FINAL

Eagle Pass Water Works System

Water & Wastewater Capital Improvements Plan and Land Use Assumptions

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PRESENTED TO

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1.0 INTRODUCTION

1.1 BACKGROUND

The City of Eagle Pass is a rapidly growing border community located in Maverick County, Texas approximately 150 miles southwest of San Antonio and 50 miles south of Del Rio on the United States/Mexico border. The area is served by United States (US) Highways 277 and 57, and Texas State Loop 480. The City and its surrounding areas make up a diverse community that includes outlying colonies and the home of the Kickapoo Indian Nation and Reservation. The city has two international bridges connecting Eagle Pass to the City of Piedras Negras, Coahuila, Mexico.

Eagle Pass Water Works System (EPWWS) serves customers within the City of Eagle Pass and Maverick County, from North Elm Creek Subdivision in the North to El Indio, Texas located seventeen miles southeast of the City. The existing system serves primarily residential and commercial customers, with a very limited number of industrial users. It is anticipated that commercial development will increase but that residential will remain as the predominant customer base.

Due to this rapid growth, Eagle Pass Water Works System will need to expand its current system to meet this new demand. To help facilitate expansion and growth, EPWWS will adopt a Land Use Assumptions Plan (LUAP) and a Capital Improvements Plan (CIP) for water and wastewater services. The CIP establishes current & future water and wastewater demands, and establishes the projects needed to provide for the growth identified in the LUAP. An Impact Fee Program is also being developed to allow EPWWS to collect impact fees from new development to help finance the projects established in the CIP.

1.2 SCOPE

The Land Use Assumptions Plan (LUAP) and Capital Improvements Plan (CIP) are prepared in accordance with the requirements of Chapter 395 of the Texas Local Government Code to support the development and adoption of Impact Fees to help finance the infrastructure needed to support new growth.

The LUAP includes a description of the service area and projections of changes in land uses, densities, intensities, and population in the service area over a 10-year and a 20-year period.

The Capital Improvements Plan includes information specifically the following items, per Chapter 395.014 of the Texas Local Government Code:

1. Description of the existing capital improvements within the service area and the costs to upgrade, update, improve, expand, or replace the improvements to meet existing needs and usage and stricter safety, efficiency, environmental, or regulatory standards.
2. An analysis of the total capacity, the level of current usage, and commitments for usage of capacity of the existing capital improvements.
3. A description of all or the parts of the capital improvements or facility expansions and their costs necessitated by an attributable to new development in the service area based on the approved land use assumptions.
4. A definitive table establishing the specific level or quantity of use, consumption, generation, or discharge of a service unit for each category of capital improvements or facility expansions and an equivalency or conversation table establishing the ratio of a service unit to various types of land uses, including residential, commercial, and industrial.
5. The total number of projected service units necessitated by and attributable to new development within the service area based on the approved land use assumptions and calculated in accordance with generally accepted engineering or planning criteria.

6. The projected demand for capital improvements or facilities expansions required by new service units projected over reasonable period of time, not to exceed 10 years.

2.0 LAND USE ASSUMPTIONS

2.1 INTRODUCTION

The LUAP uses the best available information provided by the Eagle Pass Water Works System (EPWWS) Impact Fee Advisory Committee (IFAC). The Land use assumptions are based on a 10-year and 20-year period. This comprehensive LUAP was used to develop the CIP in accordance with the requirements of Chapter 395 of the Local Government Code to support the calculation and assessment of an Impact Fee as outlined separately.

2.1.1 Methodology

2.1.1.1 Current Land Use

The EPWWS is the sole water and wastewater system purveyor in this region, thus land use areas are the same for both water and wastewater service areas and are presented in Table 2-1 and Figure 2-1. The dominant land use in the service area is residential.

Table 2-1: Service Area Land Use Distribution

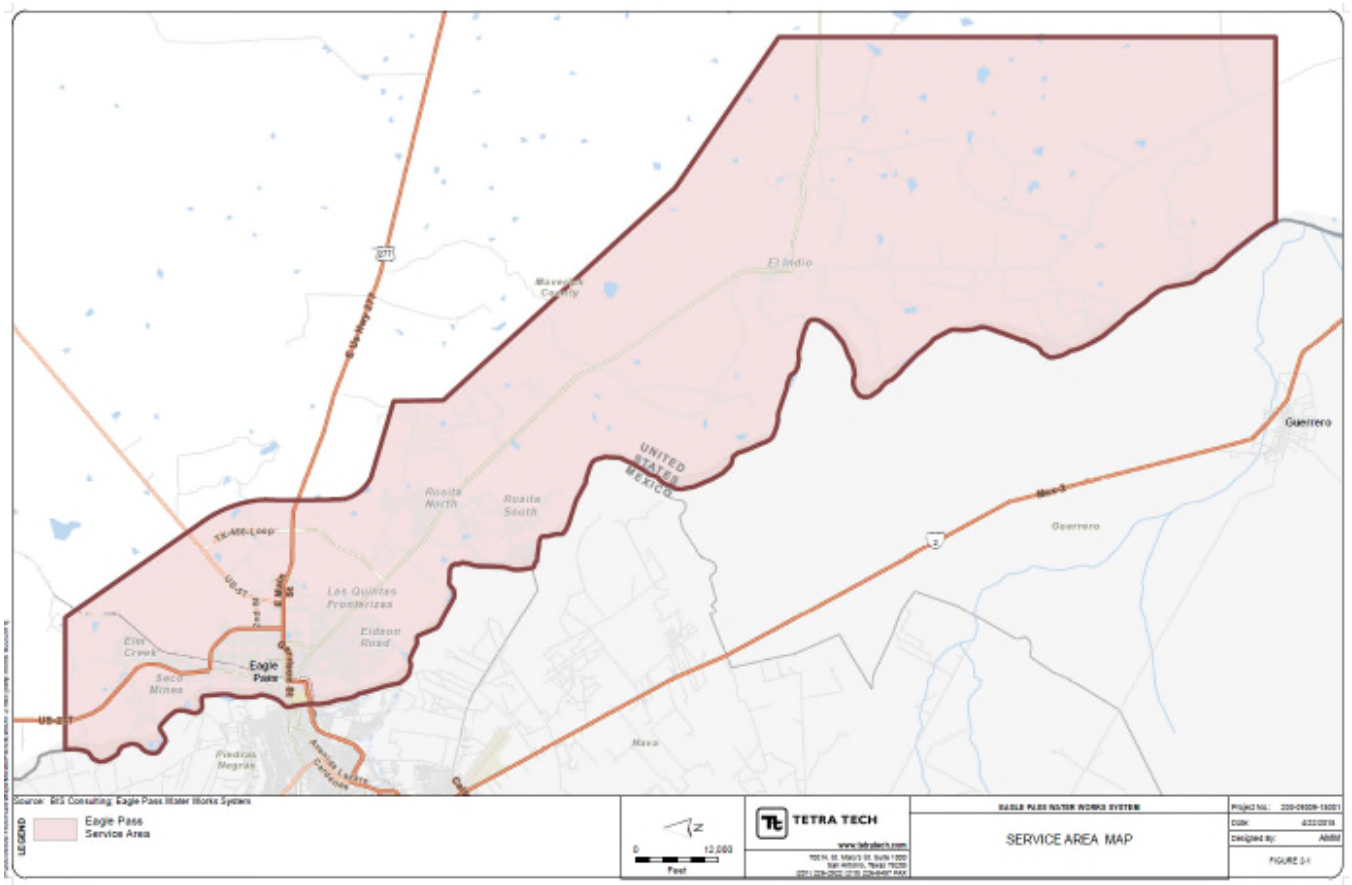
Land Use (by Tt)	Area (Acres)	Percent Total
Residential	6,528.9	55%
Multi-Family	72.4	0.6%
Commercial	1,373.8	11.5%
Industrial	2,213.6	18.7%
Government	677.1	5.7%
Public/Semi-Public	425.1	3.6%
Religious	42.0	0.4%
School	535.1	4.5%
Grand Total	**11,868.0**	

The Land Use categories include Residential, Multi-family, Commercial, Industrial, Government, Public/Semi-Public, Religious, and School. The categories are defined below:

1. Residential. A one-family dwelling; building accommodated for an occupancy exclusively by one (1) family.
2. Multi-family. Any apartment district and townhouse residence district; buildings having accommodations for and occupied exclusively by two (2) or more families.
3. Commercial. Any commercial business either in the neighborhood, central, or general business districts per the City's zoning map. This includes, but not limited to, banks, bakeries, gasoline stations, pet stores, medical offices, restaurants, and retail stores.
4. Industrial. Any area zoned within the industrial district per City of Eagle Pass zoning ordinance.
5. Government. Any area owned and operated by a local, state, or federal entity for government purposes.

6. Public/Semi-Public. Property owned by governmental or quasi-governmental entities and used as public spaces, including parks, golf courses, recreational facilities and vacant land preserved for public uses.
7. Religious. Any church or religious facility as identified in the City's zoning map.
8. School. Any school, either public or private, as identified in the City's zoning map.

