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Water & Wastewater Impact Fee Update

Exhibit D: Capital Improvement Plan Water Facilities

Prepared for:

City of Fort Worth Water Department

FORT WORTH®

Prepared by:

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FTW12213

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1.0 INTRODUCTION

In accordance with Texas Local Government Code (TLGC), Chapter 395, the City of Fort Worth has commissioned Freese and Nichols, Inc., to conduct a Water and Wastewater Impact Fee Study. This report establishes the engineering basis for the fee schedule, updating the previous study completed in 2009.

Impact fees provide the City of Fort Worth a mechanism for recouping the cost associated with expanding the municipal water system to accommodate growth in the service area. The City of Fort Worth owns and operates a system comprised of treatment facilities, pumping stations, and storage facilities, and pipelines that are continuously improved and expanded. The schedule for future investment in the water system is known as the Capital Improvements Plan (CIP). The CIP was updated as a part of this study with capital projects and costs provided by previously commissioned master planning documents and input from Fort Worth Water Department staff.

The report describes the basis for establishing which City of Fort Worth water facilities are eligible to be included in the impact fee analysis. Next, the criteria for measuring infrastructure capacity are explained for each infrastructure type. Finally, the additional facilities required to accommodate growth during the study period are summarized.

2.0 CAPACITY CRITERIA

2.1 General

This section of the study discusses the capacity of those facilities that are eligible for inclusion in the calculation of the impact fee. The only capacities that are considered are the increases in capacities due to growth during the study period of 2013 through 2023.

The following sections describe those increases in capacities for the water treatment plants, pump stations and storage tanks that were considered for inclusion in the calculation of the water impact fee.

2.2 Raw Water Sources and Transmission

The City obtains the majority of its raw water supply from the Tarrant Regional Water District (TRWD), with the balance supplied by the City's permitted capacity at Lake Worth and the Corps of Engineers (COE) permitted capacity at Lake Benbrook. The City's supply from TRWD is per a long term contract, with no contractual limits on the water withdrawn from the Richland Chambers and Cedar Creek Reservoirs, subject to the TRWD limits. The current water rights for the City are as follows:

Table 2-1 TRWD Allocated to Fort Worth

Source	Diversion (mgd)	Normal Flow (mgd)	Mild Drought Flow (mgd)
West Fork	142.374	89.2	41.0
Lake Worth (Fort Worth Permit)	--	10.8	10.8
Lake Benbrook (COE Contract)	64.675	0.6	0.6
Richland Chambers Reservoir	182.874	No Limit	No Limit
Cedar Creek Reservoir	153.882	No Limit	No Limit

Through a series of pump stations, the TRWD has implemented improvements to allow water from the Richland Chambers and Cedar Creek Reservoirs to flow to Lake Benbrook. The blended water can then be pumped back to Rolling Hills Water Treatment Plant (RHWTP) and North Holly Water Treatment Plant (NHWTP)/South Holly Water Treatment Plant (SHWTP). TRWD also has implemented improvements to tie Lake Benbrook to Eagle Mountain Lake.

The existing raw water supply facilities are shown as follows:

Table 2-2 RAW Water Supply Facilities

Unit	Capacity
Eagle Mountain Lake	66 mgd
Eagle Mountain Pump Station and Pipeline	105 mgd*
Lake Worth Intake and Pipeline	127 mgd
Clear Fork Pump Station	90 mgd*
Cedar Creek System	138 mgd*
Richland Chambers System	116 mgd*

*Indicates firm capacity with largest pump out of service

The capacity associated with the raw water facilities is calculated based on the water treatment plant criteria. Therefore the same criteria are used for both raw water facilities and water treatment plants, with the criteria explained in detail in the next section.

2.3 Water Treatment Plants

The design criteria for water treatment plants are based on the maximum day demand. A review of historical water usage over the past five years showed the maximum day demand to average day demand peaking factor to be 1.8.

The maximum day demand per capita was calculated as follows:

Max = Avg x Peaking Factor

Where Max = Maximum day usage per capita
Avg = Average day per capita usage = 185 gallons per capita per day (gpcd)
Peaking Factor = Maximum day / Average day = 1.8

Max = 185 x 1.8 = 333 gpcd

For the City of Fort Worth, the 2013 population given in the Land Use Assumptions report, times the maximum day criteria of 333 gpcd provides the following design demand for water treatment:

Max Day Demand = 333 gpcd x 767,810 population
Max Day Demand = 256 mgd

The year 2023 Max Day Demand, using the above formula would be as follows:

Max Day Demand = 333 gpcd x 1,033,754 population
Max Day Demand = 345 mgd

The wholesale customer demand was provided by the wholesale customers as part of the wholesale customer surveys. The 2013 Maximum Day Demand for wholesale customers is 154 mgd, and the 2023 Maximum Day Demand for the wholesale customers is 199 mgd.

The total 2013 Maximum Day Demand for Fort Worth and its wholesale customers is 410 mgd (256 + 154 mgd). The total 2023 Maximum Day Demand for Fort Worth and its wholesale customers is 544 mgd (345 +199 mgd).

