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DRAFT REPORT

**Impact Fee Update for the Town of Northlake
Water & Sanitary Sewer Systems**

for the

NORTHLAKE PUBLIC WORKS DEPARTMENT

Prepared by

HALFF ASSOCIATES, INC.

In association with:

NEWGEN STRATEGIES & SOLUTIONS



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ENGINEERS * SURVEYORS * SCIENTISTS
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- Exhibit 3. Northlake Character Areas
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- Exhibit D.1. Calibration Results

ACRONYMS

AD	Average day
ADD	average day demand
CCN	Certificate of Convenience and Necessity
CIP	Capital Improvement Plan
EST	elevated storage tank
EST	elevated storage tank
ETJ	extraterritorial jurisdiction
ft	feet
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
Halff	Halff Associates, Inc.
HGL	hydraulic grade line
LUE	living unit equivalent
MDD	maximum day demand
MF	multi-family
MG	million gallons
MGD	million gallons per day
MSL	mean sea level
NCTCOG	North Central Texas Council of Governments
NewGen	NewGen Strategies & Solutions, LLC
OPCC	opinions of probably construction cost
PP	Pressure Plane
PRV	pressure-reducing valve
PS	Pump Station
psi	pounds per square inch
SF	single-family
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
Town	Town of Northlake
TRA	Trinity River Authority of Texas
UTRWD	Upper Trinity Regional Water District
WSC	Water Supply Corporation

Capital Improvement Plan Project ID Labels: X1 X2 ## X3

X1	X2	##	X3
<ul style="list-style-type: none">• W: Water system capital improvement• S: Sewer system capital improvement	<ul style="list-style-type: none">• N: North Water Service Area - supplied by UTRWD• S: South Water Service Area - supplied by City of Fort Worth	<ul style="list-style-type: none">• Estimated year of construction, as 20##	<ul style="list-style-type: none">• A, B, C, etc.• Included for multiple improvements recommended in same year.• Attempted to retain Project IDs from 2018 Study, where possible.

Example: Project WS25D - Water Project in the South Water Service Area, anticipated for construction in 2025.

1. Introduction

Political subdivisions in the State of Texas may impose impact fees on land within their corporate boundaries in accordance with Chapter 395 of the Texas Local Government Code. An impact fee is defined as “a charge or assessment imposed by a political subdivision against new development in order to generate revenue for funding or recouping the costs of capital improvements or facility expansions necessitated by and attributable to new development.” The Town of Northlake (Town) retained Halff Associates, Inc. (Halff) to update land use assumptions and capital improvement plans for its water and sanitary sewer systems. Halff retained NewGen Strategies & Solutions, LLC (NewGen) to update the maximum impact fees for its water and sanitary sewer systems.

The Texas Local Government Code Chapter 395, Section 052 requires a political subdivision imposing an impact fee to update the land use assumptions and capital improvement plan at least every five years. Additionally, this impact fee update is warranted due to changes in future land use assumptions from the Town’s Comprehensive Plan¹ to accommodate actual development trends. This study’s planning period is the 10-year period from 2022 to 2032.

This master plan and impact fee report update is intended to serve as guidance for the Town when making decisions on water and sanitary sewer sizing, timing, and budgetary costs needed to service the Town as a whole. This report is based on assumptions and engineering judgment in conjunction with the planning documents that the Town has previously produced. As Northlake continues to grow, updating the master plan regularly will be necessary to reflect the ongoing and prolific development within the Town or deviations from the original plan. Each new development should be considered on a case-by-case basis to ensure that the infrastructure is sized to serve both the new development and the surrounding area accordingly.

2. Land Use Assumptions

The capital improvement plans for which the impact fees are developed must be based on approved land use assumptions for the capital improvement plan service area(s). Land use assumptions for the purposes of an impact fee study are defined as descriptions of the service area and projections of changes in land uses, densities, intensities, and population in the service area over at least a 10-year period. This section summarizes Northlake’s land use assumptions.

2.1. Service Areas

A service area must first be delineated to define the limits of land use assumptions for this impact fee study. The service area establishes the area to be served by the proposed capital improvements and the boundaries inside which an impact fee may be imposed. Service areas for water and sanitary sewer impact fees may include all or part of the Town’s current limits and its extraterritorial jurisdiction (ETJ).

Northlake’s water Certificate of Convenience and Necessity (CCN) (#12915) comprises 18,900 acres, including floodplain and undevelopable regulatory floodway, and is shown in [Exhibit 1](#). The water CCN deviates partially from the Town ETJ, primarily along its western boundary, and has been updated from the previous master plan to reflect the current CCN boundary. Northlake is divided into two water service areas, the North Water Service Area and the South Water Service Area with Denton Creek generally serving as the boundary between the two service areas. The City of Fort Worth supplies water to the South Water Service Area via one existing point of connection. The Upper Trinity Regional Water District (UTRWD) provides water to the North Water Service Area at two existing points of connection. The existing connection points and the second proposed City of Fort Worth connection point are shown in [Exhibit 1](#). The acreages shown below exclude the special flood hazard area Zone AE:

- North Water Service Area: 12,913 acres
- South Water Service Area: 3,437 acres

¹ Pathway to 2040: Northlake Comprehensive Plan Update, Adopted December 8, 2016 (Ordinance No. 16-1208E)

Northlake's sanitary sewer service area encompasses almost 10,962 acres and is shown in [Exhibit 2](#). The sanitary sewer service area includes an additional 400 acres of land west of FM 156 S compared to the Water Service Area and generally coincides with Northlake's sewer CCN (CCN #20866) without the Ranch Preservation character area. Northlake is served by the Trinity River Authority of Texas' (TRA) Henrietta Creek and Graham Branch sanitary sewer interceptor systems via multiple points of entry. The flow is currently monitored by three metering stations for nine points of entry on Graham Branch and by three metering stations for three points of entry on Henrietta Creek. Flow from both interceptors convey flow to TRA's Denton Creek sanitary sewer treatment facility for treatment.

On June 8, 2017, the Town of Northlake passed resolution no. 17-16 stating that the Town desired to protect the character of the Ranch Preservation area as identified in the Comprehensive Plan. The Ranch Preservation character area is generally in the northwest portion of Town. The Town intends to preserve this area and large lot development through "the reduction of sewer capacity in this area". Therefore, this area is not included in the sanitary sewer service area.

2.2. Water Pressure Planes

The water service areas are hydraulically subdivided by four existing pressure planes (PPs), generally established through the disconnected nature of Northlake's existing system. There are two pressure planes served by the Harvest Pump Station (PS), separated by the newly installed pressure reducing valve (PRV) on FM 407. All customers on the high-pressure side of this PRV are within a pressure plane and all customers on the low-pressure side of the PRV are within a separate pressure plane. The third pressure plane consists of customers supplied by the Canyon Falls PS and the fourth pressure plane consists of all customers supplied by the Fort Worth Meter Station 1 (MS1).

Five proposed pressure plane are recommended in the buildout system to provide acceptable pressure to all customer meters in the system: Northside High (overflow = 900'), Northside Low (overflow = 865'), North Denton Creek (overflow = 810'), South Denton Creek (overflow = 795'), and Southside (overflow = 780') pressure planes. The North Water Service Area includes the Northside High, Northside Low, and North Denton Creek pressure planes. The South Water Service Area includes the South Denton Creek and Southside pressure planes. The water service areas are not connected and flow cannot be conveyed between the service areas. [Figure 2.1](#) schematically shows the system hydraulic grade line (HGL) profile, as indicated by the water level ranges in the existing and proposed elevated storage tanks (ESTs) in each pressure plane, and connectivity between the pressure planes at buildout. The acceptable customer meter elevation ranges are indicated for each pressure plane below the elevated tank bowl range. The Northside High and Low PPs are the only pressure planes typically hydraulically connected. A sixth minor pressure plane is recommended to be established prior to construction of an EST in the North Denton Creek PP to isolate all meters above 673' in the Argyle WSC neighborhood, if these meters are still in the Northlake system at that time. Further discussion of this recommendation is included in Section 3.2.

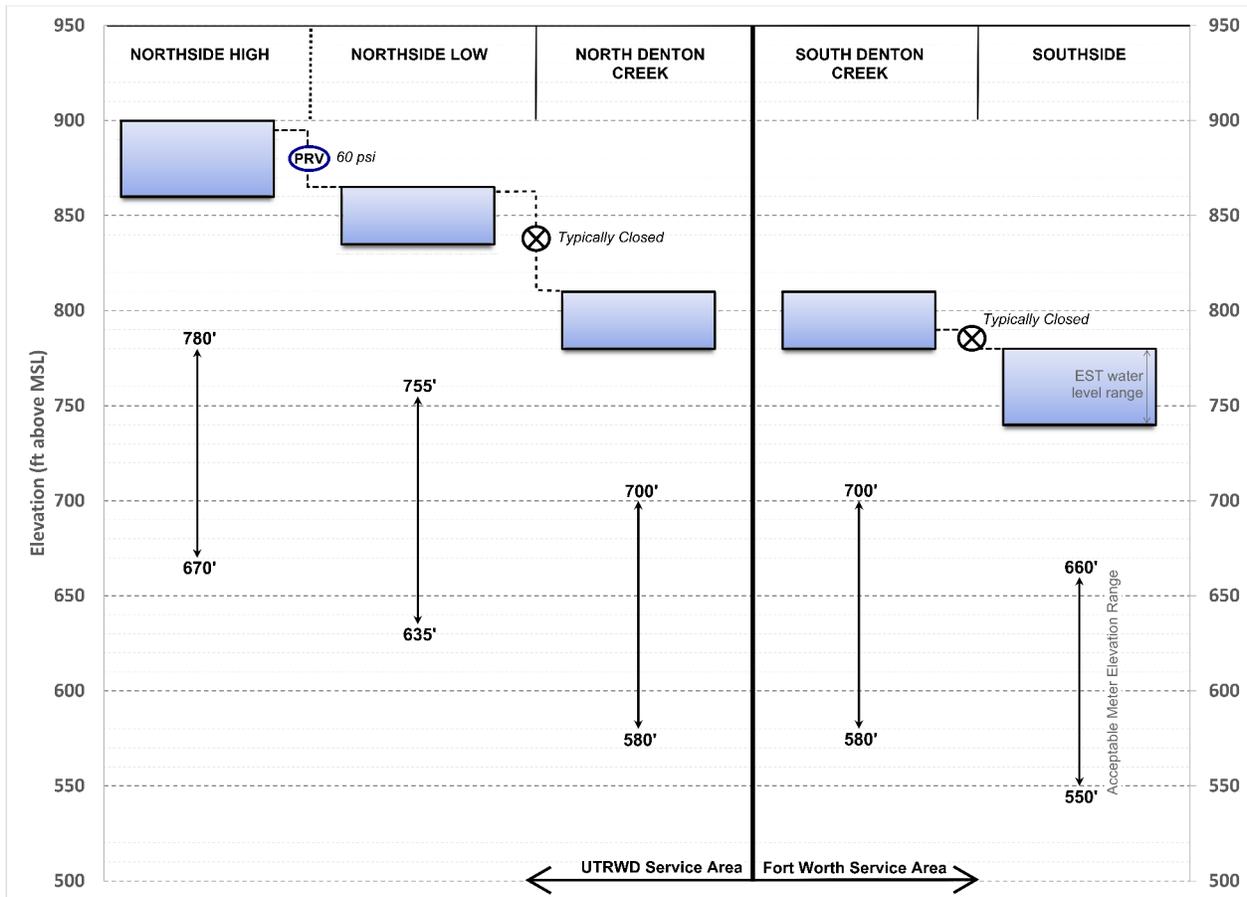


Figure 2.1. Northlake System HGL Profile and Hydraulic Connectivity Schematic

Establishing the boundary between Fort Worth and UTRWD supplied service areas is imperative as the City of Fort Worth assesses an impact fee in Northlake for water supply. This study assumes that the two water service areas will not be connected at any future point, establishing a definite boundary beyond which Fort Worth water will not be distributed. Fort Worth impact fees should be assessed for the South Water Service Area only, as this area is solely supplied from Fort Worth. The North Water Service Area is solely supplied from UTRWD.

2.3. Population

Northlake has experienced significant growth in the last several years, largely due to the Harvest, Pecan Square, and Canyon Falls master planned developments and industrial growth south of Denton Creek. Since 2000, the population of customers within Northlake’s water CCN has grown at an average rate of 13.6 percent per year. The average household in Northlake is estimated to have 2.59 people per dwelling according to the US Census 2020 estimates and input from Northlake staff. Historical population estimates and resulting growth rates for Northlake’s water CCN are shown in [Table 2.1](#).

Table 2.1. Historical Population and Growth Rate in the Northlake Water CCN

Year	2000	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Northlake Population¹	921	1,724	2,110	2,110	2,160	2,150	2,160	2,660	3,010	3,630	4,140	5,201	7,330
Estimated Additional Population²	0	0	0	0	93	383	951	1,785	2,577	3,543	4,425	5,236	6,048
Total Population within Water CCN	921	1,724	1,867	2,110	2,253	2,533	3,111	4,445	5,587	7,173	8,565	10,437	13,378
Annual Growth Rate	-	6.5%	22.4%	13.0%	6.8%	12.4%	22.8%	42.9%	25.7%	28.4%	19.4%	21.9%	28.2%

¹Decennial populations sourced from U.S. Census data; Other populations sourced from North Central Texas Council of Governments (NCTCOG) city population estimates.

²Population of water customers outside the Town incorporated area but within the ETJ and water CCN (i.e. Harvest development and Argyle Water Supply Corporation (WSC) service area).

Population estimates were projected from known unit counts for residential properties currently in development and by applying the land use and associated unit densities established in the Comprehensive Plan¹ (adopted by the Northlake Town Council in December 2016) to remaining developable land. Future land use is discussed in Section 2.5. The projected buildout population within the Northlake Water CCN is estimated at 55,100 people by the year 2050. Deviations from the 2018 Impact Fee Update estimate of 50,300 people are attributed to this study’s inclusion of the Transitional Market Dependent character area, north of Denton Creek, and the Argyle WSC population. Detailed population projection calculations are included in **Appendix C** and a summary of noteworthy changes from the 2018 Study is included in **Appendix H. Table 2.2** and **Figure 2.2** show the population projections for customers of the Northlake water system through buildout, estimated to occur in 2050.

Table 2.2. Northlake Water CCN Population Projections

	2022	2032	Buildout
<i>North Water Service Area</i>	<i>14,500</i>	<i>25,700</i>	<i>45,700</i>
<i>South Water Service Area</i>	<i>1,200</i>	<i>5,600</i>	<i>9,400</i>
Total Customer Population	15,700	31,300	55,100
Annual Growth Rate	-	7.1%	3.2%

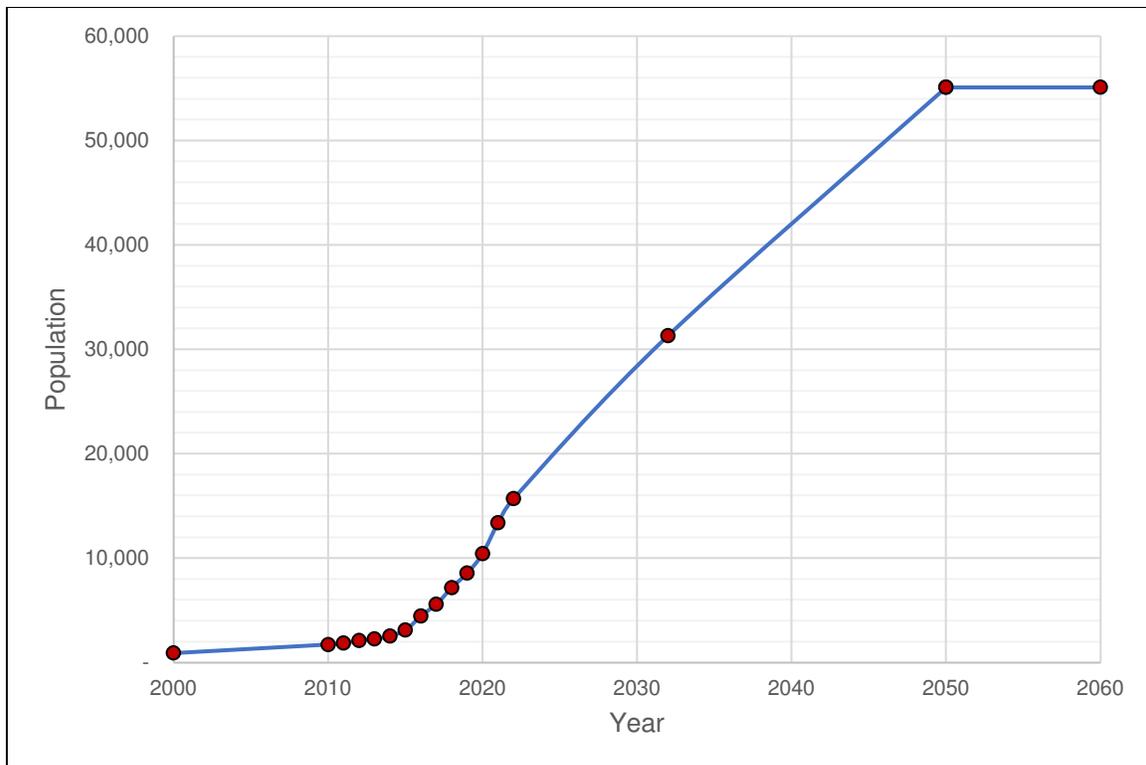


Figure 2.2. Historical and Projected Population

2.4. Future Land Use

The Town's Comprehensive Plan¹ created a future land use map that establishes geographical regions for seven types of future development and land uses, termed 'Character Areas'. [Exhibit 3](#) shows the area encompassed by each Character Area, including updates made since the Comprehensive Plan¹. Each character area a range of land use ratios for the following general categories to describe land use: residential, non-residential, and open space. The land use ratios and unit densities used in this study reflect the values that result in the highest residential unit densities, such that population and demands are conservatively projected. The seven character areas and associated unit densities used for population and demand projection for developable land in this study are listed below:

- Neighborhood Residential
 - **Density:** 3 single-family (SF) units per acre
 - **Use:** 80% Residential, 5% Non-Residential, 15% Open Space
- Ranch Preservation
 - **Density:** 10 acres per ranch or large estate or 1 SF unit per acre
 - **Use:** 100% Residential (45% SF units, 55% Residential Estates/Ranches)
- Workforce Residential
 - **Density:** 22 multi-family (MF) units per acre
 - **Use:** 30% Residential, 70% Non-Residential
- Mixed Use
 - **Density:** 6 SF units per acre or 22 MF units per acre
 - **Use:** 30% Residential (20% MF units, 80% SF units), 55% Non-Residential, 15% Open Space
- Business Park
 - **Density:** No residential land use

- **Use:** 90% Non-Residential, 10% Open Space
- Transitional Mixed Use
 - **Density:** 4 SF units per acre or 22 MF units per acre
 - **Use:** 35% Residential (20% MF units, 80% SF units), 50% Non-Residential, 15% Open Space
- Transitional Market Dependent
 - **Density:** 10 acres per ranch or large estate or 1 SF unit per acre
 - **Use:** 50% Residential (45% SF units, 55% Residential Estates/Ranches), 50% Non-Residential

Exhibit 4 identifies the location of existing and planned development within the town and categorizes developable land by character area. Any existing development within Northlake’s incorporated area and ETJ not currently on the Northlake water system are assumed to eventually develop with the land use and density of the applicable character area. Development trends were estimated so that population and demands could be projected to the 10-year and buildout systems for capital improvement planning. Coordination with Northlake staff and Half internal knowledge of development plans for the Town helped guide the estimations of where development is expected to occur in the next 10 years within Northlake. **Table 2.3** summarizes the existing and future land development estimates, as developed acres in each character area, for the existing, 10-year, and buildout systems. Land area associated with the Argyle WSC customers is not included in the below table, as these connections are not within Northlake’s incorporated area or ETJ and it is anticipated that these customers will eventually be served by Argyle WSC. A comparison with land development assumptions used in the 2018 Study is included in **Appendix H**.

Table 2.3. Land Development Estimates (as developed acres) by Character Area

Service Area		Character Area						Developed Area (acres)	
		Neighborhood Residential	Ranch Preservation	Workforce Residential	Mixed Use	Business Park	Transitional Mixed Use		Transitional Market Dependent
North Water	Existing	1,408	807	0	0	0	0	0	2,215
	2032	2,696	2,446	0	0	177	0	0	5,319
	Buildout	3,459	5,397	0	1,032	1,231	380	1,164	12,663
South Water	Existing	0	0	61	0	456	0	0	517
	2032	0	0	164	0	2,254	0	0	2,418
	Buildout	0	0	222	0	2,685	413	0	3,320
Sewer	Existing	1,408	0	61	0	456	0	0	1,925
	2032	2,696	0	164	0	2,431	0	187.0	5,478
	Buildout	3,459	0	222	1,032	3,916	793	1,724	11,146

2.5. Living Unit Equivalents

The land use assumptions must include estimates for the change in service units over the 10-year planning period. A living unit equivalent (LUE) is a standardized measure of consumption attributable to an individual water service connection. The base living unit equivalent for the purposes of water and sanitary sewer impact fee studies is typically a water service connection to a single-family residence. In Northlake, a 3/4-inch water meter is currently used for single-family residences. The consumption attributable to other water service connection types can be related to a single-family residence by comparison of the meter size required to serve that particular connection’s use.

Table 2.4 shows standard water meter sizes and their maximum operating capacities as established in American Water Works Association Standards². The ratio of each meter’s capacity to a ¾-inch meter’s capacity establishes the LUE factor. This factor is used to relate the demand attributable to water service connections with larger water meters to the demand of a single-family residence, which is the base service unit. For example, an industrial facility with a 2-inch meter has the potential to use 5.33 times as much water as a single-family residence, and thus counts as 5.33 LUEs, or the equivalent of 5.33 single-family residences.

Table 2.4. Living Unit Equivalents

Meter Size (Inches)	Meter Type	Maximum Capacity (gpm)	Ratio to ¾" Meter (LUE)
5/8	Displacement	20	0.67
3/4	Displacement	30	1
1	Displacement	50	1.67
1.5	Displacement	100	3.33
2	Displacement	160	5.33
3	Propeller	300	10
4	Propeller	600	20
6	Propeller	1,350	45
8	Propeller	1,800	60
10	Propeller	2,400	80

Table 2.5 presents the existing, 10-year, and buildout LUE estimates for each pressure plane and associated service area. **Appendix A** details the derivation of LUE counts based on existing meter sizes and future land use assumptions. Any unconnected, existing development within the CCN boundaries are assumed to be redeveloped by buildout and connected to the Northlake system, unless otherwise noted. The LUE calculations for the sewer system include all meters within the sewer CCN less the Ranch Preservation character area meters. Notable differences between the water and sewer CCN’s are that the sewer CCN excludes the Argyle WSC service area and includes the Transitional Market Dependent character area, west of FM 156 and south of Denton Creek.

Table 2.5. LUE Estimates

	Service Area	Pressure Plane	Existing LUEs	2032 Additional LUEs	2032 Total LUEs ¹	Buildout Additional LUEs	Buildout Total LUEs	Buildout LUEs by Service Area
WATER SYSTEM	NORTH	Northside High	2,231	2,074	4,390	239	4,630	16,811
		Northside Low	1,226	2,402	3,526	2,393	5,919	
		North Denton Creek	1,113	551	1,680	4,582	6,262	
	SOUTH	South Denton Creek	0	295	295	1,084	1,378	2,660
		Southside	653	401	1,054	228	1,282	
	-	Total	5,223	5,723	10,945	8,526	19,472	-
SEWER SYSTEM	SEWER	Total	4,620	5,319	9,939	8,241	18,180	18,180

¹Total 2032 LUEs account for the transfer of three 2” meters from Northside-Low to North Denton Creek and the transfer of thirty-four 1” meters, one 2” meter, and twenty-three ¾” meters from Northside-Low to Northside-High associated with pressure plane boundary modifications.

² AWWA C700-02, Cold Water Meters – Displacement Type, Bronze Main Case and AWWA C704-02, Propeller-Type Meters for Waterworks Applications

The impact fee calculation is based on the difference between the total existing and 2032 LUEs. The 2032 LUEs were determined from the anticipated growth rates for Northlake and known planned development. **Table 2.6** shows the anticipated number of additional LUEs by service area that are anticipated to be added to the system in the 10-year planning window.

Table 2.6. 2032 Additional LUEs by Service Area

Service Area	2032 Additional LUEs
North Water Service Area	5,027
South Water Service Area	696
Sanitary Sewer	5,319

2.6. Existing and Future Water Demands

Existing wholesale and customer water meter data were reviewed to determine the historical water demand trends for Northlake. Historical water demand trends were used to estimate per capita usage and average day demand (ADD) to maximum day demand (MDD) factors representative of the users in the Northlake system for future demand projections. The Northlake water use factors selected for this study include an average day per capita use of 175 gallons per capita per day (gpcd) to estimate future flows attributed to additional population and an ADD to MDD factor of 2.4 for MDD projections. Water demand trend data is included in **Appendix B**.

Existing demands were established from historic data. Monthly operating reports from 2011 to 2022 were used to estimate a current MDD based on historical trends and the system record day. The historical records indicate a maximum total purchased water record of 4.75 million gallons per day (MGD) that occurred on 11 August 2019. On this day, 0.4 MG of purchased water from Fort Worth was delivered to the Southside system and 4.35 MG of purchased water from UTRWD was delivered to the Northside (“Harvest”) and North Denton Creek (“Canyon Falls”) systems, 3.623 MG and 0.727 MG, respectively. The MDD has generally increased by 42% each year, according to monthly operating records. To account for potential drought conditions and the higher associated demands with the growing population, the 42% yearly increase in MDD was projected from the record day demand in 2019. This resulted in an existing MDD estimate of 6.2 MGD. A graphical representation of the MDD estimate is shown in **Figure 2.3**. The ADD was estimated by applying the 2.4 ADD to MDD factor to the 6.2 MGD MDD, resulting in a 2.6 MGD ADD estimate.

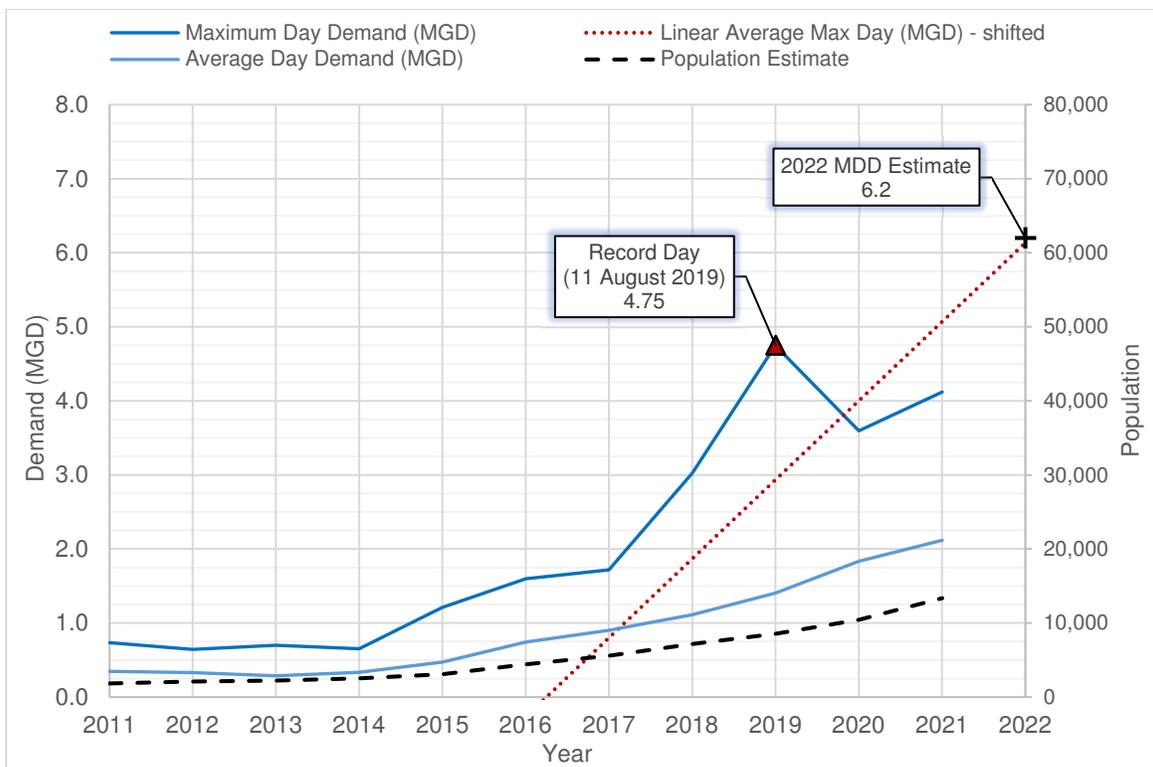


Figure 2.3. Existing Maximum Day Demand Estimate

10-year water demands were estimated by applying the Northlake water use factors to the additional residential population and City of Fort Worth demand estimates³ for commercial/light industrial properties for non-residential use. Buildout water demands were estimated by applying a systemwide per capita water use factor to the estimated buildout population that reflects anticipated water management strategies. Demand projection calculations are included in **Appendix C**. The projected average and maximum day water demands with associated systemwide per capita water use factors are shown in **Table 2.7**.

Table 2.7. Northlake Water Demand Projections

	Existing	2032	Buildout
Customer Population	15,700	31,300	55,100
Maximum Day Demand (MGD)	6.2	15.4	23.2*
Average Day Demand (MGD)	2.6	6.4	9.7
AD per capita usage rate	165	205	175

*Estimated buildout demand with application of water conservation strategies

With current water use factors, the Town of Northlake system-wide demand would approach 30.0 MGD at buildout resulting in a systemwide per capita water use rate of approximately 230 gpcd. However, in keeping with the Texas Water Development Board Region C Water Plan, water conservation is anticipated for all water users to reduce strain on limited resources. Anticipated water conservation strategies and efforts to reduce per capita water usage include city-wide conservation efforts, reduced water loss from the proactive replacement of aging assets, and installation of low flow fixtures in future developments and retrofitting in existing homes. To account for water conservation, a systemwide ADD per capita water use factor of 175 gpcd was applied to the buildout population with the ADD to MDD factor of 2.4. This results in a reduction

³ City of Fort Worth Water Department Installation Policy and Design Criteria, Adopted June 1, 2019

of the buildout maximum day demand of 29.8 MGD (without water conservation efforts, maintaining historical trend of water usage) to **23.2 MGD** as the ultimate system demand. These values reflect a 20% reduction in water use goal attributed to water conservation strategies.

The demand per pressure plane and service area is shown in **Table 2.8**.

Table 2.8. Maximum Day Demands (MGD) by Pressure Plane and Service Area

Pressure Planes	Existing	2032	Buildout	Service Area	Existing	2032	Buildout
Northside High	2.30	3.74	3.50	North	5.36	9.61	15.01*
Northside Low	1.94	3.44	5.24				
North Denton Creek	1.12	2.43	6.27*				
South Denton Creek	-	2.3	5.0	South	0.82	5.79	8.16
Southside	0.82	3.49	3.16				
Total:	6.2	15.4	23.2	Total:	6.2	15.4	23.2

*Includes Argyle High pressure plane customer demands

Water use variations over a standard 24-hour day were accounted for through the development of diurnal patterns for the customers served by each existing pump station. Diurnal patterns were developed from a water balance of flows into each system and changes in storage tank water levels. The diurnal pattern identifies hourly multipliers that represent the ratio of the demand at a given time of day to the average demand. The three diurnal curves calculated and calibrated for the Northlake system are shown in **Figure 2.4** and their applications are summarized in **Table 2.9**.

