,844,172, were identified as planned, designed, and/or constructed to provide service to the area in question. These assets are listed in Attachment F. Mustang SUD's contracted engineering firm, Steger Bizzell, provided its expert opinion of the total capacity of each asset and the total LUEs of stranded capacity (1,488) in the subject area as shown in Attachment G. As seen in Attachment G, Mustang SUD's Well #6 can support 62 of the decertified area's projected connections. This leaves a remainder of 1,426 that would have received water service from Mustang SUD's surface water through a number of UTRWD facilities. Mr. Perry Steger's affidavit is included as Attachment K.

  Mustang SUD has already completed an agreement for an additional take point with UTRWD to provide service directly to the northeast of the subject property. This take point will meet future needs for growth expected to the northeast and is further evidence that the already constructed capacity meant to serve the decertified area will remain useless going forward.

  NewGen calculated the total Net Book Value per LUE for each asset as shown in Attachment M. In calculating the net book value, the service lives relied on by NewGen were the service lives assumed by Mustang SUD within its audited financial statements. The total values for each stranded asset were summed, which resulted in a total compensable value of stranded assets at $1,231,312.

- **The Amount of the Retail Public Utility's Contractual Obligations Allocable to the Area in Question**

  Mustang SUD has several contractual obligations with Upper Trinity Regional Water District ("UTRWD"). NewGen's opinion of compensation in total, on a net present value basis, related to contractual obligations allocable to the area in question is $610,292 or approximately $410 per LUE.

Mustang SUD entered into, and contracted for, adequate services with UTRWD to provide water and sewer service to the subject area, as more fully described in Mr. Chris Boyd's Affidavit included herein as Attachment L. As this contracted capacity will no longer be needed for service to the subject area, it can potentially be used to service future growth outside the subject area. However, until such time as this growth utilizes and begins to provide revenues to support these contractual commitments, then it is our opinion that Mustang SUD should be compensated for these contractual obligations.

*Growth Absorbs Decertified LUEs Assumption*

The subject property is located in Mustang SUD's Temple Dane Area. NewGen used the count of current LUEs in the Temple Dane Area and the estimate of projected LUE counts for this area in Mustang SUD's 5-Year Capital Improvement Program, included as Attachment B, to calculate a rate of growth for the area. Using this rate, NewGen calculated the total expected LUEs for each year. The growth expected to occur within the decertified area was subtracted from the new connections since they will not materialize, leaving NewGen with annual growth counts that could conceivably absorb the UTRWD contractual obligations allocable to the decertified property.

Next, NewGen determined that the existing facilities were designed to accommodate near term growth in the East – Temple Dane Production Zone area. Based on the 5-Year Capital Improvement Program, the next facility planned for this area would not be required until 2020. NewGen relied on the anticipation of new facilities as the point in time marginal growth would exceed current capacity. It is only then that customers not already supported by existing assets will be added to absorb the contractual obligations left unmet from the decertified property.

Starting in 2020, NewGen allocated each unit of growth to offset the loss in LUE's from the decertified area. Using these population projections, the pro-rated contractual costs are valued at 100 percent until new growth absorbs the LUEs in the decertified property. Stated differently, compensable capacity is reduced ratably based on new growth beginning in 2020. This results in 100 percent values assigned for 2016 to 2019; subsequent year allocations were 72 percent, 43 percent and 12 percent for in 2020, 2021 and 2022 respectively. By the end of 2023, it is projected the new growth will have absorbed the decertified LUEs. No value is assigned in 2023 or any future years. NewGen's method for projecting this growth is shown in Attachment N.

*Costs to Mustang SUD for Contractual Obligations in Equity Fees*

Mustang SUD, in order to receive service with UTRWD, has paid multiple equity buy-in fees that total up to $10,251,207 as shown in Attachment E. The amounts paid for these fees are amortized by Mustang SUD with an annual equity amortization of $434,732 as shown on page 27 of Attachment C. NewGen reviewed an equity fee payments schedule provided by Mustang SUD to determine that 5.4 percent of this total is attributable to water service. For wastewater, Mustang SUD has paid equity fees for Peninsula, Riverbend and Doe Branch service areas. Since the subject area would not be served by Peninsula Water Reclamation Plant, related equity fees accounting for 44.9 percent of the total were excluded. This leaves 49.7 percent of the annual amortization, which is associated with sewer service, related to the subject property.

The associated equity fees support supply of water and wastewater to more than the subject property. According to the TCEQ minimums for per connection capacity assumptions used by Steger Bizzell, water equity fees support approximately 3,240 LUEs assuming 864 GPD per connection and the associated wastewater equity fees (excluding Peninsula) support 1,625 LUEs assuming 200 GPD of flow. With 1,488 decertified LUE's exceeding the uncommitted LUEs available, NewGen fully assigned the unallocated portion of the equity fees for water and wastewater, which make up approximately 3 percent and 26 percent, respectively. NewGen calculated the total costs for equity fees allocable to the decertified area by multiplying the annual equity amortization dollar figure by the percent for water or wastewater systems associated with the docket. This number then was multiplied by the percent of LUEs allocable to the decertified area, which was limited to only include the uncommitted LUEs. This result was then multiplied by the cost assignment per year until fully absorbed based on population projections. These values were calculated and added to determine a total of $242,030. NewGen then discounted this total using the average weighted interest on Mustang SUD debt, as shown in Attachment O to generate a net present value of $203,392 for water and wastewater equity fees to include in this valuation. Attachment P details this calculation.

*Costs to Mustang SUD for Contractual Obligations in Demand Charges*

Mustang SUD, in order to make sure it is able to provide continuous and adequate service, has subscribed to sufficient water and wastewater capacity through UTRWD. For this capacity, Mustang SUD pays an annual demand charge per subscribed capacity in Million Gallons per Day ("MGD"). According to page 45 of the 2014 UTRWD Comprehensive Annual Financial Report, the unit rate for water has increased every year since 2004, and averages 6.4 percent per year, compounded, for the same twelve year period. The 2014 UTRWD Comprehensive Annual Financial Report has been included as Attachment D. The unit rate for wastewater has increased every year since 2007 and would average 10.3 percent per year, compounded, for the last twelve years. NewGen used these averages to forecast future annual demand charges as shown in Attachment Q.

Mustang SUD pays for its total subscribed capacities, which are 2.800 MGD for treated water and 0.385 MGD for wastewater treatment. Some of this capacity is already in use or committed, but Mustang SUD has uncommitted capacities of 0.083 MGD for water and 0.144 MGD for wastewater, as provided in Attachment J. To determine the portion allocable to the decertified area, NewGen calculated the total LUEs that would be supported by the uncommitted capacity using the same capacity assumptions used by Steger Bizzell. Water capacity is calculated at 864 GPD per LUE and wastewater capacity was calculated assuming 200 GPD of flow per LUE. Dividing the decertified LUEs by the total LUEs supported by the uncommitted capacity produces a percent of the uncommitted demand charge allocable to the decertified property.

NewGen calculated the total cost for demand charges allocable to the decertified area, as shown in Attachment R, by first multiplying the uncommitted capacity by the forecasted demand charges. This result was then multiplied by the percent allocable to the decertified area. Lastly, the allocable amount was multiplied by the cost assignment per year until fully absorbed. These values were calculated and added to determine a total of $488,029. NewGen discounted this total using the average weighted interest on Mustang SUD debt to generate a net present value of $406,899 for demand charges to include in this valuation.

- **Any Demonstrated Impairment of Service or Increase of Cost to Consumers of the Retail Public Utility Remaining After the Decertification**

At this time, assuming adequate compensation is received associated with stranded investment in off-site improvements as well as outstanding contractual obligations, NewGen does not foresee any impairment of service or increase of cost to consumers of Mustang SUD.

- **The Impact on Future Revenues Lost from Existing Customers**

  Given that there are no current customers in the area in question, it is our opinion that Mustang SUD will not experience a loss in existing revenues associated with the loss of the area in question.

- **Necessary and Reasonable Legal Expenses and Professional Fees**

  Mustang SUD incurred legal and professional fees associated with the decertification of the area in question, which NewGen has included in its value as $8,589 or about $5.77 per LUE as further detailed below.

  As of the date of this letter, legal fees identified by Mustang SUD to be associated with the decertification total $6,711. Individual charges are shown in Attachment H.

  Engineering services invoiced to date related to the decertification are $1,878. Engineering services are shown in Attachment I.

- **Other Relevant Factors**

  No other relevant factors have been identified.

PUC Docket Nos. 44629 and 45151 refer to a 494.819 acre tract, for which facilities were planned, designed, and constructed to serve 1,488 LUEs as discussed and depicted in Attachments K and L. NewGen has divided the total value calculated in its analysis by the total decertified LUEs, as outlined in the table below.

| PUC Docket Nos. 44629 and 45151 | |
|---|---|
| Living Unit Equivalents | 1,488 |
| Total Value of Docket | $ 1,850,192 |
| Value per LUE | $ 1,243.41 |

Lastly, I have included a summary of this valuation by component as Attachment S.

Please note that I certify, to the best of my knowledge and belief, as follows:

- To my knowledge, the statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions and are the impartial and unbiased professional analyses, opinions, and conclusions of NewGen.
- NewGen has no present or prospective interest in the property that is the subject of this report and has no personal interest or bias with respect to the parties involved.
- NewGen's engagement in this assignment, or compensation provided, was not contingent upon developing or reporting predetermined results that favor the cause of the client, the amount of any

determined compensation, the attainment of stipulated results, or the occurrence of a subsequent event directly related to the intended use of the report.

After review of this Letter Report, if you have any questions or require additional information, please feel free to contact Mr. Jack Stowe at jstowe@newgenstrategies.net or call 512.479.7900.

Sincerely,

**NewGen Strategies and Solutions, LLC**

Jack E. Stowe, Jr.
Director

## Attachments

NewGen Strategies & Solutions

**Jack E. Stowe, Jr.**
Director, Environmental Practice
jstowe@newgenstrategies.net

Mr. Stowe's Public Sector consulting career began in 1975. His career includes nine years in a "big-eight" public accounting and consulting firm where he held the title of Manager at the time of his resignation. After serving one and one-half years as Chief Financial Officer and Treasurer of an International Real Estate firm, Mr. Stowe founded Aries Resource Management as a consulting group dedicated to serving the Public Sector. In 1986, Aries Resource Management entered into a partnership agreement with Reed Municipal Services, Inc., to form Reed-Stowe & Co. Effective October 2000 the company was renamed Reed, Stowe & Yanke, LLC and in March 2003 was acquired by R. W. Beck, Inc. During his tenure with R.W. Beck, Mr. Stowe served as the Local Practice Leader for the Firm's Utility Services Practice - Gulf Coast Region. Upon expiration of his employment contract with R.W. Beck in March 2008, Mr. Stowe founded J. Stowe & Co. In September 2012, Mr. Stowe became President of the Environmental Practice for NewGen Strategies & Solutions. Mr. Stowe assumed the position of Director, in January of 2015.

