

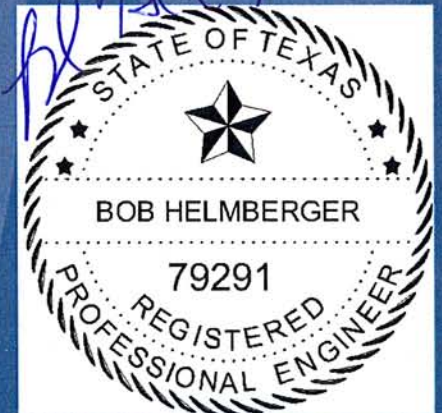
WATER AND WASTEWATER IMPACT FEE STUDY

From 2009 - 2019
Melissa, TX



Prepared for:
CITY OF MELISSA
May 2009

Prepared by:





ACKNOWLEDGEMENTS

Water and sewer system planning for this report was based on future land use assumptions contained within the City of Melissa Comprehensive Plan 2006 (hereafter referred to as “the Comprehensive Plan”), prepared by Dunkin, Sefko, and Associates, Inc. and adopted by the City of Melissa on July 11, 2006.



Water and Wastewater Capital Improvements Plan Prepared for the City of Melissa, April 2009

By Bucher, Willis & Ratliff Corporation
8140 Walnut Hill Lane, Suite 900
Dallas, TX 75231-4356

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1.0 EXECUTIVE SUMMARY

The primary purpose of this Water and Wastewater Impact Fee Study is to provide the City of Melissa with a basis for the calculation of water and wastewater impact fees as outlined in Chapter 395 of the Texas Local Government Code. This report describes specific water and sewer system projects to take place in the next 5-year and 10-year periods, along with their estimated costs.

The data in this report is based on the future land use assumptions and population growth projections published in the City of Melissa Comprehensive Plan adopted by the City of Melissa on July 11th, 2006¹. Engineering assumptions for per capita water and sewer demands combined with future land use assumptions provide the basis for estimating future water and sewer utility requirements for the City, both in capacity and geographic distribution. Combining projected population growth rates with per capita water and sewer demand calculations yields an implementation schedule for construction of water and sewer improvements necessary to accommodate projected population growth.

1.1 Summary

1.1.1 Current and Projected Population

The City of Melissa's current population is an estimated 5,000. Based on current ultimate build-out boundaries and land use assumptions in the Comprehensive Plan, the ultimate population of the City of Melissa will be approximately 96,000 at build-out. Estimates of growth rates between the present and that date vary, but they generally agree that the greatest growth rates will be observed during the next 10 years. Of the three "scenarios" in the Comprehensive Plan, an adjusted version of Scenario "B" is the one chosen for the purposes of this report, on the recommendation of the authors. The population growth predictions shown on Scenario B are *adjusted by two years to the corresponding data points* to correct for an observed delay in population growth in Melissa since the Plan's publication. Interpolating data points in this adjusted population growth estimate yields a 2014 population of 17,733 and a 2019 population of 42,673; these estimates, along with estimated extents of land uses, form the basis of the calculation of impact fees.

1.1.2 Water and Wastewater System Expansion

This report outlines a basic framework for the water and wastewater systems in Melissa as they build out in the next 10 years. The capital improvements that the City will implement in the water system should have this future development in mind.

It should be noted that the future 10-year water system in this report is designed specifically for the land use specified in the Comprehensive Plan. Even if the City builds strictly according to that document, variations from predictions in Melissa's water needs will become apparent in time; as a result, this report should only be used as a guideline, and not a substitute for, detailed design prior to any specific project.

1.2 Recommendations

1.2.1 Major Water Improvements

As Melissa approaches buildout, a large number of water improvements will be necessary to supply the customers within the city limits. Of the various improvements planned, the most pressing is obtaining additional water supply from the North Texas Municipal Water District (NTMWD). This will come from a new 30 inch line installed along State Highway 5 through downtown. Supplementing the City's well capacity in this way should support development for the next 5 years.

As the commercial area along the US-75 corridor develops in the next 10 years, a water take point, ground storage, and pumping facilities will be needed near SH5 north of downtown. This entirely new facility will provide water to the large mixed-use areas that will develop in the currently undeveloped areas near US Highway 75.

As they are needed, two elevated water storage tanks should be built; one near the intersection of US-75 and Davis Road, and one on top of the ridge south of the intersection of US-75 and Throckmorton Creek, on the west side. Maintaining the TCEQ elevated storage requirement of 100 gallons per connection will prevent the City from needing emergency power systems for the pump facilities, so building these towers should become a priority as the number of water customers increases.

1.2.2 Major Wastewater Collection System Improvements

Expanding sewer service along US-75 is essential to allow dense mixed development. For this reason, the next major sewer expansion project for the City of Melissa is the Throckmorton Creek Sewer interceptor line running from the northern border of Melissa's extraterritorial jurisdiction south to Melissa Road. After that project is complete, installing parallel sewer lines to the existing Trinity River Offsite and North Creek Offsite interceptors will be essential to continue Melissa's growth in their respective drainage basins. When it becomes feasible, the downtown lift station carrying sewer flow in the Fitzhugh Branch Sub-basin should be retired in favor of a gravity line that runs south across SH121 and across the southern study boundary line along the creek. This will allow the future industrial and residential areas south of SH121 to have sewer service.

The eastern basins will be next to develop after the western half of Melissa has its sewer interceptors installed. Stiff Creek Basin will have gravity sewer service down to the point where County Road 413 converges with the ETJ line, where it would be optimal to install a lift station. The basin would then be served by a force main that carries the sewage to the (by then, enlarged) North Creek Offsite sewer interceptor that would carry the sewer to the NTMWD mains. The southern area of Stiff Creek Basin is not anticipated to have gravity service on account of the terrain; however, development will still be possible through the construction of large-lot residences with septic systems.