Figure 2-1 Service Area Map



2.1.2 Population and Projections

To project population growth history is used as a guide. To estimate service area population, water service connections are used as they include the entire water and wastewater service area including areas outside of the city limits of the City of Eagle Pass. Since demand for water and wastewater service is proportional to the size of the water meter installed, the connection history is broken down by water meter size as shown in **Table 2-2**.

Table 2-2 Water Service Connection History

Year	5/8”	3/4"	1”	1 1/2"	2”	3”	4”	6”	8”	10”	Total
2001	9846	0	313	4	158	33	35	0	0	0	10390
2003	11194	0	406	5	189	38	33	0	0	0	11863
2005	12811	0	466	9	213	42	31	1	0	0	13573
2007	13524	0	481	15	224	44	33	1	0	0	14323
2011	14435	0	503	19	250	49	66	1	0	0	15324
2013	15056	0	504	22	266	49	67	1	2	0	15968
2014	15312	0	512	26	269	52	66	1	2	0	16240
2015	15541	0	573	29	274	51	62	1	2	0	16533
2016	15688	0	605	33	274	51	59	1	2	0	16712

2.1.2.1 Growth Projections

Four different growth scenarios were evaluated to develop growth projections for the EPWWS service area. Each scenario is based upon water connection growth at various growth rates. Growth rates were based upon various information including County population projections, Texas Water Development Board population projections and historical growth. Tetra Tech presented this information to the Impact Fee Advisory Committee (IFAC) to determine the anticipated growth in the service area. Based on the results of that presentation, the IFAC agreed that a growth rate of 2.30% was most likely over the next twenty year period. This rate was used to project future population and land use as indicated by the connection projections in **Table 2-3** and population growth as shown in **Table 2-4**.

Table 2-3 Connection Growth at various growth rates

Year	Connections at 1.72%	Connections at 1.90%	Connections at 2.30%	Connections at 2.50%
2016	16712	16712	**16712**	16712
2017	16999	17029	**17096**	17130
2018	17292	17353	**17489**	17558
2019	17589	17683	**17892**	17997
2020	17892	18019	**18303**	18447
2021	18199	18361	**18724**	18908
2022	18512	18710	**19155**	19381
2023	18831	19065	**19595**	19865
2024	19155	19428	**20046**	20362
2025	19484	19797	**20507**	20871

Year	Connections at 1.72%	Connections at 1.90%	Connections at 2.30%	Connections at 2.50%
2026	19819	20173	**20979**	21393
2036	23505	24350	**26335**	27384
2046	27875	29393	**33059**	35054

Table 2-4 Population projections at various growth rates.

Year	Population Growth at 1.72%	Population Growth at 1.90%	Population Growth at 2.30%	Population Growth at 2.50%
2016	52670	52763	**52970**	53073
2017	53576	53765	**54188**	54400
2018	54498	54787	**55434**	55760
2019	55435	55828	**56709**	57154
2020	56388	56889	**58013**	58583
2021	57358	57970	**59347**	60048
2022	58345	59071	**60712**	61549
2023	59349	60193	**62108**	63088
2024	60370	61337	**63536**	64665
2025	61408	62502	**64997**	66282
2026	62464	63690	**66492**	67939
2036	63538	64900	**68021**	69637
2046	64631	66133	**69585**	71378

Over the next ten and twenty year period changes in the land use are expected. Growth is expected in nearly every category of land use over the next ten and twenty years. The intensity of growth is expected to average about 118 acres of new development per year from 2016 to 2026 and 160 acres per year between 2026 and 2036. **Table 2-5** shows the projected changes in land use and the growth intensity of each in the EPWWS service area. The resulting LUA for 2026 and for 2036 are shown in **Figure 2-2** and **Figure 2-3.**

Table 2-5: Projections of Changes in Land Use

Land Use	Total Area (Ac.) 2016	2017-2026 Intensity (Ac. per Year)	2026 Total Area (Ac.)	2027-2036 Intensity (Ac. per Year)	2037 Total Area (Ac.)
Residential	6,528.9	71.0	7,239.0	99.9	8,238.2
Multi-Family	72.4	0.0	72.4	0.0	72.4
Commercial	1,373.8	16.4	1,537.8	20.0	1,738.0
Industrial	2,213.6	244.8	2,458.4	319.7	2,778.1
Governmental	677.1	0.0	677.1	0.0	677.1

Public/Semi-Public	425.1	0.0	425.1	0.0	425.1
Religious	42.0	0.0	42.0	0.0	42.0
Schools	535.1	6.01	595.2	7.99	675.1
Total	**11,868**	**118**	**13,047**	**160**	**14,646**

The Land Use Assumptions include changes in development density. For the purposes of this study, the density of development is computed based upon the demand for water and sewer service per unit area of land. The demand for water and sewer service is measured in Living Unit Equivalents (LUEs). One LUE is approximately equal to the average demand for water and sewer service imposed by the average single-family residence in the EPWWS service area. Land area is measured in acres, thus the density is measured in LUEs per acre. **Table 2-6** presents existing density and projected density of development within the three major categories of land use as determined by EPWWS billing categories.

Table 2-6: Land Use Densities

Land Use Category	Existing LUEs	Existing Density (LUEs/ Acre)	2026 Density (LUEs/Acre)	2036 Density (LUEs/Acre)
Residential	16,114	2.4	2.8	3.1
Commercial/ Industrial	3,830	1.1	1.2	1.3
Governmental	2,514	1.5	1.8	2.2
Total	**22,458**			

The residential billing category includes residential and multifamily land uses. The commercial/industrial billing category includes commercial, industrial, and religious land uses. The governmental billing category includes governmental, public/semi-public and school land uses. The intensity of growth and density of development for the next ten year period is presented in **Figure 2-2** and in **Figure 2-3** for the following ten year period.

Legend

Existing Land Use

- School
- Public/Semi-Public
- Government
- Religous
- Commercial
- Industrial
- Residential
- Multi-Family

Projected 2025 Land Use

- School
- Commercial
- Industrial
- Residential

Source: BING Imagery

EAGLE PASS WATER WORKS SYSTEM

2025 LAND USE MAP
MAIN GROWTH AREA

N

0 1,200 2,400 Feet

TETRA TECH

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Legend

Existing Land Use

- School
- Public/Semi-Public
- Government
- Religous
- Commercial
- Industrial
- Residential
- Multi-Family

Projected 2035 Land Use

- School
- Commercial
- Industrial
- Residential

Source: BING Imagery

EAGLE PASS WATER WORKS SYSTEM

2035 LAND USE MAP
MAIN GROWTH AREA

N

0 1,200 2,400 Feet

TETRA TECH

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3.0 WATER SYSTEM CAPITAL IMPROVEMENTS

3.1 EXISTING CAPITAL IMPROVEMENTS

3.1.1 Source of Supply

The current supply source for EPWWS is comprised entirely of raw water from the Rio Grande River. Due to the management of the river by Texas Commission on Environmental Quality (TCEQ) Water Master and the International Boundary and Water Commission (IBWC), including the upstream reservoir of Lake Amistad, EPWWS has never experienced inadequate water supplies. The limiting factor for the City of Eagle Pass is the available water rights it can draw from the water source. The City of Eagle Pass currently has access to 12,609 acre-feet (11.249 MGD average) annual water rights it can draw from the Rio Grande River.

The EPWWS typically withdraws 4 to 12 million gallons per day (MGD) of water from the Rio Grande, with the highest flows typically occurring during summer, and the lowest flows typically occurring during winter. Similarly, the temperature of the river water varies seasonally between 10°C to 30°C, with an average temperature of 23°C.

EPWWS collects raw water quality measurements of turbidity, total organic carbon (TOC), and alkalinity. The raw water turbidity varies widely, while the TOC and alkalinity are more consistent. The raw water turbidity typically varies between 10 and 100 Nephelometric Turbidity Units (NTU). The TOC varies between approximately 2.0 to 5.5 milligrams per liter (mg/L), with an average TOC of 3.0 mg/L. The alkalinity varies between approximately 110 to 210 mg/L, with an average value of 130 mg/L as calcium carbonate ($CaCO_3$).

3.1.1.1 Raw Water Pumping Capacity

TCEQ design guidelines under 30 TAC § 290.45(b)(2)(A) require firm pumping capacity of 0.6 gpm per connection. **Table 3-1** identifies the current firm raw water pumping capacity. There is sufficient firm raw water pumping capacity for 17,361 connections.

Table 3-1: Raw Water Pumping Capacity

Location	Pumps x gpm	Total Capacity (MGD)	Firm Capacity* (MGD)
Intake at Water Plant	3 x 5208	22.0	15.0
	Total Capacity :	**22.0**	**15.0**

3.1.2 Treatment

In 1949, the original conventional surface water treatment plant was constructed to supply potable water to the City of Eagle Pass. This facility was replaced in 2006 with the EPWWS Water Treatment Plant (WTP), also known as the Roberto Gonzales Regional Water Treatment Plant (RGRWTP). This facility is a 15-MGD plant which utilizes a combined clarification and ultrafiltration (UF) membrane process. The facility was master planned for expansion to 19 MGD and includes space for additional expansion beyond 19 MGD.