## EDUCATION

- Bachelor of Arts in Accounting, North Texas State University

## PROFESSIONAL AFFILIATIONS

- Texas Water Conservation Association (TWCA)
- American Water Works Association (AWWA)

## EXPERIENCE

Mr. Stowe's experience is highlighted by the major roles he has fulfilled in assisting Public Sector entities in achieving major cost savings through contract negotiations for services and implementation of organization and operational enhancements. A brief example of engagements conducted by Mr. Stowe includes:

- Raw water service contract negotiations between the City of Arlington and the Tarrant County Water Improvement District No. 1 (now Tarrant Regional Water District).
- Wastewater service contract negotiations between the Customer Cities and the City of Fort Worth. Representing the twenty-one Customer Cities of Fort Worth a detailed wastewater cost of service study was conducted to provide the foundation for contract renewal negotiations.
- Assisted TWCA-USA, Inc. in the electric load aggregation of 15 TWCA members. This effort has resulted in the release of a Request For Bid on approximately 800,000,000 kWh brought to market.

Mr. Stowe has also participated in negotiations of operation, maintenance and management privatization/outsourcing contracts for the following:

- Red River Redevelopment Authority – water, wastewater, gas, electric, steam and industrial waste treatment
- Southwest Division of United States Navy-privatization of electric, gas, water and wastewater operations

In addition, Mr. Stowe authored the "Market Strategies for Improved Service by Water Utilities Report" on behalf of the Texas Water Development Board. This study analyzes and presents the status of privatization of water utility operations within the State of Texas contrasted against national activity. Also for the Texas Water Development Board, Mr. Stowe authored the study titled "Socioeconomic Impact of Interbasin Transfers in Texas"

This study was undertaken to determine the impact of current legislation on the consideration of interbasin transfers as potential water management strategies by the State's regional water planning groups.

## Jack E. Stowe, Jr.
Director, Environmental Practice

Mr. Stowe has also been actively involved in water utility system valuation, and has performed such studies for the following entities:

- RCH Water Supply Corporation
- Kelly Air Force Base
- Walker County Water Supply Corporation
- Johnson County Water Supply Corporation
- High Point Water Supply Corporation
- Liberty City Water Supply Corporation
- Royse City, Texas / BHP Water Supply Corporation
- Groundwater Valuation – Oakland County, Michigan, Wood Wind Water System, LLC
- Groundwater Valuation – Oakland County, Michigan, Oakland Explorations Water System, LLC

The results of the above valuations served as the foundation for the sale/transfer of ownership for the utilities identified or the donation of the assets in accordance with Section 170 of the Internal Revenue Service Code of 1986.

The following is sample list of clients for which Mr. Stowe has performed water and/or wastewater cost of service, customer class cost allocation, and/or rate design study, including wholesale, clients:

- Arlington, Texas
- Argyle Water Supply Corporation
- Barton Creek Lakeside
- Bellaire, Texas
- Borger, Texas
- Cameron County Fresh Water Supply District No.1
- Celina, Texas
- Copperas Cove, Texas
- Corsicana, Texas
- Dallas Water Utilities
- Denton, Texas
- Devers Canal System
- El Oso Water Supply Corp.
- Farmers Branch, Texas
- Ft. Worth, Texas
- Georgetown, Texas
- Gilmer, Texas
- Glenn Heights, Texas
- Grapevine, Texas
- Hobbs, New Mexico
- Kaufman, Texas
- Kempner Water Supply Corporation
- Kilgore, Texas
- Knollwood,Texas
- Lewisville, Texas
- Lubbock, Texas
- Mesquite, Texas
- Midlothian, Texas
- Montgomery County MUD
- North Myrtle Beach, SC
- North Richland Hills, Texas
- Paris, Texas
- Richmond, Virginia
- Rockett Special Utility District
- Rowlett, Texas
- Sachse, Texas
- Sanger, Texas

- Tarrant Regional Water District
- United Irrigation District
- Weatherford, Texas
- Westminster, Colorado
- Wylie, Texas

Other services provided by Mr. Stowe are further detailed below:

- Assisted Dallas Water Utilities and Tarrant Regional Water District in examining the financing alternatives, obtaining state funding, and establishing the cost allocation methodology associated with the $1.9 billion Lake Palestine Pipeline Project. Mr. Stowe also performed a comprehensive examination of the impact of energy costs on the proposed Project alternatives, including developing a forecasting model of electricity costs through 2060.
- Developed an impact fee econometric model used by the Cities of North Richland Hills, Grapevine, Lewisville and Wylie to calculate the maximum allowable fee under S.B. 336. Also responsible for the development and implementation of administrative procedures and systems modifications enabling these Cities to comply with the monitoring requirements of S.B. 336.
- Performed an economic feasibility study for the City of Arlington for alternative wastewater diversion. The study provided a twenty year projected population growth within defined service areas, discharge characteristics, and related capital improvement requirements for each alternative.
- Participated in the acquisition of the Street Lighting System from Texas Electric Service Company by the City of Arlington which was consummated after a six-month study and purchase negotiation. Purchase pay back was achieved within three years with annual operating cost reduction currently accruing at the annual rate of approximately $700,000 to the City.
- Assisted Dallas Water Utilities, North Texas Municipal Water District, Sabine River Authority of Texas, and Tarrant Regional Water District in assessing the feasibility and economic impact of the Toledo Bend Water Supply Project, which proposes to supply at least 600,000 acre-feet of raw water to the DFW Metroplex.

Mr. Stowe has had extensive consulting experience within the utility industry. His experience encompasses not only utility ratemaking under federal, state and municipal jurisdictions, but also includes significant experience in the following areas:

- Organization and operations for investor owned utilities and municipal utilities;
- Financial projections and operating system requirements;
- Contract Negotiations;
- Breach of Franchise Agreements; and
- Economic Feasibility Studies.

Specifically, Mr. Stowe has conducted and/or supervised analyses of rate base, operating income, rate of return, revenue requirements, fully allocated cost of service and rate design. The results of these studies were generally summarized into expert testimony and presented in rate case proceedings at either the state and/or local jurisdictions. The various jurisdictions Mr. Stowe has performed consulting services in are as follows:

- Arizona Corporation Commission
- Federal Energy Regulatory Commission
- Illinois Commerce Commission
- Kentucky Public Service Commission
- Mississippi Public Service Commission
- New Mexico Public Service Commission
- Oklahoma Corporation Commission
- Public Utility Commission of Texas
- Railroad Commission of Texas
- Texas Commission on Environmental Quality

- Utah Public Service Commission
- Wyoming Public Service Commission

Samples of the specific utility companies analyzed by Mr. Stowe are presented below. Many of these Mr. Stowe has investigated on numerous engagements during his career:

- ATC Satelco
- AT&T
- Arkansas-Oklahoma Gas Corporation
- Arizona Public Service
- Central Power & Light (now AEP)
- Canadian River Municipal Water Authority
- Dallas Water Utilities
- Denton County Electric Cooperative (now CoServ)
- Detroit Edison
- Gulf States Utilities (now Entergy)
- Houston Lighting & Power (now Reliant)
- Indianapolis Power & Light
- Kentucky Power & Light
- Lake Dallas Telephone Company
- Lower Colorado River Authority
- Lone Star Gas Company (now ATMOS)
- Magnolia Gas
- Metro-Link Telecom, Inc.
- Mississippi Power & Light
- Mojave Electric Cooperative
- Mountain States Bell
- Southern Union Gas Company
- Southwest Electric Service Company (now TXU)
- Southwestern Bell Telephone
- Southwestern Public Service Company
- San Miguel Electric Cooperative
- Texas Electric Service Company (now TXU)
- Texas-New Mexico Power Company
- Texas Power & Light (now TXU)
- Tucson Gas & Electric
- Utah Power & Light
- United Telecommunications
- West Texas Utilities (now AEP)

## Publications and Presentations

"Street Lighting Cost Reduction, a Game Plan for the 80's", Texas Institute of Traffic Engineers

"The Impact of Senate Bill No. 336"

- Research Group of the Texas Association of City Managers
- Central Region of the Texas Association of City Managers
- Gulf Coast Region of the Texas Government Financial Officers Association

Government Finance Officers Association of Texas Newsletter

- "A New Challenge for Municipal Gas Regulation"
- "The Case of the Vanishing Gross Receipts Tax"
- "Impact of Senate Bill 336" (Assessment of Developer Impact Fees)
- "Street Lighting Cost Reduction Through Municipal Ownership"

"Rate Impact of Water Conservation Pricing", Texas Water Conservation Association, 1993

"Alternative Funding for Capital Improvements", Water Environmental Association of Texas, 1994

"Construction Management and Financing Alternatives", Water Environmental Association of Texas, 1994

"Management Audits", Texas Water Conservation Association - Technical Seminar, 1994

"Ins and Outs of Rate Making", American Association of Water Board Directors, 1995

"Solid Waste Full Cost Accounting", Texas Natural Resource Conservation Commission, 1995

"SBI Deregulation 101",

- Texas Water Conservation Association, 1998
- Texas Rural Water Association, 1999

"The Benefits of Electric Aggregation", Texas Water Conservation Association, 1999

"Water Retail Wholesale Ratemaking", Texas Water Conservation Association – Technical Seminar, 2000

"Electric Deregulation in Texas", Texas Chapter of the Public Works Association, 2000

"Innovative Financing for Water and Wastewater Utilities", Texas Water Law Seminar, February 2002

"Encroachment Issues: Your Service Area is Worth How Much?" Texas Rural Water Association Annual Conference, March 2002

Allocating the Costs of Population Growth in Wholesale Water Contracts, Texas Rural Water Association and Texas Water Conservation Association Water Law Seminar, January 2007

**JACK E. STOWE, JR.**
**EXPERT WITNESS RESUME**

| CASE | JURISDICTION | TOPIC |
|---|---|---|
| Cause No. D-1-GN-12-002156, LCRA vs. Central Texas Electric Cooperative, Inc., Fayette Electric Cooperative, Inc., and San Bernard Electric Cooperative, Inc | District Court of Travis County, Texas (261st Judicial District) | Damages Associated with Wholesale Pricing Practices |
| Docket No. 17751, Phase I, Texas-New Mexico Power Company | Public Utility Commission of Texas | Test Year Cost of Service, Revenue Requirements, Rate of Return |
| Docket No. 17751, Phase II, Texas-New Power Company | Public Utility Commission of Texas | Transition to Competition |
| City of Lacy Lakeview vs. City of Waco | Texas Natural Resource Conservation Commission | Ratemaking Methodology, Cost of Service, Rate Design |
| Cause No. 96-1702-4, Lee Washington vs. Checker Bag Company | 170th District Court, McLennan County | Damages, Product Liability |
| Walker County Water Supply Corporation vs. City of Huntsville, Texas | Federal Court, Houston, Texas | Application of Federal Law 1926B, System Valuation under Texas Water Code 13.255 |
| Cause No. 97-00070, Garland Independent School District vs. Lone Star Gas Company | 14th District Court | Damages - Breach of Contract |
| City of Parker, Texas vs. City of Murphy, Texas | Collin County District Court | Identification of Water-Related Stranded Investment |
| Cause No. 95-5530, Tal-Tex, Inc. vs. Southland Corporation | State District Court | Damages - Gross Negligence |
| Cause No. H-94-4106, StarTel, Inc. vs. TCA, Inc., et. al. | Federal Court, Houston, Texas | Damages - Predatory Pricing, Anti-Trust |
| Docket No. 15560, Texas-New Mexico Power Company | Public Utility Commission of Texas | Community Choice - Competitive Transition Plan |
| No. 67-164085-96, Tarrant Regional Water District vs. City of Bridgeport, Texas | 67th Judicial District | Damages - Breach of Contract |
| GUD No. 8664, Statement of Intent Filed by Lone Star Gas Company to Increase Intracompany City Gate Rate | Railroad Commission of Texas | System Revenue Requirements, Class Cost of Service Allocations, Unbundling, Cost of Gas Sold |
| Docket No. 95-0132-UCR, Cameron County FWSD #1 (now Laguna Madre Water District) | Texas Natural Resource Conservation Commission | Conservation Rate Making Policies |
| Docket No. 95-0295-MWD, Dallas County Water Control and Improvement District No. 6 | Texas Natural Resource Conservation Commission | Wastewater Permitting, Concepts of Regionalization |
| Cause No. H-94-1265, Canyon Services, Inc. vs. Southwestern Bell, et. al. | Federal Court, Houston, Texas | Damages - Anti-Trust |
| GUD No. 8623, Dallas Independent School District Appeal of City of Dallas Rate Decision | Railroad Commission of Texas | Cost of Service, 2nd Rate Design, Public Free Schools |
| Docket No. 12900, Texas-New Mexico Power Company | Public Utility Commission of Texas | Revenue Requirements, Cost of Service, Prudence |
| No. 89-CV-0240, Metro- Link vs. Southwestern Bell Telephone Company, et. al. | 56th Judicial District Court, Galveston County, Texas | Lost Profits and Market Value from Breach of Contract |