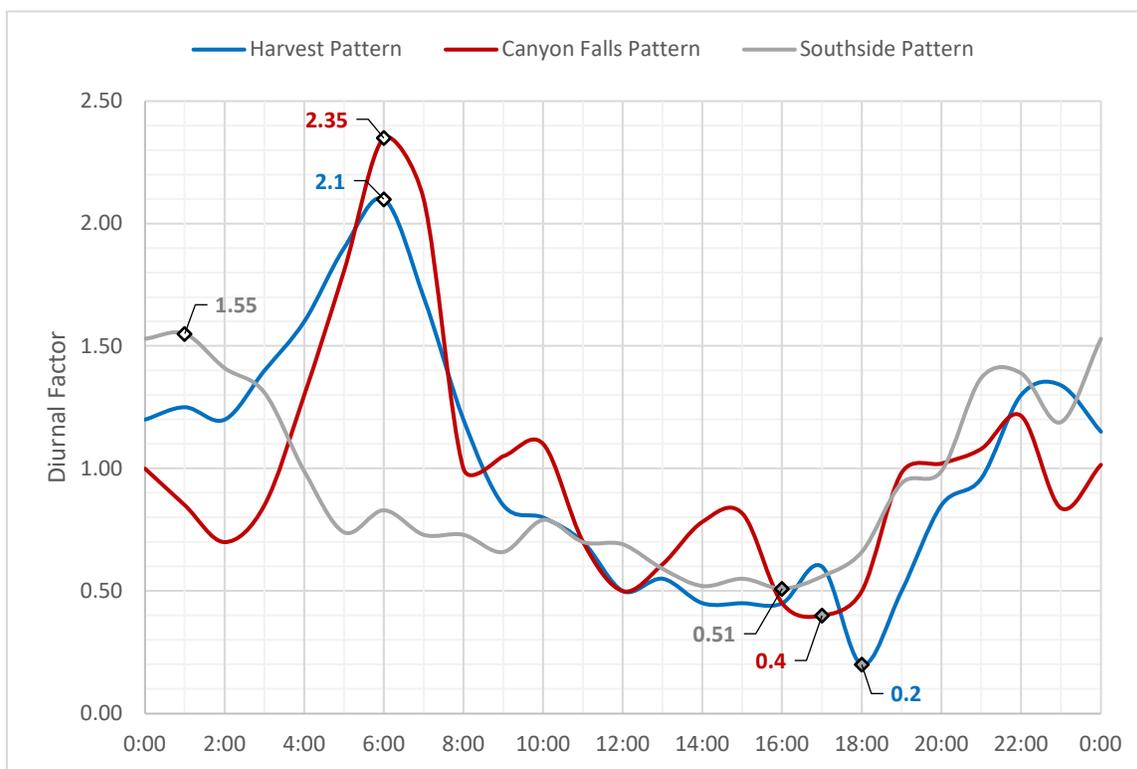


Figure 2.4. Water Demand Diurnal Patterns

Table 2.9. Northlake Diurnal Patterns Application

Pressure Plane	Existing	2032	Buildout
Northside High	Harvest Pattern		
Northside Low	Harvest Pattern		
North Denton Creek	Canyon Falls Pattern		
South Denton Creek	-	Southside Pattern	
Southside	Southside Pattern		

2.7. Existing and Future Sanitary Sewer Flowrates

Limited meter data was available for use in the sanitary sewer modeling. Therefore, Halff used an assumed standard sanitary sewer flowrate based on the values used in the water analysis. The assumed average daily flowrate used in the dry weather analysis for Northlake was 95 gpcd. An assumed diurnal curve was used to apply the sanitary sewer trade flows. The diurnal curves are shown in **Figure 2.5**.

Variations in flow rate to each sanitary sewer junction were achieved by using the ‘population’ and ‘trade flow’ parameters within the modeling software. The populations reaching each junction were based on land zoning of each parcel as described in **Section 2.4 Future Land Use**. After determining the build-out rates of the areas, a one-to-one ratio of water LUEs to sewer LUEs was applied in the applicable areas for development. Applying the growth rates with the proposed build-out densities to the areas determined the populations of the 5-year, 10-year and Ultimate Build-Out conditions for the Town of Northlake Sewer System. Detailed population projection calculations are included in **Appendix C**. **Table 2.10** shows the population used for the sanitary sewer system.

Table 2.10. Sewer CCN Population Projections

	Existing	2032	Buildout
Customer Population	13,700	28,500	52,000

Flows from industrial sources (modeled as trade flows) were calculated using square footage of industry type as determined by the land use assumptions. These flows are considered constant and are not influenced by wet weather flows or peaking factors.

Thiessen polygons were used to define which locations distribute flow to the sanitary sewer junctions. Thiessen polygons divide a catchment area based upon points of interest (sanitary sewer nodes), applying service areas to the closest node.

A wet weather flow analysis was completed for the existing, 5-year, 10-year, and buildout conditions of Northlake. Per TCEQ Rule 217.32.a.2, “When site-specific data is unavailable, the peak flow must be determined by multiplying the design flow by a factor of at least 4.0.” As previously noted, wet weather flows were incorporated into the base trade flows. To incorporate wet weather implications into the non-commercial areas a new diurnal curve was created which incorporated the required factor of 4. The wet weather diurnal curve is plotted against the dry weather curve in **Figure 2.5**.

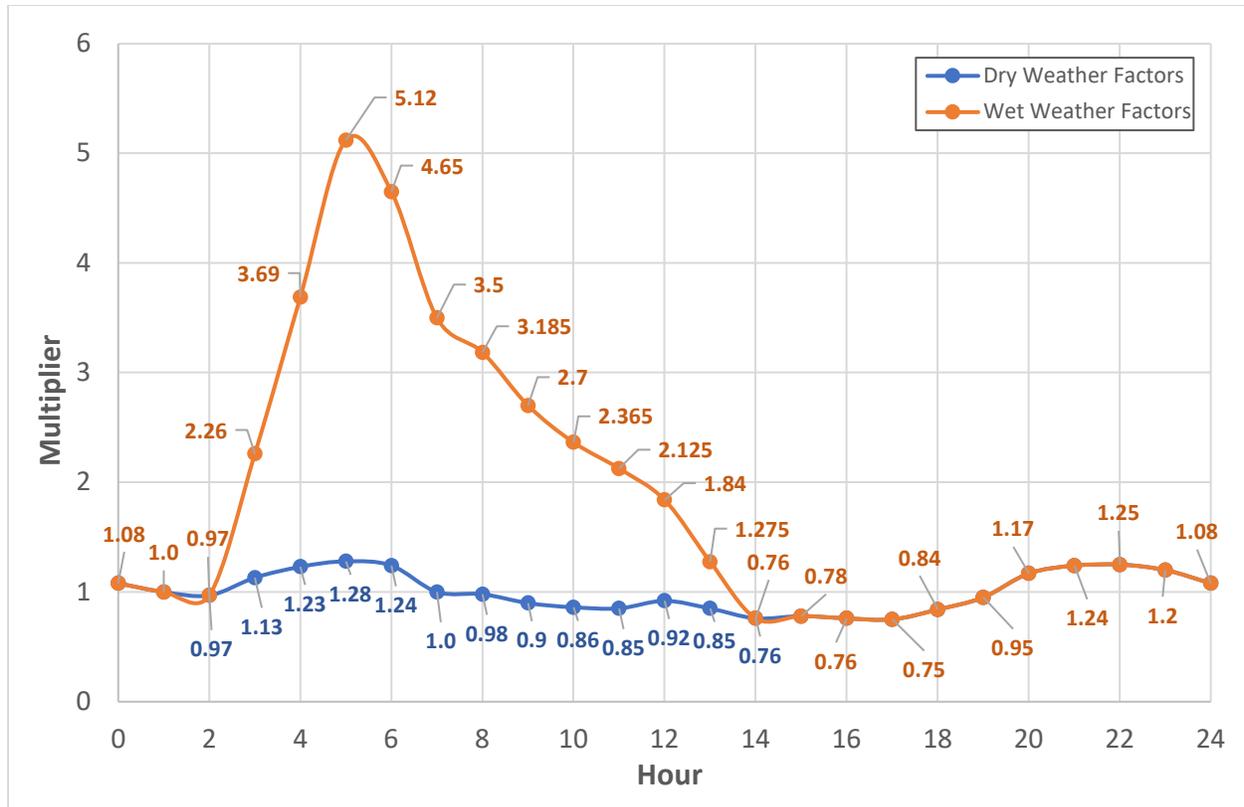


Figure 2.5: Sanitary Sewer Diurnal and Wet Weather Curves

The total outflows of the modeled Northlake system are shown in Table 2.11.

Table 2.11: Sanitary Sewer System Volumes and Flows

	Dry Weather		Wet Weather	
	Average Day Flow (MGD)	Peak Flow (MGD)	Average Day Flow (MGD)	Peak Flow (MGD)
Existing	1.3	1.5	2.1	4.8
5-Year	3.3	3.6	4.5	8.8
10-Year	5.6	6.3	7.9	16.0
Buildout	16.6	17.8	20.7	34.3

3. Water Capital Improvement Plans

The water capital improvements plan is a 10-year outlook of water infrastructure needs to meet the Town's growing demands (capital improvements plan for the sanitary sewer system is covered in Section 4.0). The cost associated with the portion of capital improvements used to meet the demands of new development within the 10-year growth period is eligible for reimbursement by the impact fees.

Halff performed hydraulic model analyses of the water distribution system using Innovyze's water distribution modeling software, InfoWater Pro Version 3.5 Update #3, but the hydraulic model can be exported to EPANET-compatible files. The primary goals of the analyses were to:

- Produce a computerized hydraulic model of the existing water distribution system that accurately reflects existing hydraulic conditions,
- Develop future system models to estimate hydraulic conditions through the buildout system, and
- Identify areas in need of capital improvements to reduce the occurrence of existing and future hydraulic and operational issues.

The water capital improvement plan developed for Northlake is for planning purposes; the alignments and sizes presented for each capital improvement project are based on the assumptions established as part of this report. Information generated from the model runs do not preclude Northlake or a developer from utilizing proper engineering practices and design prior to constructing any capital projects or development plans.

3.1. Existing Water System

The Town of Northlake provides water to customers within the Town incorporated limits and ETJ. Finished water is supplied from the City of Fort Worth and UTRWD to be redistributed either directly or indirectly to Northlake water customers. City of Fort Worth water is delivered directly to the Southside PP in the South Water Service Area. The existing Southside system does not have an EST or PS but both facilities for the Southside PP are currently under construction. The existing Southside PP was evaluated with and without the PS and EST online in the hydraulic model. UTRWD water is delivered to the ground storage tanks at Harvest PS and Canyon Falls PS in the North Water Service Area to be distributed to the Northside pressure planes and North Denton Creek PP, respectively. The North Water Service Area includes one elevated storage tank (EST) in Northside High PP and two PSs (Harvest PS and Canyon Falls PS).

The existing system was analyzed to evaluate existing deficiencies. Halff conducted a series of field tests to determine the actual field conditions and calibrated the hydraulic model to reflect field results. See **Appendix D** for the calibration analysis.

3.2. Water Master Plan

Halff updated the Town's water master plan to revise estimates for the ultimate infrastructure needs in Northlake. The master plan and capital improvement plan development considered proposed distribution mains 12-inches in diameter, or larger, and all existing pipes. The Town's ultimate water demands projected in the land use assumptions were loaded into the hydraulic model to estimate required infrastructure capacities.

Regulatory system capacity requirements and hydraulic performance standards were used as criteria to estimate required storage and pumping capacities, pipeline infrastructure sizing, and pressure plane delineation. **Table 3.1** identifies the applicable regulatory requirements and industry standards used to develop the Northlake water capital improvement plan.

Table 3.1. Regulatory System Capacity Requirements and Standard Hydraulic Performance Criteria

Facility	Reference	Rule
Pumping Capacity	30 TAC Chapter 290 Subchapter D* §290.45	For systems which provide an elevated storage capacity of 200 gallons per connection, two service pumps with a minimum combined capacity of 0.6 gallons per minute (gpm) per connection are required at each pump station or pressure plane.
Storage Capacity	30 TAC Chapter 290 Subchapter D* §290.45	For systems with more than 2,500 connections, an elevated storage capacity of 200 gallons per connection is required. <i>To be considered elevated storage, storage must be at least 80-feet above the highest service connection [§290.38].</i> For systems with less than 2,500 connections, a pressure tank capacity of 20 gallons per connection , up to 30,000 gallons, is required.
	30 TAC Chapter 290 Subchapter D* §290.45	Minimum total storage capacity of 200 gallons per connection (Excludes pressure tank capacity).
	Standard	Ground storage capacity of 8 hours of maximum day demand at each pump station.
Pressure	30 TAC Chapter 290 Subchapter D* §290.44 & §290.46	The system must be designed to maintain a minimum pressure of 35 pounds per square inch (psi) at all points within the distribution network at flow rates of at least 1.5 gallons per minute per connection. If the system is intended to provide firefighting capability, it must also be designed to maintain a minimum pressure of 20 psi under combined fire and drinking water flow
	Standard	Uniform Plumbing Code requires pressure regulators on individual service lines when static pressure in water supply piping exceeds 80 psi. This is a requirement on the customer side of the meter.
Piping	Standard	[Domestic demands]: Maximum of 7.0 feet per second (fps) but preferably less than 5.0 fps.
		[Fireflow demands]: Maximum of 10.0 fps.
		Maximum Headloss per 1,000 feet (ft/k-ft) of 7.0 ft/k-ft but preferably less than 5.0 ft/k-ft.
		Maximum velocities should reach a minimum of 2.0 fps.

*Chapter 290 Subchapter D within Chapter 30 of the Texas Administrative Code (TAC) lists the minimum capacity requirements and acceptable operating practices for a Public Drinking Water System. Rules enforced by the Texas Commission on Environmental Quality (TCEQ).

All proposed pipes are assumed to have a Hazen-Williams roughness coefficient, C, of 130. Existing pipe roughness factors were established during model calibration (**Appendix D**).

A major focus of this study was to establish the delineation of existing pressure planes and recommend buildout delineation to maintain acceptable pressures within each pressure plane. The existing system includes the following pressure planes:

- Northside High: Northside High is supplied from the Harvest PS and includes elevated storage capacity from the Harvest EST. This pressure plane includes all customers on the high-pressure side of the newly-installed PRV on FM 407.

- Northside Low: Northside Low is supplied from the Harvest PS through the FM 407 PRV and includes elevated storage capacity from the surplus capacity not currently utilized by the Northside High pressure plane connections. This pressure plane includes all customers on the low-pressure side of the FM 407 PRV.
- North Denton Creek: North Denton Creek is supplied from the Canyon Falls PS and includes pressure tank capacity at the Canyon Falls PS. There are currently less than 2,500 connections in this pressure plane and elevated storage is not yet required.
- Southside: Southside is currently supplied directly from the wholesale provider's system and is directly influenced by the pressure at the wholesale delivery point. Once the Southside PS and GST (currently under construction) are complete, Southside will be supplied from the Southside PS. Southside currently does not have elevated storage capacity but once the Sam Lee Lane EST (currently under construction) is complete, Southside will include elevated storage capacity from the Sam Lee Lane EST. This pressure plane currently includes all connections in the South Service Area.

The buildout pressure planes generally include expansion of each of these pressure planes to encompass areas identified for future service, as detailed in the land use assumptions. Pressure plane delineation recommendations are displayed in [Exhibit 5](#). Additionally, if the Argyle WSC properties are still connected to the Northlake water system when the Denton Creek EST recommendation is triggered, the Argyle High PP should be established prior to construction of the Denton Creek EST. The Argyle WSC area includes connections at significantly higher elevations than the North Denton Creek PP that would exclude a significant portion of the Denton Creek EST from qualifying as regulatory elevated storage and result in large areas with excessive pressures to accommodate minimum pressure requirements at these connections. The Argyle WSC connections above elevation 673 can be excluded from the North Denton Creek PP through reconfiguration at the Canyon Falls PS such that the hydropneumatic tanks exclusively serve the Argyle High PP. This recommendation is not anticipated in the 10-year planning window due to the connection count in North Denton Creek anticipated to remain below 2,500.

The pressure plane recommendations have previously been displayed schematically in [Figure 2.1](#). [Table 3.2](#) presents the hydraulic grade line, boundary conditions, and recommended serviceable elevations for each pressure plane. Serviceable elevations are based on a highest service connection 80 feet below the bottom of the EST bowl and an absolute maximum pressure of 100 psi.

Table 3.2. Buildout Pressure Plane Recommendations

	Northside High	Northside Low	Argyle High	North Denton Creek	South Denton Creek	Southside
Overflow (ft)	900	865	-	810	810	780
Bottom of Bowl el. (ft)	860	835	-	780	780	740
Maximum el. (ft)	780	755	735	700	700	660
Minimum el. (ft)	670	635	673	580	580	550

The option to connect North Denton Creek PP and South Denton Creek PP across Denton Creek was evaluated given the similar elevation range between these two areas. This was a viable option in regard to regulatory requirements and hydraulic performance but was ultimately removed from consideration due to the Town’s preference to keep the Fort Worth and UTRWD service areas separate. The decision to not connect the two service areas is discussed in a technical memo provided to the Town, included in **Appendix E**.

For regulatory capacity requirements, connection counts, rather than LUEs, are used to determine minimum capacity requirements, per TCEQ criteria. Connections account for physical connections to the system rather than the demand that can be drawn from the system by that physical connection. **Tables 3.3 – 3.5** show the minimum water system capacity requirements for the 10-year system for each pressure plane based on estimated connection counts, per the Town’s land use assumptions. Capacity requirements for the existing and buildout systems are included in **Appendix F**.

Table 3.3. 2032 Total Storage Capacity Requirements

Pressure Plane	2032 Connection Count Estimate	Total Storage: 200 gallons per connection			
		Existing Storage (MG)	Required Storage (MG)	Surplus / (Deficit) (MG)	Recommendation
Northside High	4,167	1.85	0.84	1.01	-
Northside Low ¹	3,638	<u>1.01</u>	0.73	0.28	-
North Denton Creek ²	2,379	0.75	0.48	0.27	-
South Denton Creek	100	0.00	0.02	-(0.02)	Projects WS26A-C
Southside ³	2,314	1.75	0.47	1.28	-
TOTAL	12,598	3.9	2.6		

Table 3.4. 2032 Elevated Storage (or Pressure Tank) Capacity Requirements

Pressure Plane	2032 Connection Count Estimate	Elevated Storage: If >2,500 connections, 200 gallons per connection. *Pressure Tank: If <2,500 connections, 20 gallons per connection up to 30,000 gal.			
		Existing Storage (MG)	Required Storage (MG)	Surplus / (Deficit) (MG)	Recommendation
Northside High	4,167	1.25	0.84	0.41	-
Northside Low ¹	3,638	<u>0.41</u>	0.73	-(0.32)	Project WN30
North Denton Creek ^{2*}	2,379	0.03	0.0300	0.00	-
South Denton Creek [*]	100	0.00	0.002	-(2,000 gal)	Project WS26E
Southside ⁴	2,314	0.75	0.47	0.28	-
TOTAL⁵	12,598	2.0	2.1		

Table 3.5. 2032 Pumping Capacity Requirements

Pressure Plane	2032 Connection Count Estimate	Pump Capacity: If elevated storage requirement met, 0.6 gpm per connection.			
		Existing Firm Capacity (MGD)	Required Total Capacity (MGD)	Surplus / (Deficit) (MGD)	Recommendation
Northside High	4,167	6.00	3.61	2.39	-
Northside Low ¹	3,638	<u>2.39</u>	3.15	-(0.76)	Project WN27C
North Denton Creek ²	2,379	4.3	2.06	2.24	-
South Denton Creek	100	0.00	0.09	-(0.09)	Projects WS26A-C
Southside	2,314	3.1	2.00	1.10	-
TOTAL	12,598	19.7	10.9		

Notes:

¹Northside Low uses surplus capacity from Northside High given its connectivity to this pressure plane.

²North Denton Creek is assumed to include Argyle High connections in the 2032 system.

³Existing total storage includes facilities currently in construction (1.0 MG ground storage at Southside PS and 0.75 MG elevated storage at Sam Lee Lane EST)

⁴Southside does not yet require elevated storage, however the elevated storage criteria is evaluated instead of pressure tank capacity as this pressure plane has an EST in construction.

⁵Total elevated storage volume does not include pressure tank volume.

3.3. Water 10-Year Capital Improvement Plans

The 10-year (2022 – 2032) capital improvements plan includes master plan infrastructure in the areas of town where development is expected in the next 10 years. Coordination with Northlake staff and Halff internal knowledge of development plans for the Town helped guide the estimations of where development is expected to occur in the next 10 years within Northlake. The size of water capital improvements were determined based on Northlake’s demands at build-out. The capital improvement plans were modeled to

verify that the infrastructure meets minimum design standards. **Exhibit 5** shows the town’s proposed 10-year water capital improvement plan.

Table 3.6 lists the water projects and estimates for each project’s total cost. Detailed cost estimates for each project are provided in **Appendix G**. Projects are labeled in a manner that identifies the infrastructure type (water or sewer), service area (North or South), and proposed year of construction. **Tables 3.7** and **3.8** list the water projects identified in the 2018 Study that are currently under construction or existing at the time of this report, respectively.

The opinions of probable construction costs (OPCC) were developed based on actual construction costs for similar projects in North Texas. The estimates include the following items:

- Construction costs, complete in place.
- Land acquisition costs for facilities not in future Town right-of-way.
- A 25% contingency factor; EST projects use a 15% contingency factor.
- Assumed annual inflation of 4%.
- Engineering and surveying fee estimates.

Table 3.6. Water 10-Year Capital Improvement Plan and Estimated Costs

Project ID	Description	Total Project Cost
WS23G	Temporary booster station along Victory Circle, west of Harmonson Road to provide adequate pressure for properties that develop on the west side of the South Denton Creek PP, prior to the establishment of this PP (South Denton Creek PP will be established once the second connection to the Fort Worth system is constructed: Projects WS26A-C).	\$3,163,890
WN21B	16" waterline along Cleveland Gibbs Road that connects Cross Timbers Road to Project WN27B.	\$2,166,000
WN21C	16" waterline along Cleveland Gibbs Road from the intersection with future Mulkey Lane to FM 407 and Thompson Road intersection.	\$4,679,274
WN22A	12" waterline starting at Schober Road and Robson Ranch Road heading East and connects to an existing 12" stubout in Cleveland Gibbs Road.	\$2,494,393
WN22B	16" waterline connecting the Canyon Falls development to the East side of Highway 35W along Cross Timbers Road.	\$2,261,378
WN22D	12" waterline from the intersection of Old Justin Road and Faught Road to the intersection of Robson Ranch Road and Yarbrough Way.	\$2,477,172
WN23A	16" waterline from Cross Timbers Road on the East side of Highway 35W down the Highway and connects to Project WN27B.	\$2,216,241
WN23B	16" waterline along future Mulkey Lane connecting Project WN21C to an existing 12" waterline in S Pecan Parkway. Includes 12" waterline replacing the connection from an existing 12" waterline in S Pecan Parkway to the 8" service waterline to the Pecan Square WWTP.	\$2,090,898
WN23E	12" waterline along Mulkey Lane beginning at the intersection with S Mulkey Lane and connecting to Project WN23B at S Pecan Parkway.	\$2,704,145
WS23F	16" waterline from Harmonson Road along Dale Earnhardt Way to future 'Street A', per Hillwood waterlines plans.	\$2,807,085

Table continued below

Table 3.6 continued

Project ID	Description	Total Project Cost
WN24D	8" waterline beginning at the intersection of 13th Street and Tattler Trail and connection to an existing 8" stubout in Prairie Mount Court.	\$206,539
WS24F	16" waterline along Dale Earnhardt Way from the future 'Street A', per Hillwood waterlines plans, to the proposed FM 156 pump station.	\$4,368,018
WS24G	12" waterline along the future Harmonson Road alignment from the intersection with McPherson Drive to future 'Street A', per Hillwood waterlines plans.	\$3,303,211
WN25A	12" waterline mostly along Evelyn Lane from Florance Road and Holder Road intersection to Faught Road.	\$1,514,353
WS25D	16" waterline along 'Street A', per Hillwood waterlines plans, and Harmonson Road from the intersection with Dale Earnhardt Way to the connection with Project WN26C.	\$4,161,728
WS26A	Second connection to Fort Worth system: Lines A-F	\$8,743,677
	Fort Worth capacity buy-in for Lines A-F	\$491,093
WS26B	Second connection to Fort Worth system: Line G	\$3,950,780
	Fort Worth capacity buy-in for Line G	\$1,586,172
WS26C	Second connection to Fort Worth system: FTW MS 2 MS/PS/GST	\$12,299,560
WS26D	16" waterline along FM 156 from the proposed FM 156 pump station to the intersection with Harmonson Road.	\$6,441,167
WS26E	New 0.5 MG elevated storage tank located in the South Denton Creek pressure plane.	\$3,863,552
WN27B	16" waterline that connects Cleveland Gibbs Road to the east side of Highway 35W.	\$2,515,314
WN27C	Replace Pump 3 at Harvest PS to match the design point of other three Harvest PS pumps.	\$253,963
WN28A	16" waterline loop from the intersection of Robson Ranch Road and Florance Road and following Robson Ranch Road to the west, FM 156, Blair Road, and Florance Road to the intersection with Yarbrough Way	\$17,790,299
WN30	New 1 MG elevated storage tank located along Florance Road on the west side of the Stardust Ranch neighborhood.	\$7,793,430
WN31C	16" waterline along FM 407 from the intersection with Canyon Ridge Drive to Project WN31D	\$653,704
WN31D	12" waterline along FM 407 and Mulkey Lane from the connection to Project WN31C to the intersection of S Mulkey Lane and Northwest Crossing.	\$2,165,494
	Total:	\$109,162,531
<p><u>Notes:</u> ¹25% contingency applied to all projects except EST construction; EST projects used a 15% contingency. ²12% Engineering and survey fee</p>		

Table 3.7. Current Construction Water Projects and Costs

Project ID	Description	Total Project Cost
WN22C	16" waterline along Cleveland Gibbs Road from the intersection with Cross Timbers Road to the Canyon Falls development.	\$430,870
WN24	New 0.6 MG ground storage tank at the Harvest Pump Station.	\$756,000
WS24A	12"/16" waterline from Highway 35W along Dale Earnhardt Way, north on Harmonson Road. [Northlake's share]	\$1,900,000
	Total:	\$3,086,870

Table 3.8. Existing Water Projects from 2018 IF Update and Costs

Project ID	Description	Total Project Cost
EX 20" WL	20" waterline connection the Harvest pump station to the NRE pump station.	\$200,000
WS18B	12" waterline along 114 between Chadwick Pkwy and Cleveland Gibbs Road.	\$745,000
WN20B	New 1 MG elevated storage tank located North of Old Justin Road and East of the existing Brian's Place neighborhood.	\$3,200,000
WN23C	One 1777 gpm Pump at Harvest pump station and a VFD.	\$1,939,000
WS24B	New 500,000 gallon ground storage tank and 3.1 MGD pump station for Southside.	\$5,650,000
WS25	New 0.75 MG elevated storage tank located in the Industrial region of Southside, south of E Sam Lee Lane.	\$3,200,000
	Total:	\$14,934,000

The buildout capital improvement plan includes a handful of noteworthy assumptions regarding additional facilities. The Northside High and Northside Low pressure planes are currently serviced from the same PS. As the system expands, the headlosses generated from friction are anticipated to decrease significantly. Additionally, the elevation range serviced by the Harvest PS (Northside High and Northside Low connections) could exceed 145 feet (see [Table 3.2](#)). These factors are expected to impact the Harvest PS pump's performance as the system expands by causing the existing pumps to operate far to the right of their design point, significantly reducing the efficiency of these pumps. It is recommended that a second pump station be constructed for the buildout system, such that the existing pump station is dedicated to Northside High and the proposed pump station is dedicated to Northside Low. Ideally, these two pump stations would be on the same property such that additional infrastructure is not required to deliver UTRWD supply to the second pump station. **Northlake should begin identifying a location for this proposed expansion of the buildout Harvest PS.** If this recommendation is implemented sooner than the end of the existing Harvest pumps service life, the existing pumps are suitable to serve the Northside High PP.

Additionally, the location of the North Denton Creek EST was evaluated at two locations representing the relative high elevation areas in the North Denton Creek PP. The second location was ultimately selected and is shown in [Exhibit 5](#). The first location alternative was on the west side of Interstate 35 near the Northlake ISD Outdoor Learning Center. This location was initially selected to accommodate the connection of North Denton Creek PP and South Denton Creek PP. However, without the connection to South Denton Creek PP, this location can result in higher water age in this corner of North Denton Creek PP due to its location near the edge of the pressure plane boundary. It is recommended that water age be evaluated with the latest hydraulic model of the system once the North Denton Creek EST siting study is initiated.

In addition to the Town CIP projects to distribute water, a cost is associated with the treatment and conveyance of treated water to Northlake by Fort Worth and UTRWD. Fort Worth’s costs are recouped from their own impact fee, which will be added to the Northlake impact fee for the South Water Service Area. UTRWD capital costs attributable to Northlake’s demand can be included in the impact fee calculation. **Table 3.9** shows UTRWD’s debt service scheduled over the next ten years for their Regional Treated Water System. The table shows the portion of the UTRWD debt service assumed to be attributable to Northlake based on Northlake’s 10-year water demand projections.

Table 3.9. 10-Year UTRWD Treatment and Conveyance Costs Attributable to Northlake

Year	UTRWD Debt Service ¹	Projected Additional Northlake Demand Supplied by UTRWD (MGD)	Capacity Attributed to Northlake ²	UTRWD Debt Attributed to Northlake
2023	\$ 24,972,450	0.43	1.13%	\$ 281,221
2024	\$ 31,391,615	0.43	1.07%	\$ 336,565
2025	\$ 37,172,310	0.43	1.03%	\$ 382,987
2026	\$ 39,775,485	0.43	1.00%	\$ 409,312
2027	\$ 42,626,245	0.43	0.96%	\$ 281,221
2028	\$ 42,594,350	0.43	0.91%	\$ 389,159
2029	\$ 44,500,535	0.43	0.87%	\$ 386,845
2030	\$ 43,077,625	0.43	0.84%	\$ 363,922
2031	\$ 42,833,655	0.43	0.82%	\$ 351,663
2032	\$ 43,501,880	0.43	0.80%	\$ 347,084
Total:				\$ 3,644,743

¹Debt Service values for years 2023 through 2027 match the 5-Year Rate Forecast (included in **Appendix I**) provided by UTRWD staff. Debt service values for years 2028 through 2032 are estimated from the UTRWD FY 2023 budget.

² The total system capacity values used to determine Northlake’s capacity percent for years 2023 through 2027 match the system ‘Estimated Flows’ from the 5-Year Rate Forecast. System capacity values for years 2028 through 2032 were estimated from 2021 Region C Water Plan trends applied to the 5-Year Rate Forecast ‘Estimated Flows’.

3.4. Capital Improvement Triggers

Table 3.10 includes a capital improvement trigger chart to aid in development within interim phases of the system (before 2032 and in between 2032 and buildout). All new development should adhere to the serviceable elevation ranges identified in **Figure 2.1** and **Table 3.2**, such that all proposed connections fall within the identified elevation range for each pressure plane. Connections outside of the acceptable serviceable elevation ranges identified for each pressure plane would result in diminished qualifying capacity to meet regulatory requirements and inadequate pressures to those connections. To retain compliance with regulatory capacity requirements, connections above the maximum serviceable elevation may be subject to private booster stations. To avoid excessive pressures, connections below the minimum serviceable elevation may be subject to individual PRVs, subject to review and approval by Northlake. **Table 3.10** is intended to assist the Town in meeting the needs of development that occurs outside of the existing system pressure planes and prior to the establishment of the recommended buildout pressure planes and associated facilities. This development guideline can be used to guide service extension to new development outside of the existing pressure planes.