Figure 2-2: Eagle Pass Regional Water Treatment Plant

The WTP draws water from the Rio Grande River through a concrete intake structure located on the bank of the river. Raw water enters the intake structure through a 5-foot by 5-foot opening and passes through a traveling screen. Water then flows through 100 feet of 36-inch diameter pipe to the raw water pump station. From the raw water pump station, the raw water is directed to either the reservoir located near the northern property boundary of the site, or to the junction splitter box. The reservoir pump station also delivers water to the junction splitter box. From there, water is either directed to the solids contact clarifiers or directly to the equalization tank. Pretreatment chemicals (alum/polymer) are added prior to clarification. Pretreated water is then directed to the UF processing building where feed pumps are used to push water through prefilters and the UF membranes. UF treated water is then chlorinated and stored in finished water storage tanks. The finished water pump station delivers potable water to the middle (upper) and lower pressure planes. Solids removed during the treatment process are directed to sludge ponds where liquids are decanted and returned to the treatment process upstream of the clarifiers and sludge is removed and disposed. A future belt filter press is planned to replace the sludge ponds.

The facility currently utilizes Pentair X-FLOW Xiga 35 membrane modules (35 m2). These are hollow fiber UF membranes that are installed in a horizontal configuration within 8-inch diameter pressure vessels. The WTP contains nine (9) membrane treatment units, with 1.875 MGD capacity each, for a combined firm capacity of 15 MGD. Each membrane unit has 31 pressure vessels, holding 4 UF membrane modules each. Each train has an "A" and "B" side that operate semi-independently. These membranes have been in use since 2006, when the UF WTP began operation and are approaching the end of their useful life. Therefore these aging membranes need to be replaced. Trains 1 and 3 have new modules that were installed in 2011.

3.1.3 High Service Pumping

Water treated at the RGRWTP is pumped to the water distribution system by high service pumps located at the WTP. The pumps are configured to pump water to two of the EPWWS's distribution system pressure zones, the lower zone and the upper zone. Pumps at the College Hills tank site provide service to the College Hills pressure zone.

Table 3-2 High Service Pumping Capacity

Location	No. of Pumps	Capacity per Pump (GPM)	Total Capacity (MGD)	Firm Capacity (MGD)
Water Treatment Plant – Finished water upper zone	3	2640	11.4	7.60
	2	1320	3.80	3.80
Water Treatment Plant – Finished water lower zone	3	1320	5.70	3.80
College Hills Booster Pumps	2	100	0.288	0.144

3.1.4 Storage

The EPWWS has a combined 7.94 million gallons of storage, including both ground and elevated tanks. **Table 3-3** presents a summary of the existing storage facilities.

Table 3-3: Storage Summary

Storage Tank	Elevated or Ground	Capacity (gallons)	Pressure Plane
College Hills	Elevated	500,000	High
Deer Run	Elevated	1,000,000	Middle (Upper)
North Loop	Elevated	600,000	Middle (Upper)
Vista Hermosa	Elevated	1,000,000	Middle (Upper)
Brown Street	Elevated	200,000	Middle (Upper)
Callejon Teran	Elevated	500,000	Middle (Upper)
Chula Vista	Elevated	1,000,000	Middle (Upper)
College Hills	Ground	30,000	Middle (Upper)
Seco Mines	Elevated	100,000	Low
North Loop	Ground	500,000	Low
Ella Heights	Ground	10,000	Low
Hillcrest	Ground	1,500,000	Low
Industrial Park	Ground	1,000,000	Low
Total		**7,940,000**	

3.1.5 Transmission/Distribution

The existing water distribution system consists of approximately 335 miles of water pipelines that include smaller diameter distribution pipelines (4-inch to 12-inch) and larger diameter transfer pipelines (14-inch to 30-inch), elevated and ground storage tanks, and service lines. The piping network is shown in **Figure 2-1.** The distribution system has been upgraded, around the new water treatment plant pump station, which has been in operation since 2007. Recent distribution pipelines to serve new customers in the outlying areas were completed in 2009. Aging distribution pipelines exist in the central and downtown areas and in the nearby neighborhoods that were established in the late 1960s and 1970s. Due to the aging distribution components, EPWWS has identified areas where failures and leakage occur and areas with the potential for future problems.

The transmission system is separated into three pressure planes: low, middle (upper), and high. The WTP pump station delivers water to the transmission mains serving the low and middle (upper) plane. In prior recent projects, several transfer pipelines were constructed to serve newly constructed elevated tanks. A northern transfer main serves the Deer Run elevated storage tank (EST), a central transfer main serves the Vista Hermosa EST and a southern transfer main serves the Chula Vista EST. These transfer mains serve the elevated tanks in the middle pressure plane and, when necessary, can also serve the elevated tank in the upper pressure plane. The transfer system was designed to accommodate future flows from WTP expansion (30 MGD capacity). The lower pressure plane is fed directly from the WTP.

3.1.5.1 Distribution Capacity

Water distribution capacity is a function of the pipe size, ground elevation and distance between pumping, storage and demand. The capacity of the water distribution system is currently adequate to maintain minimum pressure in the system with a peak hour demand of 0.76 GPM (1097 GPD). **Table 3-4** presents an inventory of the water distribution system by pipe size.

Table 3-4 Current capacity - water pipe size summary.

Pipe Diameter	Length (feet)	Length (miles)
1 inch	976	0.18
1.5 inch	800	0.15
2 inch	80,979	15.34
2.5 inch	3,188	0.60
3 inch	32,082	6.08
4 inch	100,992	19.13
6 inch	651,756	123.44
8 inch	212,356	40.22
10 inch	31,874	6.04
12 inch	256,219	48.53
14 inch	3,100	0.59
16 inch	3,131	0.59
18 inch	8,527	1.61
24 inch	4,106	0.78

3.1.6 Capital Improvements & Cost

Capital improvements and cost to upgrade, update, improve, expand or replace capital improvements to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards are presented in the table below.

Table 3-5: Capital Improvements & Cost

Project	Construction Cost Estimate	Total Cost Estimate
Cast Iron Pipe Replacement	$16,000,000	$20,000,000
Las Quintas & Jardines Verdes Water Pipeline Replacement	$3,000,000	$3,750,000
Water Tank Rehabilitation Program	$3,500,000	$4,375,000
College Hills Ground Storage Tank	$2,000,000	$2,500,000
Water Plant Expansion and Improvement Project	$7,000,000	$8,750,000
Sludge Dewatering Belt Press Project	$1,800,000	$2,250,000
Water Rights Acquisition	$6,500,000	$8,125,000
Total	**$39,800,000**	**$49,750,000**

3.2 WATER SYSTEM CAPACITY EVALUATION

Evaluation of EPWWS's current water system capacity is an important step in determining its ability to provide adequate water service to its current customer base and for evaluating the LUA section needs to serve the projected growth in the service area for the planning period 2017-2026 as established in the. Current capacities of the major required water system components are detailed below and with reference to TCEQ compliance or non-compliance:

3.2.1 Demand

Water demands are divided into two major groups, raw water and treated water. Raw water is the water pumped from the Rio Grande and treated to supply water to the community. Treated water is the water pumped from the treatment plant. More raw water is used than treated water, since some water is required to be consumed in the water treatment process itself. Treated water demands are categorized by average day, peak day and peak hour. Supplies are a function of average demands, treatment capacity is designed to meet peak day demands. High service pumping and distribution is designed to meet peak hour demands. **Table 3-6** provides a history of water demands by connection over the last eight fiscal years, from 2008 through 2015.

Table 3-6 History of EPWWS water demands.

Year	Connections	Raw Water Supply	Raw per Connection (GPD)	Treated per Connection (GPD)	Peak Day (MG)	Peak Day per Connection (GPD)	Peak Hour per Connection (GPD)
2008	14,514	2,522.2	503	476	11.56	796	995
2009	14,756	2,652.9	535	493	12.07	818	1,023
2010	14,980	2,314.1	464	423	11.51	768	960
2011	15,324	2,818.8	548	504	12.20	796	995
2012	16,691	2,573.7	492	449	11.56	737	921
2013	15,968	2,635.9	493	452	11.72	734	917
2014	16,240	2,512.6	461	424	11.78	725	907
2015	16,533	2,340.2	424	388	11.25	680	851
Average			**490**	**451**		**757**	**946**
Planning			**497**	**497**		**878**	**1,097**

To analyze the capacity used and capacity available for development, planning estimates are made from the historical data. For average water demand, the eight year average per connection is 451 GPD, or 0.3 GPM. Since several consecutive years required a demand greater than that, 497 GPD will be used for planning purposes. For peak day water demand, the eight year average per connection is 757 GPD, or 0.53 GPM. For planning purposes, and in order to be consistent with the minimum system requirements identified by the TCEQ in 30 TAC 290.45(b)(2)(B), a per connection target of 878 GPD or 0.6 GPM will be used for planning purposes. For peak hour water demand, 30 TAC 290.38(53) requires in the absence of verified historical data, 1.25 times the maximum daily demand be used. Thus historical average peak hour demand was 946 GPD which is less than 1.25 times the peak day demand. Thus, 1,097 GPD will be used for planning purposes for peak hour demand. **Table 3-7** presents the demands used for planning and design.