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| Docket No. 10200, Texas-New Mexico Power Company | Public Utility Commission of Texas | Revenue Requirements, System Cost of Service, Prudence |
| Cause No. 95-50259-367, GTE of the Southwest, Inc. vs. City of Denton, Texas | 367th Judicial District Court, Denton County, Texas | Damages - Breach of Franchise Agreement |
| Cause No. 91-1519, Trinity Water Reserve, Inc., et. al. vs. Texas Water Commission, et. al. | 126th Judicial District Court, Travis County, Texas | Temporary Injunction Eminent, Probable, and Irreparable Damages |
| Docket No. 12065, Houston Lighting & Power Company Section 42 | Public Utility Commission of Texas | Accounting Issues, Actual Taxes, FASB 106 and 112, Nuclear Decommissioning, Depreciation Rates, Street Lighting Cost of Service and Rate Design |
| Docket No. 8748-A and 9261-A, City of Arlington, Texas vs. City of Fort Worth, Texas | Texas Natural Resource Conservation Commission | Interim Rate Hearing, Rate Case, Public Interest |
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| Docket No. 9892, Denton County Electric Cooperative, Inc. | Public Utility Commission of Texas | Rate Case Increase Application, Revenue Requirements |
| Docket No. 10034, Texas-New Mexico Power Company | Public Utility Commission of Texas | Deferred Accounting Treatment for Unit 2 |
| Docket No. 8291-A, City of Arlington, Texas vs. City of Fort Worth, Texas | Texas Natural Resource Conservation Commission | Wholesale Service Pricing |
| Docket No. 8388-M, Devers Canal Rice Producers Association, Inc., et. al. vs. Trinity Water Reserve, Inc., et al. | Texas Natural Resource Conservation Commission | Interim Rate Relief and Test Year Cost of Service and Rate Design |
| Docket Nos. 7796-M and 7831-M, City of Kilgore, Texas vs. City of Longview, Texas | Texas Natural Resource Conservation Commission | Wholesale Service Pricing |
| Docket No. 9491, Texas-New Mexico Power Company | Public Utility Commission of Texas | Revenue Requirements, System Cost of Service, Prudence |
| Docket No. 8338-A, City of Highland Village, Texas vs. City of Lewisville, Texas | Texas Natural Resource Conservation Commission | Wholesale Service Pricing |
| Docket No. 8585, Petition of the General Counsel to Inquire into the Reasonableness of the Rates and Services of Southwestern Bell | Public Utility Commission of Texas | Current System Revenues Treatment of Unprotected Excess Deferred Income Taxes Consolidated Tax Saving |
| Cause No. 3-89-0115-T, City of Mesquite, Texas vs. Southwestern Bell Telephone Company | Federal Court | Breach of Franchise Agreement |

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| Docket No. 8928, Texas-New Mexico Power Company | Public Utility Commission of Texas | Revenue Requirements, System Cost of Service |
| Docket No. 8095, Texas-New Mexico Power Company | Public Utility Commission of Texas | Revenue Requirements, System Cost of Service |
| House Bill 2734 | House of Representatives Sub-Committee on Natural Resources | Statutory Clarification |
| Cause No. 17-173694-98, Computer Translation Systems Support vs. EDS | 17th Judicial District Tarrant County, Texas | Damages due to breach of Intellectual Property Contract |
| City of Lacy Lakeview vs. City of Waco | Texas Natural Resource Conservation Commission | Motion to compel service under just and reasonable rates |
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| Edwards Machine and Tool vs. Time-Condor, Inc. | District Court McLennan County | Breach of Contract, Damage Calculations |
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| Fort Worth Independent School District vs. City of Fort Worth | 348th Judicial District Tarrant County, Texas | Valuation of Easements, Rebuttal testimony |
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| Docket No. 2001-1583-UCR<br>Docket No. 582-02-2470 City of McAllen v. Hidalgo County WCID #3 | Texas Commission on Environmental Quality | Public Interest |
| Docket No. 2001-1220-DIS<br>Docket No. 582-02-2664 Platinum Ocean v. Montgomery County, MUD No. 15 | Texas Commission on Environmental Quality | Stand-by fees |
| Docket No. 2001-1298-UCR<br>Docket No. 582-02-1255 East Medina Valley SUD v. Old Hwy 90 WSC | Texas Commission on Environmental Quality | CCN Application |
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| Clarksville City vs. City of Gladewater TCEQ Docket No. 2002-1260-UCR Docket No. 582-03-1252 | Texas Commission on Environmental Quality | Incremental cost to serve and capacity constraints water and wastewater |
| Canyon Regional Water Authority and Bexar Metropolitan Water District vs. Guadalupe Blanco River Authority SOAH Docket No. 2002-1400-UCR TCEQ Docket No. 582-03-1991 | Texas Commission on Environmental Quality | Public Interest |
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| Docket Nos. 2001-1300-UCR, 2001-0813-UCR, 2002-1278-UCR, & 2002-1281-UCR Cities of McKinney, Melissa, and Anna vs. North Collin Water Supply Corporation | Texas Commission on Environmental Quality | CCN Application – Ability to Provide Service |
| Application of Denton Municipal Electric to Change Rates for Wholesale Transmission Service, PUCT Docket No. 30358 | Public Utility Commission of Texas | Transmission Cost of Service Rate Application |
| Application of San Antonio City Public Service to Change Rates for Wholesale Transmission Service, PUCT Docket No. 28475 | Public Utility Commission of Texas | Transmission Cost of Service Rate Application |
| Application of City of Garland for Update of Wholesale Transmission Rates Pursuant to PUC Subst. R 25.192(g)(1), PUCT Docket No. 31617 | Public Utility Commission of Texas | Interim Transmission Cost of Service Rate Application |
| Docket Nos. 582-05-7095 and 582-05-7096; Application of the City of Leander to Amend Certificate of Convenience and Necessity No. 10302 and Sewer CCN No. 20626 | Texas Commission on Environmental Quality | CCN Application – Ability to Provide Service |
| Docket No. 582-06-0968; Application from the City of Shenandoah to Obtain Water and Sewer Certificates of Convenience and Necessity in Montgomery County. Applications Nos. 34997-C and 34998-C. | Texas Commission on Environmental Quality | CCN Application – Ability to Provide Service |
| Petition for Review of Municipal Actions Regarding ATMOS Energy Corp., Mid-Texas Division's Annual Gas Reliability Infrastructure Program Rate Adjustment, GUD Docket Nos. 9598, 9599, 9603 | Railroad Commission of Texas | Gas Reliability Infrastructure Program |
| Cease and Desist Petition of Wax Mid, Inc. against the City of Midlothian, SOAH Docket No 582-06-2332, TCEQ Docket No. 2006-0487-UCR | Texas Commission on Environmental Quality | Response to Cease and Desist Motion |

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| Woodcreek Ratepayers Coalition Petition to Appeal the City of Woodcreek's Decision to Establish Water and Sewer Rates Charged by Aqua Utilities, SOAH Docket No. 582-06-1366, TCEQ Docket No 2006-0072-UCR | Texas Commission on Environmental Quality | Cost of Service, Revenue Requirements, Cost Allocation, Rate Design |
| Application of the Town of Lindsay to Amend Water and Sewer Certificates of Convenience and Necessity Nos. 13025 and 20927, SOAH Docket No. 582-06-2023, TCEQ Docket No. 2006-0272-UCR | Texas Commission on Environmental Quality | CCN Application – Ability to Provide Service |
| Petition of BHP Water Supply Corporation Appealing the Wholesale Water Rate Increase of Royse City, Texas and Request for Interim Rates, SOAH Docket No. 582-07-2049, TCEQ Docket No. 2007-0238-UCR | Texas Commission on Environmental Quality | Public Interest |
| The Bank of New York Mellon, Financial Guaranty Insurance Company, and Syncora Guarantee Inc. (f/k/a XL Capital Assurance, Inc.) v. Jefferson County, Alabama, Civil Action File No. CV-08-P-1703-S | U.S. District Court, Northern District of Alabama, Southern Division | Just and Reasonable Rates, Affordability |
| Application of Mustang Special Utility District to Decertify a Portion of Sewer Certificate of Convenience and Necessity No. 20867 From AquaSource Development, Inc. DBA Aqua Texas Inc., and to Amend Sewer CCN No. 20930 In Denton County, Texas, Application No. 35709-C, SOAH Docket No. 582-08-1318, TCEQ Docket No. 2007-1956-UCR | Texas Commission on Environmental Quality | CCN Application – Ability to Provide Service |
| Appeal of the Retail Water and Wastewater Rates of the Lower Colorado River Authority, SOAH Docket No. 582-08-2863, TCEQ Docket No. 2008-0093-UCR | Texas Commission on Environmental Quality | Choice of Test Year, Revenue Requirements, Indirect Cost Determination, Cost Allocation, Affiliated Transactions |
| Appeal of Navarro County Wholesale Ratepayers to Review the Wholesale Rate Increase Imposed by the City of Corsicana SOAH Docket No. 582-10-1977 TCEQ Docket No. 2009-1925-UCR | Texas Commission on Environmental Quality | Public Interest |
| Petition to Revoke CCN No. 20694 from Tall Timbers Utility Company, Inc. in Smith County SOAH Docket No. 582-10-1923 TCEQ Docket No. 2009-2064-UCR | Texas Commission on Environmental Quality | Capacity Fees |
| Application of Texas-New Mexico Power Company for Authority to Change Rates, PUCT Docket No. 36025 | Public Utility Commission of Texas | Accounting Issues, Transmission Cost of Service, Functionalization, Consolidated Tax Savings Adjustment, Hurricane Ike Cost Recovery |
| Application of City of Garland to Change Rates for Wholesale Transmission Service, PUCT Docket No. 36439 | Public Utility Commission of Texas | Transmission Cost of Service Rate Application |
| Cause No. D-1-GV-09-001199 City of Garland, Texas v. Public Utility Commission of Texas | 200th Judicial District Court Travis County, Texas | Damage Calculation |

| CASE | JURISDICTION | TOPIC |
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| Application of Upper Trinity Regional Water District for Water Use Permit No. 5821, SOAH Docket No. 582-12-5232; TCEQ Docket No. 2012-0065-WR | Texas Commission on Environmental Quality | Economic and Rate Impact of Granting Water Use Permit |
| Joint Petition of Citizens Water of Westfield, LLC, Citizens Wastewater of Westfield, LLC and the City of Westfield, Indiana for approvals in connection with the proposed transfer of certain Water Utility Assets to Citizens Water of Westfield, LLC and the proposed transfer of certain Wastewater Utility Assets to Citizens Wastewater of Westfield, LLC, Cause No. 44273 | Indiana Regulatory Commission | Calculation of Investor Supplied Capital |