1.2.3 Projected Capital Improvements Costs

Appendices A and B outline in full detail the costs of major projects which will allow sewer and water service to the full geographical extent of Melissa at buildout. The extent and capacity of the infrastructure is based on current land use predictions in the *City of Melissa Comprehensive Plan* by Dunkin, Sefko, and Associates, Inc.

1.3 Maximum Impact Fees

1.3.1 Maximum Allowable Water Impact Fee

The cost of water capital improvements to serve development projected to occur between 2009 and 2019 is **\$80,870,000**. Finance costs are based on a 20 year bond at 6.0% interest. The increase in the number of service units due to growth over the next ten years is projected as **14,700** service units. The maximum allowable water impact fee with the credit is **\$2,752** per service unit. The maximum allowable water impact fee calculation is summarized as follows:

Total Capital Improvements Costs	\$80,870,000
Total 10-year Projected Growth in Service Units	14,700
Base Maximum Calculated Water Impact Fee Per Service	
Unit Without Credit Analysis	\$5503
Water Impact Fee Credit	\$2751.50
Base Maximum Calculated Water Impact Fee Per Service Unit With Credit	\$2,752

1.3.2 Maximum Allowable Wastewater Impact Fee

The cost of wastewater capital improvements to serve development projected to occur between 2009 and 2019 is **\$20,430,000**. Finance costs are based on a 20 year bond at 6.0% interest. The increase in the number of service units due to growth over the next ten years is projected as **14,700** service units. The maximum allowable wastewater impact fee with the credit is **\$695** per service unit. The maximum allowable wastewater impact fee calculation is summarized as follows:

Total Capital Improvements Costs	\$20,730,000
Total 10-year Projected Growth in Service Units	14,700
Base Maximum Calculated Wastewater Impact Fee Per Service	
Unit Without Credit Analysis	\$1410
Water Impact Fee Credit	\$705
Base Maximum Calculated Water Impact Fee Per Service Unit With Credit	\$695

2.0 LAND USE ASSUMPTIONS

Chapter 395 will allow water and wastewater impact fees to be assessed on projects where the improvements are caused by future growth within the next 10 years. Another requirement of Chapter 395 states that the land use assumptions must be reviewed at least once every five years. The Comprehensive Plan as adopted by the City of Melissa, July 2006, was used as a basis to determine what water and wastewater improvements will be needed in the City of Melissa over the next 10 years. BWR with the assistance of City staff, identified where that growth would occur over the next 10 years.

The Comprehensive Plan established that Melissa’s ultimate population would be 95,700 and that this population would be reached in the year 2045. The projected populations and growth rates from the Comprehensive Plan are summarized in Table 1.

Table 1. City of Melissa Projected Population and Growth Rates

Year	Projected Population	Growth Rate
2005	2,300	
2010	11,410	37.80%
2015	26,590	18.40%
2020	64,540	19.40%
2025	75,650	3.20%
2030	81,240	1.40%
2035	88,830	1.80%
2040	94,670	1.30%
2045	95,700	0.30%

However, actual growth has not kept pace with those projections. The official population of the City of Melissa at the end of 2008 was 4,752. Using this new population to serve as the base for growth, the growth rate from the Comprehensive Plan was applied. Based on these growth rates, the future City of Melissa and surrounding Extra-Territorial Jurisdiction (ETJ) population for the year 2019 was determined. The revised projected population is summarized in Table 2.

Table 2. City of Melissa and ETJ Projected Population

Year	Population
2008	4,752
2009	6,548
2010	9,023
2011	10,684
2012	12,650
2013	14,977
2014	17,733
2015	20,996
2016	25,069
2017	29,932
2018	35,739
2019	42,673

Where the growth is going to occur over the next 10 years to support the projected population must also be determined. By comparing the existing land use to the Future Land Use Plan from the Comprehensive Plan and reviewing specific ordinances, BWR and City staff determined what types of land uses were likely to occur and where that growth would occur over the next 10 years. The Existing Land Use map is illustrated in Figure 1 and the 2019 Land Use Plan is illustrated in Figure 2.

3.0 EXISTING CAPITAL IMPROVEMENTS

3.1 About this section

This section is specifically dedicated to describing the existing capital improvements owned by and located within the City of Melissa, along with a description of all costs associated with upgrading, updating, improving, expanding, or replacing these existing capital improvements to meet the existing needs and usage for current residents. Costs of projects meant to serve existing customers only are to not be charged for via impact fees levied on future development, in accordance with Chapter 395 of the Local Government Code.

3.2 Existing Water System

There are no improvements to the existing water system needed to serve the current population of Melissa within regulatory requirements. All water projects described in this plan will be to serve anticipated development.

3.3 Existing Sewer System

Current sewer flows are readily collected by Melissa's existing sewer system, with one exception. Downtown Melissa is served by a project known as the Wastewater Collection and Transmission Facilities, which must be rehabilitated to serve current customers without the periodic surcharging in wet weather. This project involves the replacement of about 3,000 feet of 12" gravity sanitary sewer line and nine 5' manholes. The cost of this rehabilitation is **\$394,000** and will be subtracted from the cost of upgrading the sewer system in the downtown area for future residents.

4.0 CAPACITY OF EXISTING IMPROVEMENTS

4.1 About this section

The purpose of this section is to describe the level of utilization of existing capital improvements. This includes an analysis of total existing capacity, the amount of that capacity that is being used, and the current commitments for usage of the unused existing capacity.

4.2 Existing Water Capacity

To account for peak flows, water design in the City of Melissa is governed by a target pump capacity of 1.1 gallons per minute per connection (or "water service unit", which will be described later in this report). This provides for a more stringent standard of water distribution than the Texas Commission on Environmental Quality's (TCEQ) capacity of 0.6 gallons per minute per connection. Provided that no pump provides over 50% of the pump capacity (in the City of Melissa, this situation does not exist), TCEQ requirements will be met



with a 1.1 gpm pump capacity requirement. It also allows water pressures to remain above 35 psi during peak usage periods.

Three pumps currently serve the City of Melissa water system, with a capacity of 1360 gallons per minute each. Capacity for all three is 4080 gpm, which will serve 3710 connections at 1.1 gpm each.