Table 3-7: Demands for planning and design

Average Daily Demand (ADD)	Peak Daily Demand (PDD)	Peak Hours Demand (PHD) =1.25 x PDD
0.345 GPM (497 GPD)	0.6 GPM (878 GPD)	0.76 GPM (1,097 GPD)

For capital improvement planning the basic service unit is a Living Unit Equivalent (LUE), which is the demand for capital improvements equal to the average demand for capital improvements by one single family residence. **Table 3-8** establishes the specific level or quantity of use, consumption, generation, or discharge of a service unit or LUE.

Table 3-8: Quantity of Use

Capital Improvement	Demand Per Connection	Demand per LUE
Raw Water Supply	497 GPD	370 GPD
Treatment	878 GPD (0.61 GPM)	653 GPD (0.45 GPM)
High Service Pumping	0.6 GPM	0.45 GPM
Elevated Storage	100 Gallons	74 Gallons
Total Storage	370 Gallons	277 Gallons

Commercial and industrial demand varies depending upon specific activity. Demand is equated to LUEs by the size of the water meter used to serve the property. **Error! Reference source not found.** from AWWA 2014 M22 Sizing Water Service Lines and Meters, presents an equivalency to water meter sizes. One LUE is equivalent to a 5/8" meter because this meter size is what a single family residence would have. Larger meters produce a larger flow hence, a larger LUE. Per the table LUEs are 10% of the high-normal flow rate of the meter.

Table 3-9 Water meter LUE equivalents

Meter Size (inches)	Type	High-normal flow rate (gpm)	LUEs	Land Use
5/8"	PD, MJ	10	1	R, C, I
3/4"	PD, MJ	15	1.5	R, C, I
1"	PD, MJ	25	2.5	C, I
1-1/2"	PD, MJ	50	5	C, I
2"	U	80	8,	C, I
3"	U	175	17.5	C, I
4"	U	300	30	C, I
6"	U	675	67.5	I
8"	U	900	90	I

Meter Size (inches)	Type	High-normal flow rate (gpm)	LUEs	Land Use
10"	U	3,500	350	I

Source: AWWA 2014 M22 Sizing Water Service Lines and Meters.
Meter Type Key: PD, Positive displacement; MJ: Multi-Jet; U: Ultrasonic.
Land Use Key: R, Residential; C, Commercial; I, Industrial.

Typical residential connections use a 5/8" meter, thus a 5/8" meter represents 1 LUE. Some residential properties with greater irrigation demands may have a 3/4" meter which equates to 1.5 LUE. Commercial and Industrial meter sizes range anywhere from a 5/8" to 10" depending on demand.

3.2.2 Capacity Analysis

The Land Use Assumptions Report provides an outlook for the projected growth that EPWWS is likely to encounter within the 2017-2027 planning period. This anticipated growth, along with the need to continue to provide adequate service to existing users drives EPWWS's planning and infrastructure investment decisions.

The Project Team analyzed the following functional components of EPWWS's water system In order to evaluate the adequacy of capacity over the ten year planning period:

1. Raw water supply
2. Raw water pumping
3. Water treatment capacity
4. High service pumping capacity
5. Storage capacity
6. Distribution capacity

Commitments for usage of capacity of the existing capital improvements include the existing demands for service.

3.2.2.1 Raw Water Supply

Although the cost of raw water rights are not eligible for recovery with an impact fee, the Project Team did evaluate EPWWS's current raw water supply inventory. Currently EPWWS owns a total of 12,609 acre feet of municipal raw water rights, which is the equivalent of 11.259 million gallons per day. Based on an eight year average, EPWWS requires raw water supply capacity of 497 gallons per day per connection. No additional water rights will be required through 2026. However, it is recommended that EPWWS continue its practice of requiring development to pay for the additional water rights required to serve the new development. EPWWS should plan for the extension or renegotiation of existing contracts to allow for the purchase or lease of raw water prior to the year 2030 or plan for the acquisition of raw water rights to match the estimated growth. **Table 3-10** presents projections of the raw water supply needed for the EPWWS for the future. In addition, the capacity available to serve new development and new capacity needed to serve new development over the next 10 years is presented.

Table 3-10 Raw water supply capacity and demand analysis.

Year	Total Service Units (LUEs)	Raw Water Supply Capacity Required (370 GPD per LUE)	Total Connections	Raw Water Supply Capacity Required (497 GPD per Conn.)
2016	22,458	8.3 MGD	16,712	8.3 MGD
2026	**28,192**	**10.43 MGD**	**20,979**	**10.43 MGD**
2036	35,390	13.10 MGD	26,335	13.10 MGD

Year	Total Service Units (LUEs)	Raw Water Supply Capacity Required (370 GPD per LUE)	Total Connections	Raw Water Supply Capacity Required (497 GPD per Conn.)
2046	44,426	16.40 MGD	33,059	16.40 MGD
Current Installed Capacity	30,423	11.3 MGD	22,646	11.3 MGD
Capacity available for new development		2.1 MGD		2.1 MGD
New Capacity required in 10 year planning period		0		0

3.2.2.2 Raw Water Pumping

EPWWS had a six month average of total of 16,712 water connections as of March 2016. According to 30 TAC § 290.45(b)(2)(A), a public water supply's raw water firm pumping capacity must meet or exceed 0.6 gallons per minute per connection. EPWWS's current available raw water firm pumping capacity is 15 MGD or 10,417 gpm, a surplus when compared to the State minimum required 8,731 gpm at its current 16,712 connections. **Table 3-11** presents an analysis of the demands for raw water pumping in the 10 year impact fee planning period and for future years. The projected demands are compared to the existing capacity to determine the capacity available to provide service to new development and the new capacity that is required to serve new development. The analysis shows that 3.41 MGD is required in new pumping capacity within the 10 year impact fee planning period.

Table 3-11 Raw water pumping capacity and demand analysis.

Year	Total Service Units (LUEs)	Raw Water Pumping Capacity Required (653 GPD per LUE)	Total Connections	Raw Water Pumping Capacity Required (878 GPD per Conn.)
2016	22,458	14.67 MGD	16,712	14.67 MGD
2026	**28,192**	**18.41 MGD**	**20,979**	**18.41 MGD**
2036	35,390	23.11 MGD	26,335	23.11 MGD
2046	44,426	29.01 MGD	33,059	29.01 MGD
Current Installed Capacity	22,971	15.00 MGD	17,084	15.00 MGD
Capacity available for new development		0.33 MGD		0.33 MGD
New Capacity required in 10 year planning period		3.41 MGD		3.41 MGD

3.2.2.3 Water Treatment

According to 30 TAC § 290.42(a)(1), the total capacity of a public water system's treatment facilities must always be greater than its anticipated peak day demand. Based on these criteria, EPWWS's water treatment capacity in 2016, with 16,712 connections, must be 14.70 MGD. Assuming the 2.30% average annual growth in Scenario 3, by 2026 EPWWS must provide treatment capacity sufficient to serve 20,979 connections, or 18.4 MGD.

EPWWS's current treatment capacity is 15.0 MGD. Therefore, with current facilities EPWWS has surplus of 0.3 MGD above state requirements, based on 16,712 connections in 2016. **Table 3-12** presents an analysis of the demands for raw water pumping in the 10 year impact fee planning period and for future years. The projected

demands are compared to the existing capacity to determine the capacity available to provide service to new development and the new capacity that is required to serve new development. The analysis shows that 3.4 MGD is required in new pumping capacity within the 10 year impact fee planning period. The new capacity needed for the 20 year planning horizon is 8.1 MGD.

Table 3-12 Water treatment capacity and demand analysis.

Year	Total Service Units (LUEs)	Water Treatment Capacity Required (653 GPD per LUE)	Total Connections	Water Treatment Capacity Required (878 GPD per Conn.)
2016	22,458	14.7 MGD	16,712	14.7 MGD
2026	**28,192**	**18.4 MGD**	**20,979**	**18.4 MGD**
2036	35,390	23.1 MGD	26,335	23.1 MGD
2046	44,426	29.0 MGD	33,059	29.0 MGD
Current Installed Capacity	22,971	15.0 MGD	17,084	15.0 MGD
Capacity available for new development		0.3 MGD		0.3 MGD
New Capacity required in 10 year planning period		3.4 MGD		3.4 MGD

3.2.2.4 High Service Pump Capacity

Under 30 TAC § 290.45 (b)(2)(F) a public water supply must provide service pump capacity of 2.0 GPM per connection or have a total of 1,000 GPM firm capacity and have sufficient pumping to meet peak hour demands (whichever is less). Peak hour demands are met through a combination of high service pumping and elevated water storage. The high service pumping needed is equivalent to the peak day demand. Thus, the high service pumping capacity required for the system is 0.6 GPM per connection or 0.45 GPM per LUE.