The incremental demand related to treatment capacity during the study period is therefore 134 mgd (544 mgd – 410 mgd). This is greater than a 13 mgd increase in demand per year over the study period.

2.4 Pump Stations

The Texas Commission on Environmental Quality (TCEQ) requires pump station capacity to be a minimum of 0.6 gallons per minute (gpm) per connection, provided the City's system has an elevated storage capacity exceeding 200 gallons per connection (which it does). The required 2013 pumping capacity is calculated to be 340 mgd, as shown below.

Pump Capacity = 0.6 gpm/connection x Number of Connections x 24 hrs/day x 60 min/hr
= 0.6 gpm x 393,063 connections x 24 hrs/day x 60 min/hr
= 340 mgd

The pumping capacity requirement is actually higher than this due to the re-pumping characteristics of Fort Worth's water system. Also, the state requirements are a minimum value, with the City's own system requirements for pressure dictating the correct pumping capacity. The City's formula calculates the pumping capacity required based on the greater of the peak hour flow or the maximum day flow plus fire flow. The 2004 *Water Master Plan* recommended a peak hour factor of 1.57, but due to recent water usage trends the peak hour factor for this study was raised to 1.75. The 2013 pumping capacity that would be required for Fort Worth and its wholesale customers is:

2013 Pump Capacity = 2013 Max Day x Peak Hour Factor
= 410 mgd x 1.75
= 718 mgd

Where:

Max Day = System Maximum Day Flow (from previous section)
Peak Hour Factor = Peak Hour/Max Day Factor of 1.75

Or, based on max day plus fire flow:

2013 Pump Capacity = Maximum Day + Fire Flow
= 410 mgd + 75 mgd
= 485 mgd

Where:

Fire flow for the City is based on 4,000 gpm per pressure plane:

Fire Flow = 4,000 gpm x 60 minutes/hour x 24 hour/day x 13 pressure planes
= 75 mgd

The peak hour flow calculation provides the maximum required capacity over the maximum day plus fire flow calculation. The peak hour flow calculation is used to determine the required pumping capacity for 2023:

2023 Pump Capacity = 544 mgd x 1.75
= 952 mgd

The calculated incremental pumping capacity demand is therefore 234 mgd (952 mgd – 718 mgd) for the required level of service for the study period of 2013 to 2023. **Appendix A** shows the existing water pumping capacities.

2.5 Storage Tanks

The TCEQ criteria for water system design states that 200 gallons per connection of total storage and 100 gallons per connection of elevated storage are required. The City uses these criteria to determine the required storage capacity to serve its retail customers as most of its wholesale customers have their own storage capacity. The calculation of the storage requirement is as follows:

2013 Total = 200 gal/connection x 273,347 connections = 54.7 MG
Elevated = 100 gal/connection x 273,347 connections = 27.3 MG

2023 Total = 200 gal/connection x 368,026 connections = 73.6 MG
Elevated = 100 gal/connection x 368,026 connections = 36.8 MG

The TCEQ requirements are a minimum, with the City adopting a different formula to determine their storage requirements. The City has a total storage capacity presently of 135.7 MG (88.2 MG in the distribution system and 47.5 MG at the water treatment plants), with 17.5 MG of the total storage being elevated storage. **Appendix B** shows the existing water distribution system storage. The 2004 *Water System Master Plan* recommended 400 gallons per connection of total storage, but was raised to 460

gallons per connection for this study to accommodate increased peak hour demands. The calculation is as follows:

Total Storage (FTW only) = Population x (1 connection/3 persons) x (460 gal/connection)

The calculation of the required total storage was made net of wholesale storage requirements, because some wholesale customers have their own storage. Therefore, the consumption for the City customers was used to determine the total storage requirements.

2013 Total Storage = 767,810 x (1/3) X 460 gal
= 117.7 MG

2023 Total Storage = 1,033,754 x (1/3) X 460 gal
= 158.5 MG

Thus, the need for total storage during the study period is equal to 117.7 MG in 2013 and 158.5 MG in 2023. An incremental volume of 40.8 MG was calculated (158.5 MG – 117.7 MG).

3.0 ELIGIBLE FACILITIES

This section establishes the types of City of Fort Worth water facilities that are eligible for inclusion in the calculation of the impact fee. Projects included in the CIP can serve to rehabilitate and renew the system, enhance the system to improve efficiency and meet regulatory requirements, increase the system capacity, or achieve a combination of these objectives. Only those projects warranted by capacity issues derived from growth occurring during the study period (2013 to 2023) can be included in the impact fee calculation. Additionally, projects are excluded from the impact fee calculation if the costs cannot be accurately delineated or if alternate mechanisms for cost recovery are in place.

Raw water is obtained from the Tarrant Regional Water District (TRWD), and costs to the City of Fort Worth are tied to usage, which is effectively captured in user rates.

Financing costs associated with the water system have been excluded due to the dynamic nature of the financial markets, and the uncertainty this introduces, consistent with previous City of Fort Worth impact fee studies.