Table 3.10. Interim Development Guideline

Applicable Pressure Plane	Trigger	Project	Action
Northside High / Northside Low	Immediate Need – to maintain supply for existing peak hour demand.	WN24: Additional ground storage at Harvest PS	- This project is currently under design
	Total connection count = 6,250 within Northside High and Northside Low PPs	WN30: Northside Low EST	- This project should be in service prior to the trigger to maintain regulatory compliance . - Current connection count ~3,200 - Projected Year Need: 2028
	Total connection count = 6,940 within Northside High and Northside Low PPs	WN27C: Upsize Pump 3 at Harvest PS	- This project should be in service prior to the trigger to maintain regulatory compliance . - Current connection count ~3,200 - Projected Year Need: 2030
	Potential future customer, identified by Town, confirmed for service.	WN28A: 16" waterline	- If the trigger is never realized, these pipelines should be downsized to 12" or less to minimize the potential for water quality issues in this pressure plane.
Northside Low / North Denton Creek	Development west of Interstate 35W in North Denton Creek PP, prior to 2032	No associated project.	- Connect to nearest existing Northside Low pipeline and adhere to serviceable elevation ranges. - Temporary PRVs may be necessary for development below 635'. - Development was not projected in this area in the 10-year planning window and therefore, no capital improvements were planned.
North Denton Creek	North Denton Creek EST	Buildout CIP: Argyle High PP	- The Argyle High PP should be in operation prior to the trigger to maintain regulatory compliance . - This project includes reconfiguration of the Canyon Falls PS to service the new PP from the existing hydropneumatic tanks.
	Total connection count = 2,500 within North Denton Creek PP	Buildout CIP: North Denton Creek 1.4 MG EST	- This project should be in service prior to the trigger to maintain regulatory compliance . - Current connection count ~1,100 - Projected Year Need: 2033
	Total connection count = 3,750 within North Denton Creek PP	Buildout CIP: Additional ground storage at Canyon Falls PS	- 2 ND 0.75 MG ground storage tank should be in service prior to the trigger to maintain regulatory compliance . - Current connection count ~1,100 - Projected Year Need: 2035
	Total connection count = 4,975 within North Denton Creek PP.	Buildout CIP: Canyon Falls PS pump upgrades	- Pump station firm capacity should be increased prior to the trigger to maintain regulatory compliance . - Existing PS firm capacity is exceeded by the regulatory requirement at the trigger. - Current connection count ~1,100 - Projected Year Need: 2042

Table continued below

Table 3.10 continued

Applicable Pressure Plane	Trigger	Project	Action
South Denton Creek / Southside	Development generally west of Harmonson Road, prior to Projects WS26A-C completion.	WS23G: Temporary booster station and PRV	- The temporary South Denton Creek PP and Southside PP boundary should be established through the installation of a temporary booster station along Victory Circle and a temporary PRV installed on the western edge of Project WS24G. See Exhibit 6 .
	Projects WS26A-C		- Project WS23G should be removed from service once Projects WS26A-C are in service. The proposed buildout boundary between South Denton Creek and Southside PPs should be established by closing the valve on the 16" bore across Interstate 35W.

3.5. Water Infrastructure Utilization

An impact fee can only include the portion of the capital improvement costs attributable to that portion of capacity utilized by new development within the 10-year planning period. The infrastructure utilization is directly proportional to the buildout percentage of the Town. The difference in connection counts relative to the buildout connection counts was used to determine the new development LUE utilization percentage as demonstrated in the equation below:

$$\text{New Development (2022 to 2032) Utilization (\%)} = \frac{2032 \text{ LUEs} - 2022 \text{ LUEs}}{\text{Buildout LUEs}}$$

As an example, assume a one million gallon storage tank is needed to accommodate buildout demands. The pressure plane utilizing the storage tank is only 10 percent built out currently and will be 35 percent built out in 2032. Therefore, 25 percent of the total cost of the storage tank is eligible for impact fee reimbursement by 2032. [Table 3.11](#) represents the utilization rate for each service area for 2022, 2032, and Buildout based on LUE counts.

Table 3.11. Utilization by Service Area

Year	Water Service Area and Utilization			
	North		South	
	LUE	% Utilization	LUE	% Utilization
2022	4,570	27%	653	24%
2032	9,596	57%	1,349	51%
Buildout	16,811	100%	2,660	100%
10-Year Utilization	29.9%		26.2%	

The 10-year utilizations for each pressure plane and associated CIP projects are shown in [Table 3.12](#).

Table 3.12. 10-Year Utilizations for each Pressure Plane and associated CIP

Service Area	Pressure Plane	10-Year Utilization %	Applicable CIP Projects
NORTH	Northside High	46.6%	<ul style="list-style-type: none"> • WN22A • WN24D
	Northside Low	38.9%	<ul style="list-style-type: none"> • WN21C • WN22D • WN23B • WN23E • WN25A • WN28A • WN30 • WN31C • WN31D
	North Denton Creek	9.1%	<ul style="list-style-type: none"> • WN21B • WN22B • WN23A • WN27B • WN27C
SOUTH	South Denton Creek	21.4%	<ul style="list-style-type: none"> • WS23F • WS24F • WS24G • WS25D • WS26A-C • WS26D • WS26E
	Southside	31.2%	<ul style="list-style-type: none"> •

3.6. Water Eligible Project Costs

The cost attributable to a new development is the proportional cost eligible for inclusion in the impact fee calculation. **Tables 3.13** and **3.14** show the eligible costs of the water capital improvement projects in the UTRWD and Fort Worth service areas, respectively. **Table 3.13** includes the eligible cost of UTRWD debt service attributable to new development in Northlake.

Table 3.13. Eligible Costs for North Service Area Water Infrastructure

Status	Project ID	Eligible Utilization	Total Project Cost	Eligible Project Cost
Capital Improvement Project	WN21B	9.1%	\$2,166,000	\$197,106
	WN21C	38.9%	\$4,679,274	\$1,820,238
	WN22A	46.6%	\$2,494,393	\$1,162,387
	WN22B	9.1%	\$2,261,378	\$205,785
	WN22D	38.9%	\$2,477,172	\$963,620
	WN23A	9.1%	\$2,216,241	\$201,678
	WN23B	38.9%	\$2,090,898	\$813,359
	WN23E	38.9%	\$2,704,145	\$1,051,912
	WN24D	46.6%	\$206,539	\$96,247
	WN25A	38.9%	\$1,514,353	\$589,083
	WN27B	9.1%	\$2,515,314	\$228,894
	WN27C	9.1%	\$253,963	\$23,111
	WN28A	38.9%	\$17,790,299	\$6,920,426
	WN30	38.9%	\$7,793,430	\$3,031,644
	WN31C	38.9%	\$653,704	\$254,291
	WN31D	38.9%	\$2,165,494	\$842,377
Current Construction	WN22C	9.1%	\$430,870	\$39,209
	WN24	46.6%	\$756,000	\$352,296
Existing Projects	EX 20" WL	46.6%	\$200,000	\$93,200
	WN20B	46.6%	\$3,200,000	\$1,491,200
	WN23C	46.6%	\$1,939,000	\$903,574
UTRWD 10-Year Debt Service		100%	\$3,644,743	\$3,644,743
Water Impact Fee Update		87.8%	\$100,000	\$87,800
		Total:	\$64,253,210	\$25,014,180

Table 3.14. Eligible Costs for South Service Area Water Infrastructure

Status	Project ID	Eligible Utilization	Total Project Cost	Eligible Project Cost
Capital Improvement Project	WS23G	100%	\$3,163,890	\$3,163,890
	WS23F	21.4%	\$2,807,085	\$600,716
	WS24F	21.4%	\$4,368,018	\$934,756
	WS24G	21.4%	\$3,303,211	\$706,887
	WS25D	21.4%	\$4,161,728	\$890,610
	WS26A	21.4%	\$8,743,677	\$1,871,147
	FTW BUY-IN (LINES A-F)	21.4%	\$491,093	\$105,094
	WS26B	21.4%	\$3,950,780	\$845,467
	FTW BUY-IN (LINE G)	21.4%	\$1,586,172	\$339,441
	WS26C	21.4%	\$12,299,560	\$2,632,106
	WS26D	21.4%	\$6,441,167	\$1,378,410
	WS26E	21.4%	\$3,863,552	\$826,800
Current Construction	WS24A	31.2%	\$1,900,000	\$592,800
Existing Projects	WS18B	31.2%	\$745,000	\$232,440
	WS24B	31.2%	\$5,650,000	\$1,762,800
	WS25	31.2%	\$3,200,000	\$998,400
Water IF Update		12.2%	\$100,000	\$12,200
Total:			\$66,774,933	\$17,893,964

4. Sanitary Sewer Collection System

Hydraulic sanitary sewer collection models were developed for the existing, 5-year, 10-year, and ultimate build-out populations of the Town of Northlake CCN. The models were developed with base and peak flow scenarios calculated using the land use calculations and TCEQ sanitary sewer system capacity requirements. These hydraulic models were developed using Innovyze ICM 2021.8.0, predominately based on existing spatial data. The models used assumed flows based on assumptions of usage for commercial and residential development. The primary goals of the four (4) analyses were in a similar scope to the water model:

- Reflect the conditions and operation of the existing system
- Identify areas of needed improvements
- Provide long-term recommendations to accommodate peak, future flows through ultimate build-out conditions

Typically, the expansion of a sanitary sewer collection system is development-driven, meaning that any given development will design and install the required infrastructure as part of their agreed-upon improvements. The size(s) and alignment(s) are dictated by the demands of the proposed development as well as the total area that the sanitary sewer facility will serve.

After discussions with the Town of Northlake, subareas were identified within the Sewer CCN for future development at specific rates to determine where (and when) future sanitary sewer infrastructure would be required. Each area created within the CCN was assigned to be one of three categories, residential, industrial, or combination. Each area was then subdivided to show how the demands from the subareas would interact with the sanitary sewer system based on proximity (both laterally and vertically).

Similarly, to the Water CIP, the sanitary sewer 10-year CIP developed for Northlake is for planning purposes. Halff recommends that each CIP project identified undergo further evaluation to ensure all capacities and locations are still applicable at the time they are required.

4.1. Existing Sanitary System Overview

The City of Northlake currently manages over 70 miles of sanitary sewer lines ranging in diameter from 8-inch to 18-inches. The sanitary sewer system drains to various TRA interceptors that are located within the Town of Northlake Sewer CCN. Outfalls to the TRA system are shown on [Figure 4.1](#). With no known existing capacity issues in the system, the model developed is used to validate the existing system demands and to ensure that model is also accurately depicting how the flows are traveling through the system. The existing mains were evaluated as part of the overall system to estimate needed improvements based on existing flows and the future routing of flows.

After completing the existing demands model, no issues that would put the Town of Northlake out of compliance with TCEQ were noted; meaning velocity requirements were met as well as no surcharging of manholes.

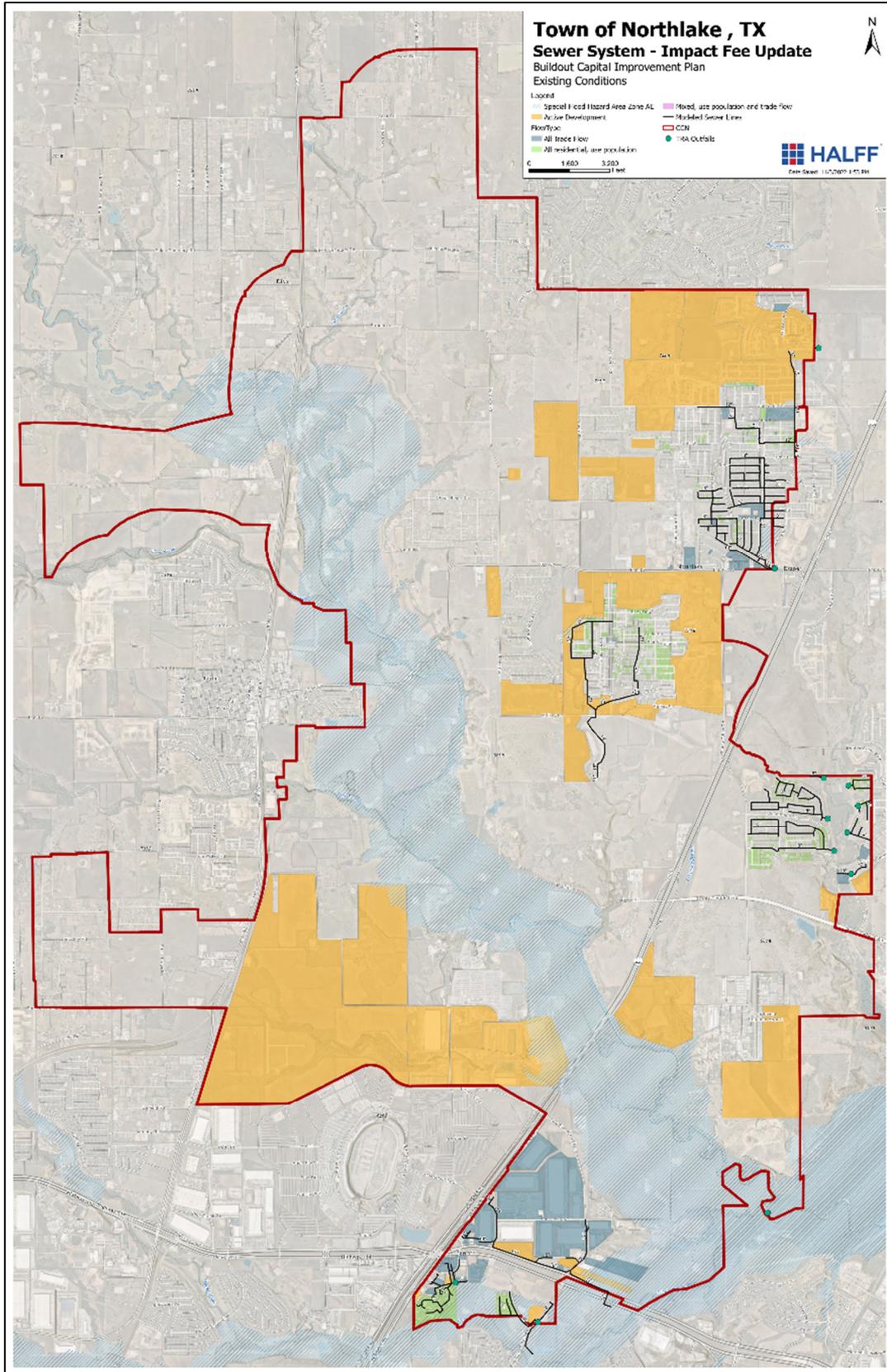


Figure 4.1. Existing Northlake Sewer System

4.2. Sanitary Sewer Master Plan

Halff developed a sanitary sewer master plan to estimate the ultimate infrastructure needs in Northlake through the ultimate build-out scenario. Northlake's ultimate sanitary sewer flowrates that were projected in the land use assumptions were input into the hydraulic model of the sanitary sewer collection system to calculate and verify the system's capacity.

The sanitary sewer improvements in the master plans were sized to meet TCEQ capacity requirements defined in 30 TAC §217.53

- Minimum Velocity in Pipes = 2 fps at full flow
- Maximum Velocity in Pipes = 10 fps at full flow
- No surcharging of manholes (i.e., the peak flow is fully contained in the infrastructure)

Additionally, Halff minimized the need for lift stations and aerial crossings to reduce the long-term maintenance requirements. The Town of Northlake topography allows for a sanitary sewer collection system to flow by gravity (i.e., no lift stations would be necessary) only if the infrastructure is phased appropriately. Pipe slopes and manhole invert elevations were estimated based on existing topography, maintaining at least 3-ft of cover and a standard drop of 4-ft respectively. Future pipes less than 8-inches are not included in these analyses.

4.3. Sanitary Sewer Model Analysis Summary

Existing System

Existing spatial data within the Town of Northlake was used as the basis for the existing conditions analysis. The modeling and reporting are intended to be an update to the previous Water and Sanitary Sewer Impact Fee Study (2018), therefore, significant updates to the digital data was unable to be completed. The existing spatial data was corrected where necessary to correct mismatched pipe flowlines and pipes incorrectly drawn from downstream to upstream, rather than upstream to downstream. Manhole rims were set as the terrain elevation at their spatial location, using the USGS 2019 Dallas Pecos dataset. TRA lines were not modeled, therefore, terminations in the model generally occur at the confluence with TRA trunks. It was assumed that the TRA pipes are half full, therefore, a steady tailwater was assumed for the duration of the analysis.

No manhole overflows were reported in either the existing or proposed conditions analysis. The TCEQ capacity requirements defined in 30 TAC §217.53 (minimum pipe velocity at 2 feet per second at full flow, maximum velocity in pipes at 10 feet per second, and no surcharging of manhole rims) were met in the existing conditions analysis. The summation of outflows in the dry weather run was 1.3 million gallons per day and the summation of outflows in the wet weather run was 2.1 million gallons per day. [Figure 4.1](#) above shows the network modeled in the existing conditions.

5-Year (2027) System

Applying 5-year demands to the existing system, as well as incorporating planned infrastructure within the next 5 years, showed minimal changes in the system capacity in terms of pipe velocities and surcharging of manholes. The 5-year planned infrastructure met the 5-year projected demands, passing the TCEQ requirements defined in 30 TAC §217.53. The Northlake sewer system with 5-year projects can be seen below in **Figure 4.2**. The summation of outflows was 3.3 million gallons per day in the dry weather conditions and 4.5 million gallons per day in the wet weather event.

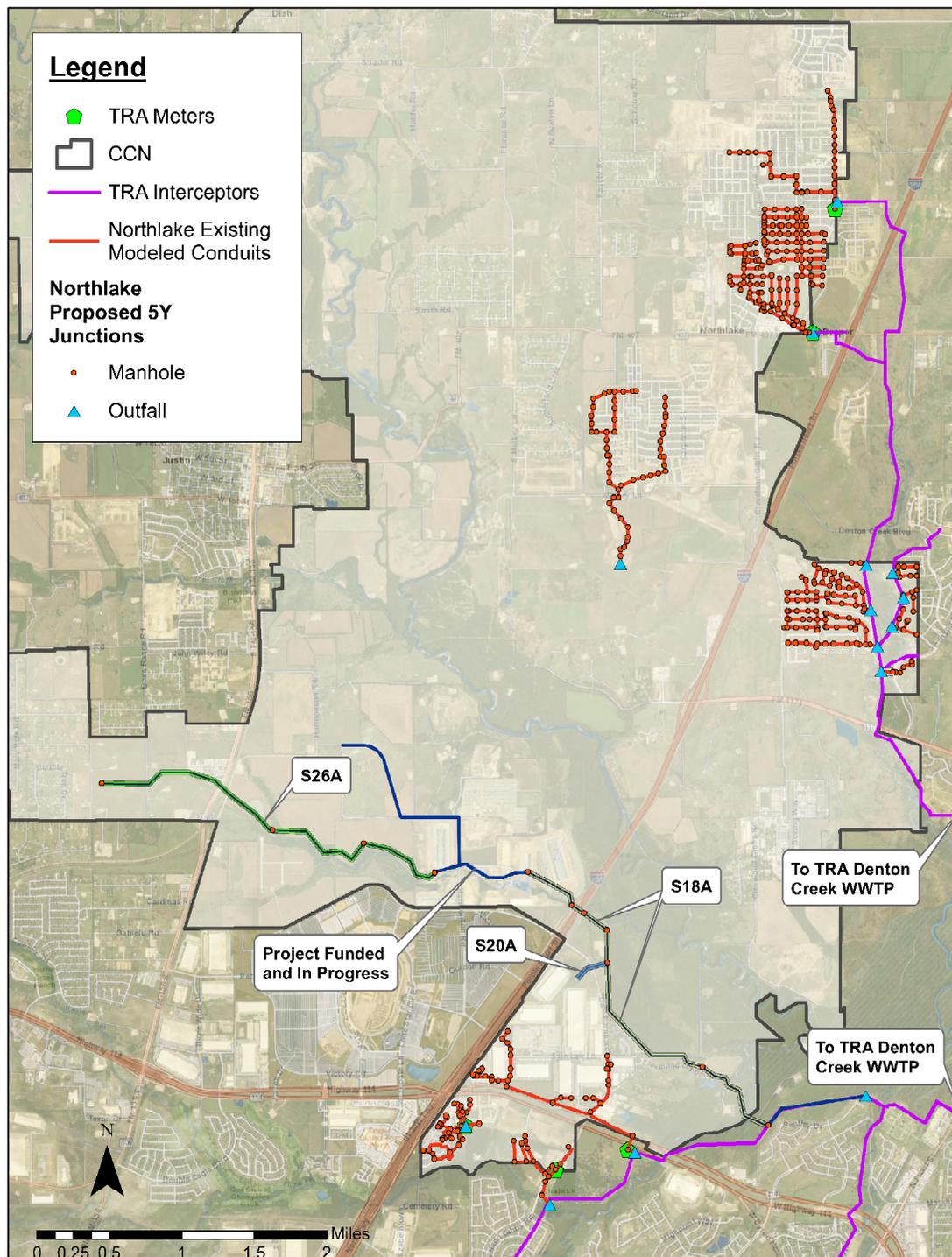


Figure 4.2. 5-Year System Analysis and Improvements

10-Year (2032) System

Several projects are currently planned for buildout within the next 10-years. These proposed projects were incorporated into the modeling in conjunction with the assumed population and commercial development projections. The proposed 10-year CIP projects are based on the upsized pipes. The modeled 10-year system passes the TCEQ requirements defined in 30 TAC §217.53. **Exhibit 7** provides the general schematic of the 10-year analysis and improvements. The summation of outflows in the dry weather run was 5.6 million gallons per day and the summation of outflows in the wet weather run was 7.9 million gallons per day.

Buildout System

Several projects are currently planned for construction in the Town of Northlake. These proposed projects were incorporated into the modeling in conjunction with the assumed population and commercial development projections. The buildout analysis primarily consisted of the 10-year sanitary sewer network. The only additional network segment added was a 15-inch to 24-inch diameter line beginning just east of Boss Range Road, terminating at a line that is proposed for the 10-year CIP, west of IH-35. Sanitary sewer flows for the buildout analysis use the anticipated fully developed conditions of the Town of Northlake.

The initial buildout model incorporated the known pipe dimensions and general layout where available. Modeling the currently planned projects, several manhole overflows were seen in the 10-year wet weather event, as shown in **Figure 4.3**. Pipe upsizing was modeled at these locations to resolve any manhole overflows. The proposed 10-year CIP projects are based on the upsized pipes.

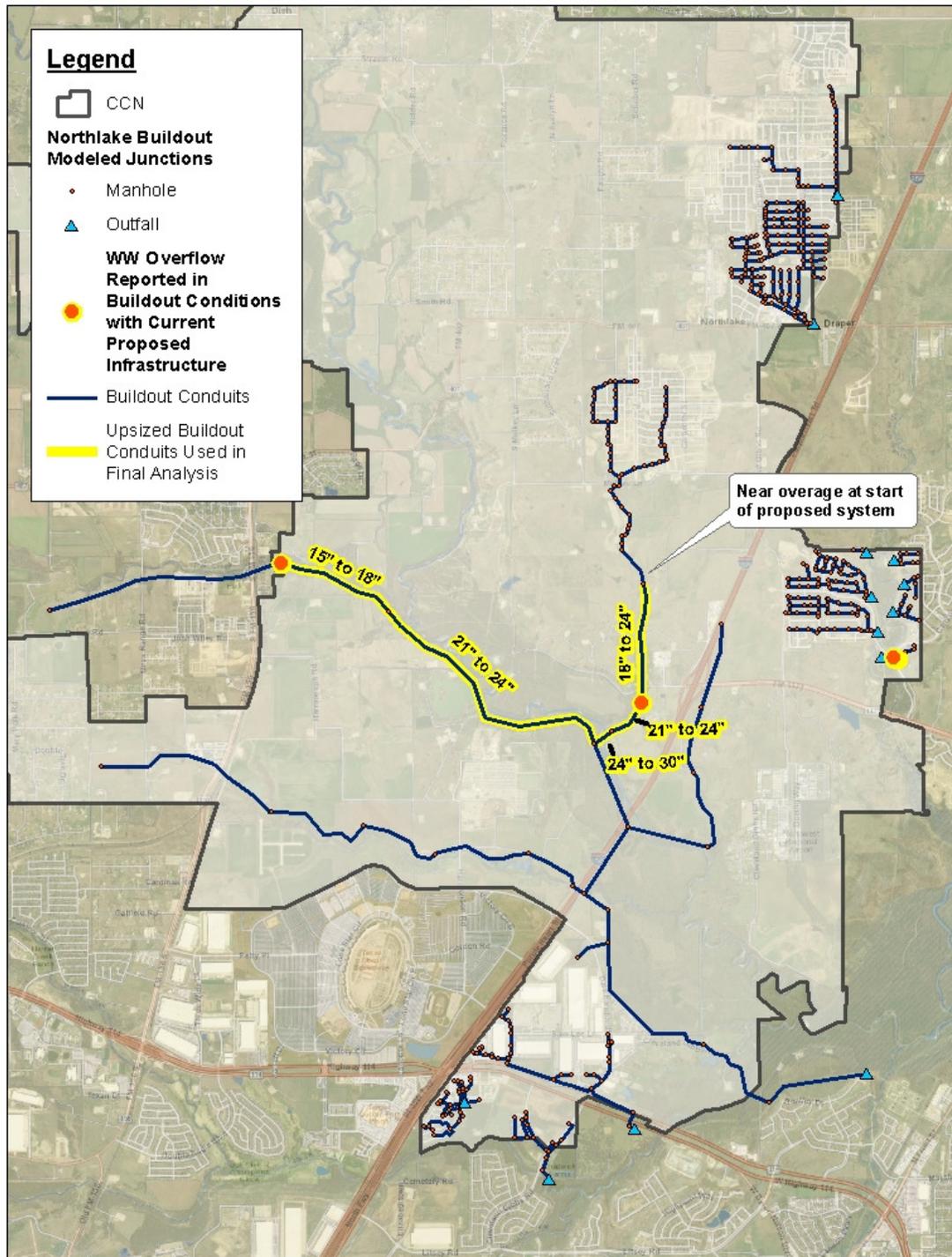


Figure 4.3. Future Demands & Existing Infrastructure

Figure 4.3 provides the general schematic of the buildout analysis and improvements. The summation of outflows in the dry weather run was 16.6 million gallons per day and the summation of outflows in the wet weather run was 20.7 million gallons per day.

4.4. Sanitary Sewer 10-Year Capital Improvement Plans

The 10-year Condition model was used to determine where new infrastructure and upgraded infrastructure would be required. While the 10-year Condition model was used to determine where the infrastructure

needed to be, the Ultimate Build-Out Condition model was used to determine the sizing and capacity needed. The sanitary sewer capital improvements plan assumes that development will occur in a way that prevents the need for lift stations, however a temporary lift station may be necessary if a development is geographically separated from the existing sanitary sewer collection system.

Projects are listed sequentially by date of anticipated construction with total cost, shown below in **Table 4.1. Exhibit 7** shows the town’s proposed 10-year sanitary sewer capital improvement plan. **Table 4.2** shows current construction projects that are occurring.

Table 4.1. Sanitary Sewer 10-Year Capital Improvement Plan and Estimated Costs

Project ID	Description	Total Project Cost
S26A	15" - 18" SS line along Catherine Branch, starting west of FM 156 and tying into downstream segment of Catherine Branch line. [Catherine Branch Trunk Line Phase 2]	\$5,806,200
S18A	24" - 54" SS line along Catherine Branch, intercepting TRA line. [Catherine Branch Lower Interceptor]	\$14,750,000
SCBE	Catherine Branch WWTP expansion to 0.5 MGD	\$19,499,891
S20A	12" SS line south of IH-35W intercepting to SS line along Catherine Branch	\$958,160
S24A	10" - 21" SS line along Cleveland Branch intercepting line along Denton Creek, east of IH-35W	\$10,861,200
S22A	15" - 48" SS line along Denton Creek, intercepting SS line along Catherine Branch	\$24,330,040
S30A	10" SS line east of Canyon Falls Rd intercepting TRA line	\$439,040
	Total:	\$76,644,531

Notes:

25% contingency, inflation at 4% per year until construction, and a 12% engineering and survey fee estimate included in all project costs.

Table 4.2. Current Construction Sanitary Sewer Projects

Project Name	Project Stage	Project Cost
Catherine Branch WWTP Phase 1	Under Construction (includes lease of WWTP)	\$4,179,870
Catherine Branch Trunk Line Phase 1	Under Construction [Northlake's share]	\$705,018
15" SS in Harmonson Road	Under Construction [Northlake's share]	\$501,684
	Total:	\$ 5,386,572

In addition to the Town CIP projects to collect sanitary sewer, a cost is associated with the treatment and disposal of sanitary sewer by the TRA. TRA capital costs attributable to Northlake’s flowrate can be included in the impact fee calculation. **Table 4.3** shows TRA’s debt service for their Denton Creek Regional Wastewater System. The table shows the portion of the TRA debt service assumed to be attributable to Northlake based on Northlake’s 10-year sanitary sewer flowrate projections.

Table 4.3. 10-Year TRA Treatment and Conveyance Costs Attributable to Northlake

Year	TRA Debt Service ¹	Projected Additional Northlake Flowrate to TRA (MGD)	Capacity Attributed to Northlake ²	TRA Debt Attributed to Northlake
2023	\$ 15,491,792	0.43	4.54%	\$ 703,918
2024	\$ 21,337,544	0.43	4.33%	\$ 923,544
2025	\$ 28,071,490	0.43	4.12%	\$ 1,156,734
2026	\$ 30,188,859	0.43	3.66%	\$ 1,047,102
2027	\$ 30,345,424	0.43	3.45%	\$ 881,232
2028	\$ 27,036,854	0.43	3.26%	\$ 703,918
2029	\$ 27,626,111	0.43	3.10%	\$ 857,560
2030	\$ 27,528,340	0.43	2.96%	\$ 813,833
2031	\$ 27,417,504	0.43	2.82%	\$ 771,959
2032	\$ 27,331,959	0.43	2.68%	\$ 732,905
Total:				\$ 8,992,973

¹Debt Service values for years 2023 through 2028 were calculated from Northlake debt service estimates (included in [Appendix I](#)) provided by TRA staff. Debt service values for years 2028 through 2032 are estimated from the TRA FY 2023 budget.

² The total system flows used to determine Northlake's capacity percent for years 2023 through 2028 were calculated from the Northlake debt service estimates provided by TRA staff. Total system flows for years 2029 through 2032 were assumed to increase annually by 5%.

4.5. Sanitary Sewer Infrastructure Utilization

An impact fee can only include the portion of the capital improvements costs attributable to that portion of capacity utilized by new development within the 10-year planning period. The eligible utilization was calculated from flowrates simulated in the hydraulic model for each infrastructure component in the sanitary sewer CIP. The flowrate values are the total flows passing through each infrastructure project during peak flow. All existing development is assumed to be connected to the sanitary sewer collection system in 2022 pursuant to the land use assumptions. The 10-year sanitary sewer utilization rate is directly proportional to the percentage of each infrastructure's utilized capacity. The utilization rates of the sanitary sewer capital improvements are presented in Section 4.6.

4.6. Sanitary Sewer Eligible Project Costs

The cost attributable to new development is the proportional cost eligible for inclusion in the impact fee calculation. The eligible cost for each infrastructure component equals the difference between the 2032 and 2022 utilization percentages multiplied by the total project cost. [Table 4.4](#) shows the eligible cost of each sanitary sewer CIP project.

Table 4.4. Eligible Costs for Sanitary Sewer Infrastructure

	Project ID	Eligible Utilization	Total Project Cost	Eligible Project Cost
Capital Improvement Project	S26A	44%	\$5,806,200	\$2,554,728
	S18A	17%	\$14,750,000	\$2,507,500
	SCBE	100%	\$19,499,891	\$19,499,891
	S20A	65%	\$958,160	\$622,804
	S24A	12%	\$10,861,200	\$1,303,344
	S22A	13%	\$24,330,040	\$3,162,905
	S30A	35%	\$439,040	\$153,664
Current Construction	Catherine Branch WWTP Phase 1	100%	\$4,179,870	\$4,179,870
	Catherine Branch Trunk Line Phase 1	40%	\$705,018	\$282,008
	15" SS in Harmonson Road	40%	\$501,684	\$200,674
TRA 10-Year Debt Service		100%	\$8,992,973	\$8,992,973
Sewer Impact Fee Update		100%	\$100,000	\$100,000
Total:			\$91,124,076	\$43,560,361

5. Impact Fee Calculations

The impact fee determination method employed by NewGen Strategies and Solutions, LLC is developed through a financial based model, which fully recognizes the requirements of Chapter 395 of the Texas Local Government Code, including the recognition of cash and/or debt financing, interest earnings, fund balances, and applicable credits. In developing the components of the financial model, several assumptions must be made, including the following:

- Financing
 - Method of financing (i.e. cash or debt financing)
 - The level of financing (e.g. 100% debt funding)
 - Cost of financing
 - Debt repayment structure
- Timing and Level of Expenditures and Revenues
- Interest Earnings
- Annual Service Unit Growth

The assumptions employed in the maximum assessable impact fee determination provide a reasonable basis for forecasting; however, it must be emphasized that these assumptions may not necessarily reflect actual future conditions. To address this, Chapter 395 requires the monitoring of impact fees through the Capital Improvements Advisory Committee and allows for the option to update or revise impact fees to reflect the actual implementation of the impact fee program.