Storage design for the City of Melissa water system is governed by the minimums set by the TCEQ. Existing storage is at 750,000 gallons in elevated storage, with an additional 125,000 gallons in ground storage. Combined, they must equal 200 gallons per planned connection to meet TCEQ requirements with 100 gallons per connection being elevated. Therefore, water storage capacity accommodates 4,375 connections.

Comparing the two capacities of the City water system as it stands today shows that the limiting factor is supply, with 3,710 water service units supportable. According to the latest "Texas Water Development Board Survey for the City of Melissa, Calendar Year 2008", this indicates an excess capacity of 2,356 water service units. The City currently has 1,354 service connections. Existing connections make up 36% of the total supportable connections.

Current usage of the water system, with the total 2008 usage averaged over the year, is 0.39 gpm for the year 2008 per connection, including unmetered usage and losses in the system. This is 35% of the allocated 1.1 gpm per connection, nearly equal to the proportion of existing connections to the total supportable.

No known deficiencies exist in Melissa's water system at this time, and all improvements proposed to the water system will serve future customers.

4.3 Existing Wastewater System Capacity

Melissa's existing wastewater system is very capable of carrying existing wastewater flows, with one notable exception in the downtown area which will be described later in this section.

Wastewater collection is handled by two large gravity mains and a small force main. Capacity for this system is not heavily taxed. The Hunter's Ridge Offsite Sewer, the first gravity line, has a capacity of 3.23 million gallons per day (MGD), the North Creek Offsite Sewer, the second gravity line, has a capacity of 6.3 MGD, and the Wastewater Transmission Facilities in downtown Melissa, a 6" diameter force main, has a capacity of 0.76 MGD. Wastewater collection from the City of Melissa averaged 0.33 MGD for the period of October 2006 to September 2007. No shortage of capacity exists for the City as a whole on average, even accounting for peak loads.

Despite the more than adequate capacity of the system, during wet weather there is overflow through Melissa's downtown lift station. To correct the TCEQ violation that this situation presents, a 12" gravity line must be installed in the downtown area. This capital improvement serves only to bring the Wastewater Transmission Facilities up to regulatory standards and does not serve anticipated development; therefore, the cost of this project shall be deducted from the calculation of impact fees resulting from future wastewater system projects.

5.0 WATER AND SEWER IMPACT FEE STUDY

5.1 Demand Distribution for the Water System

As the water system is built to accommodate Melissa's rapid growth, it is essential to have good demand estimates for the customers that will be served by any new water projects. Proper planning of the water system requires knowledge of how land will be used throughout the City, and the Future Land Use Plan provides an excellent guideline. Combining this information with assumptions of unit density per acre, water usage per unit, population estimates, and estimates of demand peaks², the water system can be planned for the next ten years. This will reduce capital expenditure from water system construction that will need to be added on to or replaced before its service life has expired, and construction that is built to accommodate more consumption than will be used.

This report estimates future water demand by unit area, using future land use data. The recent influx of development in Melissa has provided the City with facilities agreements, construction drawings, and preliminary/final plats which provide useful data regarding unit density. For example, small parks, street rights-of-way, floodplain greenbelts, and nonresidential buildings, as well as individual houses, make up any given residential development. By dividing the total number of connected lots by the total developed area, a unit density can be calculated for that subdivision. Using this method on the existing developments in Melissa provides a representative estimate which will predict future lot density.

Table 3. Estimated Water Use by Homogeneous Region

Water Use Region	Gross Acreage	%Serviceable	Net Acreage	Water Usage Pattern	Basis of Water Usage Estimate	Unit Density (per acre)	Flow per Serviceable Acre (gpm)	Total Base Flow to distribute among representative nodes (gpm)
A	1569	90%	1408	Commercial/Industrial	Double Sewer Usage	N/A	7.4	10951
B	325	90%	293	Residential	1.1 gallons per minute per residence	3.1	3.4	999
C	91	100%	91	Dense Residential	1.1 gallons per minute per residence	12	13.2	1197
D	346	95%	328	Residential	1.1 gallons per minute per residence	3.1	3.4	1120
E	513	95%	488	Commercial/Industrial	Double Sewer Usage	N/A	7.4	3792
F	419	95%	398	Residential	1.1 gallons per minute per residence	3.1	3.4	1358
I	269	95%	256	Residential	1.1 gallons per minute per residence	3.1	3.4	872
L	144	95%	137	Residential	1.1 gallons per minute per residence	3.1	3.4	468
M	35	100%	35	Dense Residential	1.1 gallons per minute per residence	12	13.2	457
N	395	50%	197	Commercial/Industrial	Double Sewer Usage	N/A	7.4	1534
O	277	80%	222	Commercial/Industrial	Double Sewer Usage	N/A	7.4	1723
Q	126	95%	120	Commercial/Industrial	Double Sewer Usage	N/A	7.4	934
R	124	95%	118	Residential	1.1 gallons per minute per residence	3.1	3.4	403
S	49	100%	49	Commercial/Industrial	Double Sewer Usage	N/A	7.4	380

Basing a peak flow of 1.1 gallons per minute per connection works well for residential development but not for nonresidential land uses. Water consumption estimates for nonresidential land use is based on a correlation with estimated sewer flows. There is still little existing commercial development in the study area on which to base a good estimate of water usage, and as Melissa develops commercially within the next 10 years, water use estimates for these land uses should be continually revised based on consumption records. Table 3 shows the analysis of the estimated water usage in each water use region, each of which represents an undeveloped part of the study area which will develop a certain land use according to the Land Use Plan.

5.2 Future Costs of Water Distribution System Improvements

The cost of water distribution system improvements required to meet future water demands is shown in Appendix B. The costs shown in these tables are in terms of 2009 dollars and include a 35% contingency, 2% bond issuance, 20% for engineering, surveying, procurement, and construction management costs, and 6.0% annual bond interest charges over 20 years. Right-of-way costs of \$10 per linear foot are also included in projects requiring land acquisition. A credit equal to 1.5% rate of return is placed against the total payments and interest on the bonds used to finance the projects. The present value of all water distribution system improvements in Melissa in the next ten years is estimated at **\$120,000,000**. The figures outlined in Appendix B are engineer's cost opinions based on zero developer contribution.