Drinking water transmission mains and distribution piping have been excluded from this study due to alternate cost recovery mechanisms in place, consistent with the previous impact fee study.

Facilities included in the impact fee study are raw water supply and transmission, water treatment facilities, pump stations, storage facilities, reclaimed water facilities, and engineering studies.

Figure D-1 and **Figure D-2** show existing and proposed facilities, respectively, for the impact fee study period.

Appendix C describes each Water CIP project for the 2013-2023 planning period. The purpose of each project, the portion that is allocated to growth and the current status is also included.

3.1 Raw Water Supply

Raw water supply is responsible for getting water to the treatment plants for disinfection in order to be pumped out into the distribution system. If a plant is near a reservoir or source of water, then a raw water pump station is required to pump water from the source to the water treatment plant. If no source is in close proximity, then a raw water line is required. The allocation of raw water supply capital costs during the study period was made as follows:

1. The second Raw Water Pump Station at the Eagle Mountain WTP is to be expanded, raising the capacity from 35 mgd 70 mgd. This is necessary to meet increased projected water demands.

   Growth-related allocation = 35 mgd/35 mgd = 100%
   % Allocated for Study Period = 100%

2. The Clear Fork Raw Water Pump Station Parallel Pipeline to Holly WTP is the design and construction of an additional raw water pipeline from the Clear Fork Trinity River Pump Station to the Holly WTP. This project provides additional raw water capacity and supply for existing and new customers.

   Allocation to existing customers = 30 mgd = 60%
   Study period allocation = 20 mgd = 40%
   % Allocated for Study Period = 40%

3.2 Water Treatment Plants

The existing water treatment capacity is 497 mgd. Section 2.3 calculations presented a maximum day demand in 2013 of 410 mgd, increasing to 544 mgd by 2023. This results in an incremental demand of 134 mgd. The current capacity of the treatment plants is greater than the 410 mgd required in 2013; however, the capacity of the Holly WTP is limited by the raw water conveyance of the pipelines that supply it. Thus, 87 mgd (497 mgd – 410 mgd) of the incremental demand has already been satisfied, which includes the 12 mgd from the Westside WTP. The 35 mgd expansion of the Eagle Mountain WTP will increase treatment plant capacity from 497 mgd to 532 mgd. Once the Clear Fork parallel pipeline is installed, the Holly WTP will be able to treat 200 mgd, increasing the total treatment capacity by 20 mgd in 2022, satisfying the remaining 12 mgd of required treatment capacity. **Figure D-3** presents the water treatment demand, as well as the treatment capacity and requirements during the study period. The allocation of capital costs during the study period was made as follows:

1. The Westside WTP was completed in 2012 at a capacity of 12 MGD. The WSWTP should be allocated against the remaining system-wide additional capacity requirement of 36 mgd.

   Growth-related allocation = 12 mgd/12 mgd = 100%
   % Allocated for Study Period = 100%

2. The Eagle Mountain WTP Pump Station Improvements and Expansion Project (105 mgd to 140 mgd) will be required during the study period. The expansion of EMWTP will

begin in 2016. The EMWTP expansion should be allocated against the remaining system-wide additional capacity requirement of 44 mgd.

Study period allocation = (140 mgd – 105 mgd) = 35 mgd < 47 mgd
Remaining incremental demand = 47 mgd – 35 mgd = 12 mgd
% Allocated for Study Period = 100%

3.3 Pump Stations

While it is more accurate to calculate pump station requirements and demand on a pressure zone basis, the Land Use Assumptions were done for the system as a whole, with not enough data to determine pressure zone requirements. System wide calculation tends to provide a conservative demand, in that much of the water is re-pumped between pressure planes. The system-wide demand was used for this study. In Section 2.4, the demand for pump station capacity increased from 718 mgd in 2013 to 952 mgd in 2023. This incremental demand of 234 mgd is required to serve growth. There is a total of 80 mgd in pumping capacity identified in the CIP. Therefore, the calculation of the study period capacity percentage is as follows:

$$\text{Study Period} = \frac{\text{2023 Pumping Required – Existing Pumping Capacity}}{\text{Capacity of Proposed Pumping Projects}}$$

$$\textbf{\% Allocation to Study Period} = \frac{\textbf{952 mgd – 872 mgd}}{\textbf{80 mgd}} = \textbf{100\%}$$

The remainder of the required pump station capacity is met from existing capacity. **Figure D-4** presents a graphical interpretation of the projects included and those attributed to future growth.

3.4 Storage Tanks

The City currently has 135.7 MG of total storage. The total incremental capacity required during the study period is 40.8 MG (158.5 MG – 117.7 MG), which was calculated in Section 2.5. There is a total of 21.0 MG in storage capacity identified in the CIP. For the purpose of allocating the costs of additional storage between study period customers, and customers beyond the study period, the following calculations were made:

$$\text{Study Period} = \frac{\text{2023 Storage Required – Existing Storage}}{\text{Capacity of Proposed Storage Projects}}$$

$$\text{\% Allocation to Study Period} = \frac{158.5\ \text{MG} - 137.5\ \text{MG}}{21.0\ \text{MG}} = 100\%$$

The remainder of the required total storage capacity is met from existing capacity. **Figure D-5** presents a graphical interpretation of the amount of projects included and those attributed to future growth.