Year	Total Service Units (LUEs)	High Service Pumping Capacity Required (0.45 GPM per LUE)	Total Connections	High Service Pumping Capacity Required (0.60 GPM per Conn.)
2016	22,458	14.4 MGD	16,712	14.4 MGD
2026	**28,192**	**18.1 MGD**	**20,979**	**18.1 MGD**
2036	35,390	22.7 MGD	26,335	22.7 MGD
2046	44,426	28.6 MGD	33,059	28.6 MGD
Current Installed Capacity	22,971	15.34 MGD	17,084	15.34 MGD
Capacity available for new development		0.94 MGD		0.94 MGD
New Capacity required in 10 year planning period		2.76 MGD		2.76 MGD

3.2.2.5 Storage Capacity

The Texas Administrative Code, specifically 30 TAC § 290.45(b)(2)(E) and (G), requires that systems have a total storage capacity of 200 gallons per connection with an elevated storage capacity of 100 gallons per connection for systems with more than 2,500 connections. Total storage capacity includes clearwells at the treatment facilities. The EPWWS includes elevated storage and ground storage and uses both to meet the requirements for total storage. Elevated storage capacity will be analyzed first and then ground storage capacity will be analyzed.

3.2.2.6 Elevated Storage

EPWWS currently has 4.9 million gallons of elevated storage. Water system master planning has determined that 102 gallons per connection is required, which is equivalent to 76 gallons per LUE. **Table 3-13** presents an analysis of the demands for raw water pumping in the 10 year impact fee planning period and for future years. The projected demands are compared to the existing capacity to determine the capacity available to provide service to new development and the new capacity that is required to serve new development. The analysis shows that current capacity is sufficient for the next 30 years or more.

Table 3-13 Elevated storage capacity and demand analysis.

Year	Total Service Units (LUEs)	Elevated Storage Capacity Required (76 Gal per LUE)	Total Connections	Elevated Storage Capacity Required (102 Gal per Conn.)
2016	22,458	1.71 MG	16,712	1.71 MG
2026	**28,192**	**2.14 MG**	**20,979**	**2.14 MG**
2036	35,390	2.69 MG	26,335	2.69 MG
2046	44,426	3.38 MG	33,059	3.38 MG
Current Installed Capacity	64,473	4.90 MG	48,039	4.90 MG
Capacity available for new development		3.19 MG		3.19 MG
New Capacity required in 10 year planning period		0 MG		0 MG

3.2.2.7 Ground Storage

The system as a whole has enough storage, however storage has been exhausted in the College Hills area and additional storage will need to be provided. Currently the College Hills service area has a capacity of 0.53 MG with 0.39 MG of the capacity being used. It is expected that the most growth will happen in the College Hills service area. Of the 4,085 new connections expected in the next ten years, 2,390 are expected to be added in the College Hills service zone. Therefore, it is expected that 0.338 MG of additional storage will be needed in the next 10 years.

3.2.2.8 Total Water Storage

According to 30 TAC § 290.45(b)(2)(E), a total storage capacity of 200 gallons per connection is required. To meet peak hour demands and maintain sufficient redundancy in clear well capacity, 300 GPD per LUE is required which equates to about 403 GPD per connection. Based on the current 22,458 LUEs, EPWWS should have a minimum of 6,737,400 gallons of total storage capacity. EPWWS currently has 7,940,000 gallons of total storage capacity and is thus in compliance. New capacity is not needed except as described above for the upper pressure plane until a time beyond the planning horizon.

Table 3-14 Total Storage capacity and demand analysis

Year	Total Service Units (LUEs)	Total Storage Capacity Required (300 Gal per LUE)	Total Connections	Total Storage Capacity Required (403 Gal per Conn.)
2016	22,458	6.74 MG	16,712	6.74 MG
2026	**28,192**	**8.46 MG**	**20,979**	**8.46 MG**
2036	35,390	10.6 MG	26,335	10.6 MG
2046	44,426	13.3 MG	33,059	13.3 MG
Current Installed Capacity	64,473	7.94 MG	48,039	7.94 MG
Capacity available for new development		1.18 MG		1.18 MG
New Capacity required in 10 year planning period		0.52 MG		0.52 MG

3.2.2.9 Distribution Capacity

The existing water distribution system consists of approximately 260 miles of water pipelines that include smaller diameter distribution pipelines (4-inch to 12-inch) and larger diameter transfer pipelines (16-inch to 24-inch), elevated and ground storage tanks, and service lines. The distribution system has been upgraded around the new water treatment plant pump station, which has been in operation since 2007. Recent distribution pipeline installation to serve new customers in the outlying areas was completed in 2009. Aging distribution pipelines exist in the central and downtown areas and in the nearby neighborhoods that were established in the late 1960s and 1970s.

3.2.2.10 Summary of Existing Capacities

An analysis of the total capacity, the level of current usage, and commitments for usage of capacity of the existing capital improvements is shown in **Table 3-15** below.

Table 3-15: Summary of Total Capacity and Usage

Capital Improvement	Existing Capacity	Capacity Used
Raw Water Supply	11.3 MGD	8.31 MGD
Raw Water Pumping	15.0 MGD	14.7 MGD
Treatment	15.0 MGD	14.7 MGD
High Service Pumping	15.3 MGD	14.4 MGD
Elevated Storage	4.90 MG	1.71 MG
Total Storage	7.94 MG	6.74 MG

3.2.3 Water System Capital Improvements

Evaluation of the water system improvements included a review of current and projected water demands, and recommendations to provide adequate supply and storage in order to meet minimum requirements. As shown in **Table 3-16** it is estimated that the probable total costs of improvements (engineering, construction and other costs) identified through the planning year of 2026 will be approximately **$13,500,000**.

The recommended water system improvements needed to serve new development include the following:

- A 4.0 MGD Water Treatment Plant expansion is proposed for the existing Regional Water Treatment Plant. It is recommended that planning and engineering for this plant expansion begin in 2016-17, with construction to begin in 2017. The proposed increase in plant treatment capacity is one of key improvements in this capital improvement plan of which supports EPWWS's current reserves and anticipated deficiencies throughout the planning period. These improvements are necessary to achieve compliance with State criteria associated with the projected water demands.
- A belt filter press to be constructed at the Eagle Pass Regional Water Treatment Plant.
- A 2 million gallon ground storage tank in the College Hills service area.

Impact fee eligible items include construction costs, appurtenances (water valves, fire hydrants, taps, etc.), utility relocations, purchase of easements, and engineering & financing costs.

The water treatment plant Expansion is needed because the demand for treated water imposed by new development will exceed the existing water treatment plant capacity. The belt filter press is needed for existing plant capacity and to provide the expansion capacity. The projected increase in demand due to new development over the next 10 years is shown in **Table 3-17**.

The Projected demand for water storage in the College Hill service level of the distribution exceeds the storage available in that service level. Thus, additional capacity is required to serve new development over the next 10 years.

Table 3-16: Proposed Capital Improvements to Water System

Project	Construction Cost	Total Cost	Cost of Project Capacity for New Development
WTP Expansion	$7,000,000	$8,750,000	$3,866,000.00
Belt Filter Press	$1,800,000	$2,250,000	$473,684.37
College Hills GST	$2,000,000	$2,500,000	$2,500,000.00
Total	**$10,800,000**	**$13,500,000**	**$6,839,684.37**

Table 3-17: Projected 10 Year Demand

Capital Improvement	LUEs 2016-2026	Capacity Demand 2016-2026
Raw Water Supply	5,734 LUEs	2.12 MGD
Treatment	5,734 LUEs	3.74 MGD
Elevated Storage	5,734 LUEs	0.436 MG
Total Storage	5,734 LUEs	1.72 MG

3.2.4 Cost Attributable to New Development

To determine cost attributable to new development, a cost of project capacity for each project must be determined. This cost is then divided by the total of new LUEs that can be served to develop a cost per LUE for each project as indicated in **Table 3-18**.

Table 3-18: Cost per LUE

Project	Total Cost	Cost of Project Capacity for New Development	Capacity Provided for New Development	Capacity per LUE	Total New LUEs that can be Served	Cost per LUE
Treatment						
Existing WTP	$22,914,116	$195,481.00	0.335 MGD	653 GPD	513	$381.0546
Proposed WTP Expansion	$8,750,000	$3,866,000.00	4 MGD	653 GPD	6,126	$631.0806
Proposed Belt Filter Press	$2,250,000	$473,684.37	4 MGD	653 GPD	6,126	$77.3236
Storage						
Existing Total Storage	$1,271,424	$509,714.00	1.20 MG	300 Gallons	4,009	$127.1424
Proposed College Hills GST	$2,500,000	$2,500,000.00	2 MG	300 Gallons	6,667	$374.9813

The cost per LUE presented in **Table 3-18** is multiplied by the number of LUE's projected by the Land Use Assumption's over the next ten years to determine the total cost attributable to new development. The projected 10 year demand for each project is shown in **Table 3-19** along with the cost attributable to new development over the next 10 years for each project and the total. The total cost attributable to new development for the next 10 years is **$5,090,287**.

Table 3-19: Cost Attributable to New Development for the Next 10 years

Project	Cost per LUE	Projected 10 year Demand 2016-2026	Cost Attributable to New Development for the Next 10 years
Existing WTP	$381.0546	513 LUEs	$195,481
Proposed WTP Expansion	$631.0806	5,221 LUEs	$3,294,872
Proposed Belt Filter Press	$77.3236	5,734 LUEs	$443,374
Existing Total Storage	$127.1424	4,009 LUEs	$509,717
Proposed College Hills GST	$374.9813	1,725 LUEs	$646,843
Total			**$5,090,287**

4.0 WASTEWATER CAPITAL IMPROVEMENTS

4.1 EXISTING WASTEWATER SYSTEM

The wastewater system is composed of two (2) wastewater treatment plants, 143 miles of gravity pipeline ranging from 2-inch to 36-inch diameter and 1 mile of force mains from 2-inch to 12-inch diameter and 14,787 customer connections. This system serves an area of approximately 11,868 acres which produces an annual average day total capacity in use of 3.51 MGD of wastewater. The EPWWS available records as of May 2016, indicated that there are 14,614 wastewater customer connection of which 14,037 are residential customers.