5.1. Maximum Assessable Impact Fee Determination

Once the cost of capacity added that is attributable to growth is determined, it must then be decided how the cost will be financed: cash and/or debt. Unless specific funding has already been determined, it is assumed that the Town will debt finance 100% of the future impact fee eligible project costs. For debt financing, the cost of financing is based on an assumed 20-year debt term with interest rates each year based on [Table 5.1](#) below. Debt was assumed to be issued equally over the 10-year period. Debt service payments for each future debt issue are assumed to be a level annual payment over the issue’s term.

Table 5.1. Interest Rate Per Year of Issuance

Fiscal Year	Interest Rate
2023	5.50%
2024	5.75%
2025	6.00%
2026	6.25%
2027	6.50%
2028	6.50%
2029	6.50%
2030	6.50%
2031	6.50%
2032	6.50%

Currently, the exact timing and annual level of cash capital expenditures over the forecast period is indeterminate; therefore, it is assumed that capital expenditures will occur in equal amounts over the 10-year program period or is based on either TRA or UTRWD debt schedules. It is also assumed that for debt-financed capital projects, the Town will expend debt proceeds over a 3-year timeframe. It is currently assumed that any existing fund balances are already encumbered.

Because debt is issued assuming a 20-year term and impact fees developed herein are to be charged over a 10-year period, sufficient fund balance must be generated to meet the future debt service obligations.

Chapter 395 states that interest earnings are funds of the impact fee account and are to be held to the same restrictions as impact fee revenues. Therefore, in order to recognize that interest earnings are used to fund only these specific Water Impact Fee Capital Improvement Plan (CIP) projects and Wastewater Impact Fee CIP projects, interest earnings are credited against the costs recoverable through impact fees. It should be noted that Chapter 395 does not require the upfront recognition of interest earnings in the impact fee determination; however, in an effort to acknowledge the time value of the impact fee payers' monies, interest earnings have been credited. Interest is assumed to be earned at an annual rate of 2.50% per discussions with Town Staff.

The timing and annual level of service unit growth over the 10-year program period is indeterminate at the present time. As such, it is assumed that service unit growth will be consistent over the 10-year forecast.

Chapter 395 requires a plan for awarding either a credit for the portion of ad valorem tax and/or utility service revenues generated by new service units during the program period that are used for payment of improvements that are included in the Water Impact Fee CIP and Wastewater Impact Fee CIP. As an alternative, a credit equal to 50% of the total cost of implementing the Water Impact Fee CIP and Wastewater Impact Fee CIP may be used. The Town has elected to calculate a credit based on a portion of ad valorem tax and/or utility service revenues.

The water impact fee is split between the South Service Area and the North Service Area. The resulting maximum fee per service unit is summarized in [Table 5.2](#) below. Further detail on the calculations can be found in the Impact Fee Determination Appendices ([Appendix J](#)). In addition to the impact fees below, water connections in the South Service Area will also be assessed an impact fee of \$1,984 per LUE, which is passed through from the City of Fort Worth.

Table 5.2. Maximum Fee Per Service Unit

Service Area	Water - South	Water - North	Wastewater
Recoverable Impact Fee CIP Costs	\$ 17,893,964	\$ 25,014,180	\$ 43,560,361
Add: Financing Costs	12,801,327	14,747,574	22,489,013
Less: Interest Earnings	(4,273,516)	(5,032,037)	(7,742,864)
Pre Credit Recoverable Cost for Impact Fee	\$ 26,421,776	\$ 34,729,717	\$ 58,306,510
Less: Credit for Utility Revenues	(11,921,322)	(13,777,446)	(22,504,120)
Maximum Recoverable Cost for Impact Fee	\$ 14,500,454	\$ 20,952,271	\$ 35,802,390
Divide: Additional Service Units Added During Planning Period	696	5,027	5,319
Maximum Assessable Fee	\$ 20,834	\$ 4,168	\$ 6,731

5.2. Comparison of Local Impact Fees

Comparisons were completed for impacts fees in the surrounding entities based on online publicly available records. It is important to note that although comparisons between communities are very common, they are not to be considered an “apples to apples” comparison and may not fully explain differences between communities. Each system is unique in geography, age of infrastructure, capital maintenance effort, and typical usage patterns, which makes this comparison imprecise and not generally instructive for detailed rate-making efforts. A utility is a business type activity of government and should be operated in the same manner as a standalone, private business enterprise. Pricing decisions should be made at the community level, reflecting the unique needs of each entity’s own business enterprise and not simply based on the actions or pricing structures of other communities. **Figure 5.1** below shows the comparisons of impact fees assuming a ¾”meter size where data was available.

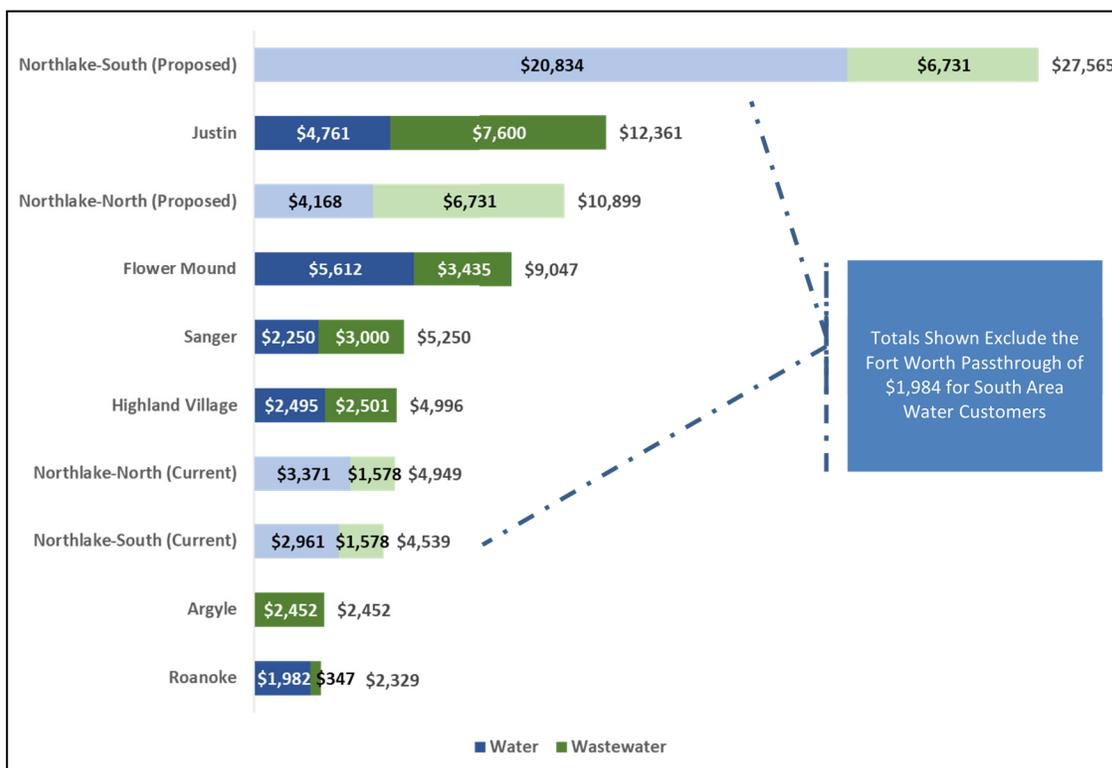


Figure 5.1. Regional Impact Fee Comparison

6. Appendices

APPENDIX A: Meter Size / LUE Conversions and Customer Only Tables

For the Northlake system, existing living unit equivalents (LUEs) were accounted for from georeferenced customer water meter data that includes meter size (in inches). LUEs from future development, however, are contingent on an unknown number of fixtures (sinks, lavatories, etc.) which determine the appropriate meter size. To establish future LUEs, Halff estimated the approximate number of LUEs for each acre of currently undeveloped land in Northlake’s water and sewer CCN boundaries based on either planned unit counts or character area descriptions, as outlined in the Town’s 2016 Comprehensive Plan. Any unconnected, existing development within the CCN boundaries are assumed to be redeveloped by buildout and connected to the Northlake system, unless otherwise noted. The LUE calculations for the sewer system include all meters within the sewer CCN less the Ranch Preservation character area meters. Notable differences between the water and sewer CCN’s are that the sewer CCN excludes the Argyle WSC service area and includes the Transitional Market Dependent character area, west of FM 156 and south of Denton Creek.

Table A.1. shows the existing water meter count in Northlake, by size, within each pressure plane and as system totals. The meter counts are converted to LUEs using the living unit equivalent factors presented in **Table 2.4** of the report.

Table A.1. Existing Northlake Water Meters and Living Unit Equivalents

	Pressure Plane	¾"		1"		1.5"		2"		3"		4"		Total LUEs
		Meters	LUEs	Meters	LUEs	Meters	LUEs	Meters	LUEs	Meters	LUEs	Meters	LUEs	
WATER SYSTEM	Northside High	1,993	1,993	19	31.7	7	23.3	25	133.3	3	30	1	20	2,231
	Northside Low	1,105	1,105	58	96.7	4	13.3	2	10.7	0	0	0	0	1,226
	North Denton Creek	1,058	1,058	1	1.7	0	0	10	53.3	0	0	0	0	1,113
	South Denton Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
	Southside	5	5	19	31.7	9	30	80	426.7	16	160	0	0	653
	Total	4,161	4,161	97	161.7	20	66.7	117	624	19	190	1	20	5,223
SEWER SYSTEM	Total	3,676	3,676	43	71.7	18	60	113	602.7	19	190	1	20	4,620

Future LUE estimates for the currently undeveloped areas were calculated based on whether planned unit counts are known for the property. For properties currently in development or review, the planned number of single-family residence units were used as LUE estimates using a 1:1 ratio of single-family unit to LUE. For the remaining property types (multi-family residential, commercial, etc.) and properties without current development plans, Halff established LUE per acre estimates based on character area unit densities identified in the Town’s 2016 Comprehensive Plan for residential properties and LUE per acre estimates based on existing data for non-residential properties. The land use ratios were applied for each character area. **Table A.2** shows the total and itemized, by property type, LUE per acre estimates used for future LUE estimate calculations.

Table A.2. LUE Per Acre Factors

Character Area	Total LUE per ACRE	Itemized LUE per acre		
		Single-Family Residential	Multi-family Residential ¹	Non-Residential ²
Neighborhood Residential	2.50	2.4	0	0.10
Ranch Preservation	0.15	0.145	0	0
Workforce Residential	3.93	0	3.00	0.93
Mixed Use ³	2.77	1.44	0.60	0.73
Business Park	0.18	0	0.00	0.18
Transitional Mixed Use ³	2.48	1.12	0.70	0.66
Transitional Market Dependent ³	0.76	0.10	0	0.66

¹Assumes a 3" meter can serve 22 multi-family residential units (equates to 10 LUEs per 22 multi-family units)

²Average LUE per acre estimates calculated from existing meter sizes and associated acreage.

³Due to a lack of existing meters, non-residential LUE per acre estimates are assumed as follows:

- Mixed Use: Workforce Residential factor applied to non-residential acreage (55% of Mixed Use acreage)
- Transitional Mixed Use: Workforce Residential factor applied to non-residential acreage (50% of Transitional Mixed Use acreage)
- Transitional Market Dependent: Transitional Mixed Use factor applied to non-residential acreage

Table A.3. presents the LUE estimates, calculated as described in this section.

Table A.3. LUE Estimates

	Service Area	Pressure Plane	Existing LUEs	2032 Additional LUEs	2032 Total LUEs ¹	Buildout Additional LUEs	Buildout Total LUEs	Buildout LUEs by Service Area
WATER SYSTEM	NORTH	Northside High	2,231	2,074	4,390	239	4,630	16,811
		Northside Low	1,226	2,402	3,526	2,393	5,919	
		North Denton Creek	1,113	551	1,680	4,582	6,262	
	SOUTH	South Denton Creek	0	295	295	1,084	1,378	2,660
		Southside	653	401	1,054	228	1,282	
	-	Total	5,223	5,723	10,945	8,526	19,472	-
SEWER SYSTEM	SEWER	Total	4,620	5,319	9,939	8,241	18,180	18,180

¹Total 2032 LUEs account for the transfer of three 2" meters from Northside-Low to North Denton Creek and the transfer of thirty-four 1" meters, one 2" meter, and twenty-three ¾" meters from Northside-Low to Northside-High associated with pressure plane boundary modifications.

APPENDIX B: Water Demand Trends

Table B.1. Northlake Water Demand Trends: Historic Water Use

Year	Estimated Customer Population*	Average Day Demand (MGD)	Maximum Day Demand (MGD)
2011	1,867	0.35	0.73
2012	2,110	0.33	0.65
2013	2,253	0.29	0.70
2014	2,533	0.33	0.65
2015	3,111	0.47	1.21
2016	4,445	0.74	1.60
2017	5,587	0.90	1.72
2018	7,173	1.11	3.02
2019	8,565	1.40	4.75
2020	10,437	1.83	3.60
2021	13,378	2.12	4.12
Average:	-	0.90	2.07

*Includes all population within the Northlake water CCN with an active service connection.

The average of the ADD to MDD factors resulted in an ADD to MDD factor of 2.4. This is somewhat less than the trendline which is significantly influenced by the 2019 outlier. To represent typical water use trends and to avoid double accounting for years with higher than typical use, an ADD to MDD factor of 2.4 was used to estimate future MDD projections. ADD to MDD factors for the Town of Northlake are shown in Figure B.1.

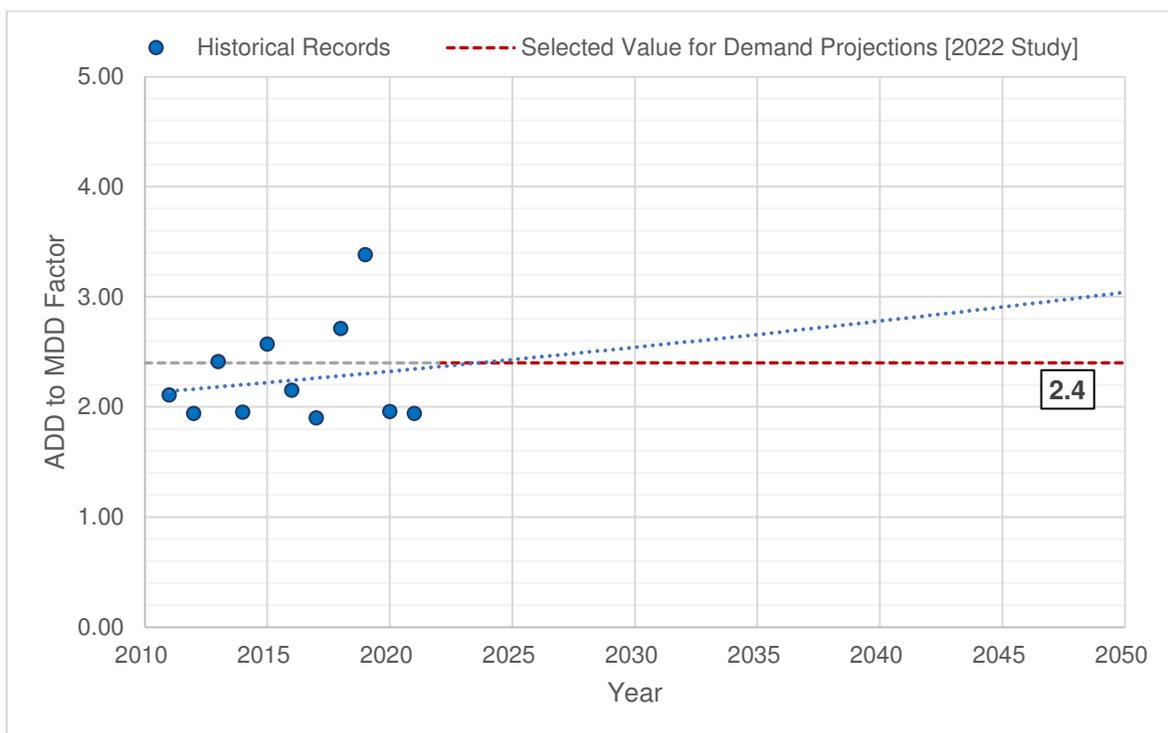


Figure B.1. Northlake Water Demand Trends: ADD to MDD Factor

The systemwide average day per capita water use (in gallons per capita per day (gpcd)) has been increasing for the Town of Northlake over the last ten years. Historical values range from approximately 130 gpcd to 190 gpcd. These values include demands from residential and non-residential use, so the 'residential only' per capita use is anticipated to be somewhat lower than the values presented in the below figure. As a conservative measure, an average day per capita water use of 175 gpcd has been selected for use in the demand projection calculations for future residential use, as this value is moderately lower than the 190 gpcd value projected by the historical trendline. Residential water demand projection methods are documented in **Appendix C**. Water use for non-residential properties was estimated from other methods, also documented in **Appendix C**. AD per capita water use factors for the Town of Northlake are shown in **Table B.2** and graphically in **Figure B.2**.

Table B.2. Northlake Water Demand Trends: AD per Capita Use Factor

Year	Estimated Customer Population*	Average Day Demand (MGD)	AD Per Capita Water Use (gpcd)
2011	1,867	0.35	186
2012	2,110	0.33	157
2013	2,253	0.29	128
2014	2,533	0.33	131
2015	3,111	0.47	151
2016	4,445	0.74	167
2017	5,587	0.90	162
2018	7,173	1.11	155
2019	8,565	1.40	164
2020	10,437	1.83	176
2021	13,378	2.12	158
Average:	-	0.90	160

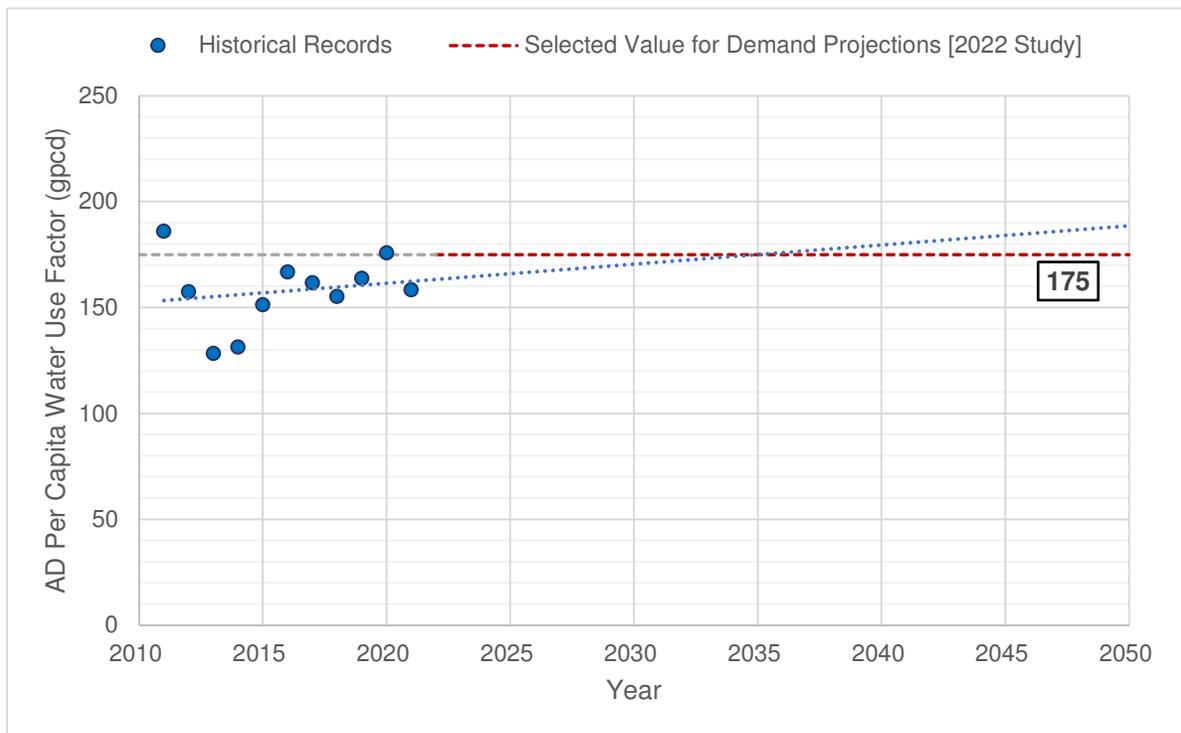


Figure B.2. Northlake Water Demand Trends: AD per Capita Use Factor

APPENDIX C: Population and Demand Projections

Existing population within Northlake’s water CCN boundary is estimated at 15,700 based on 2021 population information and a household population density estimate of 2.59 people per household for homes built in 2022. New construction homes, estimated to be occupied in 2022, were identified from existing water meter data and aerial imagery.

In Development Properties

All properties in development, are anticipated to be complete and/or occupied within the 10-year planning window. All associated demands and population are included in the 2032 system.

Residential

Residential demands estimated with the following assumptions:

1. 2.59 people per household/unit.
2. 175 gpcd AD per capita water use.
3. 2.4 ADD to MDD factor.

Table C.1. In Development Properties: Single-Family Residential Demands

Exhibit 4 ID	Property Name	SF (units)	Population	Max Day Demand (gpm)
1	The Ridge at Northlake <i>(33% builtout in existing system)</i>	411	1,064.5 <i>(352 existing)</i>	310.47 <i>(112.4 gpm applied to existing system)</i>
2	Harvest North <i>(17% builtout in existing system)</i>	670	1,735.3 <i>(295 existing)</i>	506.13 <i>(93.4 gpm applied to existing system)</i>
3	Hawthorne Estates	29	75.1	21.91
4	Creek Meadows West Phase 1	76	196.8	57.41
5	Pecan Square - Phases 3 and 4	1200	3,108.0	906.49
6	The Highlands Phase 3A & 3B	62	160.6	46.84
7	Enclave at Chadwick Farms	61	158.0	46.08
8	Identified by Northlake Staff (A)	70	181.3	52.88
9	Identified by Northlake Staff (B)	40	103.6	30.22
10	Identified by Northlake Staff (C)	4	10.4	3.02
11	Identified by Northlake Staff (D)	400	1,036.0	302.16
-	Platted, unconstructed homes	279	722.6	210.76
Total:		3,023	7,905.2	2,288.6gpm [3.3 MGD]

Table C.2. In Development Properties: Multi-Family Residential Demands

Exhibit 4 ID	Property Name	MF (units)	Population	Commercial (sf)	Max Day Demand (gpm)
12	Canyon Falls LIV	784	2,030.6	15,585	592.2
13	Jefferson Northlake	400	1,036	-	302.2
-	Existing Multi-Family development in Workforce Residential <i>(estimated 35% builtout in existing system)</i>	-	2,206.1	-	1,006.2 <i>(395.8 gpm applied to existing system)</i>
Total:		1,184	5,272.7	-	1,504.8 gpm [2.2 MGD]

Non-Residential

Non-residential demands estimated per FTW Design Criteria for Water Systems (2019) with the following assumptions:

1. Commercial/Light Industrial zoning usage rate assumptions
2. 50 gallons per employee per day
3. 2.25 ADD to MDD factor
4. Buildings are 20% office space (1 employee/400 s.f.) and 80% warehouse space (1 person/2,000 s.f.).
5. **Where building size is unknown**, building area estimated from average 16,063.6 s.f. per acre value based on existing (2022) non-residential properties.
6. 120 gpd per unit MDD for hotel properties estimated from the average demand per unit value from existing (2022) hotel properties.
7. 18,200 gpd MDD for institutional properties estimated from the average demand value from existing (2022) institutional properties.

Non-residential demands calculated as follows:

$$\text{Employee Population} = (20\% * \text{Building Size (s.f.)} * \frac{1 \text{ person}}{400 \text{ s.f.}}) + (80\% * \text{Building Size (s.f.)} * \frac{1 \text{ person}}{2,000 \text{ s.f.}})$$

$$\text{Maximum Day Demand (gpm)} = \left(\text{Employee Population} * \frac{50 \text{ gallons}}{\text{person} * \text{day}} * 2.25 \right) / \left(\frac{1,440 \text{ min}}{\text{day}} \right)$$

Table C.3. In Development Properties: Non-Residential Demands

Exhibit 4 ID	Property Name	Hotel (units)	Commercial (sf)	Max Day Demand (gpm)
15	Fieldhouse VB Plat	-	88,859	6.25
16	Canyon Falls Commercial Tract 20B & Kiddie Academy	-	72,000	5.06
17	Duke Realty - Northlake Industrial Addition	-	1,833,972	128.95
18	Northlake 35 Logistics Park (Buchanan Tract)	-	2,607,060	183.31
19	Northlake Logistics Crossing (Foster Tract)	-	1,391,800	97.86
20	DHL (6 McFarm)	-	2,928,000	205.88
21	Hillwood	-	9,603,000	675.21
22	Gerbert Tract	-	2,575,304	181.08
23	Cambria Hotel	111	10,150	9.96
24	Austin Two Tracts Addition	-	49,815	3.50
25	Urban Garages	-	52,000	3.66
26	Twin Peaks	-	33,007	2.32
27	Identified by Northlake Staff	-	1,500,000	105.47
28	Identified by Northlake Staff (Warrenstad)	-	500,000	35.16
29	Northlake Land Development Addition	-	40,300	2.83
30	Tru by Hilton Hotel	100	-	8.33
31	Identified by Northlake Staff (Elementary School)	-	-	12.61
	Total:			1,668 gpm [2.4 MGD]

Developable Area

The Town’s 2016 Comprehensive Plan Update identified seven Character Areas, each with density and land use goals to maintain the intended aesthetic of the area. The unit density and land use ratios were utilized by this study to estimate future connection count and associated demands for developable property without existing development plans. To establish a conservative estimate of future growth, the unit densities and land use ratios that resulted in the highest unit density were used for demand projection calculations. The values used from the Comprehensive Plan Update and the resulting residential and non-residential calculations are shown in **Table C.4**.

Table C.4. Developable Properties: Unit Densities

Character Areas	Maximum Units per Acre	Use (%)				Units per Acre	Non-Residential s.f. per Acre
		Residential	Ranches / Large Estates	Non-Residential	Open Space		
Neighborhood Residential (NR)	3	80%	0%	5%	15%	2.4	803
Ranch Preservation (RP)	0.2 (SF) 0.1 (Ranches)	45%	55%	0%	0%	0.145	0.00
Workforce Residential (WR)	22	30%	0%	70%	0%	6.6	11,244
Mixed Use (MU)	6 (SF) 22 (MF)	30%	0%	55%	15%	2.76	8,835
Business Park (BP)	0	0%	0%	90%	10%	0	14,457
Transitional Mixed Use (TMU)	4 (SF) 22 (MF)	35%	0%	50%	15%	2.66	8,032
Transitional Mixed Dependent (TMD)	Resembles RP when residential and TMU when non-residential.					1.40	4,016

*SF: Single-Family unit, MF: Multi-Family unit

Future building area (s.f.) was estimated from an average of existing (2022) non-residential building densities (16,063.6 s.f. per acre).

Residential demands estimated with the following assumptions:

1. 2.59 people per household/unit.
2. 175 gpcd AD per capita water use.
3. 2.4 ADD to MDD factor.

Non-residential demands estimated per FTW Design Criteria for Water Systems (2019), as described above. The densities identified in **Table C.4** were applied to developable acreage to establish the additional number of residential units and non-residential area that can be accommodated in keeping with the densities established by the Comprehensive Plan Update. The resulting additional population and demands from developable land in Northlake’s water CCN are shown in **Table C.5**.

Table C.5. Developable Properties: Demand Projections

Character Areas	Acres	# Units	Population	Residential MDD (MGD)	Building Area (s.f.)	Non-Residential MDD (gpm)	MDD [MGD]
NR	899.82	2,159.57	5,593.29	2.35	722,718	0.0732	2.42
RP	4,215.51	611.25	1,583.14	0.66	-	0.00	0.66
WR	116.20	766.94	1,986.37	0.83	1,306,641	0.13	0.97
MU	1,032.03	2,848.40	7,377.36	3.10	9,117,951	0.92	4.02
BP	1,401.91	0.00	0.00	0	20,267,771	2.05	2.05
TMU	784.41	2,086.54	5,404.14	2.27	6,300,262	0.64	2.90
TMD	1,163.52	1,631.83	4,226.44	1.77	4,672,574	0.47	2.25
Total:	9,6134.4	10,104.5	26,170.66	11.0	-	4.29	15.3

Partial development of the developable land, without current development plans, is anticipated within the 10-year planning window. The assumed allocation of population and demands expected to develop in the 2032 system and the buildout system are shown in [Table C.6](#).

Table C.6. Developable Properties: Demand Applications

Character Areas	Total Demand [MGD]	Demand Applied			Population Added		
		2022	2032	Buildout	2022	2032	Buildout
NR	2.42	0	0.4 MGD (35%)	2.0 MGD (65%)	0	852.7	4,740.6
RP	0.66	0	0.22 MGD (30%)	0.44 MGD (70%)	0	527.7	1,055.4
WR	0.97	0	0.49 MGD (50%)	0.49 MGD (50%)	0	993.2	993.2
MU	4.02	0	0	4.02 MGD (100%)	0	0	7,377.3
BP	2.50	0	0.21 MGD (8%)	2.29 MGD (90%)	0	0	0
TMU	2.91	0	0	2.91 MGD (100%)	0	0	5,404.1
TMD	2.25	0	0	2.25 MGD (100%)	0	0	4,226.5
Total:	15.3	0	1.32	14.4	0	2,373.6	23,797.1

With current water use factors, the Town of Northlake system-wide demand would approach 30.0 MGD at buildout. However, in keeping with the Texas Water Development Board Region C Water Plan, water conservation is anticipated for all water users to reduce strain on limited resources. Anticipated water conservation strategies and efforts to reduce per capita water usage include city-wide conservation efforts, reduced water loss from the proactive replacement of aging assets, and installation of low flow fixtures in future developments and retrofitting in existing homes. To account for water conservation, a systemwide ADD per capita water use factor of 175 gpcd was applied to the buildout population with the ADD to MDD factor of 2.4. This results in a reduction of the buildout maximum day demand of 29.8 MGD (without water conservation efforts, maintaining historical trend of water usage) to **23.2 MGD** as the ultimate system demand.

APPENDIX D: Model Development and Calibration

Model Calibration

The hydraulic model of the Northlake water distribution system (WDS) is a mathematical representation that makes predictions on actual water system performance. Calibration is a necessary step to verify that model predictions closely match actual system performance so that decisions made from model results are accurate. Calibration is the iterative process of comparing model results to actual field data, under identical system conditions, and adjusting appropriate system parameters to better match field data. This step serves to identify whether the physical, consumption, and operational parameters are correct and guides any modifications made to these attributes.

The Northlake hydraulic model was calibrated under steady-state (SS) and 24-hour extended-period simulations (EPS) with fire hydrant flow tests and operational SCADA data. The fire hydrant flow tests were conducted on 1 August 2022 for multiple hydrants throughout the four existing pressure planes. The flow tests provide static pressure at the tested hydrants and associated residual pressure when a high flow is induced from a nearby open hydrant. 24-hour SCADA data for multiple high demand days in August 2022 were used to calibrate system operations and setpoints within each pressure plane. The 24-hour SCADA data included pump station (PS) discharge and pressure, elevated storage tank (or hydropneumatic tank) water levels, pump status, and ground storage tank water levels for the Harvest PS and Canyon Falls PS. There is no SCADA data currently available for the Southside pressure plane. However, SCADA data for the City of Fort Worth delivery point was provided by the City of Fort Worth and included pressure and flow readings. Additionally, the pressure reducing valve (PRV) recordings were provided for the newly-installed PRV that separates the Northside High and Northside Low pressure planes.