3.5 Engineering Studies

There are nine studies which have been included in the calculation of the water impact fees. The studies are as follows:

1. **1998 Water Facilities Plan** – The Water Facilities Plan updated the water treatment plant aspects of the 1989 Master Plan for the period of 1998 through 2018. The Water Facilities Plan also made recommendations concerning reliability and regulatory improvements. Fourteen years of the twenty year study was for existing customers, and six years of the twenty year study was for the study period. The calculation of the allocation was as follows:

   Existing Customers = 14/20 = 70%
   Study Period = 6/20 = 30%

   % Allocation for Study Period = 30%

2. **2004 Water System Master Plan** – The 1989 Water System Master Plan was updated, including a comprehensive projection of the facilities required from the year 2004 through 2025. This plan will be updated again in 2014. Therefore, eight years of the ten-year life of the plan is for existing customers, and the remaining two years are for the study period.

   Existing Customers = 8/10 = 80%
   Study Period = 2/10 = 20%

   % Allocation for Study Period = 20%

3. **2014 Water System Master Plan** – The 2004 Water System Master Plan will be updated, including a comprehensive projection of the facilities required from the year 2014 through 2033. This plan will be updated again in 2024. Therefore, ten years of the ten-year life of the plan is for the study period, and the remaining ten years are for the period beyond the study period

Study Period	=	10/20	=	50%
Beyond Study Period	=	10/20	=	50%

% Allocation for Study Period = 50%

4. **2004 Impact Fee Study** – The 2004 Impact Fee Study provides impact fees for the study period 2004 through 2014. Therefore, eight years of the ten-year study period for the existing customers, and the remaining two years are for the study period. One half of the study is for the water impact fee update and the other half is for the wastewater impact fee update.

Existing Customers	=	8/10	=	80%
Study Period	=	2/10	=	20%

% Allocation for Study Period = 20%

5. **2009 Impact Fee Study** – The 2009 Impact Fee Study provided impact fees for the study period 2009 through 2019. Therefore, 70% of the study is allocated to the study period.

Existing Customers	=	3/10	=	30%
Study Period	=	7/10	=	70%

% Allocation for Study Period = 70%

6. **2012 Impact Fee Study** – Although the requirement is to conduct an impact fee study every five years, the City wants to update the study every three years. The 2012 Impact Fee Study will provide impact fees for the study period 2013 through 2023. All of the ten-year study period is allocated to the study period. One half to the study is for the water impact fee updated and the other half is for the wastewater impact fee update.

Study Period	=	10/10	=	100%

% Allocation for Study Period = 100%

7. **2015 Impact Fee Study** – The 2015 Impact Fee Study will provide impact fees for the study period 2016 through 2026. Therefore, seven years of the ten-year study period are allocated to the study period, and the remaining three years are for the period beyond the study period. One half of the study is for the water impact fee update and the other half is for the wastewater impact fee update

Study Period	=	7/10	=	70%

Beyond Study Period = 3/10 = 30%

% Allocation for Study Period = 70%

8. **2018 Impact Fee Study** – The 2018 Impact Fee Study will provide impact fees for the study period 2019 through 2029. Therefore, four years of the ten-year study period is allocated to the study period, and the remaining six years are for the period beyond the study period. One half of the study is for the water impact fee update and the other half is for the wastewater impact fee update.

   Study Period = 4/10 = 40%

   Beyond Study Period = 6/10 = 60%

   % Allocation for Study Period = 40%

9. **2021 Impact Fee Study** – The 2021 Impact Fee Study will provide impact fees for the study period 2021 through 2031. Therefore, one year of the ten-year study period is allocated to the study period, and the remaining nine years are for the period beyond the study period. One half of the study is for the water impact fee update and the other half is for the wastewater impact fee update.

   Study Period = 1/10 = 10%

   Beyond Study Period = 9/10 = 90%

   % Allocation for Study Period = 10%

4.0 GROWTH RELATED CIP

Table 4-1 summarizes the growth related costs of the eligible facilities. Appendix D shows the detail development of the costs and capacities of the eligible facilities.

Table 4-1 2013-2023 Growth Related CIP

Water Facility	Total Growth Related Cost	% Allocated to 2013-2023 Impact Fees	2013-2023 Growth Related Cost
Raw Water	$9,291,000	54.6%	$5,076,000
Treatment Plants	$109,004,968	100.0%	$109,004,968
Pump Stations	$19,593,171	62.6%	$12,277,121
Storage Tanks	$25,622,279	100.0%	$25,622,279
Engineering Studies	$4,780,780	39.5%	$1,888,537
		TOTAL	**$153,868,905**

4.1 Service Units

The differentiated costs between customer types are allocated through the application of the equivalent meter concept. Since the 5/8" x 3/4" water meter is the most frequently used meter by the residential customer, a factor has been calculated to relate the capacities of other meter sizes to the 5/8" x 3/4" meter capacity. **Table 4-2** presents the factors developed using capacity information from the American Water Works Association (AWWA) Standard C700-02, Cold-Water Meters – Displacement Type, Bronze Main Case and AWWA Standard C701-07, Cold-Water Meters – Turbine Type for Customer Service.