4.1.1 Wastewater Treatment

The Eagle Pass Water Works System currently owns and operates two WWTPs, the Eagle Pass WWTP and the Rosita Valley WWTP.

4.1.1.1 Eagle Pass WWTP

The Eagle Pass WWTP is a 6.0 MGD facility which was constructed in 1992 and originally served the entire regional area, including portions of the El Indio Water System area. The plant is planned for an expanded capacity of 8.0 MGD. The plant is situated near the Rio Grande River, south of the city and north of the El Indio Water System area. The facility uses an activated sludge operated in a Carrousel system for extended mechanical aeration. Wastewater enters the headworks, is screened, then flow is split to two of the three aeration basins. The basins are configured as a wrap-around aeration basin with a central clarifier. After aeration, the effluent enters the clarifiers, is chlorinated, and then discharges via gravity to the Rio Grande River. A small portion of the effluent is redirected to a reuse system for irrigation of a golf course. The sludge is directed to an irrigation wet well, where it is blended with treated effluent and disposed of via land application through an irrigation system consisting of a spray irrigation gun on a 50 acre site adjacent to the facility.

4.1.1.2 Rosita Valley WWTP

The Rosita Valley WWTP was constructed in 2008 and began operation in 2010 at a site location adjacent to the southern end of Rosita Creek prior to entering the Rio Grande River. The 2.0 MGD facility provides service to the Rosita Valley area and the Kickapoo Indian Reservation.

The Rosita Valley WWTP utilizes an activated sludge process operated in a Carrousel system for extended mechanical aeration, similar to the Eagle Pass WWTP. The lift station is within the secured plant site and uses a wet well design with submersible non-clog pumps and ultrasonic/float switches for control. Four (4) lift station pumps are in operation, sized to accommodate peak conditions with the largest out of service. The bar channel was designed with a bypass weir and manual bar screen, so that the automatic bar screen is automatically bypassed if clogged, and a manual bar screen is used. The aeration basins have two (2) mechanical aerators, either of which can provide the complete aeration necessary at the design flow. Two (2) independent clarifiers are located at the facility, either of which are designed to handle 100% of the peak flow. The facility also includes two (2) chlorine contact chambers, each independently able to handle the design flow. After chlorination, water is discharged via the outfall to the Rio Grande.

Sludge generated in the aeration basin and clarifier is withdrawn to an activated sludge wet well consisting of four (4) 300 gpm pumps. The outlet of these pumps is directed to the headworks downstream of the bar screen as return activated sludge (RAS), and/or to a sludge screen for eventual disposal. The sludge screen is a drum type, with 0.10-inch screens and a capacity of up to 800 gpm. The screenings form the sludge are disposed of

periodically in an on-site dumpster for disposal in a landfill. The remaining sludge is directed to an irrigation wet well, where it is blended with treated effluent and disposed of via land application through an irrigation system consisting of a spray irrigation gun on a 50 acre site adjacent to the facility. The land consists primarily of a coastal Bermuda hay crop.

4.1.2 Interceptor and Collection System

EPWWS's wastewater Interceptor and collection system includes approximately 755,000 linear feet (143 miles) of gravity pipeline with pipe diameters ranging in size from 2-inch to 36-inch and approximately 5,600 linear feet (1 mile) of force main with pipe diameters ranging in size from 2-inch to 12-inch. A summary of the pipe size and lengths for the gravity and force main systems based on the GIS data are provided in **Table 4-1** and **Table 4-3**, respectively. The majority of the gravity system is 6-inch and 8-inch in diameter and the majority of the force mains are 12-inch in diameter. The pipe material is vitrified clay for the majority of the system. Please note that the GIS files do not include recent improvement projects. EPWWS is currently updating the GIS data.

Table 4-1. Wastewater Gravity System Pipe Summary.

Pipe Diameter	Feet	Miles
2	1,473	0.28
4	13,919	2.64
6	323,410	61.25
8	304,558	57.68
10	32,934	6.24
12	31,003	5.87
15	12,381	2.34
18	9,791	1.85
20	2,825	0.54
21	2,373	0.45
24	3,942	0.75
27	4,249	0.80
30	1,318	0.25
36	10,612	2.01
Total	**754,787**	**142.95**

4.1.3 Lift Stations

A total of twelve (12) lift stations are located within the wastewater service area. Eight (8) of the lift stations pump wastewater to the Eagle Pass WWTP. The remaining 4 pump wastewater to the Rosita Valley WWTP. **Table 2-9** presents a summary of the lift station capacities.

Table 4-2. Lift Station Summary.

Lift Station	WWTP	No. of Pumps	Pump Capacity (gpm each)
Salem	Eagle Pass	2	450
Thompson	Eagle Pass	2	300
South Elm Creek	Eagle Pass	2	500
Cenizo Height	Eagle Pass	2	325
Eagle Oil	Eagle Pass	2	325
Molina Loop	Rosita Valley	2	500
Kickapoo Village	Rosita Valley	2	500
Pecan Orchard	Eagle Pass	4	3,000
Tierra Del Sol	?	2	450
Unidentified 1	?	?	?
Unidentified 2	?	?	?
River	Eagle Pass	4	2,250

Table 4-3. Wastewater Force Main System Pipe Summary.

Pipe Diameter	Feet	Miles
2	729	0.14
12	4,917	0.93

The capital improvements considered for impact fee consideration include those that have excess capacity to serve new growth. **Table 4-4** presents the existing capital improvements and the cost incurred for each. Note that some improvements were financed in part or wholly by grant funds. The portions financed by grant funding are not eligible for reimbursement by impact fees. Thus, cost of the improvements not covered by grant funds is the impact fee eligible cost as indicated in **Table 4-4**. In the demand and capacity analysis presented below, the portion of the impact fee eligible cost attributable to new development will be determined.

Table 4-4 Inventory of existing capital improvements that have capacity to serve new growth.

Project	Total Cost	Grant	Impact Fee Eligible Cost
Treatment			
EPWWS Water Reclamation Facility	$6,000,000	$6,000,000	$ -
Rosita Valley Wastewater Plant	$7,576,186	$6,796,008	$780,178
Interceptors			
River Trunk Sewer	Unknown		
Seco Mines / Elm Creek Interceptor	$4,111,019	$2,038,856	$2,072,163

Project	Total Cost	Grant	Impact Fee Eligible Cost
East Central Wastewater Interceptor	$4,198,279	$4,000,000	$198,279
El Indio / Rosita Valley Interceptor	$2,619,002	$2,497,868	$121,134

4.2 WASTEWATER SYSTEM CAPACITY EVALUATION

The capacity evaluation is based upon the historical experience of the wastewater system. The standard service unit is the Living Unit Equivalent similar to the service unit used for the water system. One LUE is approximately the equivalent of the demand for wastewater service used by the average single-family residence in the EPWWS. The typical single-family residence in EPWWS is served water by a 5/8" water meter. Wastewater flows are proportional to drinking water consumption, so the use of water meter sizes provides a measure of the relative demand for wastewater service as they do for water service. Commercial and Industrial meter sizes range anywhere from a 5/8" meter to a 4" meter depending on collection demand. **Table 4-5** below shows the number of LUEs for each corresponding meter size and land use.

Table 4-5: LUEs by Meter Size and Land Use

Meter Size (inches)	Type	High-normal flow rate (gpm)	LUEs	Land Use
5/8"	PD, MJ	10	1	R, C, I
3/4"	PD, MJ	15	1.5	R, C, I
1"	PD, MJ	25	2.5	C, I
1-1/2"	PD, MJ	50	5	C, I
2"	U	80	8,	C, I
3"	U	175	17.5	C, I
4"	U	300	30	C, I
6"	U	675	67.5	I
8"	U	900	90	I
10"	U	3,500	350	I

Not all customers connected to the water system are also connected to the wastewater collection system. The number of connections and LUEs is slightly different for the wastewater system. The connections are tabulated by meter size in **Table 4-6** and LUEs are computed using the relative values from **Table 4-5**.

Table 4-6 Wastewater connections by meter size and wastewater LUEs.

Year	Water Meter Size						Total Connections	Total LUEs
	5/8"	1"	1 ½"	2"	3"	4"		
2009	12,431	235	12	155	37	19	12,890	16,132
2010	12,659	238	13	161	38	21	13,131	16,249
2011	12,979	243	13	168	40	21	13,462	16,669
2012	13,319	245	13	176	40	21	13,815	17,084

2013	13,517	246	15	182	39	21	14,023	17,515
2014	13,807	251	16	188	41	21	14,327	17,795
2015	14,037	297	20	195	42	21	14,614	18,212

The connection count and LUE count presented in **Table 4-6** is used to compute flows on a per connection and per LUE basis to determine average demands for service.