Each hydrant test defines a calibration event where the state of the system can be replicated in the model to view the resulting modelled conditions at tested hydrants and other recorded system parameters. System conditions are replicated as close as possible for the time the field data was recorded to minimize the number of variables in question. Each calibration event is assembled by forcing the model to match system boundary conditions then using the modelled system pressures and other parameters to gauge how well the model simulates actual system performance.

The following parameters were subject to corrections and adjustments throughout the calibration process:

- System connectivity
- Pipe roughness coefficients
- Node and facility elevations
- Pump characteristics
- Diurnal patterns
- Demand distribution

Discrepancies between the field data and modelled results can be caused by needed corrections and adjustments to the above parameters but other potential factors include unknown conditions in the system and inaccurate or imprecise field or recorded data used for model input and results comparison.

Steady State Calibration

The system conditions replicated in the SS calibration events are listed by pressure plane below and defined by the following parameters:

- Flow into the system:
 - Northside High and Low: Pump status for Harvest PS pumps
 - North Denton Creek: Pump status for Canyon Falls PS pumps
 - Southside: Flow data from Fort Worth delivery point meter
- System hydraulic grade line (HGL) at start of calibration event:

- Northside High and Low: Water levels in Harvest EST (and PRV pressure readings for Northside Low)
- North Denton Creek: Water levels in hydropneumatics tanks
- Southside: Pressure data from Fort Worth delivery point meter
- Flow out of the system: Consumption at meters

11 hydrant flow tests were used as SS calibration events and the location of each hydrant is shown in [Exhibit D.1](#). Each SS calibration event is established by replicating known system boundary conditions and recording the resultant static pressures for the applicable hydrant pair then applying the known flow to the appropriate hydrant and recording the residual pressure at the other hydrant. The known system boundary conditions are replicated from PS pump status, PS total discharge, and EST water levels at the time of the flow hydrant test. Demands were universally scaled to match the total demand of that day and the time of day, based on the diurnal pattern.

The modelled results documented for the SS calibration events are static and residual pressure at the applicable hydrant pairs. The goal of calibration is to achieve modelled results within 10 percent of measured values for at least 90 percent of the collected data. [Figure D.1](#) shows the static pressure results for the SS calibration events, organized by geographic location in the WDS. [Figure D.2](#) shows the residual pressure results for the SS calibration events, organized by geographic location in the WDS. Hydrant locations are shown in [Exhibit D.1](#).

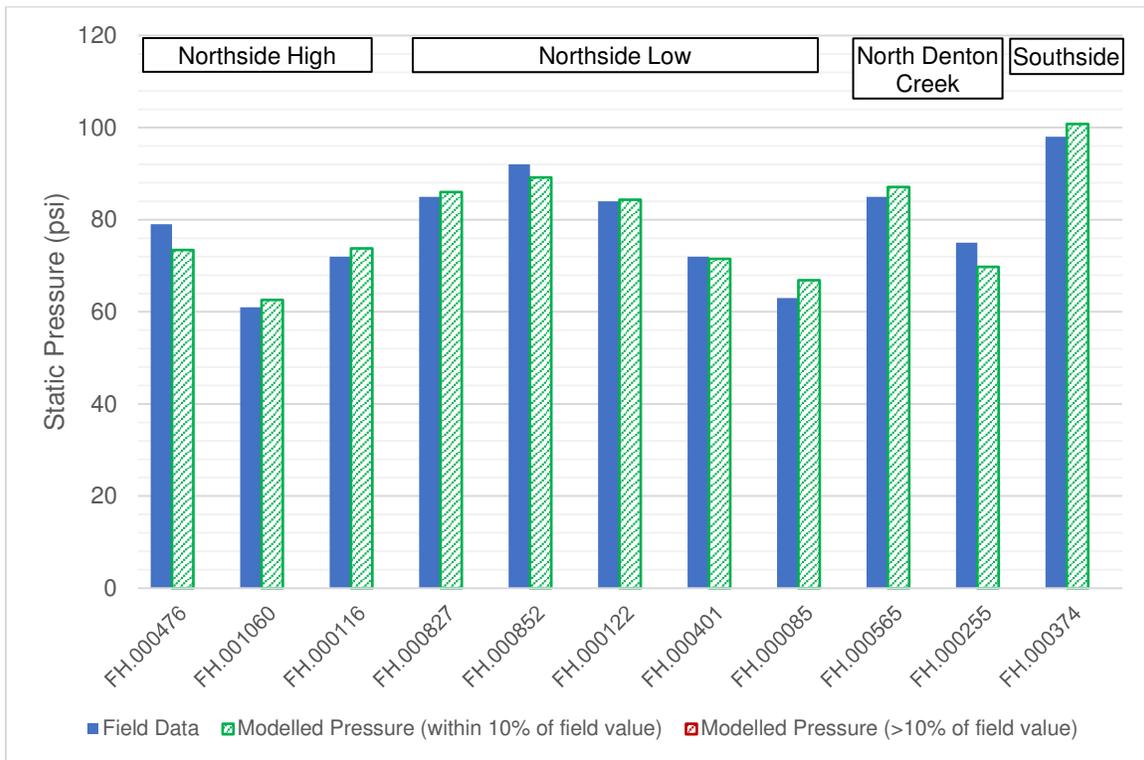


Figure D.1. Static Pressure Modelled Results: SS Calibration Events

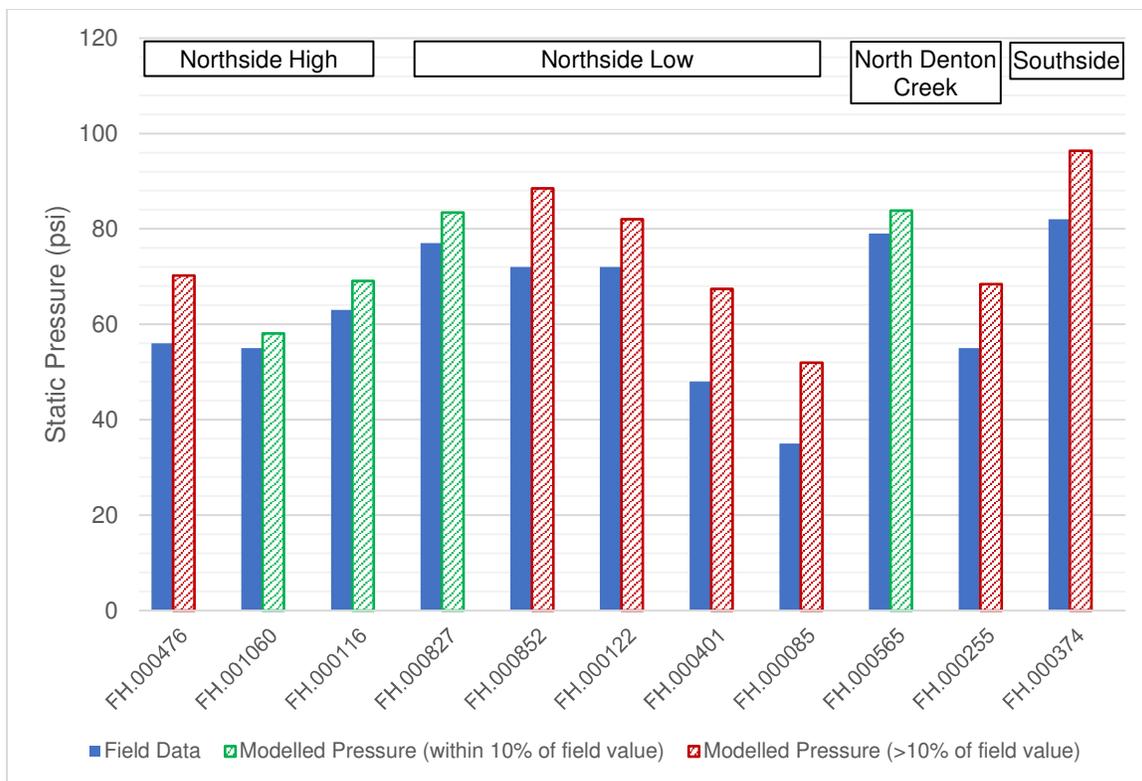


Figure D.2. Residual Pressure Modelled Results: SS Calibration Events

100% of the 11 modelled static pressure results are within 10% of their respective hydrant test values. The modelled static pressures indicate that the model is able to accurately simulate the existing static grade line throughout the majority of the distribution system.

36% of the 11 modelled residual pressure results are within 10% of their respective hydrant test values. The seven hydrants with residual pressure results outside of the 10% criteria are not limited to a specific geographic area. At the time of the flow testing, the fire hydrant diffuser attachment was initially inoperative and not producing flow readings. After a quick repair, the diffuser was able to produce flow readings but with a high degree of variability and instability in the indicated flow(s) from the hydrant. Given the high degree of accuracy for static pressures, there is concern that the diffuser was not producing reliable flow readings and the residual pressure results displayed in **Figure D.2.** are derived from incorrect flows induced at the modelled hydrant. **Table D.1** shows the required flow to produce a residual pressure within 10% of the recorded residual pressure at the modelled hydrant for hydrants outside of the 10% criteria, in **red**. For hydrants within the 10% criteria, the modelled flow required to produce a residual pressure within 5% is shown in **green**.

Table D.1. Recorded vs. Required Hydrant Flows for Residual Pressure Tests

Hydrant	Recorded Flow (gpm)	Required Modelled Flow (gpm)
FH.000476	610	1,400
FH.001060	1,000	1,050
FH.000116	865	1,200
FH.000827	865	1,300
FH.000852	350	1,500
FH.000122	785	1,150
FH.000401	785	1,850
FH.000085	960	1,500
FH.000565	610	720
FH.000255	865	2,800
FH.000374	1,100	2,000

The required modelled flows shown in **Table D.1.** are the flows that would be expected during the field tests to produce the residual pressures recorded at the partner hydrants for each field test. It is recommended that the hydrant diffusers in use by the Town are repaired and recalibrated for any future calibration efforts.

Excluding the questionable flow data, the model appears able to accurately simulate existing static conditions in the three systems.

Extended Period Calibration

EPS calibration requires time-varying controls and patterns for system conditions that cover the 24-hour calibration event. The required time-variable inputs replicated in the EPS calibration events are listed below and defined by the following parameters:

- Flow into the system:
 - Northside High and Low: Harvest PS pump status or setting changes
 - North Denton Creek: Canyon Falls PS pump status or setting changes
 - Southside: Flow data from Fort Worth delivery point meter
- System HGL:
 - Northside High and Low: Water levels in Harvest EST (and PRV pressure readings for Northside Low)
 - North Denton Creek: PS discharge pressure
 - Southside: Pressure data from Fort Worth delivery point meter
- Flow out of the system: Diurnal usage patterns

Two EPS calibration events with 24-hour SCADA recordings for system operations were used for model comparison. EPS calibration was completed for operations of the Northside pressure planes and the North Denton Creek PP. The absence of SCADA data and appropriate facilities in the Southside PP precluded this part of the system from EPS calibration. Each EPS calibration event is established by replicating known system boundary conditions and, additionally, specifying the time-variable inputs. The resulting water level fluctuations in the ESTs or hydropneumatics tanks and HSPS discharge are documented. The known system boundary conditions are replicated from pump status, tank water levels, and PRV setting, where applicable, at the start of the simulation. PS pump status is controlled based on time of day, as recorded by SCADA. System demands were scaled to match the daily demand and scaled hourly following the diurnal pattern for the applicable pressure plane.

The modelled results documented for the EPS calibration events are discharge flows and pressure at the PS and water level at the EST. The goal of calibration is to achieve modelled results within 10 percent of measured values for at least 90 percent of the collected data. **Figure D.3.** shows model results for the 7 August 2022 EPS calibration event for the Northside pressure planes.

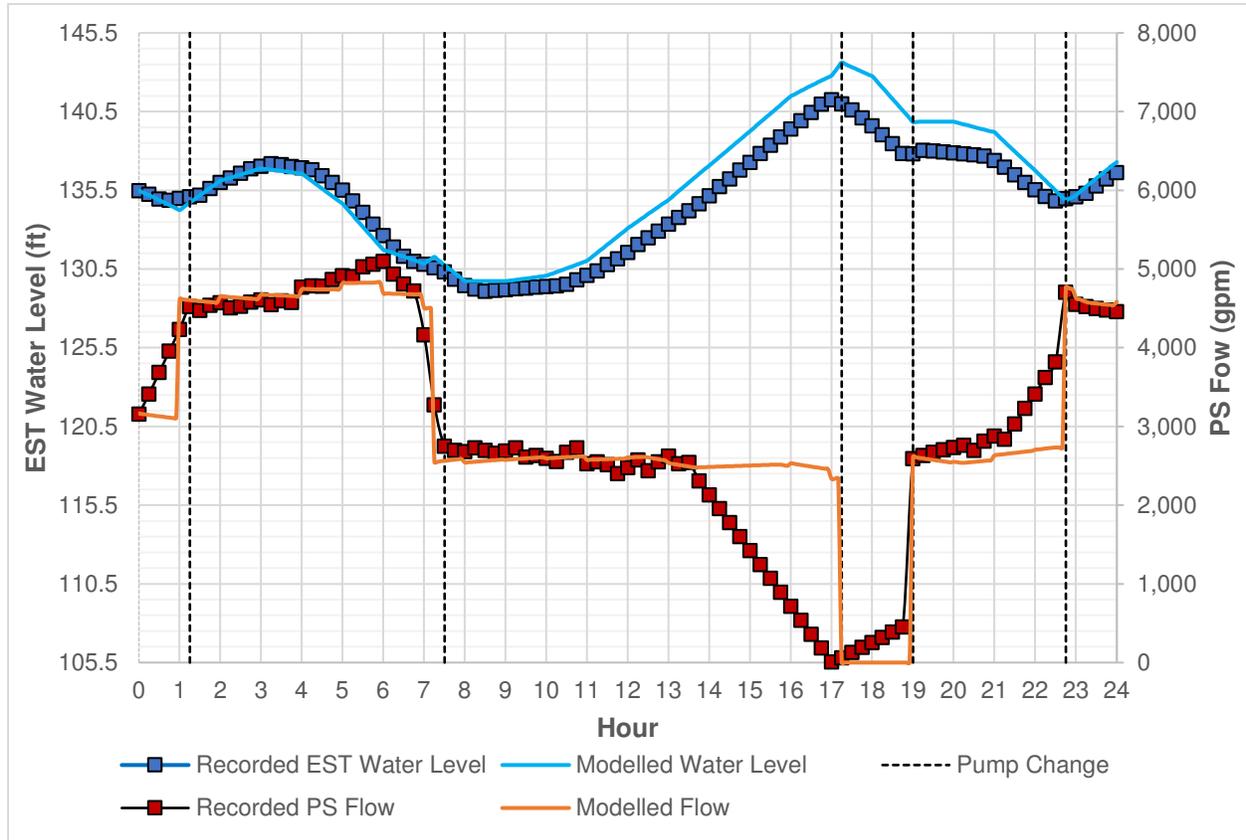


Figure D.3. EPS Calibration: Harvest PS and Harvest EST [7 August 2022]

The average modelled EST water level is 3.0% higher than the recorded average value. Modelled water levels align significantly with recorded fluctuations, indicating exceptional agreement between modelled demands, diurnal factors, pump operations, and system hydraulics. These results show that the HGL is replicated well in the Northside pressure planes by the model. The magnitude and fluctuation of PS flow shows significant agreement between modelled and recorded values, such that the average modelled PS flow is 2.6% higher than the recorded average value. The deviations from recorded flow (most notably between hours 13-17, 17-19, and 21-23) are associated with linear flow changes recorded by SCADA without any indication of pump status or motor speed changes. These linear flow readings appear to occur prior to pump status changes and are not supported by associated changes in PS pressure or EST water level trends. It is recommended that flow measurement at Harvest PS is evaluated and the instrument is recalibrated to accurately record flow at all times. Excluding the questionable flow data, the model appears able to accurately simulate existing hydraulic conditions in the Northern section of the system. **Figure D.4.** shows model results for the 21 August 2022 EPS calibration event for the North Denton Creek PP.

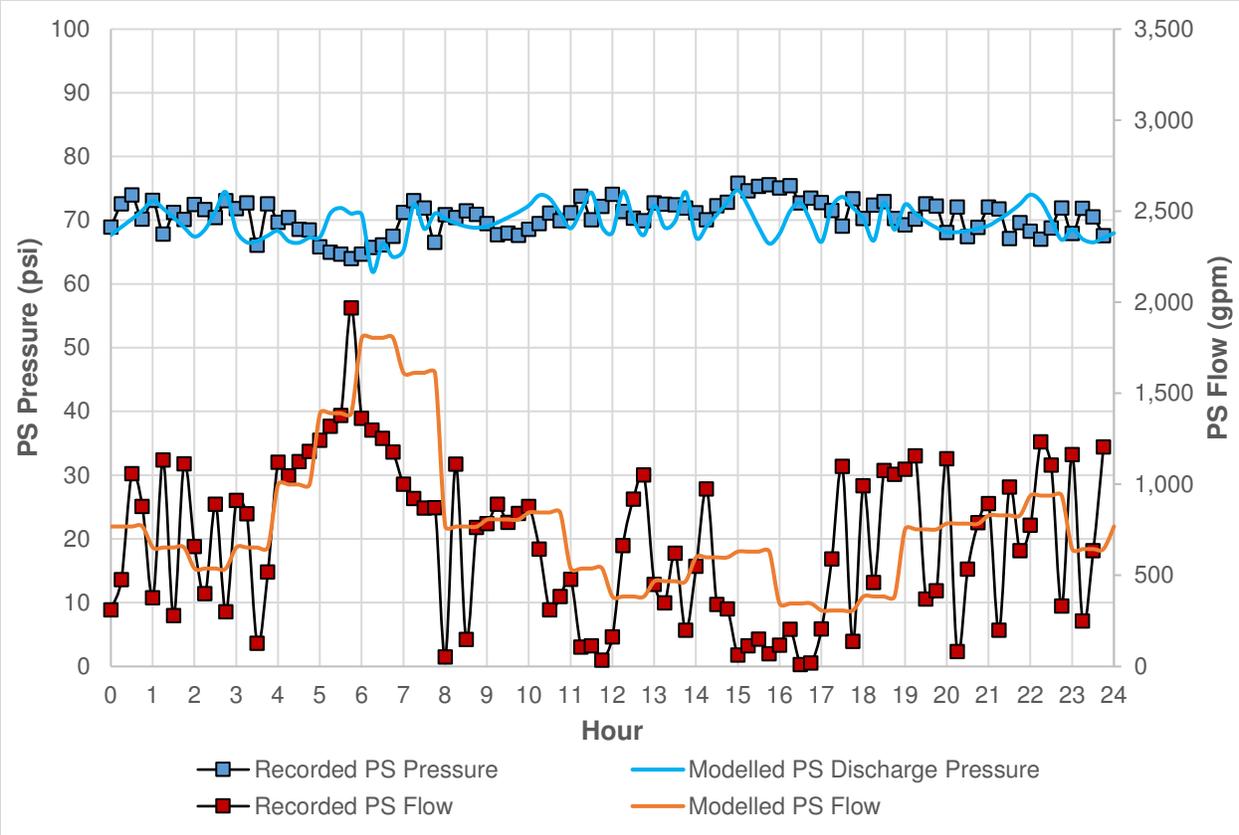


Figure D.4. EPS Calibration: Canyon Falls PS [21 August 2022]

The average modelled PS discharge pressure is less than 0.1% higher than the recorded average value. The range of modelled PS discharge pressure aligns significantly with recorded fluctuations, indicating that the model can accurately simulate the existing hydraulic grade line in the North Denton Creek PP. The magnitude of PS flow shows significant agreement between modelled and recorded values, such that the average modelled PS flow is 12.6% higher than the recorded average value. Deviations from recorded flow can be attributed to pump status changes occurring more frequently than the hydraulic timestep of the model. The model appears able to accurately simulate existing hydraulic conditions in the North Denton Creek PP.

The steady state and extended period calibration results indicate that the model appears able to accurately simulate existing hydraulic conditions, which is its initial primary purpose for this project. Significant deviations from recorded data are likely related to flawed recorded data, as discussed.

Model Limitations

The purpose of the model is to identify basic infrastructure needs so Northlake can plan and budget for construction of the projects. The alignments and sizes presented in the model are based on the assumptions established as part of this report. Information generated from the model runs does not preclude Northlake or a developer from utilizing proper engineering practices and design prior to constructing any capital projects or development plans. Care should be taken when using specific data from model results, such as pressures at nodes or velocities in pipes. These are estimated values subject to the inherent assumptions necessary to build out the model.

APPENDIX E: Denton Creek Pressure Plane Memo

In the 2022 Impact Fee Update, the North Denton Creek (NDC) and South Denton Creek (SDC) pressure planes (PPs) generally encompass the following areas within the Northlake water service area:

- North Denton Creek PP: This PP encompasses the connections currently supplied from the Canyon Falls Pump Station (PS) and generally includes land area north of Denton Creek but south of the Pecan Square development.
- South Denton Creek PP: This PP encompasses the area south of Denton Creek and west of Interstate 35W.

The North and South Denton Creek PPs are at a similar elevation range such that these areas could be served by a common hydraulic grade line (HGL). With the exception of the Argyle Water Supply Corporation connections, these two service areas have an elevation range within 580 to 688 ft above mean sea level (MSL). The absolute pressure range could be maintained between 35 to 100 psi by the water level in an elevated storage tank (EST) with an overflow of 810 feet above MSL and a 30-foot bowl height. For this reason, the option to connect the NDC and SDC PPs, to create the Denton Creek PP, via a transmission line connection across Denton Creek was evaluated in the 2022 Impact Fee Update. The pros and cons of this configuration are presented in this memo relative to the option of not connecting these two pressure planes.

The NDC PP is supplied from the Canyon Falls PS which receives water from the Upper Trinity Regional Water District (UTRWD) while the SDC PP will be supplied from a proposed pump station that will receive water from the City of Fort Worth (FW) potable water distribution system. If NDC and SDC PPs are connected across Denton Creek, this would involve the inevitable blending of two separately sourced waters between the two pressure planes. This scenario would likely require significant negotiation with both wholesale water suppliers and could ultimately be denied by one or both parties. Blending of source waters would involve approval from the Texas Commission on Environmental Quality (TCEQ) to ensure the disinfection residuals from the two sources are adequately similar. Further, if this scenario is approved by both parties, additional costs could be incurred by Northlake to accommodate stricter requirements on the supplier.

In addition to the complications related to combining systems supplied by separate water suppliers, there are several regulatory capacity requirements that are impacted by connection of the NDC and SDC PPs. If the NDC and SDC PPs are connected, regulatory water system capacity requirements can be met by combining the capacities of each pressure plane. However, the individual pressure planes must meet minimum capacity requirements of their respective system until the two systems are connected. The population and connection count estimates used in capacity calculations are shown for the 10-year and buildout systems in **Table E.1**.

Table E.1. Population and Connection Count Estimates for the SDC and NDC Pressure Planes

	2032			Buildout		
	SDC	NDC	Combined	SDC	NDC	Combined
Population	0	5,420	5,420	2,788	16,968	19,756
Commercial Connection Estimate	100	50	150	150	150	300
Estimated Connection Count	100	2,141	2,241	1,226	6,701	7,927

State legislation dictates the following minimum water system capacity requirements based on connection count for public water systems in Texas:

- A total storage capacity of 200 gallons per connection.
- An elevated storage capacity of 100 gallons per connection for systems with more than 2,500 connections and a pressure tank capacity of 20 gallons per connection, up to 30,000 gallons, for systems up to 2,500 connections.

- For systems that provide an elevated storage capacity of 200 gallons per connection, a pump station capacity of 0.6 gallons per connection (gpm) is required for each pressure plane.

This study follows the higher elevated storage requirement of 200 gallon per connection for pressure planes with greater than 2,500 connections so that pumping capacity requirements are lower. The lower elevated storage requirement, 100 gallons per connection, is associated with a pumping requirement 3.3 times the pumping capacity used in this study. The minimum system capacity requirements based on the connection count estimates in **Table E.1** are shown in **Table E.2**.

Table E.2. TCEQ Capacity Requirements for the SDC and NDC Pressure Plane

	<i>Existing Capacities</i>	2032		<i>Buildout</i>		
		Requirement	<i>Surplus / (Deficit)</i>	Requirement	<i>Surplus / (Deficit)</i>	
SDC	Total Storage (MG)	0	0.02	-0.02	0.25	-0.25
	Total Elevated Storage (MG)	0	<i>Note 1</i>			
	Pump Station Capacity (MGD)	0	0.09	-0.09	1.06	-1.06
NDC	Total Storage (MG)	0.75	0.48	0.27	1.35	-0.60
	Total Elevated Storage (MG)	0	<i>Note 2</i>		1.35	-1.35
	Pump Station Capacity (MGD)	4.3	2.06	2.24	5.79	-1.49

¹The SDC system has less than 2,500 connections in the 2032 and buildout systems and does not require elevated storage. However, a pressure tank capacity of 24,520 gallons would be required with the buildout connection count estimate.

²The NDC 2032 system has less than 2,500 connections and does not require elevated storage. However, 30,000 gallons of pressure tank capacity is required with the 2032 connection count estimate.

The NDC PP is not anticipated to exceed 2,500 connections, the elevated storage requirement trigger, for at least 10-years while the SDC PP connection count is never anticipated to surpass 2,500 due to its low connection density, related to a light industrial land use. Both systems can initially meet regulatory requirements through pressure tank capacity, rather than elevated storage capacity. The NDC PP already has pressure tank capacity while the SDC would require the installation of hydropneumatics tanks once the pressure plane is established.

Due to anticipated growth trends, elevated storage within the NDC PP will likely be required within a 15-year window. Since elevated storage cannot be incrementally added to a single tank, the buildout required volume of the combined pressure plane would need to be constructed at that time. The location of this EST would need to be somewhat central to both pressure planes, such that the ideal location for a single EST was determined to be the high point near the western edge of the NDC PP. Until the pressure planes are connected, this EST location will likely result in water age concerns in the NDC PP due to its location at the edge of the interim pressure plane boundary.

If the NDC and SDC PPs are ultimately connected, the interim system would include the following, in relation to elevated or pressure tank storage:

- The SDC PP will require up to 25,000 gallons of pressure tank capacity that will ultimately be taken offline once the pressure planes are connected.
- The NDC PP will include a 1.6 MG EST located in the western edge of the pressure plane, a location increasing the likelihood of water age concerns in the interim NDC PP.

However, if the NDC and SDC PPs are not ultimately connected, the following benefits will be realized:

- Significant negotiation with Northlake’s two water suppliers to allow blending of their waters will not be warranted.
- Coordination with TCEQ for approval of water system mixing will not be warranted.
- Temporary hydropneumatics tanks will not be needed in the SDC PP.

- The NDC PP can avoid water age concerns by placing the tank at a location that best serves its service area, without consideration for future service area footprints across Denton Creek.

Moving forward with maintaining the SDC PP and NDC PP as separate pressure planes, the SDC PP will not require elevated storage, per regulatory requirements. However, the low connection count in this pressure plane is not associated with lower demand. Rather, each connection has a much higher demand than a typical connection. For this reason, elevated storage would be beneficial to serve this pressure plane in place of hydropneumatics tanks. A volume of 0.5 MG was selected to meet the peak hour demand of the buildout system and fireflow. An overflow of 800 ft above MSL was initially selected to maintain acceptable pressures throughout the pressure plane. Two locations have been proposed for this elevated tank: (1) along FM 156 north of Industrial Road [ground elevation is approx. 678 ft above MSL] and (2) along Harmonson Road near the northern and eastern edges of the future Hillwood property [ground elevation is approx. 660 ft above MSL]. The hydraulic results for each tank option are shown in **Table E.3**.

Table E.3. Hydraulic Model Results for the Two Tank Location Options

South Denton Creek Pressure Plane	Tank on FM 156		Tank on <i>future Harmonson Rd</i>	
	MIN	MAX	MIN	MAX
Pressure (psi)	41.8	94.1	42.9	94.5
Velocity (fps)	-	4.1	-	3.8
Fireflow (gpm)	3,500	>10,000	3,900	>10,000
Water Age (hrs) <i>7day [168 hrs] ADD</i>	26	140	26	138
2032 Water Age (hrs) <i>7day [168 hrs] ADD</i>	61	168	56	168

The model results in the above table show that the hydraulic benefit of one location over the other are insignificant and both tanks exceed minimum hydraulic performance criteria and regulatory minimum pressure requirements. The tank siting criteria should weigh heavily on land availability and minimization of required tank height.

APPENDIX F: Existing and Buildout Capacity Requirements

Existing CAPACITY REQUIREMENTS

Table F.1. Existing Total Storage Capacity Requirements

Pressure Plane	2022 Connection Count Estimate	<i>Total Storage: 200 gallons per connection</i>		
		Existing Storage (MG)	Required Storage (MG)	Surplus / (Deficit) (MG)
Northside High	2,048	1.85	0.41	1.44
Northside Low ¹	1,169	<u>1.44</u>	0.24	1.20
North Denton Creek ²	1,069	0.75	0.22	0.53
Southside ³	562	1.75	0.12	1.63
TOTAL	4,848	4.4	1.0	

Table F.2. Existing Elevated Storage (or Pressure Tank) Capacity Requirements

Pressure Plane	2022 Connection Count Estimate	<i>Elevated Storage: If >2,500 connections, 200 gallons per connection. *Pressure Tank: If <2,500 connections, 20 gallons per connection up to 30,000 gal.</i>		
		Existing Storage (MG)	Required Storage (MG)	Surplus / (Deficit) (MG)
Northside High	2,048	1.25	0.41	0.84
Northside Low ¹	1,169	<u>0.84</u>	0.24	0.60
North Denton Creek ^{2*}	1,069	0.0300	0.0214	0.0086
Southside ⁴	562	0.75	0.12	0.63
TOTAL⁵	4,848	2.0	0.8	

Table F.3. Existing Pumping Capacity Requirements

Pressure Plane	2022 Connection Count Estimate	<i>Pump Capacity: If elevated storage requirement met, 0.6 gpm per connection.</i>		
		Existing Firm Capacity (MGD)	Required Total Capacity (MGD)	Surplus / (Deficit) (MGD)
Northside High	2,048	6.00	1.77	4.23
Northside Low ¹	1,169	<u>4.23</u>	1.02	3.21
North Denton Creek ²	1,069	4.30	0.93	3.37
Southside	562	3.10	0.49	2.61
TOTAL	4,848	13.4	4.3	

Notes:

¹Northside Low uses surplus capacity from Northside High given its connectivity to this pressure plane.

²North Denton Creek is assumed to include Argyle High connections in the 2032 system.

³Existing total storage includes facilities currently in construction (1.0 MG ground storage at Southside PS and 0.75 MG elevated storage at Sam Lee Lane EST)

⁴Southside does not yet require elevated storage, however the elevated storage criteria is evaluated instead of pressure tank capacity as this pressure plane has an EST in construction.

⁵Total elevated storage volume does not include pressure tank volume.

BUILDOUT CAPACITY REQUIREMENTS

Table F.4. Buildout Total Storage Capacity Requirements

Pressure Plane	Buildout Connection Count Estimate	Total Storage: 200 gallons per connection			Recommendation
		2032 Storage (MG)	Required Storage (MG)	Surplus / (Deficit) (MG)	
Northside High	4,421	2.45	0.89	1.56	Harvest PS reconfiguration
Northside Low ¹	6,535	<u>2.56</u>	1.31	1.25	
North Denton Creek	6,701	0.75	1.35	-(0.60)	0.75 MG GST at Canyon Falls PS
South Denton Creek	1,226	2.50	0.25	2.25	-
Argyle High ²	239	0.00	0.0478	-(0.0478)	Canyon Falls PS reconfiguration/expansion to create Argyle High PP
Southside	2,747	1.75	0.55	1.20	-
TOTAL	21,869	10.1	4.4		

Table F.5. Buildout Elevated Storage (or Pressure Tank) Capacity Requirements

Pressure Plane	Buildout Connection Count Estimate	Elevated Storage: If >2,500 connections, 200 gallons per connection. *Pressure Tank: If <2,500 connections, 20 gallons per connection up to 30,000 gal.			Recommendation
		2032 Storage (MG)	Required Storage (MG)	Surplus / (Deficit) (MG)	
Northside High	4,421	1.25	0.89	0.36	-
Northside Low ¹	6,535	<u>1.36</u>	1.31	0.05	-
North Denton Creek	6,701	0.00	1.35	-(1.35)	North Denton Creek 1.4 MG EST
South Denton Creek ³	1,226	0.50	0.25	0.25	-
Argyle High*	239	0.0000	0.0048	-(0.0048)	Create Argyle High PP
Southside	2,747	0.75	0.55	0.20	-
TOTAL⁴	21,869	2.5	4.35		

Table F.6. Buildout Pumping Capacity Requirements

Pressure Plane	Buildout Connection Count Estimate	Pump Capacity: If elevated storage requirement met, 0.6 gpm per connection.			Recommendation
		2032 Firm Capacity (MGD)	Required Total Capacity (MGD)	Surplus / (Deficit) (MGD)	
Northside High	4,421	7.70	3.82	3.88	Harvest PS reconfiguration
Northside Low ¹	6,535	<u>3.88</u>	5.65	-(1.77)	
North Denton Creek	6,701	4.30	5.79	-(1.49)	Canyon Falls PS expansion
South Denton Creek	1,226	5.00	1.06	3.94	-
Argyle High	239	0.00	0.21	-(0.21)	Canyon Falls PS reconfiguration/expansion to create Argyle High PP
Southside	2,747	3.10	2.38	0.72	-
TOTAL	21,869	24.0	19.0		

Notes:

¹Northside Low uses surplus capacity from Northside High given its connectivity to this pressure plane.