The 2009-2014 water improvements will cost **\$46,000,000** at estimated 2009 prices. This infrastructure purchase, cumulative with previous projects, will support the Comprehensive Plan's 2014 population estimate of 17,733, located primarily in the Throckmorton Creek/Trinity River Basin, Fitzhugh Branch Sub-basin, and the Clemmons Creek Basin. It will establish the water distribution lines and storage tanks necessary to support an increase in population density in these areas as the City develops beyond 2014. Water services to the Stiff Creek Basin will be established, but larger distribution loops will be installed later.

The 2014-2019 water improvements will cost **\$74,000,000** at estimated 2009 prices. This infrastructure purchase, cumulative with previous projects, will support the Comprehensive Plan's 2019 population estimate of 42,673, with increasing population density in the 2009-2014 development areas and more residents (and a few businesses) moving into the Stiff Creek Basin. It will add a significant amount of water supply to the water system north of the current Melissa downtown area, and will establish a major eastern water supply facility just north of the NTMWD landfill.

Table 4. Estimated Project Cost Summary in 2009 Dollars for Water Improvements

Period	#	Project Description	Total Cost
2009-2014	1	South Water Take Point	\$4,100,000
2009-2014	2	US-75 Southwest Bore	\$500,000
2009-2014	3	West Side Dual Pressure Zone Expansion	\$4,900,000
2009-2014	4	Northwest Tower and Lines	\$7,700,000
2009-2014	5	Fannin Distribution Line	\$500,000
2009-2014	6	Southwest Mains	\$3,700,000
2009-2014	7	Southwest Tower	\$8,200,000
2009-2014	8	Berry Road Line Upgrade And Industrial Line	\$1,500,000
2009-2014	9	FM 2933 Main	\$2,000,000
2009-2014	10*	Land Acquisition for Public Works Facility	\$800,000
2009-2014	10	North Water Tap and Pump Facility	\$11,000,000
2009-2014	11	North Facility to Downtown Connection	\$1,400,000
2009-2014	IFS1	Impact Fee Study – Water	\$150,000
2009-2014		Subtotal	\$46,400,000
2014-2019	12	US-75 Melissa Road Bore	\$1,000,000
2014-2019	13	US-75 Throckmorton Road Bore	\$800,000
2014-2019	14	County Road 365 Line	\$1,000,000
2014-2019	14*	Public Works Facility	\$18,000,000
2014-2019	15	Northwest Transmission Line	\$3,000,000
2014-2019	16	East Water Facility	\$44,200,000
2014-2019	17	East Water Facility Transmission Lines	\$5,500,000
2014-2019	IFS2	Impact Fee Study – Water	\$150,000
2014-2019		Subtotal	\$73,700,000
2009-2019		Grand Total	\$120,100,000

Note: Individual items may not add up evenly to subtotals and grand total due to rounding.

5.3 Future Demand Distribution for the Wastewater System

The infrastructure of the future gravity sewer system is far more dependent on topography than the future water system is, and there is less variation in the amount of sanitary sewer flow than the amount of water used among different land uses. Therefore, alignments and sizes of future sewer lines, along with the geographical extent to which larger (City-funded as opposed to developer-funded) trunk lines will be needed, can be determined with greater confidence.

For planning purposes, the entire study area of Melissa is separated into several major basins and sub-basins, and each of these basins can be split into many “micro-basins”. Mapping the major basins and sub-basins is a simple matter of dividing the study area along major ridgelines, where the drainage diverges into different streams. Micro-basins, however, are

more artificial, as they are estimates of the extent and location of the areas which will drain into each sewer interceptor manhole. These micro-basins have individual sewer flows and small segments of future sewer line (usually 1-3 manhole spacing's worth) associated with them, the underlying assumption being that each micro-basin will contribute its flow at the most downstream point. This sewer microanalysis enables a close, topographically-based estimate of how large sewer lines will need to be from the highest points in the City study area to the lowest.

Table 5. Sewer Usage Estimates By Land Use

	Units per Acre	Persons per unit	Sewer pppd (gal)	Flow Per Acre Per Day (approx. gallons)
Low Density Residential	3.1	3.2	100	1000
Medium Density Residential	10.0	3.3	100	3250
High Density Residential	15.0	3.0	75	3375
Residential Estate (Very Low Density Residential)	1.0	3.5	100	350
Mixed Use	N/A	N/A	N/A	5300
Office	N/A	N/A	N/A	2000
Retail	N/A	N/A	N/A	2500
Industrial	N/A	N/A	N/A	2500
Commercial	N/A	N/A	N/A	2500

The sewer usage estimates above are based on some limited information and assumptions which will cover a heavy usage scenario in the sewer system as the City develops. Unit density per acre for residential land uses in Table 5 is based on "Chapter 3: Future Land Use Plan" in the Comprehensive Plan.

Modifications to the unit density were made to the Low and Medium Density zones. For Low Density Residential, due to the large number of constructed low density residential developments in Melissa, an accurate unit density was calculated by dividing the area of the subdivision by the number of residential lots contained therein (as shown in 2.3). For Medium Density Residential, due to the relatively small areas predicted to develop with this land use, an increase in assumed density from 8 units to 10 units per acre was made to accommodate possible fluctuation from an average density.

Estimating wastewater flow from commercial and industrial areas is a complex process. The City of Melissa Developer's Package includes useful information on flows from some nonresidential sources, peaking factors based on serviced area, infiltration, and inflow. An equitable assessment of wastewater impact fees will require a direct correlation with water meter size.

