

Attachment DTR 1.1 – 1.B.2  
Justification for the Proposed Facility

{COG000000473}

# ENGINEERING FEASIBILITY REPORT

FOR

## GRANBURY PHASE I WASTEWATER SYSTEM IMPROVEMENTS ENVIRONMENTAL INFORMATION DOCUMENT PROJECT ELEMENTS CITY OF GRANBURY HOOD COUNTY, TEXAS

Prepared for:  
**CITY OF GRANBURY  
AND  
TEXAS WATER DEVELOPMENT BOARD**

**APRIL 2019**

The following pages were excerpted from the EFR which was submitted for the project. Population projections and calculations of the proposed facility flow are included.



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4/24/19

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The objective of this Engineering Feasibility Report (EFR) is to discuss the proposed Phase I improvements such that the City’s wastewater system can better meet the needs of the service area in the near- and long-term future. Funds for the project are being solicited from the Texas Water Development Board (TWDB) Clean Water State Revolving Fund (CWSRF).

**II. PROJECT PLANNING AREA**

The City is located approximately 35 miles southwest of Fort Worth, Texas along State Highway 377 in Hood County. The City’s existing WWTP is located at 1800 Waters Edge Drive. The City holds a Certificate of Convenience and Necessity (CCN No. 10904) for water and wastewater service that is valid for Hood County and the areas immediately surrounding the City. The Phase I improvements will not expand the existing service area. Instead, Phase I is intended to address current capacity limitations of the existing wastewater treatment infrastructure.

Refer to Appendix A for a general map of the project planning area. The City’s existing WWTP discharge permit (TPDES Permit No. WQ0010178002) and reclaimed water authorization (No. R10178002) are provided in Appendix B and C, respectively.

**III. POPULATION AND WASTEWATER DEMAND PROJECTIONS**

A twenty-year design horizon was evaluated for the proposed Phase I improvements. Beginning with the City-estimated population for 2017 (9,880 residents), population projections were determined in accordance with the City’s 2016 Comprehensive Plan, as well as City-approved growth estimates. Specifically, a compound annual growth rate (CAGR) of 2.6% was assumed for 2017–2026 and 1.6% for the remaining timeframe. These growth rates are in relatively good agreement with the TWDB water planning projections of approximately 2.1% for 2020–2030 and approximately 1.3% for 2030–2040. Population projections are presented in Table 1.

**Table 1: Population Projections for City of Granbury**

Service Area	Projected Population					
	2018	2020	2025	2030	2035	2038
City of Granbury	10,137	10,671	12,132	13,264	14,359	15,060

Historical plant flows at the WWTP were also evaluated for the last five years to determine average annual, maximum monthly, and maximum daily flows. Two-hour peak flow data was not available for the WWTP. Overall, the average daily and maximum monthly flows have not exceeded 75% of the Plant’s capacity during the five-year period, whereas maximum daily influent flows in four out of five years exceeded the WWTP’s rated capacity of 2.0 MGD. The highest daily flow occurred in May 2015 with influent flows approaching 4.0 MGD. The historical data is summarized in Table 2.

**Table 2: Historical Influent Flows at Existing (South) WWTP**

Year	Average Annual Flow, MGD	Maximum Month Flow, MGD (Event Month)	Maximum Daily Flow, MGD (Event Month)
2013	0.99	1.07 (April)	1.83 (January)
2014	0.97	1.12 (December)	2.53 (June)
2015	1.37	1.88 (May)	3.99 (May)
2016	1.36	1.59 (June)	3.40 (May)
2017	1.25	1.38 (June)	2.17 (June)
<b>Running Average</b>	<b>1.19</b>	<b>1.41</b>	<b>2.78</b>

The population projections and historical plant flow data from 2017 were used to determine the treatment capacity requirements with 2038 as the design basis.