²Argyle High uses surplus ground storage capacity from North Denton Creek

³South Denton Creek does not yet require elevated storage, however the elevated storage criteria is evaluated instead of pressure tank capacity as this pressure plane has a planned EST in the 10-year planning window to meet fireflow needs.

⁴Total elevated storage volume does not include pressure tank volume.

Comparison to buildout system capacity requirements used in the 2018 Study is included in **Appendix H (Table H.2)**.

APPENDIX G: Detailed Cost Estimates



Town of Northlake Impact Fee Water Capital Improvement Plan

Opinion of Probable Construction Cost

Project:				WS23G
Anticipated Construction Year				2023
<i>Description: Temporary booster station along Victory Circle, west of Harmonson Road to provide adequate pressure for properties that develop on the west side of the South Denton Creek PP, prior to the establishment of this PP (South Denton Creek PP will be established once the second connection to the Fort Worth system is constructed: Projects WS26A-C). 2 - 700 gpm pumps; skid mounted in PEMB building, Using Town's existing 2 - 15K gallon HPT's; approx. 0.70 acre site</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
Bonds, Insurance 1%	1	LS	\$21,000	\$21,000
Erosion Control, SWPPP	1	LS	\$8,500	\$8,500
Site Clearing, Grubbing, Leveling, & Staking	1	LS	\$40,000	\$40,000
Trench Safety and Excavation Shoring	1	LS	\$45,000	\$45,000
Connect to Existing Water Mains (2 Connections)	2	EA	\$20,000	\$40,000
20" Water Main	300	LF	\$320	\$96,000
Move/Install City Owned Hydro Tanks (2 Total)	1	LS	\$100,000	\$100,000
PEMB Structure	2500	SF	\$48	\$120,000
PEMB Roof	2500	SF	\$24	\$60,000
PEMB Siding & Vaneer	3600	SF	\$18	\$64,800
PEMB Foundation & Equipment Pads	100	CY	\$700	\$70,000
Booster Station Process Piping (DIP)	1	LS	\$85,000	\$85,000
Booster Station Process Fittings (DIP)	1	LS	\$40,000	\$40,000
Booster Station Process Valves (water only)	1	LS	\$80,000	\$80,000
Booster Station Process Meter	1	LS	\$30,000	\$30,000
Booster Station - Pumps, Pads, Conduit, Power, Controls	2	EA	\$85,000	\$170,000
Booster Station - Air Service Piping, Valves, Plumbing, & Compressor	1	LS	\$45,000	\$45,000
Booster Station - Backup Generators, Enclosure, Fuel Tank	1	LS	\$200,000	\$200,000
Site - Hauling, Excavation, Grading, etc.	1	LS	\$60,000	\$60,000
Site - Select Fill & Backfill, Pipe Bedding, Compaction	1	LS	\$55,000	\$55,000
Site - Concrete & Flowable Fill Encasement	50	CY	\$700	\$35,000
Site - Lighting, Fencing, Site Access & Security	1	LS	\$65,000	\$65,000
Electrical - Conduit, Power, Comms, Integration, Drives/Contrl's	1	LS	\$500,000	\$500,000
Mechanical - HVAC, Plumbing	1	LS	\$35,000	\$35,000

Miscellaneous - Equipment Painting	1	LS		\$-
Landscaping/Hydromulch	1.0	LS	\$7,500	\$7,500
Subtotal:				\$2,072,800
Mobilization 5%:				\$104,000
30% Construction Contingency:				\$621,840
Total Construction:				\$2,798,640
Engineering + Geotech + Surveying:				\$365,250
Total Project Cost:				\$3,163,890



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN21B
Anticipated Construction Year				2026
Description:				
<i>16" waterline along Cleveland Gibbs Road that connects Cross Timbers Road to Project WN27B.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$1,333,744	\$1,333,744
Subtotal:				\$1,333,744
25% Contingency:				\$333,436
Years Until Construction:				4
Inflation at 4%:				\$266,749
Total Construction:				\$1,933,928
Engineering + Surveying:				\$232,071
Total Project Cost:				\$2,166,000



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN21C
Anticipated Construction Year				2023
Description:				
<i>16" waterline along Cleveland Gibbs Road from the intersection with future Mulkey Lane to FM 407 and Thompson Road intersection.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$3,213,787	\$3,213,787
Subtotal:				\$3,213,787
25% Contingency:				\$803,447
Years Until Construction:				1
Inflation at 4%:				\$160,689
Total Construction:				\$4,177,924
Engineering + Surveying:				\$501,351
Total Project Cost:				\$4,679,274



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN22A
Anticipated Construction Year				2023
Description:				
<i>12" waterline starting at Schober Road and Robson Ranch Road heading East and connects to an existing 12" stubout in Cleveland Gibbs Road.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
12" Waterline	1	LS	\$1,713,182	\$1,713,182
Subtotal:				\$1,713,182
25% Contingency:				\$428,295
Years Until Construction:				1
Inflation at 4%:				\$85,659
Total Construction:				\$2,227,136
Engineering + Surveying:				\$267,256
Total Project Cost:				\$2,494,393



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN22B
Anticipated Construction Year				2023
Description:				
<i>16" waterline connecting the Canyon Falls development to the East side of Highway 35W along Cross Timbers Road.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$1,553,144	\$1,553,144
Subtotal:				\$1,553,144
25% Contingency:				\$388,286
Years Until Construction:				1
Inflation at 4%:				\$77,657
Total Construction:				\$2,019,088
Engineering + Surveying:				\$242,291
Total Project Cost:				\$2,261,378



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN22D
Anticipated Construction Year				2023
Description:				
<i>12" waterline from the intersection of Old Justin Road and Faught Road to the intersection of Robson Ranch Road and Yarbrough Way.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
12" Waterline	1	LS	\$1,701,354	\$1,701,354
Subtotal:				\$1,701,354
25% Contingency:				\$425,339
Years Until Construction:				1
Inflation at 4%:				\$85,068
Total Construction:				\$2,211,761
Engineering + Surveying:				\$265,411
Total Project Cost:				\$2,477,172



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN23A
Anticipated Construction Year				2023
Description:				
<i>16" waterline from Cross Timbers Road on the East side of Highway 35W down the Highway and connects to Project WN27B.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$1,522,143	\$1,522,143
Subtotal:				\$1,522,143
25% Contingency:				\$380,536
Years Until Construction:				1
Inflation at 4%:				\$76,107
Total Construction:				\$1,978,786
Engineering + Surveying:				\$237,454
Total Project Cost:				\$2,216,241



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN23B
Anticipated Construction Year				2024
Description:				
<i>16" waterline along future Mulkey Lane connecting Project WN21C to an existing 12" waterline in S Pecan Parkway. Includes 12" waterline replacing the connection from an existing 12" waterline in S Pecan Parkway to the 8" service waterline to the Pecan Square WWTP.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$1,285,300	\$1,285,300
12" Waterline	1	LS	\$97,569	\$97,569
Subtotal:				\$1,382,869
25% Contingency:				\$345,717
Years Until Construction:				2
Inflation at 4%:				\$138,287
Total Construction:				\$1,866,873
Engineering + Surveying:				\$224,025
Total Project Cost:				\$2,090,898



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN23E
Anticipated Construction Year				2028
Description:				
<i>12" waterline along Mulkey Lane beginning at the intersection with S Mulkey Lane and connecting to Project WN23B at S Pecan Parkway.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
12" Waterline	1	LS	\$1,557,687	\$1,557,687
Subtotal:				\$1,557,687
25% Contingency:				\$389,422
Years Until Construction:				6
Inflation at 4%:				\$467,306
Total Construction:				\$2,414,415
Engineering + Surveying:				\$289,730
Total Project Cost:				\$2,704,145



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WS23F
Anticipated Construction Year				2028
Description:				
<i>16" waterline from Harmonson Road along Dale Earnhardt Way to future 'Street A', per Hillwood waterlines plans.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$1,616,985	\$1,616,985
Subtotal:				\$1,616,985
25% Contingency:				\$404,246
Years Until Construction:				6
Inflation at 4%:				\$485,095
Total Construction:				\$2,506,326
Engineering + Surveying:				\$300,759
Total Project Cost:				\$2,807,085



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN24D
Anticipated Construction Year				2029
Description:				
<i>8" waterline beginning at the intersection of 13th Street and Tattler Trail and connection to an existing 8" stubout in Prairie Mount Court.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
8" Waterline	1	LS	\$115,256	\$115,256
Subtotal:				\$115,256
25% Contingency:				\$28,814
Years Until Construction:				7
Inflation at 4%:				\$40,340
Total Construction:				\$184,409
Engineering + Surveying:				\$22,129
Total Project Cost:				\$206,539



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WS24F
Anticipated Construction Year				2029
Description:				
<i>16" waterline along Dale Earnhardt Way from the future 'Street A', per Hillwood waterlines plans, to the proposed FM 156 pump station.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$2,437,510	\$2,437,510
Subtotal:				\$2,437,510
25% Contingency:				\$609,377
Years Until Construction:				7
Inflation at 4%:				\$853,128
Total Construction:				\$3,900,016
Engineering + Surveying:				\$468,002
Total Project Cost:				\$4,368,018



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WS24G
Anticipated Construction Year				2029
Description:				
<i>12" waterline along the future Harmonson Road alignment from the intersection with McPherson Drive to future 'Street A', per Hillwood waterlines plans.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
12" Waterline	1	LS	\$1,843,310	\$1,843,310
Subtotal:				\$1,843,310
25% Contingency:				\$460,827
Years Until Construction:				7
Inflation at 4%:				\$645,158
Total Construction:				\$2,949,296
Engineering + Surveying:				\$353,916
Total Project Cost:				\$3,303,211



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN25A
Anticipated Construction Year				2023
Description:				
<i>12" waterline mostly along Evelyn Lane from Florance Road and Holder Road intersection to Faught Road.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
12" Waterline	1	LS	\$1,040,077	\$1,040,077
Subtotal:				\$1,040,077
25% Contingency:				\$260,019
Years Until Construction:				1
Inflation at 4%:				\$52,004
Total Construction:				\$1,352,101
Engineering + Surveying:				\$162,252
Total Project Cost:				\$1,514,353



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WS25D
Anticipated Construction Year				2030
Description:				
<i>12" waterline along 'Street A', per Hillwood waterlines plans, and Harmonson Road from the intersection with Dale Earnhardt Way to the connection with Project WN26C.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
12" Waterline	1	LS	\$2,252,017	\$2,252,017
Subtotal:				\$2,252,017
25% Contingency:				\$563,004
Years Until Construction:				8
Inflation at 4%:				\$900,807
Total Construction:				\$3,715,828
Engineering + Surveying:				\$445,899
Total Project Cost:				\$4,161,728



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WS26A
Anticipated Construction Year				2028
Description:				
<i>Second connection to Fort Worth system: Lines A-F.²</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
Design	1	LS	\$396,638	\$396,638
Bid Documents and CM	1	LS	\$70,221	\$70,221
Construction Costs	1	LS	\$4,799,030	\$4,799,030
Easement / Property Costs	1	LS	\$166,775	\$166,775
Inspection & Material Testing ³	1	LS	\$191,962	\$191,962
IPRC Review Fees	1	LS	\$16,458	\$16,458
Subtotal:				\$5,641,082
25% Contingency:				\$1,410,271
Years Until Construction:				6
Inflation at 4%:				\$1,692,325
Total Construction:				\$8,743,677
Engineering + Surveying:				<i>Included in above costs</i>
Fort Worth capacity buy-in for Lines A-F:				\$491,093
Total Project Cost:				\$9,234,770

¹Need clarification that Term Sheet provides that no City or Town staff time will be included in the cost share.

²Property Acquisition, R/R Permit Fee, Public Notification, and Administrative Fees not included in Halff scope/fees for Lines A-F.

³Need confirmation from COFW - is City inspector cost to be shared? Also, need estimate from COFW.



Town of Northlake Impact Fee Water Capital Improvement Plan

Opinion of Probable Construction Cost

Project:				WS26B
Anticipated Construction Year				2028
Description:				
<i>Second connection to Fort Worth system: Lines G.²</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
Design	1	LS	\$211,000	\$211,000
Property Acquisition	1	LS	\$87,500	\$87,500
Bid Documents and CM	1	LS	\$44,000	\$44,000
Construction Costs	1	LS	\$2,078,260	\$2,078,260
Easement / Property Costs	1	LS	\$33,000	\$33,000
Inspection & Material Testing ³	1	LS	\$83,130	\$83,130
IPRC Review Fees	1	LS	\$12,000	\$12,000
Subtotal:				\$2,548,890
25% Contingency:				\$637,223
Years Until Construction:				6
Inflation at 4%:				\$764,667
Total Construction:				\$3,950,780
Engineering + Surveying:				<i>Included in above costs</i>
Fort Worth capacity buy-in for Lines A-F:				\$1,586,172
Total Project Cost:				\$5,536,952

¹Need clarification that Term Sheet provides that no City or Town staff time will be included in the cost share.

²R/R Permit Fee, Public Notification, and Administrative Fees not included in Halff scope/fees for Lines A-F.

³Need confirmation from COFW - is City inspector cost to be shared? Also, need estimate from COFW.



Town of Northlake Impact Fee Water Capital Improvement Plan

Opinion of Probable Construction Cost

Project:				WS26C
Anticipated Construction Year				2028
Description:				
<i>Second connection to Fort Worth system: FTW MS 2 meter station (MS), pump station (PS), and ground storage tank (GST).</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
MS/PS/GST ¹	1	LS	\$9,919,000	\$9,919,000
Subtotal:				\$9,919,000
Contingency:				<i>Included in above costs</i>
Years Until Construction:				6
Inflation at 4%:				\$2,380,560
Total Construction:				\$12,299,560
Engineering + Surveying:				<i>Included in above costs</i>
Total Project Cost:				\$12,299,560

¹Lump sum cost includes contingency, engineering and survey, and easement/land costs.



Town of Northlake Impact Fee Water Capital Improvement Plan

Opinion of Probable Construction Cost

Project:				WS26D
Anticipated Construction Year				2029
Description:				
<i>16" waterline along FM 156 from the proposed FM 156 pump station to the intersection with Harmonson Road.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$3,594,401	\$3,594,401
Subtotal:				\$3,594,401
25% Contingency:				\$898,600
Years Until Construction:				7
Inflation at 4%:				\$1,258,040
Total Construction:				\$5,751,042
Engineering + Surveying:				\$690,125
Total Project Cost:				\$6,441,167



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WS26E
Anticipated Construction Year				2029
Description:				
<i>New 0.5 MG elevated storage tank (EST) located in the South Denton Creek pressure plane.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
0.5 MG EST	1	LS	\$2,156,000	\$2,156,000
Subtotal:				\$2,156,000
15% Contingency:				\$539,000
Years Until Construction:				7
Inflation at 4%:				\$754,600
Total Construction:				\$3,449,600
Engineering + Surveying:				\$413,952
Total Project Cost:				\$3,863,552



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN27B
Anticipated Construction Year				2032
Description:				
<i>16" waterline that connects Cleveland Gibbs Road to the east side of Highway 35W.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$1,283,323	\$1,283,323
Subtotal:				\$1,283,323
25% Contingency:				\$320,831
Years Until Construction:				10
Inflation at 4%:				\$641,662
Total Construction:				\$2,245,816
Engineering + Surveying:				\$269,498
Total Project Cost:				\$2,515,314



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN27C
Anticipated Construction Year				2032
Description:				
<i>Replace Pump 3 at Harvest PS to match the design point of other three Harvest PS pumps.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
2.5 MGD Pump	1	LS	\$129,573	\$129,573
Subtotal:				\$129,573
25% Contingency:				\$32,393
Years Until Construction:				10
Inflation at 4%:				\$64,786
Total Construction:				\$226,753
Engineering + Surveying:				\$27,210
Total Project Cost:				\$253,963



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN28A
Anticipated Construction Year				2032
Description:				
<i>16" waterline loop from the intersection of Robson Ranch Road and Florance Road and following Robson Ranch Road to the west, FM 156, Blair Road, and Florance Road to the intersection with Yarbrough Way.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$9,076,683	\$9,076,683
Subtotal:				\$9,076,683
25% Contingency:				\$2,269,171
Years Until Construction:				10
Inflation at 4%:				\$4,538,342
Total Construction:				\$15,884,196
Engineering + Surveying:				\$1,906,103
Total Project Cost:				\$17,790,299



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN30
Anticipated Construction Year				2032
Description:				
<i>New 1 MG elevated storage tank located along Florance Road on the west side of the Stardust Ranch neighborhood.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
1.0 MG EST	1	LS	\$4,312,000	\$4,312,000
Subtotal:				\$4,312,000
15% Contingency:				\$646,800
Land Costs:				\$11,500
Years Until Construction:				10
Inflation at 4%:				\$1,988,120
Total Construction:				\$6,958,420
Engineering + Surveying:				\$835,010
Total Project Cost:				\$7,793,430



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN31C
Anticipated Construction Year				2032
Description:				
<i>16" waterline along FM 407 from the intersection with Canyon Ridge Drive to Project WN31D.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
16" Waterline	1	LS	\$333,523	\$333,523
Subtotal:				\$333,523
25% Contingency:				\$83,381
Years Until Construction:				10
Inflation at 4%:				\$166,761
Total Construction:				\$583,665
Engineering + Surveying:				\$70,040
Total Project Cost:				\$653,704



**Town of Northlake Impact Fee
 Water Capital Improvement Plan**

Opinion of Probable Construction Cost

Project:				WN31D
Anticipated Construction Year				2032
Description:				
<i>12" waterline along FM 407 and Mulkey Lane from the connection to Project WN31C to the intersection of S Mulkey Lane and Northwest Crossing.</i>				
Item	Quantity	Unit	Unit Cost	Item Cost
12" Waterline	1	LS	\$1,104,844	\$1,104,844
Subtotal:				\$1,104,844
25% Contingency:				\$276,211
Years Until Construction:				10
Inflation at 4%:				\$552,422
Total Construction:				\$1,933,477
Engineering + Surveying:				\$232,017
Total Project Cost:				\$2,165,494

APPENDIX H: Deviations from 2018 Study

Table H.1. Acreage Comparison
 [2018 values shown in parenthesis below current study values]

Service Area		Character Area							Service Area Total
		NR	RP	WR	MU	BP	TMU	TMD	
North	Existing Metered Properties	1,408 (1,040)	807 (1,000)	0 (0)	0 (0)	0 (40)	0 (0)	0 (0)	2,215 (2,080)
	To Be Developed*	2,051 (2,280)	4,590 (3,800)	0 (0)	1,032 (1,160)	1,231 (960)	380 (170)	1,164 (0)	10,448 (8,370)
	Total	3,459 (3,320)	5,397 (4,800)	0 (0)	1,032 (1,160)	1,231 (1,000)	380 (170)	1,164 (0)	12,663 (10,450)
South	Existing Metered Properties	0 (0)	0 (0)	61 (120)	0 (0)	456 (310)	0 (0)	0 (0)	517 (430)
	To Be Developed*	0 (0)	0 (230)	161 (110)	0 (1,710)	2,229 (300)	413 (540)	0 (0)	2,803 (2,890)
	Total	0 (0)	0 (230)	222 (230)	0 (1,710)	2,685 (610)	413 (540)	0 (0)	3,320 (3,320)
Sewer	Existing Metered Properties	1,408 (1,040)	0 (0)	61 (120)	0 (0)	456 (350)	0 (0)	0 (400)	1,925 (1,910)
	To Be Developed*	2,051 (2,280)	0 (0)	161 (110)	1,032 (2,870)	3,460 (1,260)	793 (710)	1,724 (1,100)	9,221 (8,330)
	Total	3,459 (3,320)	0 (0)	222 (230)	1,032 (2,870)	3,916 (1,610)	793 (710)	1,724 (1,500)	11,146 (10,240)

*Includes In Development and Developable properties. Also includes acreage for developed land within the Northlake CCN without a connection to the water system (currently served by groundwater or other water service provider).

Table H.1. shows the differences in service area acreage between the current study and the 2018 study which can be attributed to the following:

- This study's inclusion of the Transitional Market Dependent character area,
- This study's inclusion of special flood hazard area A (assuming some floodplain will be developed),
- Modifications to character area designations and/or boundaries (particularly the transition of the Mixed Use character area to Business Park in the South Service Area.), and
- Modifications to political and CCN boundaries.

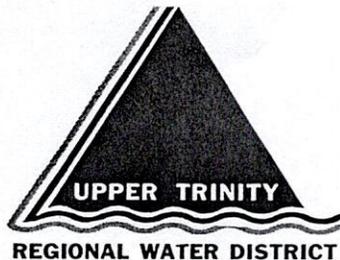
Differences between Existing values are attributed to development since the 2018 study and the current study. Comparison between the buildout system capacity requirements for this study and those used in the 2018 Study is shown below in Table H.2.

Table H.2. Capacity Requirements Comparison

2018 Report	Buildout LUEs	Req. Pumping Capacity (MGD)	Req. EST Capacity (MG)	2022 Report	Buildout LUEs	Req. Pumping Capacity (MGD)	Req. EST Capacity (MG)
North Town Hall / Ranch	8,671	12.85	0.9	Northside High	4,421	3.82	0.89
				Northside Low <i>(includes TMD Character Area west of FM 156)</i>	6,535	5.65	1.31
North Denton Creek	4,972	4.30	0.5	North Denton Creek	6,701	5.79	1.35
South Denton Creek	4,447	3.84	0.4	South Denton Creek	1,465	1.06	0.25
Southside	2,036	1.76	0	Southside	2,747	2.38	0.55

APPENDIX I: Provided Documentation

[ATTACHMENTS]



DATA SHEET
Agenda No. 14

Meeting Date: September 1, 2022

Agenda Item:

14. Presentation of 5-Year Rate Forecast for the Regional Treated Water System (RTWS).

Placement: <input type="checkbox"/> Consent <input checked="" type="checkbox"/> Individual Consideration <input type="checkbox"/> Executive Session
Vote: <input type="checkbox"/> Non-Weighted <input type="checkbox"/> Weighted Capital <input checked="" type="checkbox"/> No Vote Required
Recommending Department: Business (Informational Presentation)

Background:

Each year after completion of the Proposed RTWS Operating and Capital Budget Staff prepares a forecast of possible rate impacts for a 5-year period - in this case FY 2023 through FY 2027.

The forecast looks at calculating required revenues to meet projected operating expenses, debt service payments and transfers into reserve accounts. It also identifies bond coverage ratios on a cash basis, estimated member/customer subscriptions, estimated water sales, and Capital Improvement Budget expenditures.

A critical part of an analysis of this type are the assumptions used to develop the forecast -- these are shown on the second and third pages of the enclosure for Board review and consideration. A forward-looking analysis of this type is based on assumptions and estimates, anticipated future events and activities which could differ from those utilized in the forecast.

Financial:

Since this is a future forecast, there will be no financial impact to the System budget.

Recommendation:

Receive Staff briefing – no action required.

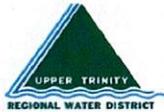
Enclosures:

Rate Forecast for the Regional Treated Water System (FY 2023 – FY 2027).

Submitted By: _____

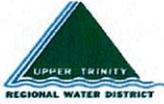

William A. Greenleaf, Chief Financial Officer

Date: August 26, 2022



UPPER TRINITY REGIONAL WATER DISTRICT
Regional Treated Water System
Five-Year Pro-Forma Forecast
September 1, 2022

	Proposed				
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Estimated Blended Rate Impact	4.25% - 4.75%	6.25% - 6.75%	6.50% - 7.00%	7.50% - 8.00%	4.75% - 5.25%
	4.60%	6.50%	6.80%	7.65%	5.00%
Demand Revenues	\$ 41,619,280	\$ 45,491,775	\$ 50,300,025	\$ 56,591,650	\$ 62,282,490
Volume Revenues	19,533,475	22,861,770	24,580,445	25,613,030	26,362,075
Contract Payments, Loan Repayments, Interest & Other Revenues	954,725	1,031,675	1,139,525	1,292,585	1,094,460
Operating Revenue Subtotal	\$ 62,107,480	\$ 69,385,220	\$ 76,019,995	\$ 83,497,265	\$ 89,739,025
Interfund Transfers (from Operations)	1,830,500	165,000	1,164,845	50,000	50,000
Contributions from Lake Ralph Hall Reserve	-	2,000,000	3,000,000	3,000,000	1,966,600
Operating Revenues	\$ 63,937,980	\$ 71,550,220	\$ 80,184,840	\$ 86,547,265	\$ 91,755,625
Operating Expenses	\$ 34,322,725	\$ 36,226,965	\$ 39,806,645	\$ 42,521,535	\$ 42,840,475
Debt Service	24,972,450	31,391,615	37,172,310	39,775,485	42,626,245
Total Expenses	\$ 59,295,175	\$ 67,618,580	\$ 76,978,955	\$ 82,297,020	\$ 85,466,720
Net Revenues from Operations before Transfer to Lake Ralph Hall Rsrv.	\$ 4,642,805	\$ 3,931,640	\$ 3,205,885	\$ 4,250,245	\$ 6,288,905
Transfers to Lake Ralph Hall Reserve from Excess Working Capital	-	2,000,000	2,000,000	2,000,000	2,000,000
Net Revenues from Operations After Transfer to Lake Ralph Hall Rsrv.	\$ 4,642,805	\$ 1,931,640	\$ 1,205,885	\$ 2,250,245	\$ 4,288,905
Bond Coverage Ratio (Cash Basis) (1.15 Minimum per District Policy)	1.18	1.17	1.17	1.15	1.19
Estimated Subscriptions (MGD)	88.64	92.34	94.09	95.49	97.54
Estimated Flows (MGD)	37.74	39.64	41.25	42.69	44.26
CIP Expenditures	\$ 254,449,685	\$ 209,332,455	\$ 155,673,200	\$ 58,140,000	\$ 50,110,790



UPPER TRINITY REGIONAL WATER DISTRICT
Regional Treated Water System
Five-Year Pro-Forma Forecast
September 1, 2022

Assumptions for the 5-Year Planning Period:

• **Raw Water Source Rates & Quantities**

Dallas Raw Water - 8% Annual Rate Increase in FY 2024 through FY 2027

FY 2024 - 22.52 MGD; FY 2025 - 23.72 MGD; FY 2026 - 20.97 MGD; FY 2027 - 15.61 MGD

Denton Raw Water - 8% Annual Rate Increase in FY 2024 through FY 2027

FY 2024 through FY 2027 - 5.00 MGD

Chapman Raw Water - 3% Annual Rate Increase for Transportation, including \$100K / Year for True-Ups

FY 2024 - 9.50 MGD; FY 2025 - 9.50 MGD; FY 2026 - 10.00 MGD; FY 2027 - 10.00 MGD

Lake Ralph Hall Raw Water - begins in FY 2026

FY 2026 - 3.50 MGD; FY 2027 - 7.0 MGD

• **Denton Treated Water Rates**

3% Annual Rate Increase (Krum and Sanger) in FY 2024. 3.5% increase for FY 2025 through FY 2027.

• **Electricity Rates**

Taylor RTWP - No rate change through April 2023; 3.5% per KWH Rate Decrease in May 2023, remaining through May 2026, then a 3% increase

Harpool RTWP - 6.5% per KWH Rate Annual Increase for FY 2024, 6% for FY 2025, 5.5% for FY 2026 and 3% for FY 2027

• **Chemicals**

5% Annual Increase through FY 2027

• **Personnel**

5% Annual Increase

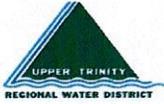
FY 2024 includes \$100K for additional Transmission Operator @ Taylor Plant. FY 2027 includes \$100K for additional Operator @ Taylor Plant.

• **Plant Equipment, Maintenance, and Materials**

4% Annual Increase

Includes funding for Harpool road improvements in FY 2024 (\$65K) and Taylor Plant roof replacement in FY 2025 (\$200K)

FY 2026 includes \$750K for Lake Ralph Hall operating expenses. FY 2027 includes \$1.575M.



UPPER TRINITY REGIONAL WATER DISTRICT
Regional Treated Water System
Five-Year Pro-Forma Forecast
September 1, 2022

● **Debt Service**

Conversion of Variable Rate Financing to Long-Term Debt

\$60M in FY 2024; \$50M in FY 2025; \$40M in FY 2026; and \$40M in FY 2027

Series 2021 Board Participation Bonds of \$10.6M to fund 75% of the Harpool RWTP Northeast Transmission Pipeline, Ph 1 & 2

No Debt Service FY 2024; then, Deferred Interest Payback @ 20% (FY'25)

Series 2023 Board Participation Bonds of \$9.1M to fund 75% of the Harpool RWTP Northeast Transmission Pipeline, Ph 1 & 2

No Debt Service through FY 2025; then, Deferred Interest Payback @ 20% (FY'26)

Series 2024 Board Participation Bonds of \$4.6M to fund 75% of the Harpool RWTP Northeast Transmission Pipeline, Ph 1 & 2

No Debt Service through FY 2026; then, Deferred Interest Payback @ 20% (FY'27)

Series 2025 Board Participation Bonds of \$5.0M to fund 75% of the Harpool RWTP Northeast Transmission Pipeline, Ph 1 & 2

No Debt Service FY 2024 through FY 2027

Series 2024 Board Participation Bonds of \$1.65M to fund 75% of the Harpool RWTP Northeast Transmission Pipeline, Ph 3 & 4

No Debt Service through FY 2026; then, Deferred Interest Payback @ 20% (FY'27)

Series 2026 Board Participation Bonds of \$18.5M to fund 75% of the Harpool RWTP Northeast Transmission Pipeline, Ph 3 & 4

No Debt Service FY 2024 through FY 2027

Series 2027 Board Participation Bonds of \$6.57M to fund 75% of the Harpool RWTP Northeast Transmission Pipeline, Ph 3 & 4

No Debt Service FY 2024 through FY 2027

Annual Board Participation Debt Service for the Lake Ralph Hall Project

2016 Issue- Payback increases annually to 70% (FY'24), 85% (FY'25) and 100% (FY'26)

2020 Issue- Payback increases annually to 20% (FY'24), 30% (FY'25), 40% (FY'26), and 55% (FY'27)

2021 Issue- Payback increases annually to 20% (FY'24 & FY'25), 30% (FY'26), and 40% (FY'27)

2022 Issue- No Debt Service through FY 2024; then @ 20% (FY'25 & FY'26) and 30% (FY'27)

2023 Issue- No Debt Service through FY 2025; then @ 20% (FY'26 & FY'27)

Deferred Interest Funding Debt Service for the Lake Ralph Hall Project

2016 Issue- Debt Service begins in FY 2024 (\$1.6M - \$2.0M per year over 22 years)

2023 Issue- No Debt Service through FY 2027

2024 Issue- No Debt Service through FY 2027

● **Maintenance Fund Allocation**

4% Annual Increase - Also includes funding for additional Maintenance Staff in FY 2024 through FY 2027

● **Administration and Information Technology Fund Allocation**

4% Annual Increase for FY 2024 through FY 2027

● **Reserve / Program Contributions**

Watershed Protection Program - \$0.02 per 1,000 gallons for FY 2024 through FY 2027

Water Conservation Program - \$0.02 per 1,000 gallons for FY 2024 through FY 2027

Future Water Program - \$0.02 per 1,000 gallons for FY 2024 through FY 2027

Capital Replacement Reserve - \$0.11 per 1,000 gallons for FY 2024 through FY 2027

Raw Water Pond Dredging Reserve - \$0.01 per 1,000 gallons for FY 2024 through FY 2027

Lake Ralph Hall Reserve - Deposits made from net revenues to offset future debt service

Non-Bond Capital Reserve - Deposits made from net revenues to fund future CIP projects

From: Kim Probasco <probascok@trinityra.org>
Sent: Friday, September 23, 2022 11:32 AM
To: Nick Dons <donsn@trinityra.org>
Subject: Projected DS for Northlake at DCRWS

Hi Nick,

We are using 5% increase in flows per year at DCRWS overall. I realize this may be different for Northlake specifically but I am providing the debt service based on that 5% increase. I also included the projected O&M for Northlake during that 5 year timeframe. Please see below:

	2023	2024	2025	2026	2027	2028
Northlake Projected Flows	1.000	1.050	1.103	1.158	1.216	1.276
% of System	10.567%	10.569%	10.570%	9.850%	9.758%	9.672%
O&M	\$ 630,125.44	\$ 658,436.16	\$ 690,991.45	\$ 678,579.00	\$ 706,271.75	\$ 735,519.12
DS	\$ 1,637,017.71	\$ 2,255,165.05	\$ 2,967,156.51	\$ 2,973,602.58	\$ 2,961,106.49	\$ 2,615,004.50

Let me know if you need additional data.