5.4 Future Costs of Wastewater Collection System Improvements

The estimated cost of improvements to the wastewater collection system required to carry future wastewater flows is shown in Appendix B. The costs shown in these tables are in terms of 2009 dollars and include a 35% contingency, 2% bond issuance, 20% for engineering, surveying, procurement, and construction management costs, and 6.0% annual bond interest charges over 20 years. Right-of-way costs of \$10 per linear foot are also included in projects requiring land acquisition. A credit equal to 1.5% rate of return is placed against the total payments and interest on the bonds used to finance the projects. The present value of all wastewater collection system improvements in Melissa in the next ten years is estimated at **\$42,000,000**.

The figures outlined in Appendix A are engineer's cost opinions based on zero developer contribution.

The 2009-2014 wastewater capital improvements will cost **\$39,000,000** at estimated 2009 prices. This infrastructure purchase, cumulative with previous projects, will support the Comprehensive Plan's 2014 modified population estimate of 17,733, providing or increasing sewer service to the Throckmorton Creek/Trinity River Basin, Fitzhugh Branch Sub-basin, the Clemmons Creek Basin, and the Stiff Creek Basin. A lift station south of downtown should be retired by the end of this period and gravity service extended southward to join with the Clemmons Creek Offsite Sewer line. A new lift station will be installed in the Stiff Creek Basin to allow a gravity line to be installed therein, to coincide with water infrastructure development.

The 2014-2019 wastewater improvements will cost **\$3,000,000** at estimated 2009 prices. This infrastructure purchase, cumulatively with previous projects, will support the Comprehensive Plan's 2019 population estimate of 42,673. It is difficult to predict when gravity sewer service will be available downstream of Melissa's Sister Grove Creek Basin, which is a prerequisite to gravity sewer service everything east of the Stiff Creek Basin. The choice of the South Sister Grove Branch Basin for sewer service installation in this time period is arbitrary; depending on circumstances, the Brinlee Branch basin may develop instead. Either way, the installation costs of each are similar and nearly interchangeable.

Table 7. Estimated Project Cost Summary in 2009 Dollars for Wastewater Improvements

Period	#	Project Description	Total Cost
2009-2014	1	Throckmorton Creek Sewer (GTUA Phase II)	\$4,800,000
2009-2014	2	Trinity River Sewer (GTUA Phase III)	\$14,100,000
2009-2014	3	Stiff Creek Force Main	\$4,500,000
2009-2014	4	Stiff Creek Gravity Interceptor	\$3,900,000
2009-2014	5	Fitzhugh Gravity Sewer Line	\$4,500,000
2009-2014	6	Clemmons Sewer Line Expansion	\$9,900,000
2009-2014	7	Davis Road Gravity Sewer Interceptor	\$1,400,000
2009-2014	8	Unnamed Sewer Interceptor	\$1,100,000
2009-2014	IFS1	Impact Fee Study – Sewer	\$150,000
2009-2014		Subtotal	\$44,200,000
2014-2019	9	South Sister Grove Branch Sewer	\$3,400,000
2009-2014	IFS1	Impact Fee Study – Sewer	\$150,000
2009-2019		Grand Total	\$47,700,000

Note: Individual items may not add up evenly to subtotals and grand total due to rounding.

6.0 SERVICE UNITS

6.1 Utility Usage Based on Future Land Use Assumptions

To estimate utility usage in Melissa’s future development area, the following factors are taken into account:

- The quantity of water or wastewater usage on a single baseline service connection, to be called a “water service unit” or “wastewater service unit”;
- The expected nature of the use of any given portion of land;
- An equivalent number of “baseline” service connection units per unit area of the developed land. For example, a commercial building in a dense retail area may have a single service connection in a two acre space, and a residence on a two acre lot may have a single service connection as well. However, due to the nature of the land use the commercial building will have a greater equivalent number of water service units than the residence.

Wastewater and water usage varies relative to each other based on land use. The benchmark for one standard service unit, for both water and wastewater, is equal to one single family home on a 10,000 square foot lot.

Table 8. Usage of Water and Wastewater Service

Type of Service	1 service unit is equivalent to:
Water	1.1 gallons per minute (gpm) per connection
Wastewater	300 gallons per connection per day

Table 9. Service Unit Density by Land Use

Land Use	Service Unit Equivalents per Acre for Wastewater	Simplified Land Use Designation for Water Planning Purposes	Service Unit Equivalents per Acre for Water
Residential Estate (Very Low Density Residential)	1.2	Residential	3.1
Low Density Residential	3.2	Residential	3.1
Medium Density Residential	10.8	Dense Residential	12
High Density Residential	11.3	Dense Residential	12
Mixed Use	17.7	Commercial/Industrial	7.1
Office	6.7	Commercial/Industrial	7.1
Retail/Industrial/Commercial	8.3	Commercial/Industrial	7.1

Table 9 above is derived from area based estimates covered earlier in this report.

Residential Utility Usage

Estimating residential water usage for the purposes of capital water improvements is the multiplication of two factors: amount of water used per residence, and amount of residences per acre. Examination of Table 9 shows that there are two categories for residential land use for water, where on Table 3 there are four. Table 9 uses two residential categories to simplify future water modeling because the residential estate zones that will be served until 2019 are not one-acre lots, but closer in size to the 0.3-acre lots seen in the average low density residential zone. Also, the high and medium density zones are small enough that an estimate of water use can simply be averaged to 12 units per acre, and called "Dense Residential". Dividing the water usage by 1.1 gallons per minute gives a standard number of "service units".

Wastewater usage per acre in residential zones is outlined in Table 5. Dividing the wastewater usage by 300 gallons per day gives a standard number of "service units".

Nonresidential Utility Usage

Estimating nonresidential water usage was estimated at 7.4 gallons per minute per serviceable acre. This is equal to twice the wastewater flow for Mixed Use development. This brings service unit density for all commercial and industrial areas along with Mixed Use, to 7.1 services per acre.

Nonresidential wastewater flows are based on estimated sewer usage per acre. When divided by the 300 gallons per service unit, the number of service units in that acre is obtained. Water service unit density is calculated in a simpler fashion: first, the usage categories are reduced to three, from the nine categories used for wastewater. Then, each usage category is assigned an expected water usage based on double the expected sewer flow (converted to gallons per minute).