4.2.1 Demands

The average flow volume treated and average daily flow are tabulated for the seven year period from 2009 through 2015 in **Table 4-7**. These flow rates and then connection count and LUE count from **Table 4-6** are used to determine the flow per connection and flow per LUE. The average flow per connection and flow per LUE are used for planning purposes. The average demand for wastewater treatment is 248 GPD per connection and 201 GPD per LUE.

Table 4-7 Summary of historical flow rates treated.

Year	Connections	LUEs	Total Annual Volume Treated (MG)	Average Daily Flow (MGD)	Flow per Connection (GPD)	Flow per LUE (GPD)
2009	12,890	16,132	1,171	3.21	249	199
2010	13,131	16,249	1,240	3.40	259	209
2011	13,462	16,669	1,155	3.16	235	190
2012	13,815	17,084	1,277	3.50	253	205
2013	14,023	17,515	1,219	3.34	238	191
2014	14,327	17,795	1,380	3.78	264	212
2015	14,614	18,212	1,333	3.65	250	201
Average Flow for Planning and Design					248	201

Demands for design of wastewater components include average demands as computed in **Table 4-7** for design of wastewater treatment plants and peak demands for design of collection system components. Currently, the EPWWS uses a peaking factor of 4 per 31 TAC §217.32(a)(2) to determine peak demands for design of collection system components especially wastewater interceptors. **Table 4-8** presents the design flows for planning and design. These are the flows per service unit used to determine the demand for capital improvements and capacity of the capital improvements.

Table 4-8 Wastewater flows for planning and design.

Capital Improvement	Demand Per Connection	Demand per LUE
Treatment	250 GPD	201 GPD
Interceptors	1000 GPD	804 GPD

The growth rates determined by the land use assumptions provide the projected number of connections and LUEs for the future wastewater as presented in **Table 4-9**.

Table 4-9 Projected growth of wastewater connections and LUEs.

Year	Connections	LUEs
2016	14,787	18,427
2017	15,127	18,851
2018	15,475	19,284
2019	15,831	19,728
2020	16,195	20,182
2021	16,568	20,646
2022	16,949	21,121
2023	17,338	21,606
2024	17,737	22,103
2025	18,145	22,612
2026	**18,562**	**23,132**
2036	**23,302**	**29,038**
2046	**29,252**	**36,452**

4.2.2 Wastewater System Capacity Analysis

4.2.2.1 Wastewater Treatment Analysis

The capacity analysis of the wastewater system focuses on the ability of the two EPWWS wastewater treatment plants to meet the projected wastewater flows in the service area. Permit requirements set in 31 TAC §305.126 set the thresholds for beginning engineering planning and construction of additional capacity.

The Eagle Pass WWTP has a capacity of 6.0 MGD and the facility currently receives approximately 4.0 MGD of wastewater. There is sufficient capacity in the Eagle pass WWTP to treat the projected flows through the end of the 10-year planning period. However, planning and design of the facilities should occur around 2027 when the WWTP flows start to reach 75% (4.5 MGD) of the rated capacity.

The Rosita Valley WWTP has a capacity of 2.0 MGD and the facility is currently receiving approximately 0.35 MGD of wastewater. The WWTP has sufficient capacity to meet the projected 10-year demand (1.05 MGD) and 20-year demand (1.65 MGD) for wastewater treatment; however, near the end of the 20 year planning period, planning and engineering activities for an expansion will need to be initiated.

Combined, the facilities provide 8.0 MGD of capacity, which is equivalent to the capacity required to provide service for 32,000 connections and for 39,801 LUEs. **Table 4-10** presents projections of the capacity required for wastewater treatment and a comparison to the total available capacity.

Table 4-10 Wastewater treatment capacity and demand.

Year	Total Service Units (LUEs)	Total Treatment Capacity Required (201 GPD per LUE)	Total Connections	Total Treatment Capacity Required (250 GPD per Conn.)
2016	18,427	3.70 MGD	14,787	3.70 MGD
2026	**23,132**	**4.64 MGD**	**18,562**	**4.64 MGD**
2036	29,038	5.83 MGD	23,302	5.83 MGD
2046	36,452	7.31 MGD	29,252	7.31 MGD
Current Installed Capacity		8.00 MGD		8.00 MGD
Capacity available for new development		4.30 MGD		4.30 MGD
New Capacity required in 10 year planning period		0.00 MGD		0.00 MGD

Based on the wastewater projections and the capacity of the WWTPs no near term expansion are necessary. In the latter half of the 10-year planning period, planning and design should begin on expanding the Eagle Pass WWTP, and near the end of the planning period similar activities should start for the Rosita Valley WWTP.

Per the Land Use Assumptions, about 10.3% of the new growth will occur in the area served by the Rosita Valley WWTP. Thus, **Table 4-11** presents projections of the capacity used in the Rosita Valley WWTP.

Table 4-11 Rosita Valley WWTP demand and capacity analysis

Year	Total Service Units (LUEs)	Treatment Capacity Required (201 GPD per LUE)	Total Connections	Treatment Capacity Required (250 GPD per Conn.)
2016	1,893	0.38 MGD	1,519	0.38 MGD
2026	**2,376**	**0.48 MGD**	**1,906**	**0.48 MGD**
2036	2,982	0.60 MGD	2,393	0.60 MGD
2046	3,744	0.75 MGD	3,004	0.75 MGD
Current Installed Capacity		2.00 MGD		2.00 MGD
Capacity available for new development		1.62 MGD		1.62 MGD
New Capacity required in 10 year planning period		0.00 MGD		0.00 MGD

Similarly, the Eagle Pass WWTP serves about 89.7% of the wastewater customers in the EPWWS. Thus the capacity analysis and demand projections are presented in **Table 4-12**.

Table 4-12 Eagle Pass WWTP demand and capacity analysis.

Year	Total Service Units (LUEs)	Total Treatment Capacity Required (201 GPD per LUE)	Total Connections	Total Treatment Capacity Required (248 GPD per Conn.)

2016	16,534	3.32 MGD	1,519	3.32 MGD
2026	**20,756**	**4.16 MGD**	**1,906**	**4.16 MGD**
2036	26,056	5.23 MGD	2,393	5.23 MGD
2046	32,708	6.56 MGD	3,004	6.56 MGD
Current Installed Capacity		6.00 MGD		6.00 MGD
Capacity available for new development		2.68 MGD		2.68 MGD
New Capacity required in 10 year planning period		0.00 MGD		0.00 MGD

4.2.3 Collection System Analysis

The wastewater system is composed of two (2) wastewater treatment plants, 143 miles of gravity pipeline ranging from 2-inch to 36-inch diameter and 1 mile of force mains from 2-inch to 12-inch diameter and 14,787 customer connections. The collection system analysis focuses on the Interceptors required to carry the wastewater to the wastewater treatment plants.

4.2.3.1 River Trunk Sewer

The River Truck Sewer is 36-inch in diameter along the western boundary of the City of Eagle Pass and is the original wastewater interceptor for the EPWWS wastewater system. It conveys wastewater from the Seco / Elm Creek Interceptor and other collection system pipes to the Eagle Pass Wastewater Treatment Plant. The total peak capacity in use is 6.23 MGD with a remaining peak capacity of 2.91 MGD. The projected demands and capacities are presented in **Table 4-13**.

Table 4-13 River Trunk Sewer demand and capacity analysis.

Year	Total Service Units (LUEs)	Total Interceptor Capacity Required (201 GPD per LUE)	Total Connections	Total Interceptor Capacity Required (248 GPD per Conn.)
2016	7,769	6.23 MGD	6,235	6.23 MGD
2026	**9,753**	**7.83 MGD**	**7,826**	**7.83 MGD**
2036	12,243	9.82 MGD	9,825	9.82 MGD
2046	15,369	12.33 MGD	12,333	12.33 MGD
Current Installed Capacity		9.14 MGD		9.14 MGD
Capacity available for new development		2.91 MGD		2.91 MGD
New Capacity required in 10 year planning period		0.00 MGD		0.00 MGD

4.2.3.2 Seco Mines / Elm Creek Interceptor

The Seco Mines / Elm Creek Interceptor collects wastewater from the northern portion of the City of Eagle Pass. This area is made of 10 single family subdivisions and the Seco Mines Elementary School. The interceptor is approximately 39,000 LF of 6 to 30-inch diameter gravity pipe and connects to the 36-inch River Trunk Sewer Interceptor. The total peak capacity in use is 3.52 MGD with a remaining capacity of 2.97 MGD. **Table 4-14** presents the projected demands and capacity remaining.

Table 4-14 Seco Mines/Elm Creek Interceptor demand and capacity analysis.