**Projected Wastewater Demand**

Normally, the most recent year’s historical flows, projected populations, and TCEQ requirements are used to determine a WWTPs capacity. While the traditional approach is applicable for the Phase I improvements, another factor exists that warrants consideration. Specifically, the City has approximately two-dozen developments that have been platted, approved by the City, and had core utility infrastructure, including water and wastewater, installed. As a result, the City could see accelerated wastewater demands above those anticipated by the CAGR. Accordingly, the capacity analysis is presented two ways: first, to account for requirements based on historical flow data and population projections assuming the approved developments are completed slowly with negligible impact on the CAGR; and second, assuming the approved developments are rapidly completed.

**Traditional Capacity Analysis**

As a baseline, the 2017 population data and average annual flow were used to determine demands on a per capita basis, which was then used to estimate wastewater demands in 2038. Thus, for 9,880 residents and 1.25 MGD of influent wastewater, the waste generation rate in 2017 was approximately 127 gallons per capita per day (GPCD). Assuming this rate remains constant, the estimated 2038 demand will be 1.91 MGD, which excludes inflow and infiltration (I/I) considerations. Including the TCEQ’s 75% Rule yields a recommended capacity for Phase I as follows:

- Total Projected Average Daily Flow = 1.91 MGD
- TCEQ Requirement (75% Rule) = 1.91 MGD / 75% = 2.55 MGD
- Total recommended capacity = 2.6 MGD

Although 2.6 MGD utilizes TCEQ design standards and representative plant flow data, I/I effects become more apparent in the maximum monthly and daily flows. In terms of quantifying I/I, it is desirable and more accurate to conduct flow monitoring and modeling of the collection system; however, such a program has not previously been undertaken by the City. In the absence of site-specific I/I correlated data, I/I flow impacts on projected daily flows inevitably require simplifying assumptions.

### Capacity Analysis with Rapid Completion of Approved Developments

Previously, the City retained Enprotec / Hibbs & Todd, Inc. (eHT) to aid with an impact fee assessment for the service area. During that assessment, it was determined that 6,639 living unit equivalent (LUE) wastewater connections were in use in 2017. Based on the 2017 population, an average of 1.49 persons per LUE was established. In addition, there are currently 2,670 LUE wastewater connections platted, approved, and ready for development. If all of these developments were completed in 2018, the City's population would soar to 14,115 instead of 10,137. Assuming growth thereafter returns to the CAGR rates stated previously, the population in 2038 could be as high as 20,970. At 127 GPCD, the estimated wastewater demand in 2038 would be 2.66 MGD. Correspondingly, the recommended capacity would be as follows:

Total Projected Average Daily Flow	=	2.66 MGD
TCEQ Requirement (75% Rule)	=	2.66 MGD / 75% = 3.55 MGD
Total recommended capacity	=	<u>3.6 MGD</u>

Realistically, the rate at which the approved developments are completed is unknown. Regardless, the City could experience accelerated growth above the current CAGR as the developments are built.

### Recommended Capacity

Because the completion timeframe of the approved developments and the impact on the growth rate across the service area are unknown, the traditional analysis was used as the basis for the Phase I recommended capacity. However, if the analysis were repeated using the 2017 average maximum monthly flow as a representation of I/I, the capacity would be 2.8 MGD (rounded to 3.0 MGD). Given capacity implications associated with I/I, a flow monitoring and modeling effort is recommended for the City's wastewater collection system. Until such time, the recommended treatment capacity for the Phase I improvements is 3.0 MGD: 2.0 MGD at the existing South WWTP; and 1.0 MGD at the new East WWTP.

## IV. EXISTING FACILITIES

The City's sewer collection system conveys wastewater from developed regions within the service area to the existing WWTP. However, the proximity of the City to Lake Granbury presents several challenges in terms of conveying wastewater to the treatment plant. For example, wastewater from developments in the northern region of the City limits must be pumped south across Lake Granbury via the Weatherford Highway bridge where it is recombined with the network of gravity sewer lines and other force mains on the west side of Lake Granbury. Ultimately, wastewater from the west side of Lake Granbury is pumped to the east side at two different locations: a force main bored under the Lake from the Granbury City Beach Park to Old Cleburne Road, and a second force main across the U.S. Highway 377 bridge. In addition, wastewater generated from the City's eastern developments are also conveyed to the WWTP through a series of gravity sewer lines and force mains. A simplified aerial overview of the collection system is provided in Appendix D.