7.0 UTILITY SYSTEMS ANALYSIS

7.1 Computer Model Results

Computer modeling of the City of Melissa’s current water system revealed some important background information on the current system. First, it showed that fire flows could be sustained under average demand conditions quite easily, provided that water was being drawn from an 8” or larger pipe—a result that helps support Melissa’s 8” minimum diameter water line requirement (individual services excepted). Second, it showed that, as of this report, the water system in Melissa is sufficient to meet customer demand on every developed lot. Third, it helped show what projects would be useful to pursue in the near future.

7.2 Water Distribution System Design Criteria

7.2.1 Hydraulic Analysis Criteria

The hydraulics of the water system in Melissa were analyzed using Haestad Methods’ water modeling software, WaterCAD (version 4.1). To account for minor losses, the modeled distribution pipes’ Hazen-Williams coefficient (a number that describes the smoothness of the interior of a pipe) used in the analysis was set to 140. This assumed value is significantly lower than the known PVC values of the coefficient, which are about 150-155, which provides for a margin of safety for calculation.

7.2.2 Regulatory Requirements

It would not be prudent, however, to allow increases in connection to the 4,375 total limit under minimum supply and distribution rules. A more stringent design criterion—one mandated by the Texas Commission on Environmental Quality—is designing a water system to maintain mandatory minimum pressures under maximum daily demand. If Melissa were to only meet TCEQ requirements for distribution and storage without regard for TCEQ pressure requirements, it would, within 10 years, have a system that regularly drops below the mandated 35 psi under high demand (usually summer) conditions. Thus, as Melissa expands, maintaining pressure during high demand periods will be the main driving factor for construction of new water distribution and storage facilities.

7.3 Wastewater System Facilities

Analysis of topographical data in the City of Melissa reveals seven major serviceable basins. These basins are shown on Sheet C5 in Appendix C, and the basins include:

- *Throckmorton Creek/Trinity River Basin*

This basin has a 21” interceptor (Hunter’s Ridge Offsite Sewer) currently installed to provide sanitary sewer service to a residential subdivision and carry the wastewater to a NTMWD interceptor near State Highway 121. Despite this line’s capacity of 3.23 MGD, an expansion of service is needed in this basin to serve the major commercial corridor expected to develop. Two larger lines are under construction to meet the future needs of

the City outlined in the Comprehensive Plan: the Throckmorton Creek and Trinity River Sewer Interceptors (Greater Texoma Utility Authority Sewers Phases II and III). For the purposes of impact fee calculation, these lines will not be included in this report. One lift station can be found in this basin along Fannin Road, just north of the intersection with Davis Road. The Davis Road gravity sewer line will not only serve the rapid mixed development in this area, but will also allow the lift station here to be removed from service.

- *Fitzhugh Branch (Clemmons) Basin*

The Fitzhugh Branch Basin has a 6" force main that currently serves downtown and runs along State Highway 121 to a NTMWD line in McKinney. This main will be replaced by a gravity line that will run south and connect to the future Clemmons Creek Sewer Expansion. This gravity line will serve not only as a replacement for the existing force main but as an interceptor for future development to the south of SH 121, much of which will be industrial in nature. Operating costs will also be reduced by the installation of a gravity line.

- *Clemmons Creek Basin*

The North Creek Offsite Sewer Line provides gravity sewer service to this basin currently, with line sizes of 27" near the downstream end. This line will need to have a parallel line (Clemmons Sewer Line Expansion) installed to serve further development in this basin as it is built, which will be mostly residential. The neighboring basin, Stiff Creek, will collect future sewer flows that it will not be able to send downstream along its natural grades; these flows will need to be carried by the parallel line in Clemmons as well, and must be accounted for in the design.

- *Stiff Creek Basin*

This basin has no City-owned sewer systems presently. Residential subdivisions, development of the industrial area near SH 121, and other construction will necessitate building sanitary sewer lines and a lift station to move the wastewater to the neighboring basin to the west, Clemmons Creek, where an upgraded sewer collection system will be able to carry the added load to the North Texas Municipal Water District's sewer treatment facilities.

- *Brinlee Branch (Sister Grove) Basin, South Sister Grove Branch (Sister Grove) Basin, Sister Grove Creek (Main) Basin*

These basins are not currently developed in a way that requires a central sewage collection system, and they are not expected to develop as such for the next 10 years. A gravity line is predicted to serve these areas after development.

7.4 Wholesale Service Provider

The City of Melissa sends its wastewater to the Wilson Creek Treatment Plant for processing. This is done using NTMWD sewer interceptors that collect wastewater from Melissa's trunk lines. An ongoing task for the City will be to negotiate a sufficient peak wastewater flow for the North Texas Municipal Water District to accept from Melissa's sewer system as more development occurs.

7.5 Wastewater Flow Estimates and Allocation

Land use predictions were used to estimate future wastewater flow throughout the City of Melissa. Appendix A shows a breakdown of sewer flow made by estimating the area of land served by each manhole, and how that land will be used. A peaking factor (PF) based on the active acreage being serviced upstream of each manhole is then applied to the loads (external flows excepted). The PF ranges between 1.7 (at the very bottom of the largest basin, with a sewer area of approximately 3,300 acres) and 5.0 (for any sewer area smaller than 65 acres). Appendix A contains a PF chart and graph which was used for sewer flow estimates. Allowances for infiltration and inflow were made based on the sewer area and were added in at each manhole.

Based on the terrain, sewer flow estimates, and an understanding of gravity sewer hydraulics, conceptual designs were constructed. More detailed design considerations such as existing sewer easements, road crossings, creek crossings, and platted (existing and future) sewer systems were taken into account for the Clemmons Creek Basin, Fitzhugh Branch Basin, and the Throckmorton/Trinity Basin. The other basins (Stiff Creek and eastward) remain undeveloped for the time being, and the sewer alignments for them are currently only in the conceptual stages of planning.