Year	Total Service Units (LUEs)	Total Interceptor Capacity Required (201 GPD per LUE)	Total Connections	Total Interceptor Capacity Required (248 GPD per Conn.)
2016	4,383	3.52 MGD	3,517	3.52 MGD
2026	**5,502**	**4.41 MGD**	**4,415**	**4.41 MGD**
2036	6,906	5.54 MGD	5,542	5.54 MGD
2046	8,670	6.96 MGD	6,957	6.96 MGD
Current Installed Capacity		6.49 MGD		6.49 MGD
Capacity available for new development		2.97 MGD		2.97 MGD
New Capacity required in 10 year planning period		0.00 MGD		0.00 MGD

4.2.3.3 East Central Wastewater Interceptor

The East Central Wastewater Interceptor collects wastewater from the eastern region of Eagle Pass and conveys the flow to Eagle Pass Wastewater Treatment Plant. The interceptor is composed 25,500 LF of 12 to 42-inch diameter gravity wastewater pipe. The total peak capacity in use is 3.52 MGD with a remaining peak capacity of 13.08 MGD. **Table 4-15** presents the demand projections and capacity comparison for the East Central Wastewater Interceptor.

Table 4-15 East Central Wastewater Interceptor demand and capacity analysis.

Year	Total Service Units (LUEs)	Total Interceptor Capacity Required (201 GPD per LUE)	Total Connections	Total Interceptor Capacity Required (248 GPD per Conn.)
2016	4,383	3.52 MGD	3,517	3.52 MGD
2026	**5,502**	**4.41 MGD**	**4,415**	**4.41 MGD**
2036	6,906	5.54 MGD	5,542	5.54 MGD
2046	8,670	6.96 MGD	6,957	6.96 MGD
Current Installed Capacity		16.6 MGD		16.6 MGD
Capacity available for new development		13.1 MGD		13.1 MGD
New Capacity required in 10 year planning period		0.00 MGD		0.00 MGD

4.2.3.4 El Indio / Rosita Valley Interceptor

The El Indio / Rosita Valley Interceptor collects wastewater from the Rosita Valley and the Sotelo Lift Stations. The wastewater is conveyed to the Rosita Valley Wastewater Treatment Plant through 2,200 LF of 12 and 18-inch diameter gravity wastewater pipe. The total peak capacity in use is 1.52 MGD with a remaining peak capacity of 2.61 MGD.

Table 4-16 El Indio/Rosita Valley Interceptor demand and capacity analysis.

Year	Total Service Units (LUEs)	Total Interceptor Capacity Required (201 GPD per LUE)	Total Connections	Total Interceptor Capacity Required (248 GPD per Conn.)
2016	1,893	1.52 MGD	1,519	6.18 MGD
2026	**2,376**	**1.91 MGD**	**1,906**	**7.76 MGD**
2036	2,982	2.39 MGD	2,393	9.75 MGD
2046	3,744	3.00 MGD	3,004	12.20 MGD
Current Installed Capacity		4.13 MGD		4.13 MGD
Capacity available for new development		2.61 MGD		2.61 MGD
New Capacity required in 10 year planning period		0.00 MGD		0.00 MGD

Table 4-17: Level of Current Usage of existing capital improvements.

Project	Total Capacity (MGD)	Capacity in Use (MGD)	Capacity Available for new growth (MGD)	Projected Capacity used in 10 Years
Treatment				
EPWWS Water Reclamation Facility	6	3.32	2.68	0.81
Rosita Valley Wastewater Plant	2	0.38	1.62	0.09
Interceptors and Outfalls				
River Trunk Sewer	9.14	6.23	2.91	1.52
Seco Mines / Elm Creek Interceptor	6.49	3.52	2.97	0.86
East Central Wastewater Interceptor	16.6	3.52	13.1	0.86
El Indio / Rosita Valley Interceptor	4.13	1.52	2.61	0.37

4.2.4 Wastewater System Capital Improvements

No new Capital improvements are currently needed to upgrade, update, improve, expand, or replace capital improvements to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards. The existing capital improvements have capacity available to serve new development.

4.2.5 Cost Attributable to New Development

The cost of capital improvements that can be attributed to new development is computed by determining the excess capacity available in the capital improvement, the capacity to be used by new development within the eligible 10-year period and calculating the ratio of the 10-year capacity to the total capacity and then multiplying that ratio by the impact fee eligible portion of the cost of the capital improvement. The eligible costs of the capital improvements were given in **Table 4-4**. These costs are used in **Table 4-18** with the capacity to determine the total cost attributable to new development.

Table 4-18: Cost and capacity of existing wastewater capital improvements.

Project	Impact Fee Eligible Cost	Total Capacity (MGD)	Capacity Available for new growth (MGD)	Capacity Used in 10-Year Period (MGD)	Cost Attributed to new growth in 10-Year Period
Treatment					
EPWWS Water Reclamation Facility	$ -	6	2.68	0.81	$0
Rosita Valley Wastewater Plant	$780,178	2	1.62	0.09	$36,057
Interceptors					
River Trunk Sewer		9.14	2.9	1.52	$0
Seco Mines / Elm Creek Interceptor	$2,072,163	6.49	2.97	0.86	$273,377
East Central Wastewater Interceptor	$198,279	16.6	13.08	0.86	$10,227
El Indio / Rosita Valley Interceptor	$121,134	4.13	2.61	0.37	$10,844
Total Cost Attributed to new growth					**$330,506**

The Cost attributable to new growth over the ten year period divided by the number of new LUEs projected based upon the Land Use Assumptions determines the cost per LUE for determining the maximum allowable impact fee. The total cost attributed to new growth for the wastewater system in the next 10 years is $330,506. **Table 4-19** presents the cost per LUE for each capital improvement that is recoverable from the individual capital improvement. The total cost recoverable is $350.55 per LUE. However, this cost must be reduced by a plan for providing a rate credit as required by Chapter 395 of the Local Government Code.

Table 4-19 Computation of eligible cost recovery per LUE.

Project	Cost Attributed to new growth in 10-Year Period	New LUEs in 10-Year Period	Cost per LUE
Treatment			
EPWWS Water Reclamation Facility	$0	4,705	$0
Rosita Valley Wastewater Plant	$36,057	4,705	$7.66
Interceptors			
River Trunk Sewer	$0	4,705	$0
Seco Mines / Elm Creek Interceptor	$273,377	4,705	$58.10
East Central Wastewater Interceptor	$10,227	4,705	$2.17
El Indio / Rosita Valley Interceptor	$10,844	4,705	$2.31
Total Cost Attributed to new growth	**$330,506**	**4,705**	**$70.24**

5.0 RATE CREDIT PLAN

Texas Local Government Code Chapter 395 states that the maximum fee amount may not exceed the full capital cost per unit. The statute also requires the specific enumeration of a plan for awarding the impact fee credit. Section 395.014(7) requires:

(7) A plan for awarding:

(A) a credit for the portion of ad valorem tax and utility service revenues generated by new service units during the program period that is used for the payment of improvements, including the payment of debt, that are included in the capital improvements plan;

(B) In the alternative, a credit equal to 50 percent of the total projected cost of implementing the capital improvements plan.

Because EPWW does not levy or receive ad valorem tax revenues, utility service revenue is the only CIP funding source available beyond impact fees. Accordingly, EPWW may either develop a plan for crediting fee payers for their future rate payments to fund their proportionate share of CIP facilities, or it may simply cut the cost in half to establish the maximum fee amount.

As an initial step, the project team will evaluate the portion of the water and wastewater CIP that will be funded solely by the rate revenue to be generated by EPWW's current LUEs. Next, the project team will calculate the amount of debt service that will be borne by its existing customers over the 10 year planning period. This debt service will then be divided by the total number of monthly bills from current customers over the planning period in order to derive the amount of monthly rate revenue to be contributed to CIP debt service.

Next, the number and timing of new LUEs during the planning period will be analyzed. This step is important due to the fact that EPWW can only generate rate revenue from new service units as the service units actually come.

6.0 SUMMARY

Per Texas Local Government Section 395.014, this Capital Improvements Plan has provided a description of the existing capital improvements within the service area and the costs to improve and expand the improvements to meet existing needs and usage. An analysis of the total capacity, the level of current usage, and commitments for usage of capacity of the existing capital improvements, and descriptions of all of the capital improvements or facility expansions and their costs necessitated by and attributable to new development in the service area has also been incorporated into the capital improvements plan. This capital improvements plans has established a quantity of use for each category of capital improvements, total number of projected service units necessitated by and attributable to new development within the service area, and projected demand for capital improvements required by new service units projected over the next 10 years. Finally, the capital improvements plan establishes a plan for awarding impact fee credits.

In accordance to the Texas Administrative Code for minimum water system and wastewater system capacity requirements, the following items summarize EPWWS's deficiencies or adequacy throughout the planning period.

- The current raw water firm pumping capacity is expected to exceed the state's minimum requirements up to the planning period of 2026
- **The current water treatment plant capacity is expected to be deficient within the planning period**
- The current/pending elevated storage capacity is expected to exceed the state's minimum requirement up the planning period of 2026

- The current total storage capacity is expected to exceed the state's minimum requirements up to the planning period of 2026
- The current clearwell storage capacity is expected to exceed the state's minimum requirements up to the planning period of 2026
- The current service pump capacity is expected to exceed the state's minimum requirements up to the planning period of 2026
- **The current distribution system capacity is expected to be sufficient through 2026**
- The current wastewater collection system capacity is expected to be sufficient through 2026.
- The WWTPs capacity is expected to exceed to the state's minimum requires up to the planning period of 2026.