# ENVIRONMENTAL INFORMATION DOCUMENT

## CITY OF GRANBURY, TEXAS

### WASTEWATER PHASE I IMPROVEMENTS TWDB CWSRF PROJECT NO.

AUGUST, 2019

The following pages were excerpted from the EID which was submitted for the project. The Project Need & Purpose section justifies the proposed facility

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## Section 3: Project Description Preferred Action Alternative

of Old Granbury Road.

- Lift Station #23 (LS #23): The improvements at LS #23 will all be done on the existing lift station which is situated on the south side of Old Granbury Road within an undeveloped lot.
- LS#23 Force Main: The new force main will run from LS#23 to the new East WWTP site. The line will be installed within existing utility right-of-way (ROW) on the south side of Old Granbury Road.
- Lift Station #22 (LS#22) Gravity Line: The new 8-inch gravity line, which will eliminate the need for LS#22, will be installed within the existing ROW on the south side of Old Granbury Road. The line will run from the location of LS#22 to a tie-in to the existing line along Old Granbury Road.
- WTP Force Main: The new force main will be installed from the existing WTP, across Highway 377, and along the north side of Crawford Court. The line will then tie-in to the existing force main in easement which runs south from Crawford Ct.

Latitude/Longitude:

- New East WWTP site: 32.45285, -97.73934
- Water Line for the East WWTP: 32.45821, -97.73685 to 32.45263, -97.73517
- Electric Line for the East WWTP: 32.44547, -97.74822 to 32.45332, -97.74065
- LS#23: 32.45023, -97.74353
- LS#23 Force Main: From 32.45023, -97.74353 to 32.45323, -97.74085
- LS#22 Gravity Line: From 32.44798, -97.7456 to 32.44875, -97.74502
- WTP Force Main: 32.44056, -97.76389 to 32.43882, -97.76817

~~Project Address (if applicable): New satellite WWTP: 3500 E. State Highway 377, Granbury, Texas 76048~~

**3. Project Need & Purpose:** What need does the project address? (e.g., improve water quality, increase capacity, inadequate system or system components, increase treatment due to more stringent effluent limits, linear work, etc.)

Continued growth across the City's service area and the lack of operational flexibility and treatment limitations at the existing WWTP motivate the need for the Phase I improvements. Improvements to the existing system are necessary to improve operational flexibility, increase the capacity of the system to meet growing demands, address aging equipment, and to prepare for anticipated phosphorus regulations. Additionally, much of the equipment at the existing WWTP is reaching the end of its intended design life and needs to be replaced.

The City's existing WWTP has historically been able to meet the conditions of its TPDES discharge permit, but the facility has limitations regarding treatment capacity and nutrient removal capabilities. In terms of operational flexibility, flow spikes can easily upset plant operations because the CAS process consists of a single train. The lack of redundancy can create a number of issues for the facility. In addition, the secondary treatment process is not well suited for total phosphorus (TP) removal, which is likely to be implemented by the TCEQ as a permit condition in either the 2019 permit renewal cycle or the following cycle.

### Section 3: Project Description Preferred Action Alternative

The population of the City of Granbury is rapidly increasing, and the growth in the area is expected to continue for the foreseeable future. Approximately two-dozen new developments have been platted, approved by the City, and have core utility infrastructure, including water and wastewater, installed. The completion timeframe of the approved developments and the impact on the growth rate across the service area are unknown, so a traditional population demand analysis was used as the basis for the Phase I recommended capacity. In order to accurately estimate the necessary future capacity of the wastewater system, a complete flow monitoring and modeling effort of the City's wastewater collection system will be required.