Attachment B

# 5 Year Capital Improvement Program
## (FY 2015 – FY 2019)

*for*

## Mustang Special Utility District
Denton County, Texas

*August 22, 2014*

STEGER BIZZELL
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TEXAS REGISTERED ENGINEERING FIRM F-181

Attachment B

# 5 Year Capital Improvement Program
## (FY 2015 – FY 2019)

*for*

## Mustang Special Utility District
Denton County, Texas

*August 22, 2014*

STATE OF TEXAS
DAVID M. PIERCE
102322
LICENSED
PROFESSIONAL ENGINEER

2014-08-22

STATE OF TEXAS
CURTIS R. STEGER
87905
LICENSED
PROFESSIONAL ENGINEER

8/22/14

# 5 Year Capital Improvement Program
## (FY 2015 – FY 2019)

## Mustang Special Utility District
Denton County, Texas

*August 22, 2014*

**Board Members:**

| | |
|---|---|
| Bill Hathaway | President |
| Mike Frazier | Vice President |
| James Burnham | Secretary |
| Wade Veeder | Director |
| Pete Carruthers | Director |
| Steve Rebhan | Director |
| Sue Galinski | Director |
| Dean Jameson | Director |
| Donna Sims | Director |

**Management:**

| | |
|---|---|
| Chris Boyd | General Manager |
| Aldo Zamora | Operations Manager |
| Patricia Parks | Finance Director |
| Beth Kazel | Customer Service Supervisor |

*Prepared by:*
STEGER BIZZELL

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# Executive Summary

## Background

Mustang Special Utility District (Mustang) began as a Water Supply Corporation serving 50 customers in 1966. Mustang's water Certificate of Convenience and Necessity (CCN) is comprised of over 120 square miles of NE Denton County including almost 24 square miles in the flood plain. Its wastewater CCN covers over 115 square miles. The water and wastewater CCNs are shown in the map on the next page.

Today, Mustang SUD provides service to over 8,800 water customers, a subset of whom are also wastewater customers. (In this report, the Providence Fresh Water Supply District (FWSD) is not included in current or projected numbers of customers). Mustang's system includes over 240 miles of water pipeline and 75 miles of wastewater mains. Mustang has a current well production capacity of 1540 GPM and a surface water production capacity of 5200 GPM.

Based on historical population growth and known plans for the development of new subdivisions, Mustang is projected to triple the number of connections over the next 10 years. In 20 years, the number of connections is projected to increase by a factor of five.

## 20-year Growth

This Capital Improvement Program (CIP) projects a system-wide 8.6% annual growth rate over the next twenty years, resulting in growth from 8,800 connections at the end of 2013 to more than 53,000 connections by the end of 2035. Correspondingly, peak day water supply requirements (0.6 GPM per LUE) are projected to increase from 7.6 MGD in 2013 to 46.4 MGD in the year 2035.

## 50-year Growth

Growth is expected to slow as the region reaches its ultimate build-out density. We expect the average population density of Mustang's CCN to level off at an average of around 1.3 LUEs (living unit equivalents) per acre by 2065 for a total of 83,000 LUEs.

## Scope - Water

This capital improvement program includes an analysis of Mustang's existing system, a projected population growth analysis, a discussion of Mustang's long-term water supply planning, and a series of capital improvement project recommendations to increase water production, storage, pumping and transmission capacity needed to meet 5- and 20-year growth demands for Mustang's system.

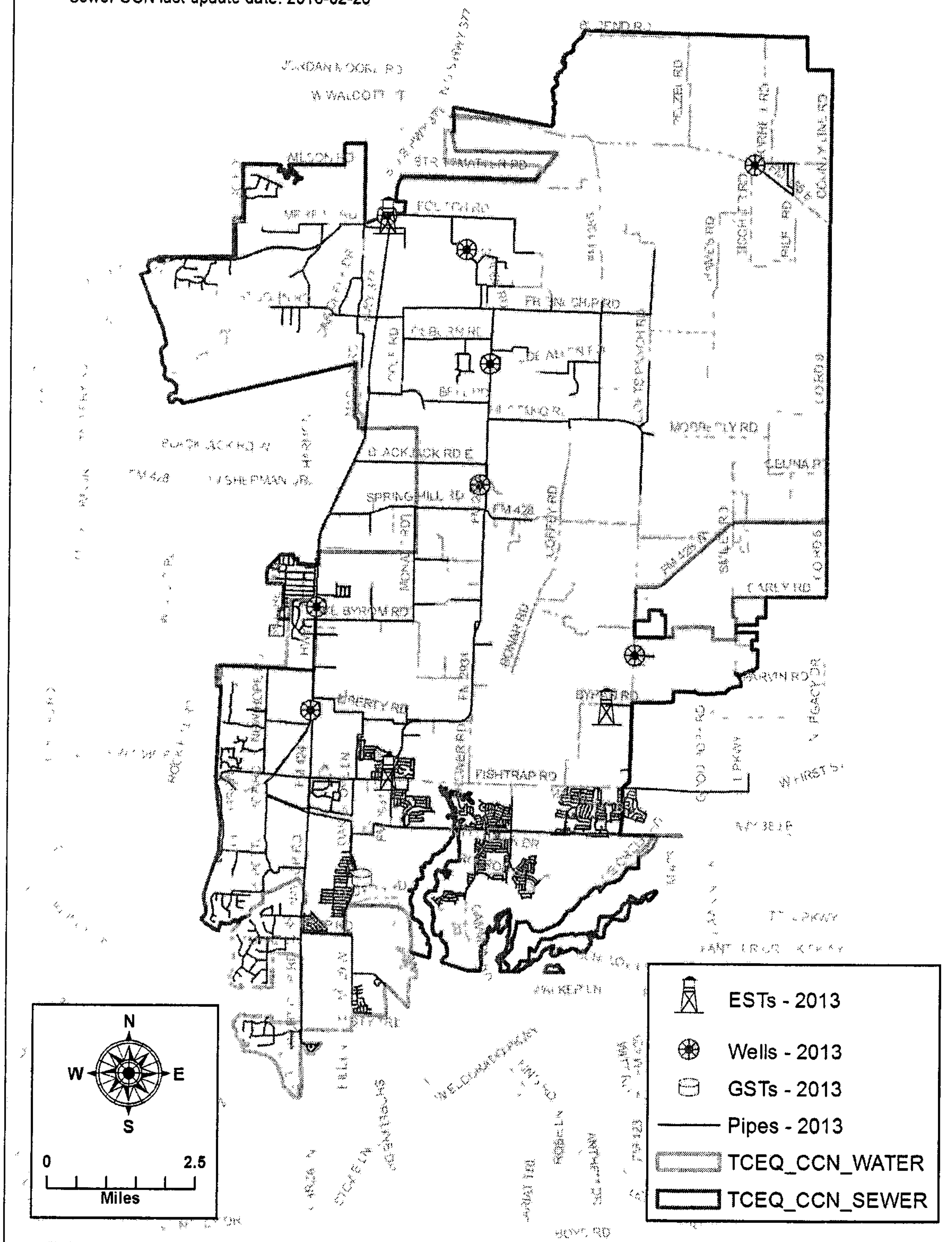
Projections are based on production and consumption data from 2013. Recommendations apply to fiscal years 2015 through 2019 (five-year plan) and through 2034 (20-year plan). Tables and charts in this report show projections through 2035 and 2065.

## Scope – Wastewater

We developed a comprehensive wastewater model that includes existing infrastructure and adds proposed interceptors, mains, manholes, and lift stations to service every parcel in Mustang's CCN. The computer model ensures that pipes are sized for the predicted demand and meet TCEQ requirements. From the model we produced a map to be used by Mustang personnel to specify sizes and locations of sewer mains to be installed by developer. Most improvements will be made by developers. We have identified two lines that will need to be put in by Mustang.

# Mustang Water and Wastewater CCNs

Water CCN last-update date: 2011-08-25
Sewer CCN last-update date: 2013-02-26



## Groundwater vs Surface Water

In this report, we favor the use of well water over groundwater because of the lower cost of groundwater as shown in the table below:

| | | Cost per LUE per Month | Notes/Sources |
|---|---|---|---|
| **Ground Water** | | | |
| Capital cost for 1000-GPM well | $1,500,000 | | From cost estimates for proposed wells |
| Capital cost per peak GPD | $1.04 | | Cost divided by (1000 GPM*1440 min/day) |
| Peak GPD per LUE | 864 | | 0.6 GPM*1440 min/day (TCEQ req.) |
| Capital cost of production per LUE | $900.00 | | $/GPD * GPD/LUE |
| Amortized monthly capital cost per LUE | | $5.45 | 20 years at 4% |
| Water well operating cost per 1000 gal. | $0.60 | | Chemicals, electrical, operators, maintenance |
| Average monthly usage per customer (gal.) | 9504 | | 0.22 GPM*1440 min/day*30 day/month |
| Monthly well operating cost per LUE | | $5.74 | ($/kgal) * (1 kgal / 1000 gal.) * (gal. / LUE) |
| **Monthly cost per LUE (Residential Meter):** | | **$11.20** | |

| | | | |
|---|---|---|---|
| **Surface Water** | | | |
| Monthly demand charge ($ per Peak MGD) | $32,343 | | $388,110/year/MGD (UTRWD contract) |
| Peak GPD per LUE | 864 | | 0.6 GPM*1440 min/day (TCEQ req.) |
| Monthly demand cost per LUE | | $27.94 | $/MGD*(GPD/meter)*(1 MGD/1000000 GPD) |
| Variable volume charge ($0.94 per 1000 gal.) | $0.94 | | |
| Average monthly usage per customer (gal.) | 9504 | | 0.22 GPM*1440 min/day*30 day/month |
| Monthly cost per LUE | | $8.93 | ($/kgal) * (1 kgal / 1000 gal.) * (gal. / LUE) |
| **Monthly cost per LUE (Residential Meter):** | | **$36.88** | |
| Note: Estimates are based on 2014 costs to construct and operate facilities to produce potable water that meets current federal and state drinking water regulations. Figures do not include costs of transmission mains and pumping facilities, storage, and general overhead. | | | |

The proposed long-term plan described in this report is based on the assumption that we can develop 12 wells with a capacity of 1000 GPM or better by 2030. If we are not successful in drilling this many productive wells, the alternative will be to advance our plans for adding a transmission main and pump station to send water from the Temple Dane pump station to the northwest. We will revisit this assumption in the next few years as Mustang proceeds with plans to drill several new wells.

## Proposed Improvements

The total proposed project costs for FY2015 is $4,400,000. The total proposed project costs for the capital improvement program through 2019 is $27,600,000. The following is a summary of recommended five-year water system improvement project costs through 2019:

| | |
|---|---|
| Southwest | $ 5,900,000 |
| Northwest | $ 8,400,000 |
| Southeast | $ 8,600,000 |
| Northeast | $ 2,600,000 |
| Tank Painting | $ 1,100,000 |
| Miscellaneous | $ 500,000 |
| Facility Upgrades | $ 500,000 |
| Total 5-Year Capital Improvement Projects | $ 27,600,000 |

This plan describes a sequence of construction for these projects that will keep Mustang in compliance with applicable regulations and plans to bring additional system capacity on line in time to meet future system growth. The plan also includes a discussion on long-term water supply planning to meet Mustang's water supply needs over the next 50 years.