8.0 IMPACT FEES

The calculation of impact fees for the City of Melissa is based on a 10 year plan, the maximum allowed Chapter 395 of the Texas Local Government Code. Knowing the following:

- The number of service units expected to develop within the next 10 years;
- The total costs of the future capital improvements in the next 10 years;

A maximum impact fee can be calculated, within the restrictions set in Chapter 395.

8.1 Expected Increase in Service Units

Ultimately, the calculation of impact fees is a division problem. The base impact fee is calculated by the following:

- The total cost of capital improvements expected to be developed until 2019, including finance charges calculated individually for each project from when they are estimated to be built to the end of that 10 year period, divided by
- The total number of service units expected to be built in 2019, minus the total number of service units in service today.

The modified population growth estimates in the Comprehensive Plan show us estimated populations in Melissa from now until buildout. The number of service units we have calculated in total for Melissa is based on land area and usage as outlined in the

Comprehensive Plan for buildout. Once the City of Melissa reaches a certain population threshold, the differing residential, commercial, and industrial uses of land will hold equal percentages as that which will be seen at buildout. Since that population threshold will be surpassed in 10 years, we can scale down the predicted number of service units at buildout along the population curve.

Ultimate population, according to the revised population estimate for the City of Melissa, will be 95,859. 2019 population is projected to be 42,673.

Ultimate buildout is the basis for the future flows shown in the Appendix Tables. Scaling down the service usage is necessary before impact fee calculation; the percentage of ultimate buildout usage anticipated in 2019 is **44.5%**.

The allocation of water service is simpler than that of sewer, as it does not depend on geographically varying peaking factors. In addition, the sanitary sewer service needs in Melissa can be split evenly among water service connections, as the amount of sewer service is proportional to the amount of water used. Therefore, the number of service units expected to join the Melissa water and sewer system will be equal and can be represented as a single figure.

Table 10. Increase in Service Units for Utilities to 2019

Water Flow (Buildout) (gallons per minute - gpm)	Water Flow (2019) (gpm)	Number of Equivalent Service Units in 2019	Number of Equivalent Service Units Today	Expected 10-year Increase in Service Units
39,700	17,700	16,100	1602	14,500

Table Notes:

- Table A6 in Appendix A forms the basis for estimating water use at buildout for areas that will develop by 2019.
- “Number of Service Units Today” is based on the “Municipal Water Use Survey for the Calendar Year Ending December 31, 2008”, completed by Melissa for the Texas Water Development Board.
 - Residential meters are counted as 1 service unit each, and nonresidential meters were counted as 1.6 service units each.

-
- There are 1,283 residential service connections on the primary City of Melissa water system, and 205 residential service connections on the Country Ridge subdivision's water system
 - The remainder of the service units in Melissa are 71 commercial/industrial connections, counted as 1.6 service units each.
 - $1,283(1.0) + 205(1.0) + 71(1.6) = 1,605$ service units today.
 - A single service unit for both water and wastewater utilities is based on a usage of 1.1 gallons per minute (gpm) flow on a $\frac{3}{4}$ " water meter. 1.1 gpm is not an expected average load on the system, but a peak usage estimate used for designing a distribution system that will not lose pressure during high usage periods. Average usage of water per connection (for all meters, largely residential) is 0.39 gpm averaged over calendar year 2008.

8.2 Utilization of Water and Wastewater Projects

Many of the projects anticipated for construction in this 10-year plan are not expected to be utilized fully by 2019. Therefore, the Estimates of Future Project Cost Tables in this report often outline construction costs not fully recoverable by impact fees derived from this plan.

Table 11. Water Cost Allocations Based on Project Utilization

No.	Project	Total Project Cost	Utilization Expected in Next 10 years	Cost Distribution By Time Period (2009 Dollars)	
				10-year	Beyond 10-year
1	South Water Take Point	\$4,100,000	100%	\$4,100,000	\$0
2	US-75 Southwest Bore	\$500,000	100%	\$500,000	\$0
3	West Side Low Pressure Plane Exp.	\$4,900,000	100%	\$4,900,000	\$0
4	Northwest Tower and Lines	\$7,700,000	100%	\$7,700,000	\$0
5	Fannin Distribution Line	\$500,000	100%	\$500,000	\$0
6	Southwest Mains	\$3,700,000	100%	\$3,700,000	\$0
7	Southwest Tower	\$8,200,000	100%	\$8,200,000	\$0
8	Berry Road/Industrial Lines	\$1,500,000	100%	\$1,500,000	\$0
9	FM 2933 Main	\$2,000,000	100%	\$2,000,000	\$0
10	North Water Tap and Pump Facility	\$800,000	32%	\$260,000	\$540,000
10*	Public Works Facility Land	\$11,000,000	100%	\$11,000,000	\$0
11	N Facility to Downtown Connection	\$1,400,000	32%	\$450,000	\$950,000
IFS1	Impact Fee Study 2014	\$150,000	100%	\$150,000	\$0
12	US-75 Melissa Road Bore	\$1,000,000	32%	\$320,000	\$680,000
13	US-75 Throckmorton Road Bore	\$800,000	32%	\$260,000	\$540,000
14	County Road 365 Line	\$1,000,000	32%	\$320,000	\$680,000
14*	Public Works Facility	\$18,000,000	100%	\$18,000,000	\$18,000,000
15	Northwest Transmission Line	\$3,000,000	32%	\$960,000	\$2,000,000
16	East Water Facility	\$44,200,000	32%	\$14,100,000	\$30,100,000
17	East Water Facility Lines	\$5,500,000	32%	\$1,800,000	\$3,700,000
IFS2	Impact Fee Study 2019	\$150,000	100%	\$150,000	\$0
TOTALS		\$120,000,000		\$80,870,000	\$57,190,000

Water projects constructed in the next five years include projects numbered 1-9. These projects will serve the projected population of 17,733 in 2014 (the difference between current population and 2014's being 12,733), and will be completely utilized in ten years. The utilization of the 2009-2014 water projects will be 100% within 10 years.