Table 4-2 AWWA Meter Equivalency Factors

Meter Size	5/8" x 3/4" Equivalency Factor
5/8" x 3/4"	1.00
3/4"	1.50
1"	2.50
1-1/2"	5.00
2"	8.00
3"	21.75
4"	37.50
6"	80.00
8"	140.00
10"	210.00

Appendix D contains the number of water meters for residential and non-residential customers by meter size for the City of Fort Worth as well as for the wholesale customers who provided this information to FNI. The number of equivalent meters is also calculated for the City and wholesale customers.

The next calculation step determines population per residential meter and employment per non-residential meter. **Table 4-3** summarizes this calculation for the City of Fort Worth and wholesale customers using 2013 information.

Table 4-3 Development of 2013 Population and Employment by Equivalent Meter

Description	Residential	Non-Residential
City of Fort Worth		
Number of Equivalent Meters	252,602	119,716
Population / Employment	767,810	525,108
Population per Equivalent Meter	3.04	--
Employment per Equivalent Meter	--	4.47
Wholesale Customers		
Number of Equivalent Meters	158,536	61,122
Population / Employment	365,804	181,500
Population per Equivalent Meter	2.31	--
Employment per Equivalent Meter	--	2.97

FNI did not receive meter count information from five of Fort Worth's wholesale water customers; however, their meter counts were estimated based on growth since the previous impact fee study. The number of equivalent meters used to calculate the wholesale customers' population/employment per equivalent meter in Table 4-3 is the total number of equivalent meters served by Fort Worth for all wholesale customers. In order to more accurately estimate the population/employment per equivalent meter, Freese and Nichols, Inc. divided the number of equivalent meters by the sum of population or employment served by Fort Worth.

The projected increase in equivalent meters between 2013 and 2023 uses the ratios in Table 4-3 and the population and employment projections for 2013 and 2023 in Exhibit A- Water Land Use Assumptions report. The calculation is shown below.

City of Fort Worth

Residential = Population Change / Population per Equivalent Meter
= (1,033,754 – 767,810) / 3.04
= 87,482

Non- Residential = Employment Change / Employment per Equivalent Meter
= (642,268 – 525,108) / 4.47
= 26,210

Fort Worth Total = Residential + Non-Residential
= 87,482 + 26,210
= 113,692

Wholesale Customers

Residential = Population Change / Population per Equivalent Meter
= (450,163 – 365,804) / 2.31
= 36,519

Non- Residential = Employment Change / Employment per Equivalent Meter
= (222,315 – 181,500) / 2.97
= 13,743

Wholesale Total = Residential + Non-Residential
= 36,519 + 13,743
= 50,262

Grand Total = Fort Worth Total + Wholesale Total
= 113,692 + 50,262
= 163,954

4.2 Impact Fee Calculations

Impact fees are the quotient of the total cost of expansion for the study period from Table 4-1 divided by the increase in equivalent meters from Section 4.1. This fee equals the maximum water impact fee for a 5/8" x 3/4" water meter size.

Maximum Water Impact Fee = Cost of Expansion / Increase in Equivalent Meters
= $153,868,905 / 163,954
= $938 per 5/8" x 3/4" equivalent meter

The water impact fees for meters other than 5/8" x 3/4" are the product of fee per 5/8" x 3/4" equivalent meter multiplied by the respective equivalent meter factor from Table 4-2. The maximum allowable water impact fees are provided in **Table 4-4**, as well as the resulting impact fee at a 50% collection rate.

Table 4-4 Proposed Water Impact Fees

Meter Size	5/8" x 3/4" Equivalency Factor	Maximum Allowable Impact Fee	Proposed Impact Fee (Collected at 50%)
5/8" x 3/4"	1.00	$938	$469
3/4"	1.50	$1,407	$704
1"	2.50	$2,345	$1,173
1-1/2"	5.00	$4,690	$2,345
2"	8.00	$7,504	$3,752
3"	21.75	$20,402	$10,201
4"	37.50	$35,175	$17,588
6"	80.00	$75,040	$37,520
8"	140.00	$131,320	$65,660
10"	210.00	$196,980	$98,490

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FIGURE D-1
CITY OF FORT WORTH
2012 WATER IMPACT FEE STUDY
EXISTING FACILITIES

LEGEND

- Existing Pump Station
- Existing Ground Storage Tank
- Existing Elevated Storage Tank
- Existing Water Treatment Plant
- Lake
- Stream
- Water Wholesale Customer
- Non-Wholesale Customer
- City Limit
- ETJ Boundary
- County Boundary

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Wise County
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Ellis County