As these projects are implemented, Mustang SUD will see the following benefits:

- Increase in water supply sources to meet long-term future demands
- Improved system operating efficiency by improving transmission line capacity, adding elevated storage, and decommissioning older existing pump station facilities
- Efficient, cost-effective use of capital expenditures to meet future growth demands

## Design Requirements

The Texas Commission on Environmental Quality (TCEQ) is charged with regulating and inspecting public drinking water supplies. Texas Administrative Code Chapter 290 defines Minimum Water System Capacity Requirements. These rules require that for each pressure plane, Mustang SUD must have 0.6 GPM per connection of water supply and pumping capacity, 200 gallons of total storage per connection, and 100 gallons of elevated storage per connection. The TCEQ requires Mustang to maintain a minimum pressure of 35 psi for each connection under normal conditions and 20 psi under fire flow conditions. Additionally, there are restrictions on the number of connections allowed on a dead-end line, in accordance with the chart below.

| *Minimum Line Size* | *Maximum Number of Connections* |
|---|---|
| 2" | 10 |
| 2.5" | 25 |
| 3" | 50 |
| 4" | 100 |
| 5" | 150 |
| 6" | 250 |
| 8" and larger | >250 |

## Design Philosophy

In creating a Capital Improvement Plan, guidelines must be established to create the most cost-effective plan possible. Planning too far in advance would create unnecessarily large and costly projects that could remain underused for years, leading to higher capital expenditures and maintenance costs. Planning with too close a horizon would result in replacement or paralleling of recently installed undersized facilities, which can be considerably more expensive than building larger facilities in the first place. This plan uses different design timeframes for different system components, as detailed in the following chart:

| *Component* | *Design Horizon* |
|---|---|
| Water Supply | 40-60 Years |
| Pipelines, Sewer Mains | 15-25 Years |
| Pump Stations, Lift Stations | 15-25 Years |
| Elevated Storage | 12-22 Years |
| Water, Wastewater Treatment Plants | 10-20 Years |
| Pump Installation | 5-7 Years |
| Water, Wastewater Treatment Plant Expansion | 5-7 Years |
| Water Wells | 5-7 Years |

The cost to increase the diameter of a proposed water or wastewater line to double capacity typically increases installed cost by only 20%. This economy of scale warrants a 20-year planning horizon for pipeline construction. Although treatment facilities are designed with a 10 to 20 year horizon, capacities can be increased incrementally, and 5 to 7 years is the appropriate design timeframe for these expandable facilities.

We also factor in operating and maintenance costs when determining appropriate design timeframes for different components. For example, operating and maintenance (O&M) expenses for a pipeline are relatively low compared to construction costs. Therefore it is cost-effective to design pipelines for a longer timeframe than O&M intensive facilities such as water treatment plants and storage tanks. Similarly, in designing pump stations we recommend sizing the pump building and yard piping for twenty years, but only installing sufficient pumping capacity for five- to seven-year projected growth.

# Design Methodology

**Population Growth Analysis:** Because the usual sources of population growth data (US Census, the North Central Texas Council of Governments, the Texas Water Development Board) do not take into account a detailed knowledge of known developments, we developed our own model of population growth by breaking Mustang's CCN into *growth regions*, each with its own start date, build-out date, and ultimate population density.

**Analysis of the Existing Water System:** We analyzed the current state of the water system to either confirm that it meets TCEQ requirements or identify components that are lacking.

**Long-Term Water Supply Planning:** Based on projections of future demand, available water sources, and other constraints, we developed a high-level strategy to meet the demand by specifying when and where to add wells, pump stations, and elevated storage. The strategy acknowledges that Mustang's system uses both surface water and groundwater and that the boundaries between the surface and groundwater regions may have to change over time.

**Hydraulic Modeling:** We modeled Mustang's water system using code developed at Steger Bizzell to convert GIS (geographical information systems) data to an EPANET2 hydraulic network model. Whereas a high-level strategy may be used to determine when to add production sources and storage, it does not determine all of the infrastructure that comprises a functioning water distribution system. We use engineering judgment to choose locations for future transmission mains and other piping. We use the model to determine appropriate pipe diameters and to prove that the network will keep customers in water over an extended period of peak demand.

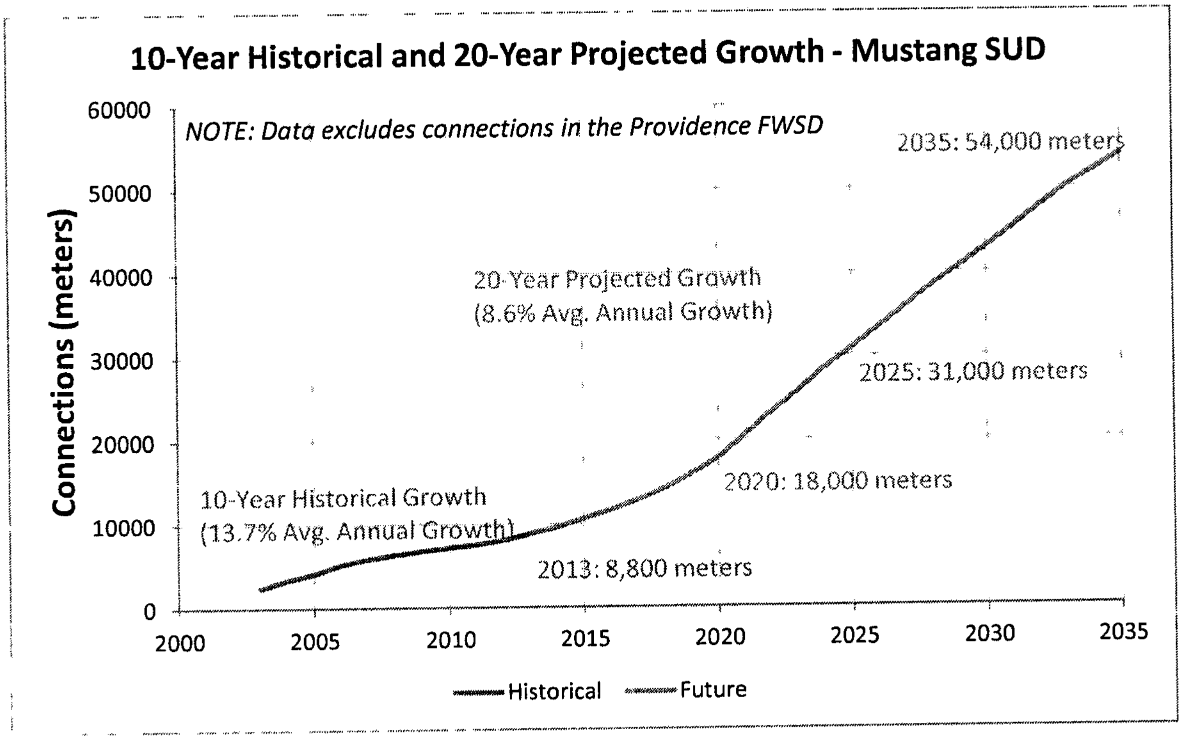
**Developing a Comprehensive Wastewater Plan:** We decided the best way to produce a comprehensive wastewater plan was to take a brute-force approach and solve the complete problem: to specify how to serve every parcel in Mustang's wastewater CCN. In this way we were able to give Mustang personnel what they requested—a map showing how future developers should locate and size interceptors running through their property and showing all landowners how they would receive wastewater service.

# Population Growth Analysis

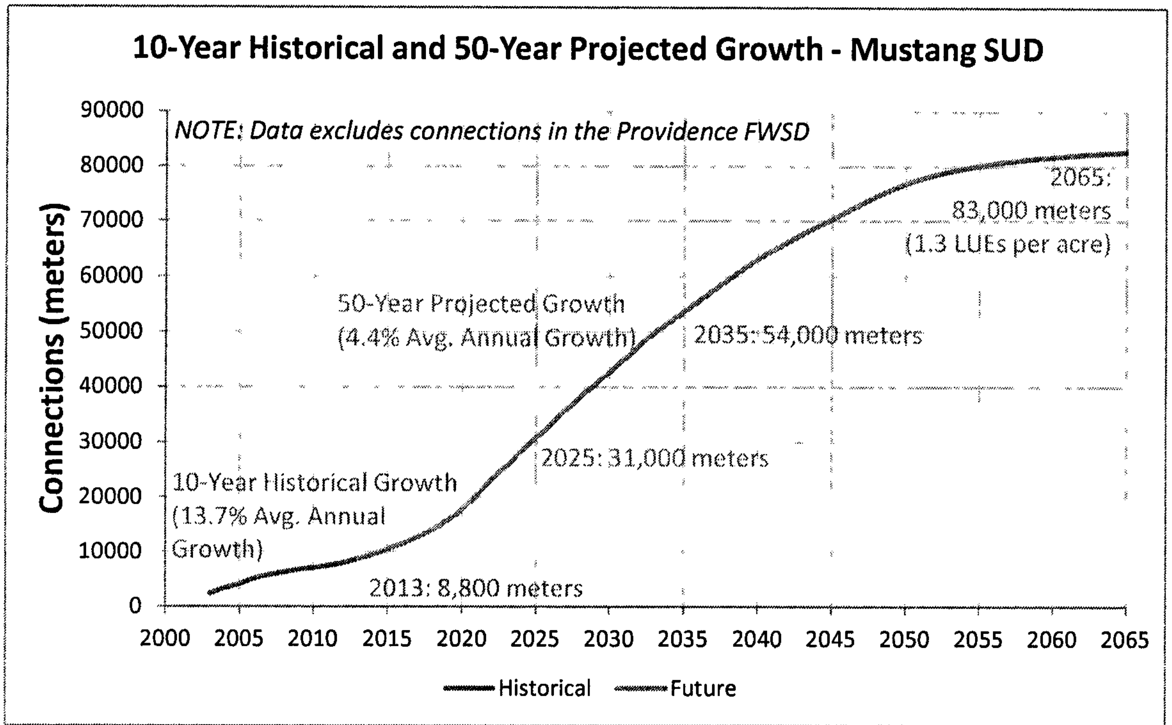
Based on information from developers and guidelines from Mustang personnel, we divided Mustang's CCN into a set of growth regions, corresponding to developments, Fresh Water Supply Districts, MUDs, cities, and city Extraterritorial Jurisdictions (ETJs) and for each specified a pattern of growth. For some growth regions we were given the developer's projected build-out numbers of units for each year until full build out. For others, we estimate a start year, ultimate build-out year, and ultimate build-out density (LUEs per acre) and used these to define the region's pattern of growth.

The parameters used for these growth projections is included in Appendix A.

The graph below shows both historical and projected growth through 2035.