A majority of the equipment at the WWTP is approaching the end of its intended design life. The most recent major project at the WWTP was completed in 1999. During that time, the influent lift station pumps were replaced, the Schreiber grit and grease removal system was installed, and the secondary treatment system was upgraded. Prior to 1999 the secondary treatment process utilized the sludge holding basin as a racetrack-style aeration basin with clarification via the two smaller clarifiers. Disinfection of the clarifier effluent was accomplished using chlorination. The 1999 improvements converted the racetrack aeration basin into a sludge holding basin, added the two larger conventional aeration basins, and added the third, larger clarifier. In addition, the RAS/WAS pump station was installed along with conversion of the chlorine disinfection system to a UV system. While the 1999 improvements increased the overall capacity and improved treatment capabilities, the physical age of the equipment is beginning to show. The influent lift station pumps are approaching the end of their intended life, which is also true of the aeration basins, clarifiers, UV system, and solids handling and dewatering equipment.

Is the proposed project being pursued in response to a compliance order? No

**4. Project Description:** Description should include project costs, design year and design population.

Based on the population and flow projections, in conjunction with the City's long-term planning strategy, the proposed Phase I improvements include construction of a new, 1.0 MGD satellite WWTP (with space to support expansion to approximately 2.0 MGD in a future project) on a 10.8 acre site the east side of the City, support system improvements for the new East WWTP, upgrades to the collection system to transport wastewater the new East WWTP, and upgrades at the existing South WWTP to address the aging equipment and improve the treatment capability.

The new East WWTP site is situated such that the effluent will discharge into an unnamed tributary to Rucker Creek, then to Rucker Creek, and finally to Lake Granbury in Segment No. 1205 of the Brazos River, upstream of the City's surface water treatment plant, which utilizes raw water from the lake. Budget has been allocated for the following core processes at the East WWTP: screen system, influent lift station, secondary treatment process, disinfection system, and solids dewatering system. In addition, budget has been reserved for ancillary infrastructure such as site piping, grading and paving, noise and odor mitigation systems, site lighting, and a control/support building. A grit removal system may also be integrated at the WWTP, but this has yet to be finalized. The total budgeted project cost for the construction at the East Satellite WWTP is \$9,111,000.00.

Essential support system improvements will also be required to service the new East WWTP. A new 8" water

### Section 3: Project Description Preferred Action Alternative

line will be installed to provide water to the East WWTP, and a new overhead electrical line will be hung to power the East WWTP.

Improvements and modifications will also be made to the collection system on the eastern portion of the service area. In general, the work will consist of redirecting flows to the new treatment facility and modifying or eliminating some of the force mains, lift stations, and/or gravity sewer lines on the east side of the City. Construction of the collection system improvements has been allocated a budget of \$620,000.000.

The total project costs, including contingency and the costs for the elements included in the Categorical Exclusion (CE), which is described below, is \$34,950,000.00.

For all project elements, the design year is 2038 (20 years) and the design population in 2038 is 15,060.

Is the proposed project part of a larger project?  Yes  No

If the proposed project is one phase of a larger project, describe the duration and purpose of the larger project. These EID project elements are part of the City's overall Phase I wastewater system improvements, which includes CE project elements. A CE is an exclusion from the full environmental review because the proposed projects do not have significant adverse effects on the quality of the human environment either individually or cumulatively. The CE project elements include some collection system improvements and upgrades to the existing South WWTP. The collection system improvements included in the CE are upsizing of the existing 6-inch gravity sewer lines along Heather Drive, Travis Street, and Brazos Street to 8-inch lines, and repairs and improvements to Lift Station #7. The upgrades at the South WWTP include, but are not limited to: a new screen system, new influent lift station structure, rehabilitation of the grit removal system, rehabilitation and upgrade to the secondary treatment process, upgrade to the solids dewatering system, upgrade to the reuse pump station, and rehabilitation of the control building. The CE was issued by the TWDB for these project elements on May 14, 2019.

5. **Waste Disposal:** Does the project require sludge/soil/waste disposal?  Yes  No

If yes, identify the location(s) and method(s) of disposal:

After startup, sludge generated from the new East WWTP will be transported to the IESI Weatherford Landfill (Registration MSW-47A) in Parker County via a Progressive Waste Solutions Truck (registration number: 22591) in a semi-solid form. This is the same form of sludge disposal as is used at the existing South WWTP.