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WESTLAKE
HASLET
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KELLER
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NORTH RICHLAND HILLS
SAGINAW
Blue Mound
Bedford
Euless
HURST
HALTOM CITY
RICHLAND HILLS
Lakeside
LAKE WORTH
Lake Worth
SANSOM PARK
RIVER OAKS
WHITE SETTLEMENT
WESTWORTH VILLAGE
WESTOVER HILLS
Willow Park
ALEDO
Benbrook
Benbrook Lake
EDGECLIFF VILLAGE
FOREST HILL
EVERMAN
KENNEDALE
CROWLEY
BURLESON
BETHESDA WSC
Pantego
Arlington
DALWORTHINGTON GARDENS
GRAND PRAIRIE
Mansfield
Grapevine Lake
Lake Arlington
Joe Pool Lake

Sendera Ranch GST and PS
Willow Springs EST
Caylor Road GST
North Beach GST and PS
Lago Vista PS
Bradley EST
Lake Country EST
Eagle Mountain WTP
Jenkins Heights EST
Jenkins Heights PS
Cantrell-Sansom PS
Fleetwood GST and PS
Northside GST and PS
Northside PS
Westland GST and PS & Chapel Creek PS
Westside PS
Westside WTP
North Holly WTP
South Holly WTP
Randol Mill GST and PS
Meadowbrook EST
Meadowbrook EST
Eastside PS
Stagecoach GST and PS
Como GSTs and PS
Eastwood EST
Walsh Ranch GST and Standpipe
Edwards Ranch PS
Timberline EST
Southside GST and PS
Seminary Hill EST
Russom Ranch PS
Rolling Hills WTP
Alta Mesa GST and PS
Armstrong Ranch EST
McCart GST and PS
Sun Country EST

0 18,000
SCALE IN FEET

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Updated: Wednesday, August 15, 2012

FIGURE D-2
CITY OF FORT WORTH
2012 WATER IMPACT FEE STUDY
PROPOSED FACILITY IMPROVEMENTS

LEGEND

- Proposed Pump Station
- Proposed Ground Storage Tank
- Proposed Elevated Storage Tank
- Pump Station Expansion
- Existing Ground Storage Tank
- Existing Water Treatment Plant
- Stream
- Water Wholesale Customer
- Non-Wholesale Customer
- County Boundary
- City Limit
- ETJ Boundary
- Lake