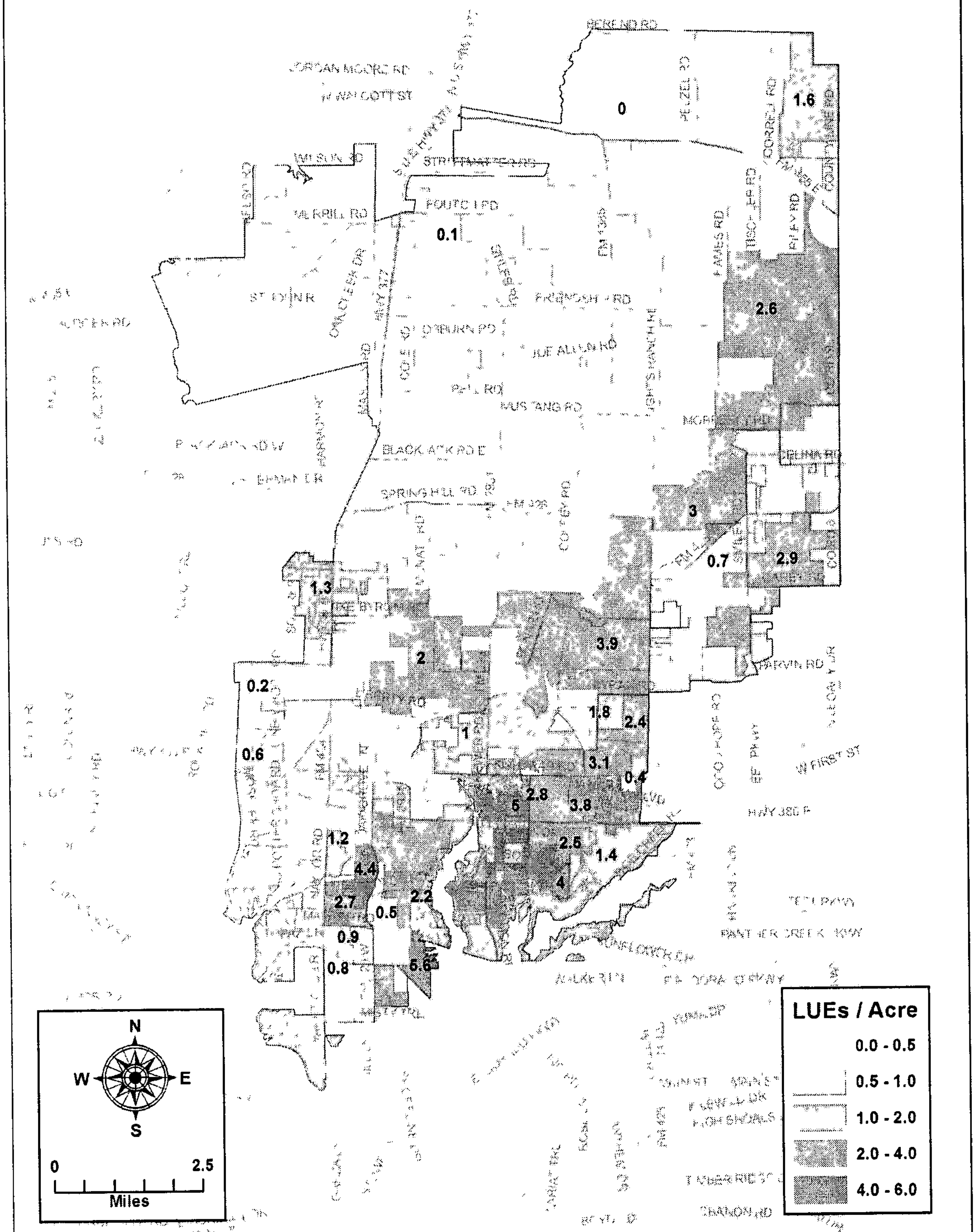


The graph below shows projected growth through 2065 by which time we anticipate that the population in Mustang's CCN will have leveled off.




The map on the following page shows the projected population density in terms of living equivalent units (LUEs) per acre for 2035. The above graph shows that that the 2035 densities represent over half of the ultimate build-out density.

## Projected 2035 Demand Density (LUEs / Acre)



# Analysis of the Existing Water System

## TCEQ Requirements

We performed an audit of the entire Mustang SUD system to determine TCEQ compliance in each pressure plane in terms of well supply, pumping capacity, elevated storage capacity, and ground storage capacity.

Mustang's distribution system is currently divided into two production zones, one served by well water and one served by surface water from Upper Trinity Regional Water District (UTRWD). The following tables summarize production and storage capacities as of December, 2013.

| *Groundwater Production Zone* | | | | |
|---|---|---|---|---|
| Site | *Production (GPM)* | *Pumpage (GPM)* | *Ground Storage (Gallons)* | *Elevated Storage (Gallons)* |
| *Well #1* | 130 | 100 | 30,000 | |
| *Well #2* | 120 | 100 | 19,500 | |
| | | | 50,000 | |
| *Well #3* | 200 | 225 | 80,000 | |
| *Well #4* | 225 | 225 | 85,000 | |
| *Well #5* | 240 | 300 | 500,000 | 300,000 |
| *Well #6* | 50 | 30 | 5,000 | |
| *Well #10* | 525 | 740 | 250,000 | |
| *Light Ranch* | 50 | 30 | 20,000 | |
| ***Totals*** | **1540** | **1750** | **1,069,500** | **300,000** |

*Table 1: Summary of Mustang's production and storage in the groundwater production zone.*

| *Surface Water Production Zone* | | | | |
|---|---|---|---|---|
| Site | *Production (GPM)* | *Pumpage (GPM)* | *Ground Storage (Gallons)* | *Elevated Storage (Gallons)* |
| *Temple Dane* | 5200 | 5200 | 2,000,000 | |
| *Byran Road* | | | | 2,250,000 |
| *Providence* | | | | 770,000 |
| ***Totals*** | **5200** | **5200** | **2,000,000** | **3,020,000** |

*Table 2: Summary of Mustang's production and storage in the surface water production zone.*

The tables below summarize TCEQ requirements and how each of these production zones fares on each criterion. In these tables, a margin of zero percent means that the TCEQ requirement is exactly met. A negative margin would indicate a problem.

| *Groundwater Production Zone* | | | LUES: | 1,665 |
|---|---|---|---|---|
| | | | | |
| ***Criterion*** | **Rule** | **Required (GPM)** | **Actual (GPM)** | **Margin** |
| ***Production (GPM)*** | 0.6 GPM per LUE | 999 | 1,540 | 54% |
| ***Pumping Capacity (GPM)*** | 0.6 GPM per LUE | 999 | 1,750 | 75% |
| ***Ground Storage*** | | | 1,069,500 | |
| ***Elevated Storage*** | 100 gallons per LUE | 166,530 | 300,000 | 80% |
| ***Total Storage*** | 200 gallons per LUE | 333,060 | 1,369,500 | 311% |

*Table 3: Mustang's 2013 current groundwater production zone meets TCEQ requirements with ample reserves.*

| *Surface Water Production Zone* | | | LUES: | 7,136 |
|---|---|---|---|---|
| | | | | |
| ***Criterion*** | **Rule** | **Required (GPM)** | **Actual (GPM)** | **Margin** |
| ***Production (GPM)*** | 0.6 GPM per LUE | 4,281 | 5,200 | 21% |
| ***Pumping Capacity (GPM)*** | 0.6 GPM per LUE | 4,281 | 5,200 | 21% |
| ***Ground Storage*** | | | 2,000,000 | |
| ***Elevated Storage*** | 100 gallons per LUE | 713,570 | 3,020,000 | 323% |
| ***Total Storage*** | 200 gallons per LUE | 1,427,140 | 5,020,000 | 252% |

*Table 4: Mustang's 2013 surface water production zone meets TCEQ requirements but will need to increase its production and pumping capacities to meet projected growth.*

The tables above show that Mustang's system met TCEQ requirements with comfortable margins in 2013. Because of Mustang's current growth rate of 8 – 10%, it will soon be necessary to increase the production and pumping capacity in the surface water production zone. This will be accomplished by increasing the capacity of the Temple Dane pump station from 5200 GPM to 8000 GPM by upgrading all five pumps to 150-hp.

As noted previously, these calculations exclude the Providence FWSD and do not include its customers, storage, or production.

## Actual Production and Consumption

The table below summarizes well production for 2013.

| Groundwater Production Summary | | | | | |
|---|---|---|---|---|---|
| | Monthly | Daily | | | |
| | Total (gal) | Min (gal) | Max (gal) | Ave (gal) | Max (GPM) |
| ***January*** | 13,423,400 | 289,500 | 614,200 | 433,013 | 427 |
| ***February*** | 11,103,500 | 274,300 | 590,000 | 396,554 | 410 |
| ***March*** | 13,354,300 | 256,100 | 576,800 | 430,784 | 401 |
| ***April*** | 13,741,500 | 304,300 | 869,800 | 458,050 | 604 |
| ***May*** | 17,775,800 | 410,200 | 915,400 | 573,413 | 636 |
| ***June*** | 21,530,500 | 399,500 | 1,304,700 | 717,683 | 906 |
| ***July*** | 29,696,400 | 495,300 | 1,328,200 | 957,948 | 922 |
| ***August*** | 35,172,600 | 835,500 | 1,439,800 | 1,134,600 | 1,000 |
| ***September*** | 25,304,400 | 438,300 | 1,316,900 | 843,480 | 915 |
| ***October*** | 18,654,200 | 237,500 | 761,600 | 601,748 | 529 |
| ***November*** | 13,111,200 | 229,000 | 782,200 | 437,040 | 543 |
| ***December*** | 11,084,000 | 135,600 | 848,800 | 357,548 | 589 |
| | **Yearly Total (gallons)** | **Min Day (gallons)** | **Max Day (gallons)** | **Ave Day (gallons)** | **Max Day (GPM)** |
| | **223,951,800** | **135,600** | **1,439,800** | **613,567** | **1,000** |
| | | | | | |
| | | | **Peaking Factor:** | **2.35** | |

The maximum average daily production of 1000 GPM is well below the theoretical production capacity of 1420 GPM. It is just a little higher than the TCEQ mandated 999 GPM.

The peaking factor (the ratio of maximum daily production to average production) is 2.35. This number will be important for our hydraulic model.

The table below summarizes surface water production from May of 2013 through April of 2014 since data was not available prior to May of 2013. 2014 data is shown in green.

| *Surface Water Production Summary* | | | | | |
|---|---|---|---|---|---|
| | Monthly | Daily | | | |
| | Total (gal) | Min (gal) | Max (gal) | Ave (gal) | Max (GPM) |
| ***January*** | 46,900,000 | | | 1,512,903 | |
| ***February*** | 41,200,000 | | | 1,471,429 | |
| ***March*** | 52,600,000 | | | 1,696,774 | |
| ***April*** | 59,500,000 | | | 1,983,333 | |
| ***May*** | 74,400,000 | | | 2,400,000 | |
| ***June*** | 79,900,000 | | 4,600,000 | 2,663,333 | 3,194 |
| ***July*** | 102,000,000 | | 5,100,000 | 3,290,323 | 3,542 |
| ***August*** | 115,700,000 | | 5,600,000 | 3,732,258 | 3,889 |
| ***September*** | 100,200,000 | | 4,600,000 | 3,340,000 | 3,194 |
| ***October*** | 73,900,000 | | | 2,383,871 | |
| ***November*** | 50,800,000 | | | 1,693,333 | |
| ***December*** | 44,600,000 | | 848,800 | 1,438,710 | 589 |
| | **Yearly Total (gallons)** | **Min Day (gallons)** | **Max Day (gallons)** | **Ave Day (gallons)** | **Max Day (GPM)** |
| | **841,700,000** | | **5,600,000** | **2,306,027** | **3,889** |
| | | | | | |
| | | | **Peaking Factor:** | **2.43** | |

The maximum average daily production of 3,889 GPM is well below the theoretical production capacity of 5200 GPM. It is also below the TCEQ mandated value of 4281 GPM.