Thanks!

Kim C. Probasco
 Financial Administrator, NR
 Trinity River Authority
 (817) 493-5100 x144

APPENDIX J: Water and Wastewater Impact Fees Determination

[ATTACHMENTS]

SUMMARY OF WATER IMPACT FEE DETERMINATION

South Water Service Area

Recoverable Impact Fee CIP Costs	\$ 17,893,964	Per Half Study
Financing Cost	12,801,327	See Detail Below
Existing Fund Balance	-	Water Appendices - page 1
Interest Earnings	(4,273,516)	Water Appendices - page 4
Pre Credit Recoverable Cost for Impact Fee	\$ 26,421,776	Sum of Above
Credit for Utility Revenues	(11,921,322)	Water Appendices - page 7
Maximum Recoverable Cost for Impact Fee	\$ 14,500,454	

Recoverable Impact Fee CIP Costs:

Represents the portion of capital improvement costs that are eligible for funding through impact fees. Reference is the Half Impact Fee Study.

Financing Costs:

Represents the interest costs associated with debt financing the new impact fee project costs. Interest costs are derived from existing debt issues and forecasted debt issues.

New Annual Debt Service	\$ 25,439,616	Water Appendices - page 2
Existing Annual Debt Service	4,869,075	Water Appendices - page 2
Principal Component (New and Existing Debt)	(17,507,364)	Water Appendices - page 1
Financing Costs	\$ 12,801,327	

Existing Fund Balance:

Represents impact fee revenue collected but not yet expended. Assuming all existing fund balance is already encumbered for projects from prior impact fee studies. Reference is page 1 of Water Appendices.

Interest Earnings:

Represents the interest earned on cash flows and assumes a 2.50% annual interest rate. The Impact Fee Statute states that interest earnings are funds of the impact fee account and are held to the same restrictions as impact fee revenues. Therefore in order to recognize that interest earnings are used to fund capital improvements, interest earnings are credited against the recoverable costs. Reference is the sum of Accumulated Interest on page 4 of Water Appendices.

Pre Credit Recoverable Cost for Impact Fee:

Represents Recoverable Impact Fee CIP Costs plus Financing Costs less Existing Fund Balance and Interest Earnings.

Credit for Utility Revenues:

In 2001, the Local Government Code Chapter 395 was amended to include a credit for ad valorem and/or utility revenues generated by new service units during the ten-year timeframe that are used to fund impact fee eligible projects for which the new service units were charged an impact fee. The intent of this amendment is to avoid double-charging the new service units for impact fee capital improvements. The credit recognizes utility revenues used to fund impact fee eligible projects. Reference is page 7 of Water Appendices.

Maximum Recoverable Cost for Impact Fee:

Represents Pre Credit Recoverable Cost for Impact Fee less Credit for Utility Revenues. This is the maximum cost that can be recovered through impact fees.

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Calculation Assumptions
South Water Service Area

I. General Assumptions

Annual Interest Rate on Deposits ⁽¹⁾	2.50%
Annual Service Unit Growth ⁽²⁾	70
Existing Fund Balance ⁽³⁾	-
Portion of Projects Funded by Existing Debt ⁽⁴⁾	\$ 3,212,040
Non-debt Funded Project Cost ⁽⁵⁾	386,600
New Project Cost Funded Through New Debt ⁽⁶⁾	14,295,324
Total Recoverable Project Cost ⁽⁷⁾	\$ 17,893,964

II. New Debt Issues Assumptions

<u>Year</u>	<u>Principal</u> ⁽⁸⁾	<u>Interest</u> ⁽⁹⁾	<u>Term</u>
1	\$ 1,429,532	5.50%	20
2	1,429,532	5.75%	20
3	1,429,532	6.00%	20
4	1,429,532	6.25%	20
5	1,429,532	6.50%	20
6	1,429,532	6.50%	20
7	1,429,532	6.50%	20
8	1,429,532	6.50%	20
9	1,429,532	6.50%	20
10	1,429,532	6.50%	20
Total	\$ 14,295,324		

III. Capital Expenditure Assumptions

<u>Year</u>	<u>Annual Capital Expenditures</u> ⁽¹⁰⁾
1	\$ 38,660
2	515,171
3	991,682
4	1,468,192
5	1,468,192
6	1,468,192
7	1,468,192
8	1,468,192
9	1,468,192
10	1,468,192
11	1,429,532
12	953,022
13	476,511
Total	14,681,924

- (1) Per discussions with Town Staff
- (2) Per Half Impact Fee Study
- (3) Assumes all existing fund balances are already encumbered
- (4) Per discussions with Town Staff
- (5) This assumes 0% of new project costs funded through sources other than debt, unless specified otherwise
- (6) This assumes 100% of new project costs funded through new debt issues, unless specified otherwise
- (7) Per Half Impact Fee Study
- (8) Assumes new debt issued in equal annual amounts
- (9) Per discussions with Town Staff
- (10) Assumes new debt proceeds expended over a 3-year timeframe
 Non-debt funded expenditures expended over 10 years equally

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Debt Service and Expense Summary
South Water Service Area

I. New Debt Service Detail

<u>Year</u>	<u>Series 1</u>	<u>Series 2</u>	<u>Series 3</u>	<u>Series 4</u>	<u>Series 5</u>	<u>Series 6</u>	<u>Series 7</u>	<u>Series 8</u>	<u>Series 9</u>	<u>Series 10</u>	<u>Total Annual New Debt Service</u>
1	\$ 119,622	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 119,622
2	119,622	122,116	-	-	-	-	-	-	-	-	241,738
3	119,622	122,116	124,633	-	-	-	-	-	-	-	366,371
4	119,622	122,116	124,633	127,174	-	-	-	-	-	-	493,546
5	119,622	122,116	124,633	127,174	129,739	-	-	-	-	-	623,285
6	119,622	122,116	124,633	127,174	129,739	129,739	-	-	-	-	753,024
7	119,622	122,116	124,633	127,174	129,739	129,739	129,739	-	-	-	882,763
8	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	-	-	1,012,502
9	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	-	1,142,242
10	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
11	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
12	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
13	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
14	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
15	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
16	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
17	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
18	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
19	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
20	119,622	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,271,981
21	-	122,116	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,152,358
22	-	-	124,633	127,174	129,739	129,739	129,739	129,739	129,739	129,739	1,030,243
23	-	-	-	127,174	129,739	129,739	129,739	129,739	129,739	129,739	905,610
24	-	-	-	-	129,739	129,739	129,739	129,739	129,739	129,739	778,435
25	-	-	-	-	-	129,739	129,739	129,739	129,739	129,739	648,696
26	-	-	-	-	-	-	129,739	129,739	129,739	129,739	518,957
27	-	-	-	-	-	-	-	129,739	129,739	129,739	389,218
28	-	-	-	-	-	-	-	-	129,739	129,739	259,478
29	-	-	-	-	-	-	-	-	-	129,739	129,739
Total	\$ 2,392,446	\$ 2,442,313	\$ 2,492,663	\$ 2,543,489	\$ 2,594,784	\$ 25,439,616					

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Debt Service and Expense Summary

II. Summary of Annual Expenses

<u>Year</u>	<u>New Annual Debt Service⁽¹⁾</u>	<u>Annual Capital Expenditures⁽²⁾</u>	<u>Annual Bond Proceeds⁽²⁾</u>	<u>Existing Annual Debt Service⁽³⁾</u>	<u>Annual Credit⁽⁴⁾</u>	<u>Total Expense</u>
1	\$ 119,622	\$ 38,660	\$ (1,429,532)	\$ 189,452	\$ (29,770)	\$ (1,111,568)
2	241,738	515,171	(1,429,532)	205,641	(78,610)	(545,593)
3	366,371	991,682	(1,429,532)	222,449	(142,661)	8,308
4	493,546	1,468,192	(1,429,532)	274,167	(229,473)	576,900
5	623,285	1,468,192	(1,429,532)	284,859	(315,718)	631,086
6	753,024	1,468,192	(1,429,532)	257,486	(394,161)	655,009
7	882,763	1,468,192	(1,429,532)	269,439	(492,329)	698,534
8	1,012,502	1,468,192	(1,429,532)	279,094	(594,446)	735,810
9	1,142,242	1,468,192	(1,429,532)	285,202	(698,883)	767,221
10	1,271,981	1,468,192	(1,429,532)	283,954	(802,766)	791,829
11	1,271,981	1,429,532	-	284,874	(776,135)	2,210,252
12	1,271,981	953,022	-	284,874	(749,945)	1,759,931
13	1,271,981	476,511	-	284,506	(724,468)	1,308,530
14	1,271,981	-	-	284,008	(699,797)	856,192
15	1,271,981	-	-	284,238	(676,283)	879,936
16	1,271,981	-	-	284,146	(653,424)	902,703
17	1,271,981	-	-	-	(516,086)	755,894
18	1,271,981	-	-	-	(498,672)	773,309
19	1,271,981	-	-	-	(482,628)	789,352
20	1,271,981	-	-	-	(467,101)	804,879
21	1,152,358	-	-	-	(409,559)	742,799
22	1,030,243	-	-	-	(354,378)	675,865
23	905,610	-	-	-	(301,486)	604,124
24	778,435	-	-	-	(250,811)	527,624
25	648,696	-	-	-	(202,285)	446,411
26	518,957	-	-	-	(156,622)	362,335
27	389,218	-	-	-	(113,687)	275,531
28	259,478	-	-	-	(73,353)	186,125
29	129,739	-	-	-	(35,785)	93,954
PTD	-	-	-	610,686	-	610,686
	\$ 25,439,616	\$ 14,681,924	\$ (14,295,324)	\$ 4,869,075	\$ (11,921,322)	\$ 18,773,970

(1) Water Appendices - page 2 Section I

(2) Water Appendices - page 1

(3) Eligible outstanding debt funded projects as a percent of total principal times original annual debt service, including Paid-To-Date (PTD) amounts

(4) Water Appendices - page 7

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Revenue Test
South Water Service Area

<u>Year</u>	<u>Impact Fee</u>	<u>Service Units</u>	<u>Impact Fee Revenue</u>	<u>Annual Expenses</u>	<u>Sub-Total</u>	<u>Accumulated Interest</u>	<u>Estimated Fund Balance</u>
Initial							\$ -
1	\$ 20,834	70	\$ 1,450,045	\$ (1,111,568)	\$ 2,561,614	\$ 32,020	2,593,634
2	20,834	70	1,450,045	(545,593)	1,995,639	89,786	4,679,059
3	20,834	70	1,450,045	8,308	1,441,738	134,998	6,255,794
4	20,834	70	1,450,045	576,900	873,146	167,309	7,296,249
5	20,834	70	1,450,045	631,086	818,960	192,643	8,307,852
6	20,834	70	1,450,045	655,009	795,037	217,634	9,320,523
7	20,834	70	1,450,045	698,534	751,512	242,407	10,314,442
8	20,834	70	1,450,045	735,810	714,235	266,789	11,295,466
9	20,834	70	1,450,045	767,221	682,825	290,922	12,269,212
10	20,834	70	1,450,045	791,829	658,216	314,958	13,242,386
11	-	-	-	2,210,252	(2,210,252)	303,432	11,335,566
12	-	-	-	1,759,931	(1,759,931)	261,390	9,837,025
13	-	-	-	1,308,530	(1,308,530)	229,569	8,758,064
14	-	-	-	856,192	(856,192)	208,249	8,110,122
15	-	-	-	879,936	(879,936)	191,754	7,421,940
16	-	-	-	902,703	(902,703)	174,265	6,693,501
17	-	-	-	755,894	(755,894)	157,889	6,095,495
18	-	-	-	773,309	(773,309)	142,721	5,464,907
19	-	-	-	789,352	(789,352)	126,756	4,802,311
20	-	-	-	804,879	(804,879)	109,997	4,107,428
21	-	-	-	742,799	(742,799)	93,401	3,458,029
22	-	-	-	675,865	(675,865)	78,002	2,860,167
23	-	-	-	604,124	(604,124)	63,953	2,319,995
24	-	-	-	527,624	(527,624)	51,405	1,843,775
25	-	-	-	446,411	(446,411)	40,514	1,437,878
26	-	-	-	362,335	(362,335)	31,418	1,106,961
27	-	-	-	275,531	(275,531)	24,230	855,660
28	-	-	-	186,125	(186,125)	19,065	688,600
29	-	-	-	93,954	(93,954)	16,041	610,686
PTD	-	-	-	610,686	(610,686)	-	0
			\$ 14,500,454	\$ 18,773,970		\$ 4,273,516	

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Calculation
South Water Service Area

<u>Year</u>	<u>Number of Years to End of Period</u>	<u>Future Value Escalation</u>		<u>Annual Service Units</u>		<u>Annual Expense</u>	
		<u>Interest Rate Factor</u>	<u>Recovery Fee Factor</u>	<u>Actual</u>	<u>Escalated</u>	<u>Actual</u>	<u>Escalated</u>
1	29	2.0215	1.0000	70	141	\$ (1,111,568)	\$ (2,246,981)
2	28	1.9721	1.0000	70	137	(545,593)	(1,075,990)
3	27	1.9240	1.0000	70	134	8,308	15,984
4	26	1.8771	1.0000	70	131	576,900	1,082,909
5	25	1.8313	1.0000	70	127	631,086	1,155,729
6	24	1.7867	1.0000	70	124	655,009	1,170,283
7	23	1.7431	1.0000	70	121	698,534	1,217,608
8	22	1.7006	1.0000	70	118	735,810	1,251,302
9	21	1.6591	1.0000	70	115	767,221	1,272,895
10	20	1.6186	1.0000	70	113	791,829	1,281,681
11	19	1.5792	1.0000	-	-	2,210,252	3,490,329
12	18	1.5406	1.0000	-	-	1,759,931	2,711,417
13	17	1.5031	1.0000	-	-	1,308,530	1,966,801
14	16	1.4664	1.0000	-	-	856,192	1,255,521
15	15	1.4306	1.0000	-	-	879,936	1,258,868
16	14	1.3957	1.0000	-	-	902,703	1,259,941
17	13	1.3617	1.0000	-	-	755,894	1,029,301
18	12	1.3285	1.0000	-	-	773,309	1,027,332
19	11	1.2961	1.0000	-	-	789,352	1,023,068
20	10	1.2645	1.0000	-	-	804,879	1,017,749
21	9	1.2336	1.0000	-	-	742,799	916,342
22	8	1.2035	1.0000	-	-	675,865	813,433
23	7	1.1742	1.0000	-	-	604,124	709,356
24	6	1.1456	1.0000	-	-	527,624	604,421
25	5	1.1176	1.0000	-	-	446,411	498,914
26	4	1.0904	1.0000	-	-	362,335	395,073
27	3	1.0638	1.0000	-	-	275,531	293,098
28	2	1.0378	1.0000	-	-	186,125	193,163
29	1	1.0125	1.0000	-	-	93,954	95,128
PTD		1.0000	1.0000	-	-	610,686	610,686
					<u>1,262</u>		<u>\$ 26,295,365</u>

Annual Interest Rate: 2.50%

Present Value of Initial Impact Fee Fund Balance \$ -

Total Escalated Expense for Entire Period \$ 26,295,365

Less Future Value of Initial Impact Fee Fund Balance -

Sub-Total \$ 26,295,365

Total Escalated Service Units 1,262

Maximum Assessable Impact Fee for Water Service Area \$ 20,834

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Project Funding
South Water Service Area

<u>Impact Fee Project Name⁽¹⁾</u>	<u>Cost In</u>		<u>Impact Fee</u>		<u>Debt Funded⁽²⁾</u>		<u>Non-Debt Funded⁽²⁾</u>	
	<u>Service Area</u>	<u>⁽¹⁾</u>	<u>Recoverable Cost⁽¹⁾</u>	<u>⁽¹⁾</u>	<u>Existing</u>	<u>Proposed</u>		
Temporary booster station for FM 156 area	\$	3,163,890	\$	3,163,890	\$	-	\$ 3,163,890	\$ -
16" waterline from Harmonson Road along Dale Earnhardt Way to future 'Street A'		2,807,085		600,716		-	600,716	-
16" waterline along Dale Earnhardt Way from the future 'Street A', per Hillwood		4,368,018		934,756		-	934,756	-
12" waterline along the future Harmonson Road alignment from the intersection		3,303,211		706,887		-	706,887	-
16" waterline along 'Street A', per Hillwood waterlines exhibit, and Harmonson I		4,161,728		890,610		-	890,610	-
Second connection to Fort Worth system: Lines A-F		8,743,677		1,871,147		-	1,871,147	-
Fort Worth capacity buy-in for Lines A-F		491,093		105,094		-	105,094	-
Second connection to Fort Worth system: Line G		3,950,780		845,467		-	845,467	-
Fort Worth capacity buy-in for Line G		1,586,172		339,441		-	339,441	-
Second connection to Fort Worth system: FTW MS 2 MS/PS/GST		12,299,560		2,632,106		-	2,632,106	-
20" waterline along FM 156 from the proposed FM 156 pump station to the inte		6,441,167		1,378,410		-	1,378,410	-
New 0.5 MG elevated storage tank located in the South Denton Creek pressur		3,863,552		826,800		-	826,800	-
12"/16" waterline from Highway 35W along Dale Earnhardt Way, north on Harn		1,900,000		592,800		218,400	-	374,400
12" waterline along 114 between Chadwick Pkwy and Cleveland Gibbs Road.		745,000		232,440		232,440	-	-
16" waterline along Interstate 35 West Service Road from Ashmore Lane to Da		-		-		-	-	-
16" waterline connecting the intersection of E Sam Lee Lane and Cleveland Gil		-		-		-	-	-
New 500,000 gallon ground storage tank and 3.1 MGD pump station for Souths		5,650,000		1,762,800		1,762,800	-	-
New 0.75 MG elevated storage tank located in the Industrial region of Southsid		3,200,000		998,400		998,400	-	-
Water Impact Fee Update		12,200		12,200		-	-	12,200
Total	\$	66,687,134	\$	17,893,964	\$	3,212,040	\$ 14,295,324	\$ 386,600

(1) Per Half Impact Fee Study

(2) Per discussions with Town staff and Town files

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Credit Determination
South Water Service Area

<u>Year</u>	<u>Eligible Revenue Funded Cost ⁽¹⁾</u>	<u>Annual Service Units⁽³⁾</u>	<u>Eligible Debt Service per Service Unit</u>	<u>Annual Growth in Service Units (Cumulative)</u>	<u>Credit for Annual Utility Rate Revenues</u>
1	\$ 309,074	723	\$ 427.72	70	\$ 29,770
2	447,379	792	564.73	139	78,610
3	588,820	862	683.24	209	142,661
4	767,713	931	824.26	278	229,473
5	908,144	1,001	907.24	348	315,718
6	1,010,510	1,071	943.87	418	394,161
7	1,152,202	1,140	1,010.53	487	492,329
8	1,291,596	1,210	1,067.61	557	594,446
9	1,427,444	1,279	1,115.71	626	698,883
10	1,555,935	1,349	1,153.40	696	802,766
11	1,556,854	1,396	1,115.14	696	776,135
12	1,556,854	1,445	1,077.51	696	749,945
13	1,556,487	1,495	1,040.90	696	724,468
14	1,555,989	1,548	1,005.46	696	699,797
15	1,556,219	1,602	971.67	696	676,283
16	1,556,127	1,658	938.83	696	653,424
17	1,271,981	1,715	741.50	696	516,086
18	1,271,981	1,775	716.48	696	498,672
19	1,271,981	1,834	693.43	696	482,628
20	1,271,981	1,895	671.12	696	467,101
21	1,152,358	1,958	588.45	696	409,559
22	1,030,243	2,023	509.16	696	354,378
23	905,610	2,091	433.17	696	301,486
24	778,435	2,160	360.36	696	250,811
25	648,696	2,232	290.64	696	202,285
26	518,957	2,306	225.03	696	156,622
27	389,218	2,383	163.34	696	113,687
28	259,478	2,462	105.39	696	73,353
29	129,739	2,523	51.42	696	35,785
Total	\$ 29,698,005				\$ 11,921,322

2022 Service Units ⁽²⁾	653
Ten Year Growth in Service Units ⁽²⁾	696
Annual Growth in Service Units	<u>10</u> years 70
Credit Amount	\$ 11,921,322

(1) Water Appendices - page 3 Section II
(2) Per Half Impact Fee Study
(3) Per Half and State Water Plan Projections

SUMMARY OF WATER IMPACT FEE DETERMINATION

North Water Service Area

Recoverable Impact Fee CIP Costs	\$ 25,014,180	Per Half Study
Financing Cost	14,747,574	See Detail Below
Existing Fund Balance	-	Water Appendices - page 1
Interest Earnings	(5,032,037)	Water Appendices - page 4
Pre Credit Recoverable Cost for Impact Fee	\$ 34,729,717	Sum of Above
Credit for Utility Revenues	(13,777,446)	Water Appendices - page 7
Maximum Recoverable Cost for Impact Fee	\$ 20,952,271	

Recoverable Impact Fee CIP Costs:

Represents the portion of capital improvement costs that are eligible for funding through impact fees. Reference is the Half Impact Fee Study.

Financing Costs:

Represents the interest costs associated with debt financing the new impact fee project costs. Interest costs are derived from existing debt issues and forecasted debt issues.

New Annual Debt Service	\$ 32,748,039	Water Appendices - page 2
Existing Annual Debt Service	1,186,502	Water Appendices - page 2
Principal Component (New and Existing Debt)	(19,186,967)	Water Appendices - page 1
Financing Costs	\$ 14,747,574	

Existing Fund Balance:

Represents impact fee revenue collected but not yet expended. Assuming all existing fund balance is already encumbered for projects from prior impact fee studies. Reference is page 1 of Water Appendices.

Interest Earnings:

Represents the interest earned on cash flows and assumes a 2.50% annual interest rate. The Impact Fee Statute states that interest earnings are funds of the impact fee account and are held to the same restrictions as impact fee revenues. Therefore in order to recognize that interest earnings are used to fund capital improvements, interest earnings are credited against the recoverable costs. Reference is the sum of Accumulated Interest on page 4 of Water Appendices.

Pre Credit Recoverable Cost for Impact Fee:

Represents Recoverable Impact Fee CIP Costs plus Financing Costs less Existing Fund Balance and Interest Earnings.

Credit for Utility Revenues:

In 2001, the Local Government Code Chapter 395 was amended to include a credit for ad valorem and/or utility revenues generated by new service units during the ten-year timeframe that are used to fund impact fee eligible projects for which the new service units were charged an impact fee. The intent of this amendment is to avoid double-charging the new service units for impact fee capital improvements. The credit recognizes utility revenues used to fund impact fee eligible projects. Reference is page 7 of Water Appendices.

Maximum Recoverable Cost for Impact Fee:

Represents Pre Credit Recoverable Cost for Impact Fee less Credit for Utility Revenues. This is the maximum cost that can be recovered through impact fees.

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Calculation Assumptions
North Water Service Area

I. General Assumptions

Annual Interest Rate on Deposits ⁽¹⁾	2.50%
Annual Service Unit Growth ⁽²⁾	503
Existing Fund Balance ⁽³⁾	-
Portion of Projects Funded by Existing Debt ⁽⁴⁾	\$ 784,809
Non-debt Funded Project Cost ⁽⁵⁾	5,827,213
New Project Cost Funded Through New Debt ⁽⁶⁾	18,402,158
Total Recoverable Project Cost ⁽⁷⁾	\$ 25,014,180

II. New Debt Issues Assumptions

<u>Year</u>	<u>Principal</u> ⁽⁸⁾	<u>Interest</u> ⁽⁹⁾	<u>Term</u>
1	\$ 1,840,216	5.50%	20
2	1,840,216	5.75%	20
3	1,840,216	6.00%	20
4	1,840,216	6.25%	20
5	1,840,216	6.50%	20
6	1,840,216	6.50%	20
7	1,840,216	6.50%	20
8	1,840,216	6.50%	20
9	1,840,216	6.50%	20
10	1,840,216	6.50%	20
Total	\$ 18,402,158		

III. Capital Expenditure Assumptions

<u>Year</u>	<u>Annual Capital Expenditures</u> ⁽¹⁰⁾
1	\$ 499,468
2	1,168,217
3	1,828,045
4	2,454,447
5	2,467,775
6	2,447,622
7	2,445,308
8	2,422,385
9	2,410,126
10	2,405,546
11	1,840,216
12	1,226,811
13	613,405
Total	24,229,371

- (1) Per discussions with Town Staff
- (2) Per Half Impact Fee Study
- (3) Assumes all existing fund balances are already encumbered
- (4) Per discussions with Town Staff
- (5) This assumes 0% of new project costs funded through sources other than debt, unless specified otherwise
- (6) This assumes 100% of new project costs funded through new debt issues, unless specified otherwise
- (7) Per Half Impact Fee Study
- (8) Assumes new debt issued in equal annual amounts
- (9) Per discussions with Town Staff
- (10) Assumes new debt proceeds expended over a 3-year timeframe
 Non-debt funded expenditures expended over 10 years equally or UTRWD debt schedules

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Debt Service and Expense Summary
North Water Service Area

I. New Debt Service Detail

<u>Year</u>	<u>Series 1</u>	<u>Series 2</u>	<u>Series 3</u>	<u>Series 4</u>	<u>Series 5</u>	<u>Series 6</u>	<u>Series 7</u>	<u>Series 8</u>	<u>Series 9</u>	<u>Series 10</u>	<u>Total Annual New Debt Service</u>
1	\$ 153,988	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 153,988
2	153,988	157,198	-	-	-	-	-	-	-	-	311,186
3	153,988	157,198	160,438	-	-	-	-	-	-	-	471,624
4	153,988	157,198	160,438	163,710	-	-	-	-	-	-	635,334
5	153,988	157,198	160,438	163,710	167,011	-	-	-	-	-	802,345
6	153,988	157,198	160,438	163,710	167,011	167,011	-	-	-	-	969,357
7	153,988	157,198	160,438	163,710	167,011	167,011	167,011	-	-	-	1,136,368
8	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	-	-	1,303,379
9	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	-	1,470,391
10	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
11	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
12	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
13	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
14	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
15	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
16	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
17	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
18	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
19	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
20	153,988	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,637,402
21	-	157,198	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,483,414
22	-	-	160,438	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,326,216
23	-	-	-	163,710	167,011	167,011	167,011	167,011	167,011	167,011	1,165,778
24	-	-	-	-	167,011	167,011	167,011	167,011	167,011	167,011	1,002,068
25	-	-	-	-	-	167,011	167,011	167,011	167,011	167,011	835,057
26	-	-	-	-	-	-	167,011	167,011	167,011	167,011	668,045
27	-	-	-	-	-	-	-	167,011	167,011	167,011	501,034
28	-	-	-	-	-	-	-	-	167,011	167,011	334,023
29	-	-	-	-	-	-	-	-	-	167,011	167,011
	\$ 3,079,760	\$ 3,143,953	\$ 3,208,768	\$ 3,274,195	\$ 3,340,227	\$ 3,340,227	\$ 3,340,227	\$ 3,340,227	\$ 3,340,227	\$ 3,340,227	\$ 32,748,039

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Debt Service and Expense Summary

II. Summary of Annual Expenses

<u>Year</u>	<u>New Annual Debt Service⁽¹⁾</u>	<u>Annual Capital Expenditures⁽²⁾</u>	<u>Annual Bond Proceeds⁽²⁾</u>	<u>Existing Annual Debt Service⁽³⁾</u>	<u>Annual Credit⁽⁴⁾</u>	<u>Total Expense</u>
1	\$ 153,988	\$ 499,468	\$ (1,840,216)	\$ 41,605	\$ (19,383)	\$ (1,164,538)
2	311,186	1,168,217	(1,840,216)	45,019	(64,234)	(380,027)
3	471,624	1,828,045	(1,840,216)	48,568	(129,070)	378,951
4	635,334	2,454,447	(1,840,216)	59,731	(212,381)	1,096,915
5	802,345	2,467,775	(1,840,216)	61,924	(306,676)	1,185,152
6	969,357	2,447,622	(1,840,216)	65,131	(411,302)	1,230,591
7	1,136,368	2,445,308	(1,840,216)	67,579	(523,751)	1,285,288
8	1,303,379	2,422,385	(1,840,216)	69,497	(642,623)	1,312,423
9	1,470,391	2,410,126	(1,840,216)	70,655	(766,651)	1,344,305
10	1,637,402	2,405,546	(1,840,216)	70,202	(894,459)	1,378,475
11	1,637,402	1,840,216	-	70,219	(864,285)	2,683,552
12	1,637,402	1,226,811	-	69,999	(835,013)	2,099,199
13	1,637,402	613,405	-	64,172	(804,082)	1,510,897
14	1,637,402	-	-	64,063	(776,900)	924,566
15	1,637,402	-	-	64,139	(750,717)	950,824
16	1,637,402	-	-	64,114	(725,374)	976,142
17	1,637,402	-	-	2,184	(675,386)	964,200
18	1,637,402	-	-	2,187	(652,597)	986,992
19	1,637,402	-	-	2,172	(631,596)	1,007,978
20	1,637,402	-	-	-	(610,467)	1,026,935
21	1,483,414	-	-	-	(535,263)	948,151
22	1,326,216	-	-	-	(463,146)	863,071
23	1,165,778	-	-	-	(394,019)	771,759
24	1,002,068	-	-	-	(327,791)	674,277
25	835,057	-	-	-	(264,371)	570,686
26	668,045	-	-	-	(204,693)	463,353
27	501,034	-	-	-	(148,581)	352,454
28	334,023	-	-	-	(95,867)	238,156
29	167,011	-	-	-	(46,769)	120,243
PTD	-	-	-	183,341	-	183,341
	\$ 32,748,039	\$ 24,229,371	\$ (18,402,158)	\$ 1,186,502	\$ (13,777,446)	\$ 25,984,308

(1) Water Appendices - page 2 Section I

(2) Water Appendices - page 1

(3) Eligible outstanding debt funded projects as a percent of total principal times original annual debt service, including Paid-To-Date (PTD) amounts

(4) Water Appendices - page 7

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Revenue Test
North Water Service Area