FREESE AND NICHOLS

FORT WORTH

Proposed
NS-II - 5.0 MG EST
N2-10

Proposed
NS-IV - 1.0 MG EST
N4-2

Eagle Mountain WTP
Proposed Improvements

Proposed
WS-IV - 1.0 MG EST
W4-6

Westside WTP
Proposed Improvements
W3 - 15A

Eastside PS
Proposed Improvements
E2 - 1

Proposed
WS-V PS
W5-1

Proposed
WS-V - 1.0 MG EST
W5-3

Proposed
WS-III - 3.0 MG GST
W3-4

Proposed
WS-IV PS
W4-3

Proposed
WS-III - 1.5 MG EST
W3-6

Proposed
SS-IV PS
W4-5

McCart GST and PS
Proposed Improvements

Denton County
Wise County
Parker County
Johnson County
Ellis County

0 18,000
SCALE IN FEET

Figure D-3
Water Treatment Plant Expansion Schedule

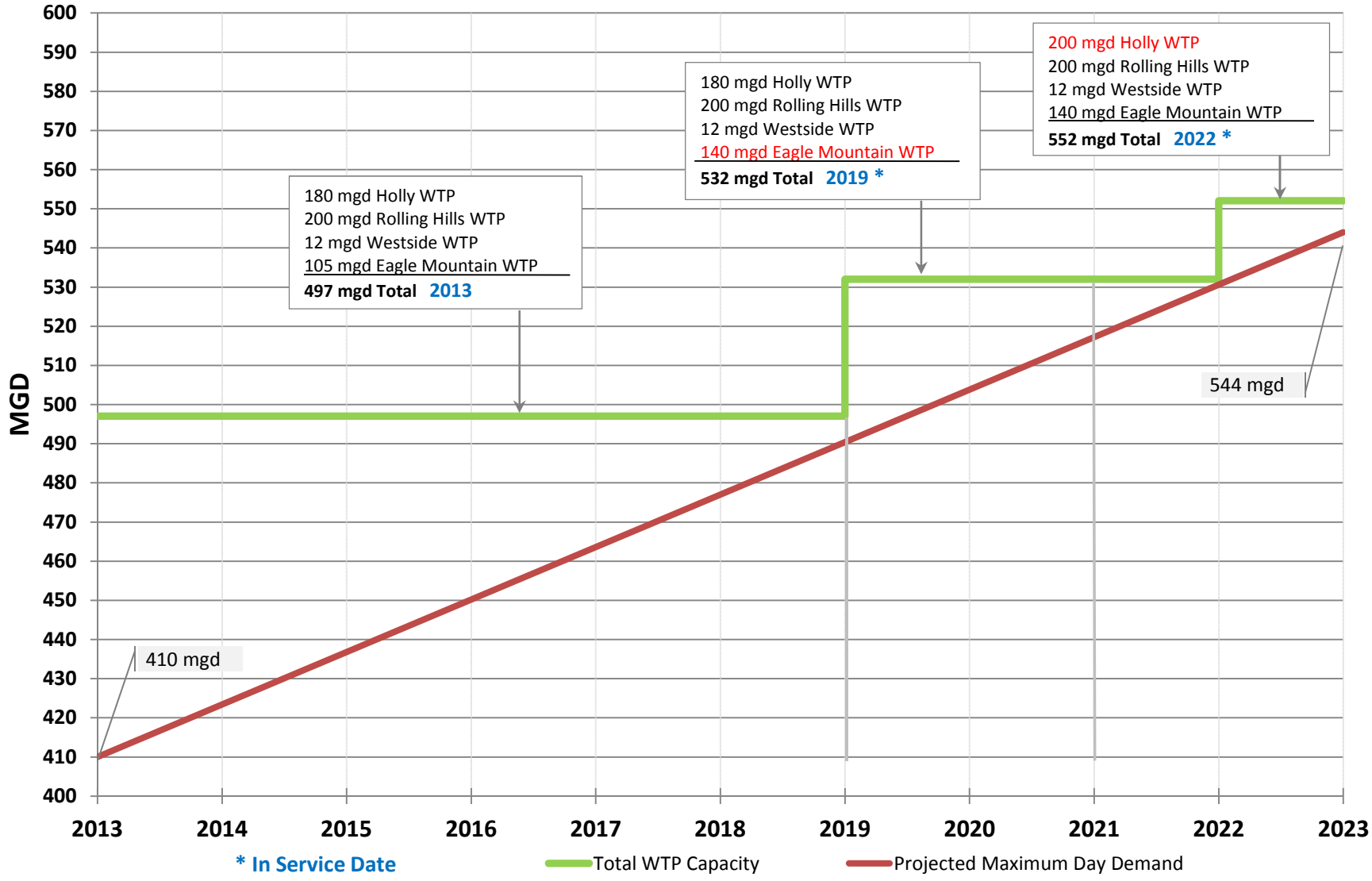


Figure D-4
Pump Station Allocation

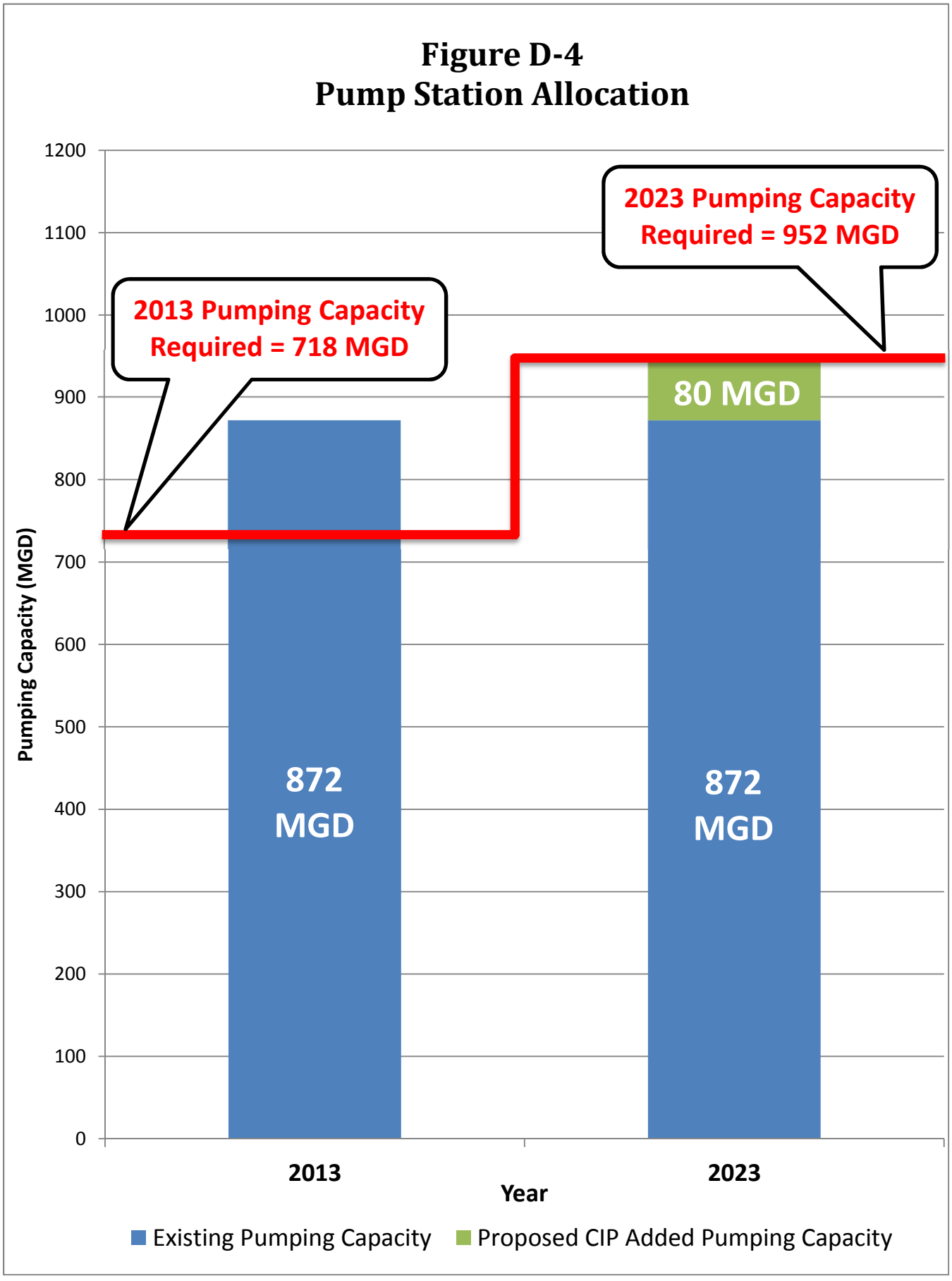
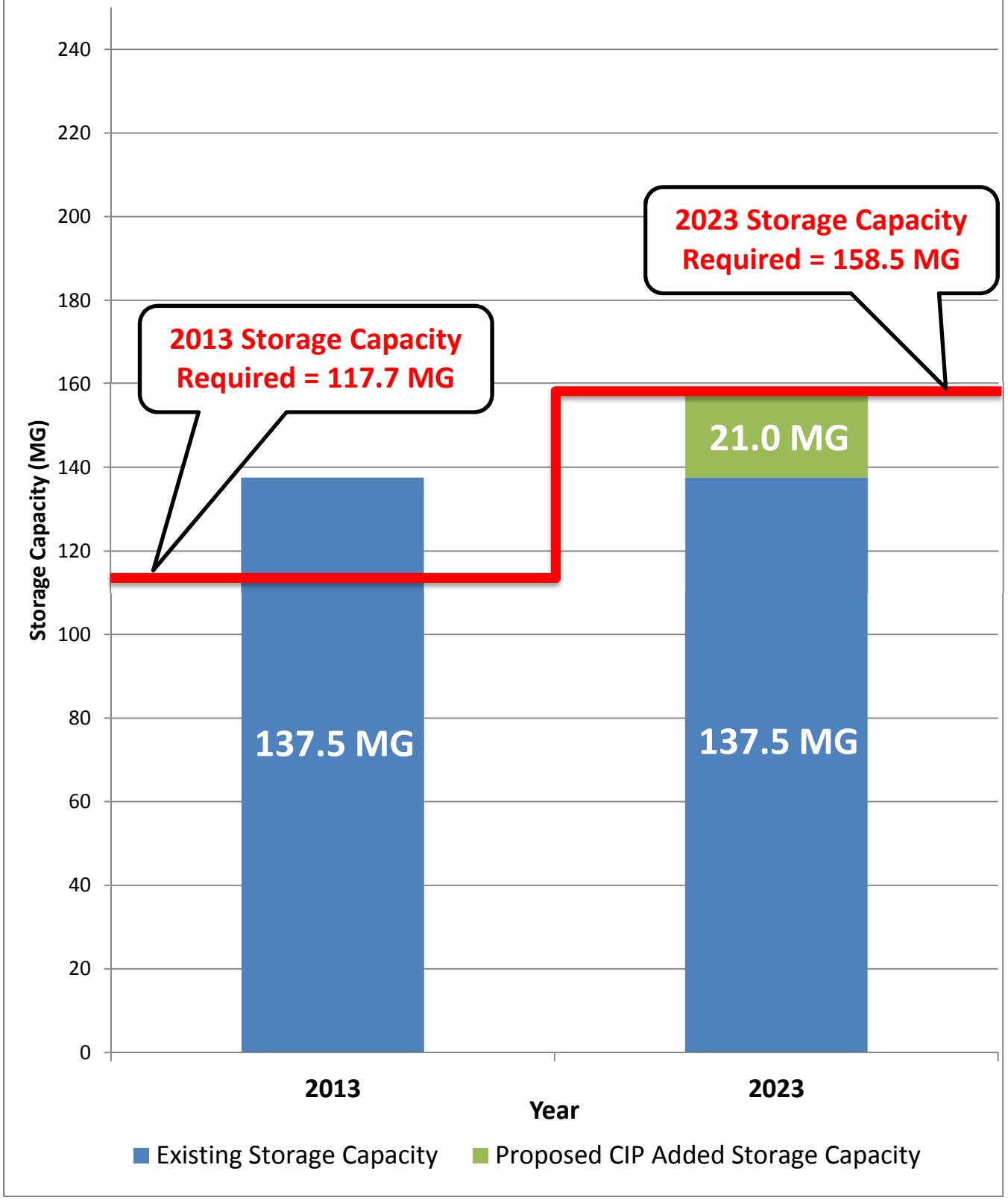


Figure D-5
Storage Tank Allocation



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