The peaking factor (the ratio of maximum daily production to average production) is 2.43. This number will be important for our hydraulic model.

# Long-Term Water Supply Planning

In conversations with Mustang personnel, we developed the following strategy to meet future demand with a combination of ground and surface water.

## Near Term (2015 to 2020)

1. Increase production in the Temple Dane pump station by upsizing the remaining original three pumps so that all five pumps are 150 horsepower and capable of producing 2000 GPM. This gives a production capacity of 8000 GPM with one pump out of service. The Temple Dane pump station serves the regions with the highest near-term growth. The Upper Trinity Regional Water Disctrict (UTRWD) will be paying the majority of the cost for this upgrade.

2. Convert the southwest area from surface to ground water including Oak Point WCIDs 1 and 4, MUD 5, Rudman Partnership developments, and the Denton ISD Junior High School. This will lessen the demand on Temple Dane and extend the length of time before an additional surface water take point is needed.

3. Reconnect the northwest and southwest regions into a single groundwater region with two pressure planes, including Cross Roads, Oak Hill Estates, and the area along Hwy 380 west of FM 720 that is currently served by Temple Dane.

4. Add wells in the northwest region to meet growth in that area including The Lakes. Add a transmission main connecting The Lakes to the Providence tank for elevated storage.

5. Upsize small lines to maintain pressures above TCEQ minimum.

6. Add a second surface water take point (Jackson Ridge Pump Station) near the Byran Road tank to handle the increased population along Highway 380 east of FM 720 and along FM 1835.

## 2020 to 2030

1. Continue to add wells on the west side in the groundwater production zone.

2. Increase the pumping capacity of the second surface water pump station as needed, up to a total capacity of 8000 GPM.

3. Add wells in the northeast, creating a groundwater production zone to service the Four Seasons Ranch MUD and Talley Ranch WCID.

## Long Term (2030 to 2065)

1. Add wells in the southeast.

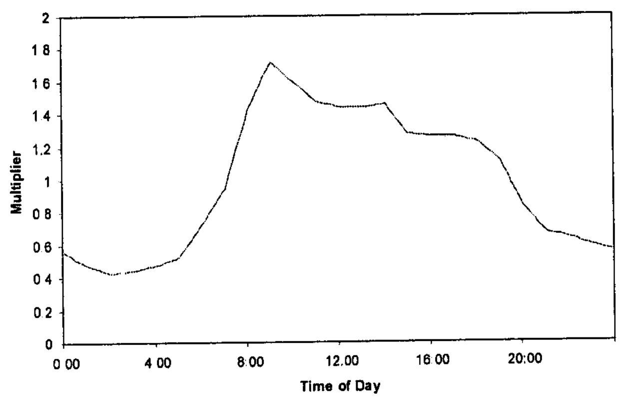
2. Add chloramination (or other TCEQ-mandated treatment) to groundwater and combine the groundwater and surface water production zones.

3. Add a third surface water take point and pump station with an ultimate capacity of 30 MGD.

# Hydraulic Modeling

The model consists of Mustang's entire existing distribution network including all pipe lengths, diameters and material types, pump stations, storage tanks, wells, and treatment facilities. Additionally, the water model is able to look at actual water demands for each meter in Mustang's system to model the behavior of Mustang's system as accurately as possible. Using this software, we can perform an extended period simulation to predict system behavior over several consecutive peak demand days, including operation of pumps, control valves, and emptying and filling of storage tanks.

During an extended period simulation, we used a demand multiplier pattern over a 24-hr period which was applied to each connection in the model. This pattern simulates the real-world peak day demand patterns typical for a retail water system where demand is highest during mid-morning hours and lowest during early morning hours. This demand pattern is shown in the chart below.




The computer hydraulic model was developed to first model the existing system and facilities to find areas where the system has deficient production, transmission, or storage capacity, if any, and then to prove out proposed infrastructure to meet future demand.

## Calibration

Average Consumption per LUE

In the hydraulic model, we associate each meter with its customer's average consumption in gallons per minute. We computed this average based on data from the customer database. For meters that do not yet have customer IDs associated with them, we use a default value. We computed this default value by dividing the total production (gallons) by the number of customer-days recorded in the database. We divided this by 1440 to get the average in gallons per minute:

$$\frac{1{,}065{,}651{,}800\ gallons}{3361180\ customer \cdot days} * \frac{1\ day}{1440\ minutes} = 0.22\ \frac{gallons}{minute}\ per\ customer$$

Peak Consumption per LUE

Applying the larger of the peaking factors computed for groundwater and surface water, we compute the consumption per LUE for a peak summer day:

$$0.22\ GPM * 2.43 = 0.54\ GPM$$

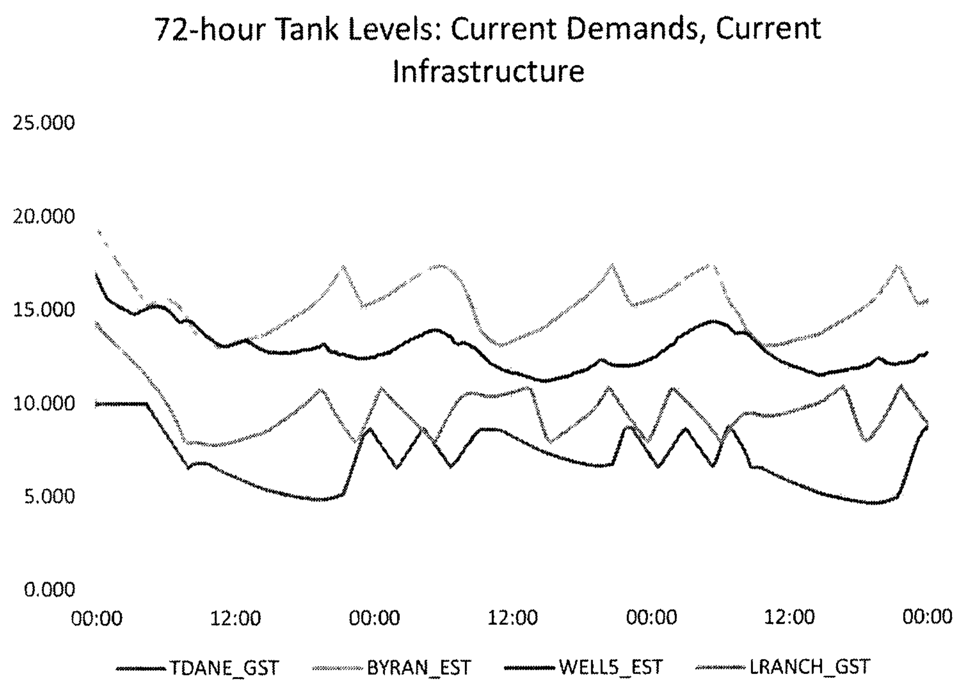
Hydraulic Modeling Parameters

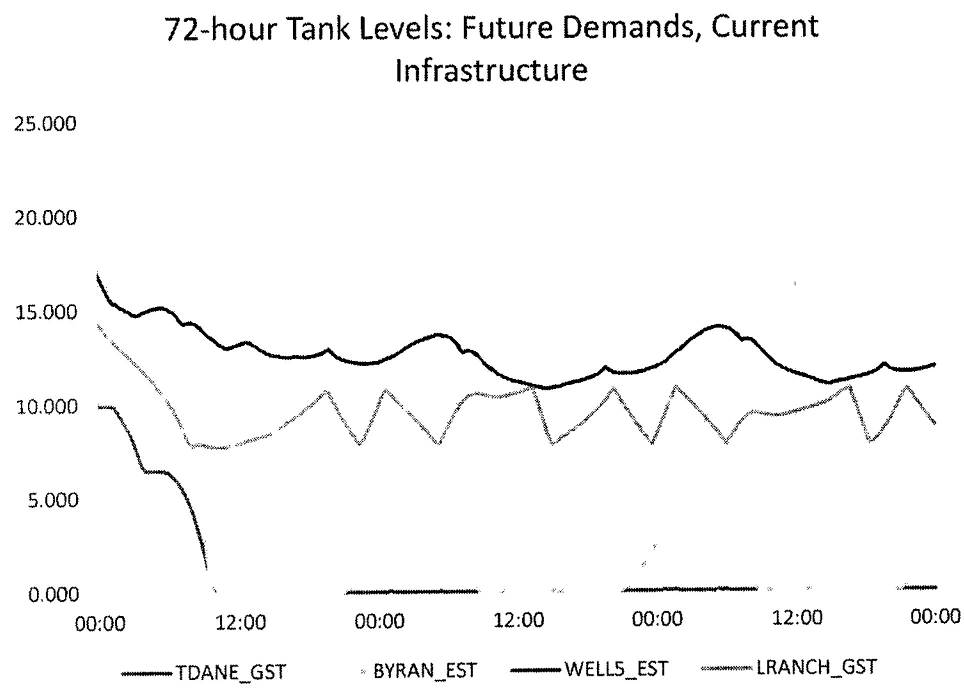
For the actual model, we use the TCEQ mandated consumption of 0.6 GPM per LUE. We use 0.2 GPM per LUE to model typical usage and apply a peaking factor of 3 to model peak usage.

## Modeling the Current System

The charts below and on the next page show elevated and ground storage tank behavior for the existing system with current and 20-year demands added. The second chart illustrates that the existing system does not have the treatment, storage and transmission capacity to handle the projected demands of the next 20 years.

The third chart shows elevated storage tank behavior with 20 year demands after all improvements recommended in this CIP are added to the Mustang system. This chart displays how tank levels are able to fully recover at the end of each day, indicating the system has adequate treatment, storage and pumping capacity to meet 20-year demands with the proposed improvements.