<u>Year</u>	<u>Impact Fee</u>	<u>Service Units</u>	<u>Impact Fee Revenue</u>	<u>Annual Expenses</u>	<u>Sub-Total</u>	<u>Accumulated Interest</u>	<u>Estimated Fund Balance</u>
Initial							\$ -
1	\$ 4,168	503	\$ 2,095,227	\$ (1,164,538)	\$ 3,259,765	\$ 40,747	3,300,512
2	4,168	503	2,095,227	(380,027)	2,475,254	113,453	5,889,220
3	4,168	503	2,095,227	378,951	1,716,276	168,684	7,774,180
4	4,168	503	2,095,227	1,096,915	998,312	206,833	8,979,325
5	4,168	503	2,095,227	1,185,152	910,075	235,859	10,125,259
6	4,168	503	2,095,227	1,230,591	864,636	263,939	11,253,835
7	4,168	503	2,095,227	1,285,288	809,939	291,470	12,355,244
8	4,168	503	2,095,227	1,312,423	782,805	318,666	13,456,714
9	4,168	503	2,095,227	1,344,305	750,922	345,804	14,553,441
10	4,168	503	2,095,227	1,378,475	716,752	372,795	15,642,988
11	-	-	-	2,683,552	(2,683,552)	357,530	13,316,967
12	-	-	-	2,099,199	(2,099,199)	306,684	11,524,452
13	-	-	-	1,510,897	(1,510,897)	269,225	10,282,780
14	-	-	-	924,566	(924,566)	245,512	9,603,727
15	-	-	-	950,824	(950,824)	228,208	8,881,111
16	-	-	-	976,142	(976,142)	209,826	8,114,795
17	-	-	-	964,200	(964,200)	190,817	7,341,413
18	-	-	-	986,992	(986,992)	171,198	6,525,618
19	-	-	-	1,007,978	(1,007,978)	150,541	5,668,181
20	-	-	-	1,026,935	(1,026,935)	128,868	4,770,114
21	-	-	-	948,151	(948,151)	107,401	3,929,364
22	-	-	-	863,071	(863,071)	87,446	3,153,739
23	-	-	-	771,759	(771,759)	69,196	2,451,177
24	-	-	-	674,277	(674,277)	52,851	1,829,750
25	-	-	-	570,686	(570,686)	38,610	1,297,675
26	-	-	-	463,353	(463,353)	26,650	860,972
27	-	-	-	352,454	(352,454)	17,119	525,637
28	-	-	-	238,156	(238,156)	10,164	297,646
29	-	-	-	120,243	(120,243)	5,938	183,341
PTD	-	-	-	183,341	(183,341)	-	0
			\$ 20,952,271	\$ 25,984,308		\$ 5,032,037	

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Calculation
North Water Service Area

<u>Year</u>	<u>Number of Years to End of Period</u>	<u>Future Value Escalation</u>		<u>Annual Service Units</u>		<u>Annual Expense</u>	
		<u>Interest Rate Factor</u>	<u>Recovery Fee Factor</u>	<u>Actual</u>	<u>Escalated</u>	<u>Actual</u>	<u>Escalated</u>
1	29	2.0215	1.0000	503	1,016	\$ (1,164,538)	\$ (2,354,057)
2	28	1.9721	1.0000	503	991	(380,027)	(749,470)
3	27	1.9240	1.0000	503	967	378,951	729,120
4	26	1.8771	1.0000	503	944	1,096,915	2,059,040
5	25	1.8313	1.0000	503	921	1,185,152	2,170,411
6	24	1.7867	1.0000	503	898	1,230,591	2,198,657
7	23	1.7431	1.0000	503	876	1,285,288	2,240,374
8	22	1.7006	1.0000	503	855	1,312,423	2,231,875
9	21	1.6591	1.0000	503	834	1,344,305	2,230,335
10	20	1.6186	1.0000	503	814	1,378,475	2,231,246
11	19	1.5792	1.0000	-	-	2,683,552	4,237,742
12	18	1.5406	1.0000	-	-	2,099,199	3,234,107
13	17	1.5031	1.0000	-	-	1,510,897	2,270,972
14	16	1.4664	1.0000	-	-	924,566	1,355,785
15	15	1.4306	1.0000	-	-	950,824	1,360,283
16	14	1.3957	1.0000	-	-	976,142	1,362,443
17	13	1.3617	1.0000	-	-	964,200	1,312,951
18	12	1.3285	1.0000	-	-	986,992	1,311,207
19	11	1.2961	1.0000	-	-	1,007,978	1,306,426
20	10	1.2645	1.0000	-	-	1,026,935	1,298,533
21	9	1.2336	1.0000	-	-	948,151	1,169,670
22	8	1.2035	1.0000	-	-	863,071	1,038,744
23	7	1.1742	1.0000	-	-	771,759	906,191
24	6	1.1456	1.0000	-	-	674,277	772,419
25	5	1.1176	1.0000	-	-	570,686	637,804
26	4	1.0904	1.0000	-	-	463,353	505,217
27	3	1.0638	1.0000	-	-	352,454	374,925
28	2	1.0378	1.0000	-	-	238,156	247,161
29	1	1.0125	1.0000	-	-	120,243	121,746
PTD		1.0000	1.0000	-	-	183,341	183,341
					9,116		\$ 37,995,198

Annual Interest Rate: 2.50%

Present Value of Initial Impact Fee Fund Balance \$ -

Total Escalated Expense for Entire Period \$ 37,995,198

Less Future Value of Initial Impact Fee Fund Balance -

Sub-Total \$ 37,995,198

Total Escalated Service Units 9,116

Maximum Assessable Impact Fee for Water Service Area \$ 4,168

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Project Funding
North Water Service Area

<u>Impact Fee Project Name⁽¹⁾</u>	<u>Cost In</u>	<u>Impact Fee</u>	<u>Debt Funded⁽²⁾</u>		<u>Non-Debt</u>
	<u>Service Area⁽¹⁾</u>	<u>Recoverable Cost⁽¹⁾</u>	<u>Existing</u>	<u>Proposed</u>	<u>Funded⁽²⁾</u>
16" waterline along Cleveland Gibbs Road that connects Cross Timbers Road	\$ 2,166,000	\$ 197,106	\$ -	\$ 197,106	\$ -
16" waterline along Cleveland Gibbs Road from the intersection with future Mul	4,679,274	1,820,238	-	1,820,238	-
12" waterline starting at Schober Road and Robson Ranch Road heading East	2,494,393	1,162,387	-	1,162,387	-
16" waterline connecting the Canyon Falls development to the East side of High	2,261,378	205,785	-	205,785	-
12" waterline from the intersection of Old Justin Road and Faught Road to the i	2,477,172	963,620	-	963,620	-
16" waterline from Cross Timbers Road on the East side of Highway 35W down	2,216,241	201,678	-	201,678	-
16" waterline along future Mulkey Lane connecting Project WN21C to an existin	2,090,898	813,359	-	813,359	-
12" waterline along Mulkey Lane beginning at the intersection with S Mulkey La	2,704,145	1,051,912	-	1,051,912	-
New 0.6 MG ground storage tank at the Harvest Pump Station.	756,000	352,296	-	-	352,296
8" waterline beginning at the intersection of 13th Street and Tattler Trail and co	206,539	96,247	-	96,247	-
12" waterline mostly along Evelyn Lane from Florance Road and Holder Road i	1,514,353	589,083	-	589,083	-
16" waterline that connects Cleveland Gibbs Road to the east side of Highway	2,515,314	228,894	-	228,894	-
Replace Pump 3 at Harvest PS to match the design point of other three Harves	253,963	23,111	-	23,111	-
16" waterline loop from the intersection of Robson Ranch Road and Florance F	17,790,299	6,920,426	-	6,920,426	-
New 1 MG elevated storage tank located along Florance Road on the west side	7,793,430	3,031,644	-	3,031,644	-
16" waterline along FM 407 from the intersection with Canyon Ridge Drive to P	653,704	254,291	-	254,291	-
12" waterline along FM 407 and Mulkey Lane from the connection to Project W	2,165,494	842,377	-	842,377	-
12" waterline that connects the Canyon Falls development to Cross Timbers R	-	-	-	-	-
16" waterline along Cleveland Gibbs Road from the intersection with Cross Tirr	430,870	39,209	39,209	(0)	-
12" waterline along Old Justin Road from the intersection with Flanagan Farm I	-	-	-	-	-
Existing Canyon Falls waterlines.	-	-	-	-	-
20" waterline connection the Harvest pump station to the NRE pump station.	200,000	93,200	93,200	-	-
New 750,000 gallon ground storage tank and 5.2 MGD pump station for Canyo	-	-	-	-	-
12" waterline East of Woodhill Farm extending from FM 407 to CR 335.	-	-	-	-	-
12" waterlines directly North of Harvest from Robson Ranch Road to CR 317 fr	-	-	-	-	-
New 1 MG elevated storage tank located North of Old Justin Road and East of	3,200,000	1,491,200	652,400	-	838,800
One 1777 gpm Pump at Harvest pump station and a VFD.	1,939,000	903,574	-	-	903,574
UTRWD Debt Service (10-Yr Growth Portion Only)	3,644,743	3,644,743	-	-	3,644,743
Water Impact Fee Update	87,800	87,800	-	-	87,800
Total	\$ 64,241,010	\$ 25,014,180	\$ 784,809	\$ 18,402,158	\$ 5,827,213

(1) Per Half Impact Fee Study
(2) Per discussions with Town staff and Town files

Town of Northlake - 2023 Water Impact Fee Study
Capital Improvement Plan for Impact Fees
Credit Determination
North Water Service Area

<u>Year</u>	<u>Eligible Revenue Funded Cost ⁽¹⁾</u>	<u>Annual Service Units⁽³⁾</u>	<u>Eligible Debt Service per Service Unit</u>	<u>Annual Growth in Service Units (Cumulative)</u>	<u>Credit for Annual Utility Rate Revenues</u>
1	\$ 195,593	5,073	\$ 38.56	503	\$ 19,383
2	356,205	5,575	63.89	1,005	64,234
3	520,192	6,078	85.58	1,508	129,070
4	695,065	6,581	105.62	2,011	212,381
5	864,269	7,084	122.01	2,514	306,676
6	1,034,487	7,586	136.36	3,016	411,302
7	1,203,947	8,089	148.84	3,519	523,751
8	1,372,876	8,592	159.79	4,022	642,623
9	1,541,046	9,094	169.45	4,524	766,651
10	1,707,604	9,597	177.93	5,027	894,459
11	1,707,621	9,932	171.93	5,027	864,285
12	1,707,401	10,279	166.11	5,027	835,013
13	1,701,574	10,638	159.95	5,027	804,082
14	1,701,465	11,009	154.55	5,027	776,900
15	1,701,541	11,394	149.34	5,027	750,717
16	1,701,516	11,792	144.30	5,027	725,374
17	1,639,586	12,204	134.35	5,027	675,386
18	1,639,589	12,630	129.82	5,027	652,597
19	1,639,574	13,050	125.64	5,027	631,596
20	1,637,402	13,483	121.44	5,027	610,467
21	1,483,414	13,932	106.48	5,027	535,263
22	1,326,216	14,395	92.13	5,027	463,146
23	1,165,778	14,873	78.38	5,027	394,019
24	1,002,068	15,368	65.21	5,027	327,791
25	835,057	15,879	52.59	5,027	264,371
26	668,045	16,406	40.72	5,027	204,693
27	501,034	16,952	29.56	5,027	148,581
28	334,023	17,515	19.07	5,027	95,867
29	167,011	17,951	9.30	5,027	46,769
Total	\$ 33,751,200				\$ 13,777,446

2022 Service Units ⁽²⁾	4,570
Ten Year Growth in Service Units ⁽²⁾	5,027
	<u>10</u> years
Annual Growth in Service Units	503
Credit Amount	\$ 13,777,446

(1) Water Appendices - page 3 Section II
(2) Per Half Impact Fee Study
(3) Per Half and State Water Plan Projections

SUMMARY OF WASTEWATER IMPACT FEE DETERMINATION

Wastewater Service Area

Recoverable Impact Fee CIP Costs	\$ 43,560,361	Per Half Study
Financing Cost	22,489,013	See Detail Below
Existing Fund Balance	-	Wastewater Appendices - page 1
Interest Earnings	(7,742,864)	Wastewater Appendices - page 4
Pre Credit Recoverable Cost for Impact Fee	\$ 58,306,510	Sum of Above
Credit for Utility Revenues	(22,504,120)	Wastewater Appendices - page 7
Maximum Recoverable Cost for Impact Fee	\$ 35,802,390	

Recoverable Impact Fee CIP Costs:

Represents the portion of capital improvement costs that are eligible for funding through impact fees. Reference is the Half Impact Fee Study.

Financing Costs:

Represents the interest costs associated with debt financing the new impact fee project costs. Interest costs are derived from existing debt issues and forecasted debt issues.

New Annual Debt Service	\$ 48,747,553	Wastewater Appendices - page 2
Existing Annual Debt Service	7,382,977	Wastewater Appendices - page 2
Principal Component (New and Existing Debt)	(33,641,518)	Wastewater Appendices - page 1
Financing Costs	\$ 22,489,013	

Existing Fund Balance:

Represents impact fee revenue collected but not yet expended. Assuming all existing fund balance is already encumbered for projects from prior impact fee studies. Reference is page 1 of Wastewater Appendices.

Interest Earnings:

Represents the interest earned on cash flows and assumes a 2.50% annual interest rate. The Impact Fee Statute states that interest earnings are funds of the impact fee account and are held to the same restrictions as impact fee revenues. Therefore in order to recognize that interest earnings are used to fund capital improvements, interest earnings are credited against the recoverable costs. Reference is the sum of Accumulated Interest on page 4 of Wastewater Appendices.

Pre Credit Recoverable Cost for Impact Fee:

Represents Recoverable Impact Fee CIP Costs plus Financing Costs less Existing Fund Balance and Interest Earnings.

Credit for Utility Revenues:

In 2001, the Local Government Code Chapter 395 was amended to include a credit for ad valorem and/or utility revenues generated by new service units during the ten-year timeframe that are used to fund impact fee eligible projects for which the new service units were charged an impact fee. The intent of this amendment is to avoid double-charging the new service units for impact fee capital improvements. The credit recognizes utility revenues used to fund impact fee eligible projects. Reference is page 7 of Wastewater Appendices.

Maximum Recoverable Cost for Impact Fee:

Represents Pre Credit Recoverable Cost for Impact Fee less Credit for Utility Revenues. This is the maximum cost that can be recovered through impact fees.

Town of Northlake - 2023 Wastewater Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Calculation Assumptions
Wastewater Service Area

I. General Assumptions

Annual Interest Rate on Deposits ⁽¹⁾	2.50%
Annual Service Unit Growth ⁽²⁾	532
Existing Fund Balance ⁽³⁾	-
Portion of Projects Funded by Existing Debt ⁽⁴⁾	\$ 6,248,728
Non-debt Funded Project Cost ⁽⁵⁾	9,918,843
New Project Cost Funded Through New Debt ⁽⁶⁾	27,392,790
Total Recoverable Project Cost ⁽⁷⁾	\$ 43,560,361

II. New Debt Issues Assumptions

<u>Year</u>	<u>Principal</u> ⁽⁸⁾	<u>Interest</u> ⁽⁹⁾	<u>Term</u>
1	\$ 2,739,279	5.50%	20
2	2,739,279	5.75%	20
3	2,739,279	6.00%	20
4	2,739,279	6.25%	20
5	2,739,279	6.50%	20
6	2,739,279	6.50%	20
7	2,739,279	6.50%	20
8	2,739,279	6.50%	20
9	2,739,279	6.50%	20
10	2,739,279	6.50%	20
Total	\$ 27,392,790		

III. Capital Expenditure Assumptions

<u>Year</u>	<u>Annual Capital Expenditures</u> ⁽¹⁰⁾
1	\$ 796,505
2	1,929,224
3	3,075,507
4	3,936,053
5	3,878,968
6	3,713,098
7	3,689,426
8	3,645,699
9	3,603,825
10	3,564,771
11	2,739,279
12	1,826,186
13	913,093
Total	37,311,633

- (1) Per discussions with Town Staff
- (2) Per Half Impact Fee Study
- (3) Assumes all existing fund balances are already encumbered
- (4) Per discussions with Town Staff
- (5) This assumes 0% of new project costs funded through sources other than debt, unless specified otherwise
- (6) This assumes 100% of new project costs funded through new debt issues, unless specified otherwise
- (7) Per Half Impact Fee Study
- (8) Assumes new debt issued in equal annual amounts
- (9) Per discussions with Town Staff
- (10) Assumes new debt proceeds expended over a 3-year timeframe
 Non-debt funded expenditures expended over 10 years equally or TRA debt schedules

Town of Northlake - 2023 Wastewater Impact Fee Study
Capital Improvement Plan for Impact Fees
Debt Service and Expense Summary
Wastewater Service Area

I. New Debt Service Detail

<u>Year</u>	<u>Series 1</u>	<u>Series 2</u>	<u>Series 3</u>	<u>Series 4</u>	<u>Series 5</u>	<u>Series 6</u>	<u>Series 7</u>	<u>Series 8</u>	<u>Series 9</u>	<u>Series 10</u>	<u>Total Annual New Debt Service</u>
1	\$ 229,221	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 229,221
2	229,221	233,999	-	-	-	-	-	-	-	-	463,220
3	229,221	233,999	238,823	-	-	-	-	-	-	-	702,043
4	229,221	233,999	238,823	243,692	-	-	-	-	-	-	945,735
5	229,221	233,999	238,823	243,692	248,607	-	-	-	-	-	1,194,342
6	229,221	233,999	238,823	243,692	248,607	248,607	-	-	-	-	1,442,949
7	229,221	233,999	238,823	243,692	248,607	248,607	248,607	-	-	-	1,691,556
8	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	-	-	1,940,163
9	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	-	2,188,771
10	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
11	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
12	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
13	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
14	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
15	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
16	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
17	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
18	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
19	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
20	229,221	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,437,378
21	-	233,999	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	2,208,157
22	-	-	238,823	243,692	248,607	248,607	248,607	248,607	248,607	248,607	1,974,158
23	-	-	-	243,692	248,607	248,607	248,607	248,607	248,607	248,607	1,735,335
24	-	-	-	-	248,607	248,607	248,607	248,607	248,607	248,607	1,491,643
25	-	-	-	-	-	248,607	248,607	248,607	248,607	248,607	1,243,035
26	-	-	-	-	-	-	248,607	248,607	248,607	248,607	994,428
27	-	-	-	-	-	-	-	248,607	248,607	248,607	745,821
28	-	-	-	-	-	-	-	-	248,607	248,607	497,214
29	-	-	-	-	-	-	-	-	-	248,607	248,607
30	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-	-	-	-
	\$ 4,584,421	\$ 4,679,976	\$ 4,776,457	\$ 4,873,849	\$ 4,972,142	\$ 4,972,142	\$ 4,972,142	\$ 4,972,142	\$ 4,972,142	\$ 4,972,142	\$ 48,747,553

Town of Northlake - 2023 Wastewater Impact Fee Study
Capital Improvement Plan for Impact Fees
Debt Service and Expense Summary

II. Summary of Annual Expenses

<u>Year</u>	<u>New Annual Debt Service⁽¹⁾</u>	<u>Annual Capital Expenditures⁽²⁾</u>	<u>Annual Bond Proceeds⁽²⁾</u>	<u>Existing Annual Debt Service⁽³⁾</u>	<u>Annual Credit⁽⁴⁾</u>	<u>Total Expense</u>
1	\$ 229,221	\$ 796,505	\$ (2,739,279)	\$ 684,625	\$ (94,349)	\$ (1,123,277)
2	463,220	1,929,224	(2,739,279)	687,353	(215,345)	125,173
3	702,043	3,075,507	(2,739,279)	686,103	(356,366)	1,368,007
4	945,735	3,936,053	(2,739,279)	686,439	(514,644)	2,314,304
5	1,194,342	3,878,968	(2,739,279)	684,771	(686,517)	2,332,285
6	1,442,949	3,713,098	(2,739,279)	203,960	(672,856)	1,947,873
7	1,691,556	3,689,426	(2,739,279)	204,729	(846,241)	2,000,192
8	1,940,163	3,645,699	(2,739,279)	203,224	(1,027,644)	2,022,164
9	2,188,771	3,603,825	(2,739,279)	203,963	(1,217,618)	2,039,661
10	2,437,378	3,564,771	(2,739,279)	204,182	(1,413,669)	2,053,383
11	2,437,378	2,739,279	-	204,504	(1,366,132)	4,015,028
12	2,437,378	1,826,186	-	202,839	(1,319,201)	3,147,202
13	2,437,378	913,093	-	203,019	(1,274,773)	2,278,717
14	2,437,378	-	-	202,927	(1,231,713)	1,408,591
15	2,437,378	-	-	204,421	(1,190,824)	1,450,975
16	2,437,378	-	-	204,215	(1,150,550)	1,491,042
17	2,437,378	-	-	203,813	(1,111,557)	1,529,634
18	2,437,378	-	-	203,909	(1,074,087)	1,567,199
19	2,437,378	-	-	203,045	(1,039,192)	1,601,231
20	2,437,378	-	-	-	(928,418)	1,508,960
21	2,208,157	-	-	-	(814,046)	1,394,111
22	1,974,158	-	-	-	(704,367)	1,269,791
23	1,735,335	-	-	-	(599,237)	1,136,098
24	1,491,643	-	-	-	(498,515)	993,127
25	1,243,035	-	-	-	(402,064)	840,971
26	994,428	-	-	-	(311,303)	683,125
27	745,821	-	-	-	(225,966)	519,855
28	497,214	-	-	-	(145,798)	351,417
29	248,607	-	-	-	(71,127)	177,480
PTD	-	-	-	1,100,937	-	1,100,937
	\$ 48,747,553	\$ 37,311,633	\$ (27,392,790)	\$ 7,382,977	\$ (22,504,120)	\$ 43,545,254

(1) Wastewater Appendices - page 2 Section I

(2) Wastewater Appendices - page 1

(3) Eligible outstanding debt funded projects as a percent of total principal times original annual debt service, including Paid-To-Date (PTD) amounts

(4) Wastewater Appendices - page 7

Town of Northlake - 2023 Wastewater Impact Fee Study
Capital Improvement Plan for Impact Fees
Revenue Test
Wastewater Service Area

<u>Year</u>	<u>Impact Fee</u>	<u>Service Units</u>	<u>Impact Fee Revenue</u>	<u>Annual Expenses</u>	<u>Sub-Total</u>	<u>Accumulated Interest</u>	<u>Estimated Fund Balance</u>
Initial							\$ -
1	\$ 6,731	532	\$ 3,580,239	\$ (1,123,277)	\$ 4,703,516	\$ 58,794	4,762,309
2	6,731	532	3,580,239	125,173	3,455,066	162,246	8,379,622
3	6,731	532	3,580,239	1,368,007	2,212,232	237,143	10,828,997
4	6,731	532	3,580,239	2,314,304	1,265,935	286,549	12,381,481
5	6,731	532	3,580,239	2,332,285	1,247,954	325,136	13,954,572
6	6,731	532	3,580,239	1,947,873	1,632,366	369,269	15,956,207
7	6,731	532	3,580,239	2,000,192	1,580,047	418,656	17,954,910
8	6,731	532	3,580,239	2,022,164	1,558,075	468,349	19,981,334
9	6,731	532	3,580,239	2,039,661	1,540,578	518,791	22,040,702
10	6,731	532	3,580,239	2,053,383	1,526,856	570,103	24,137,661
11	-	-	-	4,015,028	(4,015,028)	553,254	20,675,887
12	-	-	-	3,147,202	(3,147,202)	477,557	18,006,242
13	-	-	-	2,278,717	(2,278,717)	421,672	16,149,197
14	-	-	-	1,408,591	(1,408,591)	386,123	15,126,729
15	-	-	-	1,450,975	(1,450,975)	360,031	14,035,785
16	-	-	-	1,491,042	(1,491,042)	332,257	12,877,000
17	-	-	-	1,529,634	(1,529,634)	302,805	11,650,170
18	-	-	-	1,567,199	(1,567,199)	271,664	10,354,635
19	-	-	-	1,601,231	(1,601,231)	238,851	8,992,255
20	-	-	-	1,508,960	(1,508,960)	205,944	7,689,240
21	-	-	-	1,394,111	(1,394,111)	174,805	6,469,933
22	-	-	-	1,269,791	(1,269,791)	145,876	5,346,019
23	-	-	-	1,136,098	(1,136,098)	119,449	4,329,370
24	-	-	-	993,127	(993,127)	95,820	3,432,063
25	-	-	-	840,971	(840,971)	75,289	2,666,381
26	-	-	-	683,125	(683,125)	58,120	2,041,377
27	-	-	-	519,855	(519,855)	44,536	1,566,058
28	-	-	-	351,417	(351,417)	34,759	1,249,400
29	-	-	-	177,480	(177,480)	29,016	1,100,937
PTD	-	-	-	1,100,937	(1,100,937)	-	0
			\$ 35,802,390	\$ 43,545,254		\$ 7,742,864	

Town of Northlake - 2023 Wastewater Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Calculation
Wastewater Service Area

<u>Year</u>	<u>Number of Years to End of Period</u>	<u>Future Value Escalation</u>		<u>Annual Service Units</u>		<u>Annual Expense</u>	
		<u>Interest Rate Factor</u>	<u>Recovery Fee Factor</u>	<u>Actual</u>	<u>Escalated</u>	<u>Actual</u>	<u>Escalated</u>
1	29	2.0215	1.0000	532	1,075	\$ (1,123,277)	\$ (2,270,649)
2	28	1.9721	1.0000	532	1,049	125,173	246,859
3	27	1.9240	1.0000	532	1,023	1,368,007	2,632,109
4	26	1.8771	1.0000	532	998	2,314,304	4,344,223
5	25	1.8313	1.0000	532	974	2,332,285	4,271,194
6	24	1.7867	1.0000	532	950	1,947,873	3,480,202
7	23	1.7431	1.0000	532	927	2,000,192	3,486,516
8	22	1.7006	1.0000	532	905	2,022,164	3,438,845
9	21	1.6591	1.0000	532	882	2,039,661	3,384,000
10	20	1.6186	1.0000	532	861	2,053,383	3,323,674
11	19	1.5792	1.0000	-	-	4,015,028	6,340,350
12	18	1.5406	1.0000	-	-	3,147,202	4,848,700
13	17	1.5031	1.0000	-	-	2,278,717	3,425,053
14	16	1.4664	1.0000	-	-	1,408,591	2,065,560
15	15	1.4306	1.0000	-	-	1,450,975	2,075,817
16	14	1.3957	1.0000	-	-	1,491,042	2,081,110
17	13	1.3617	1.0000	-	-	1,529,634	2,082,902
18	12	1.3285	1.0000	-	-	1,567,199	2,082,005
19	11	1.2961	1.0000	-	-	1,601,231	2,075,332
20	10	1.2645	1.0000	-	-	1,508,960	1,908,040
21	9	1.2336	1.0000	-	-	1,394,111	1,719,821
22	8	1.2035	1.0000	-	-	1,269,791	1,528,249
23	7	1.1742	1.0000	-	-	1,136,098	1,333,994
24	6	1.1456	1.0000	-	-	993,127	1,137,678
25	5	1.1176	1.0000	-	-	840,971	939,878
26	4	1.0904	1.0000	-	-	683,125	744,847
27	3	1.0638	1.0000	-	-	519,855	553,000
28	2	1.0378	1.0000	-	-	351,417	364,705
29	1	1.0125	1.0000	-	-	177,480	179,698
PTD		1.0000	1.0000	-	-	1,100,937	1,100,937
					<u>9,646</u>		<u>\$ 64,924,651</u>

Annual Interest Rate: 2.50%

Present Value of Initial Impact Fee Fund Balance \$ -

Total Escalated Expense for Entire Period \$ 64,924,651

Less Future Value of Initial Impact Fee Fund Balance -

Sub-Total \$ 64,924,651

Total Escalated Service Units 9,646

Maximum Assessable Impact Fee for Wastewater Service Area \$ 6,731

Town of Northlake - 2023 Wastewater Impact Fee Study
Capital Improvement Plan for Impact Fees
Impact Fee Project Funding
Wastewater Service Area

<u>Impact Fee Project Name⁽¹⁾</u>	<u>Cost In</u>	<u>Impact Fee</u>	<u>Debt Funded⁽²⁾</u>		<u>Non-Debt</u>
	<u>Service Area</u> ⁽¹⁾	<u>Recoverable Cost</u> ⁽¹⁾	<u>Existing</u>	<u>Proposed</u>	<u>Funded</u> ⁽²⁾
Catherine Branch WWTP Phase 1	\$ 4,179,870	\$ 4,179,870	\$ 3,354,000	\$ -	\$ 825,870
Catherine Branch Lower Interceptor	14,750,000	2,507,500	340,000	2,167,500	-
Catherine Branch Trunk Line Phase 2	5,806,200	2,554,728	2,554,728	-	-
Catherine Branch Trunk Line Phase 1	705,018	282,008	-	282,008	-
15" - 48" SS line along Denton Creek, intercepting SS line along Cathe	24,330,040	3,162,905	-	3,162,905	-
10" - 21" SS line along Cleveland Branch intercepting line along Denton	10,861,200	1,303,344	-	1,303,344	-
12" SS line south of IH-35W intercepting to SS line along Catherine Br	958,160	622,804	-	622,804	-
10" SS line east of Canyon Falls Rd intercepting TRA line	439,040	153,664	-	153,664	-
Catherine Branch WWTP Expansion to 0.5 MGD	19,499,891	19,499,891	-	19,499,891	-
15" SS in Harmonson Road	501,684	200,674	-	200,674	-
TRA Debt Service (10-Yr Growth Portion Only)	8,992,973	8,992,973	-	-	8,992,973
Wastewater Impact Fee Update	100,000	100,000	-	-	100,000
Total	\$ 91,124,076	\$ 43,560,361	\$ 6,248,728	\$ 27,392,790	\$ 9,918,843

(1) Per Half Impact Fee Study

(2) Per discussions with Town staff and Town files

Town of Northlake - 2023 Wastewater Impact Fee Study
Capital Improvement Plan for Impact Fees
Credit Determination
Wastewater Service Area

<u>Year</u>	<u>Eligible Revenue Funded Cost ⁽¹⁾</u>	<u>Annual Service Units⁽³⁾</u>	<u>Eligible Debt Service per Service Unit</u>	<u>Annual Growth in Service Units (Cumulative)</u>	<u>Credit for Annual Utility Rate Revenues</u>
1	\$ 913,847	5,152	\$ 177.38	532	\$ 94,349
2	1,150,573	5,684	202.43	1,064	215,345
3	1,388,145	6,216	223.33	1,596	356,366
4	1,632,174	6,748	241.89	2,128	514,644
5	1,879,113	7,280	258.14	2,660	686,517
6	1,646,910	7,811	210.83	3,191	672,856
7	1,896,285	8,343	227.28	3,723	846,241
8	2,143,387	8,875	241.50	4,255	1,027,644
9	2,392,734	9,407	254.35	4,787	1,217,618
10	2,641,560	9,939	265.78	5,319	1,413,669
11	2,641,882	10,286	256.84	5,319	1,366,132
12	2,640,217	10,645	248.02	5,319	1,319,201
13	2,640,397	11,017	239.66	5,319	1,274,773
14	2,640,304	11,402	231.57	5,319	1,231,713
15	2,641,799	11,800	223.88	5,319	1,190,824
16	2,641,592	12,212	216.31	5,319	1,150,550
17	2,641,191	12,639	208.98	5,319	1,111,557
18	2,641,286	13,080	201.93	5,319	1,074,087
19	2,640,422	13,515	195.37	5,319	1,039,192
20	2,437,378	13,964	174.55	5,319	928,418
21	2,208,157	14,428	153.04	5,319	814,046
22	1,974,158	14,908	132.42	5,319	704,367
23	1,735,335	15,403	112.66	5,319	599,237
24	1,491,643	15,915	93.72	5,319	498,515
25	1,243,035	16,444	75.59	5,319	402,064
26	994,428	16,991	58.53	5,319	311,303
27	745,821	17,556	42.48	5,319	225,966
28	497,214	18,139	27.41	5,319	145,798
29	248,607	18,591	13.37	5,319	71,127
Total	\$ 55,029,594				\$ 22,504,120

2022 Service Units ⁽²⁾	4,620
Ten Year Growth in Service Units ⁽²⁾	5,319
	<u>10</u> years
Annual Growth in Service Units	532
Credit Amount	\$ 22,504,120

(1) Wastewater Appendices - page 3 Section II

(2) Per Half Impact Fee Study

(3) Per Half and State Water Plan Projections