72-hour Tank Levels: Future Demands, Current Infrastructure
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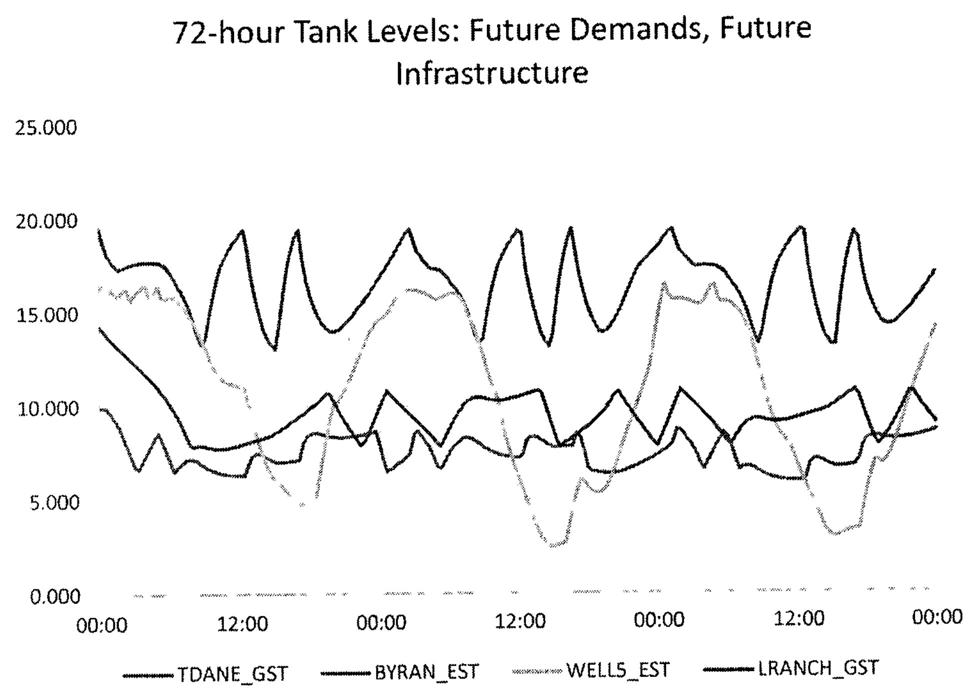
WELL5_EST
LRANCH_GST


72-hour Tank Levels: Future Demands, Future Infrastructure
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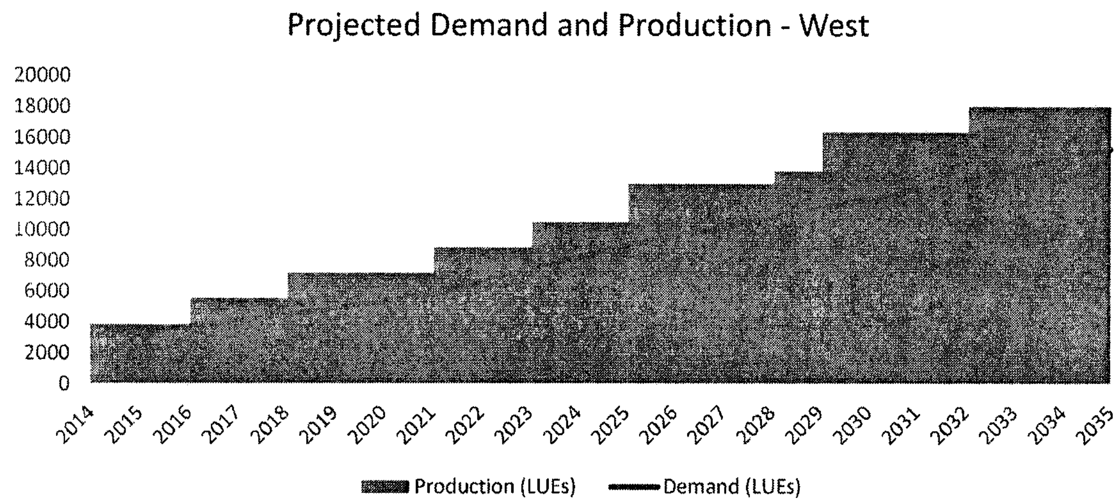
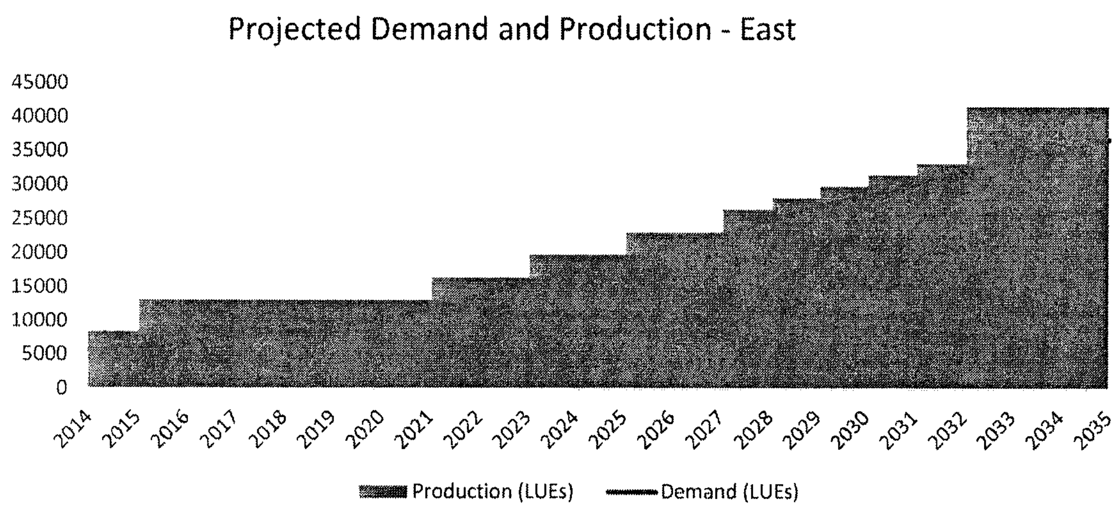
TDANE_GST
BYRAN_EST
WELL5_EST
LRANCH_GST

## Modeling the Future System

Matching Production to Demand

To help time the deployment of new water sources, we created charts showing projected production and demand as shown below. Here "West" refers to customers served by groundwater between 2020 and 2030 and "East" refers to customers served by surface water during that time. Each step in the yellow line corresponds to the addition of a well or the the addition of a surface water pump station high service pump.



## Using Modeling to Prove out Proposed Infrastructure Improvements

After calculating the projected number of new meters for each growth region, we selected 50 major intersections at which to assign the increase in water demand. The determination of where to assign these new demands was based both on currently planned developments (example: The Lakes) and intersections where other future development is most likely to occur.

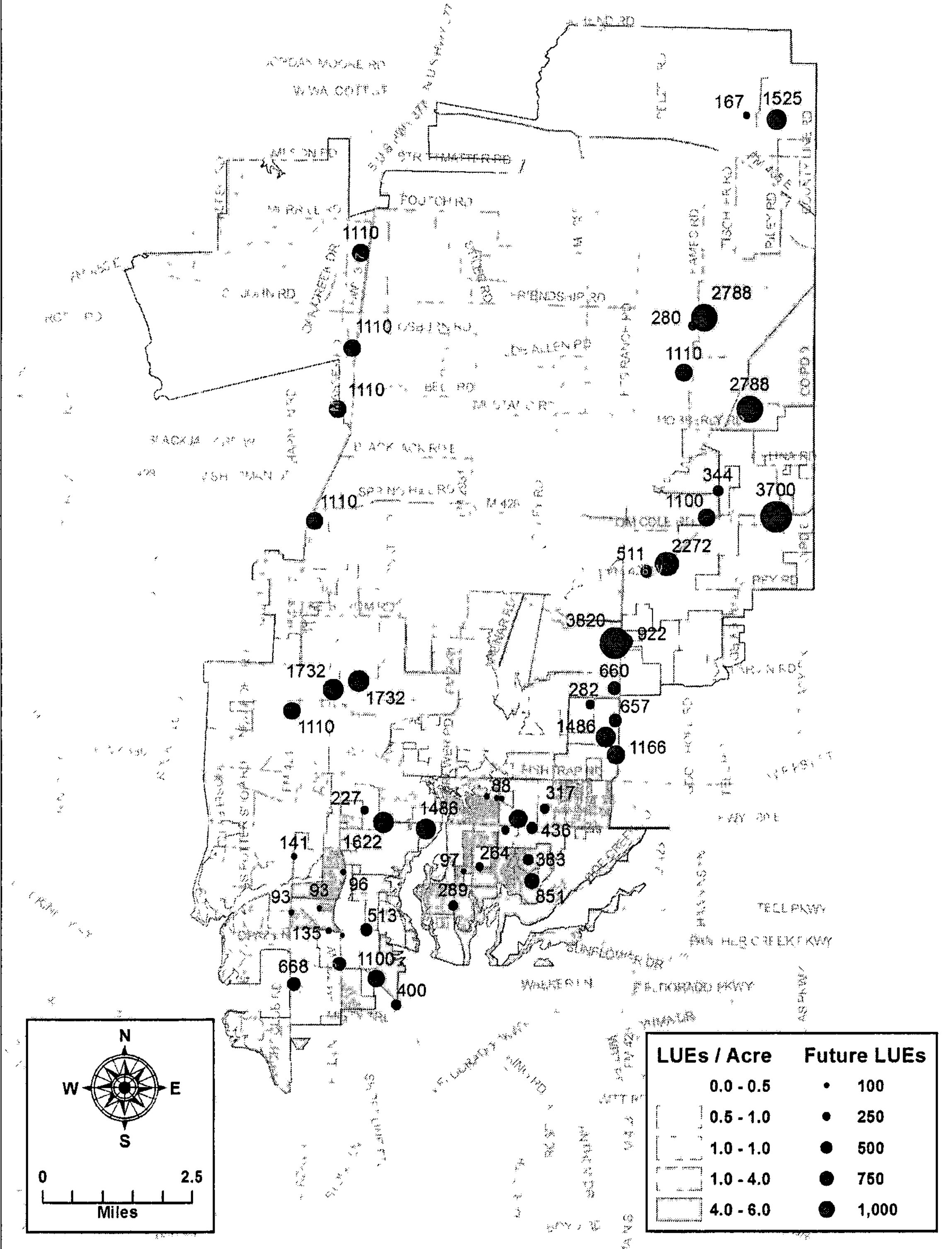
Once the projected demands were added to the computer hydraulic model, we began the involved process of developing numerous capital improvement scenarios to determine the most cost-effective combination of projects to meet these projected demands, and maintain an acceptable level of service to all customers, both existing and projected. We then divided the modeled system improvements into discrete, specific capital improvement projects.

Once each project was defined, we met with Mustang staff to discuss and prioritize each project based on need. We developed detailed cost estimates for each project and scheduled the first five years' worth of recommended capital improvement projects to coincide with Mustang's annual budget, beginning in FY2015.

A map showing these demand as numbers of LUEs, projected for 2035, appears on the next page. These projected demands were computed for each year making it possible to model any year in the future through 2065.

These improvement projects, their cost estimates, and proposed schedule are included in the Appendix.

## Projected 2035 Demand (LUEs)



# Developing a Comprehensive Wastewater Plan

We were asked by Mustang personnel to produce a map that could be used to tell developers how to locate and size wastewater lines running through their property. We decided the best way to do this was to solve a more comprehensive problem: how to provide service to every potential customer in the wastewater CCN.

We had previously developed computer modeling tools to validate wastewater systems. We decided to use this to help us design a system for Mustang that would cover its entire CCN, specifying the location, size, and elevations of a network of mains, manholes, lift stations, and force mains connecting every parcel to a water reclamation plant (WRP).

## Detailed Methodology

The process used to produce the proposed wastewater system is summarized here.

1. Using a geographic information system (GIS) application, draw a network of mains and manholes, starting from the treatment plants and working outward to every parcel. Use a set of heuristics when placing these:
    a. Run interceptors and larger mains in the flood plain when possible.
    b. Use contour maps to place mains so they follow the natural grade.
2. For each parcel, connect a service connection (customer) and lateral to the nearest main. Use GIS tools to compute the demand (the capacity required, expressed in gallons per minute) for that connection as the product of the area of the parcel in acres and the projected population density of that region in LUEs per acre (see the Projected 2035 Demand Density map).
3. For each manhole, use GIS tools to automatically assign a starting elevation (e.g., 4 feet below ground). The elevation can be adjusted later if necessary.
4. For each main, assign an initial pipe diameter. The diameter can be adjusted later if necessary.
5. Run the computer modeling tool to validate the system. This tool performs the following functions:
    a. Add up demands connected to each main including demands from service connections and demands from upstream mains.
    b. Compute the capacity in each main, taking into account pipe diameter, slope, and the capacity of downstream mains.
    c. Identify any main whose demand exceeds its capacity.
    d. Identify any main whose slope is outside of the range allowed by the TCEQ.
    e. Identify any main less than 4 feet or more than 25 feet below ground.
    f. Specify a recommended diameter for each main based on its slope and required capacity.