Water projects constructed between five and 10 years from now include projects numbered 10-17. This five year period from 2014 to 2019 will see the City's population increase to 42,673 (the difference between 2014 projected population and 2019's being 24,940). These water projects will serve Melissa's population from the time they are constructed to the population of Melissa at buildout in 2045 (estimated at 95,859).

$(2019 \text{ pop.} - 2014 \text{ pop.}) / (2045 \text{ pop.} - 2014 \text{ pop.}) = \text{Utilization factor for 2014-2019 projects}$

$$(42,673 - 17,733) / (95,859 - 17,733) = 0.319 = \mathbf{32\%}$$

Table 12. Wastewater Cost Allocations Based on Project Utilization

No.	Project	Total Project Cost	Utilization Expected in Next 10 years	Cost Distribution By Time Period (2009 Dollars)	
				10-year	Beyond 10-year
1	Throckmorton Creek Sewer	\$4,790,000	44.5%	\$2,130,000	\$2,660,000
2	Trinity River Sewer/HROffsite Parallel	\$14,100,000	44.5%	\$6,270,000	\$7,820,000
3	Stiff Creek Force Main/Lift Station	\$4,460,000	44.5%	\$1,990,000	\$2,470,000
4	Stiff Creek Gravity Interceptor	\$3,860,000	44.5%	\$1,720,000	\$2,140,000
5	Fitzhugh Gravity Sewer Line	\$4,460,000	44.5%	\$1,980,000	\$2,480,000
6	Clemmons Sewer Line Expansion	\$9,880,000	44.5%	\$4,400,000	\$5,480,000
7	Davis Road Gravity Sewer Interceptor	\$1,380,000	44.5%	\$620,000	\$760,000
8	Unnamed Sewer Interceptor	\$1,110,000	44.5%	\$490,000	\$620,000
9	South Sister Grove Branch Sewer	\$3,390,000	44.5%	\$1,510,000	\$1,880,000
IFS1	Impact Fee Study 2014	\$150,000	100%	\$150,000	\$0
SUBTOTAL		\$47,400,000	-	\$21,260,000	\$26,310,000
	Wastewater Rehabilitation Credit	(\$675,000)	-	(\$675,000)	-
IFS1	Impact Fee Study 2014	\$150,000	100%	\$150,000	\$0
TOTAL		-	-	\$20,730,000	-

Note on Wastewater Utilization: Wastewater flows in the next ten years, less the 0.33 MGD average from the latest historical flows, will be 10.2 MGD on average (no peaking factor applied), which is 42.0% of the average wastewater collection system capacity in the basins expected to develop by then (24.3 MGD). There is only one rehabilitative project in the wastewater capital improvements plan, and that is the 12" sewer line rehabilitation through downtown, which will be directly deducted from the maximum impact fee.

8.3 Impact Fee Calculation and Allocation

The maximum impact fee that may be assessed is derived from the cost of the capital improvements in the 10 year plan. The cost is divided by the number of future service units expected to receive utility service in the next 10 years, and then a 50% credit is applied to get the impact fee.

The total cost of water projects attributable to growth in the next 10 years is **\$80,900,000**. This will be divided by the number of service units estimated to move into Melissa in the next 10 years, and with a 50% factor applied, to obtain the impact fee.

The total cost of wastewater projects attributable to growth in the next 10 years is **\$21,400,000**. One rehabilitative project, costing **\$675,000**, will be deducted from the impact fee because its construction would only serve existing customers. So **\$20,730,000** will be divided by the number of service units estimated to move into Melissa in the next 10 years to obtain the wastewater impact fee.

Base Impact Fee for Water: (\$80,900,000) ÷ 14,500 = \$5580 per unit
Maximum Water Impact Fee (50% of Base) = \$2790 per unit

Base Impact Fee for Wastewater: (\$20,730,000) ÷ 14,500 = \$1430 per unit
Maximum Wastewater Impact Fee (50% of Base) = \$715 per unit

Water and wastewater capital improvements costs are the grand totals for the period 2009-2019, prorated for expected utilization in that time period.

8.3.1 Impact Fees for Water

Allocation of impact fees will be designated as a multiple of the ¾" water meter, which will be **1 service unit**. According to *AWWA Manual 6, Water Meters – Selection, Installation, Testing, and Maintenance, 4th Edition*, ©1999, there is a maximum capacity for water meters based on the size of the tap. The service unit equivalence is as follows on **Table 14**.

Table 13. Service Unit Equivalence - Water

Water Meter Size	Maximum Flow (gpm)	Service Units
¾" Simple	25	1.0
1" Simple	40	1.6
1 ½" Simple	50	2.0
2" Simple	100	4.0
2" Compound	115	4.6
3" Compound	165	6.6
4" Compound	215	8.6
6" Compound	515	20.6

8.3.2 Impact Fees for Wastewater

Wastewater impact fees should be assessed on the same criteria as the water impact fee, as sewer usage is directly attributable to the usage of water.

Table 14. Service Unit Equivalence - Wastewater

Water Meter Size	Service Units	Estimated Peak Sewer Flow (gpd)
¾" Simple	1.0	715
1" Simple	1.6	1140
1 ½" Simple	2.0	1430
2" Simple	4.0	2860
2" Compound	4.6	3290
3" Compound	6.6	4720
4" Compound	8.6	6150
6" Compound	20.6	14700

9.0 PROJECT DESCRIPTIONS

The following is a series of descriptions of the projects to be constructed in Melissa to allow future development.

9.1 Wastewater Projects, 2009-2014

Project #1: Throckmorton Creek Sewer

This project is also known as the "GTUA (Greater Texoma Utility Authority) Sewer Interceptor, Phase II." This gravity-flow-only wastewater interceptor will connect to, and thus retire, a lift station in the City of Anna and will carry wastewater flows from that city, up to a mutually agreed upon limit. As it leaves the City of Anna's jurisdiction south to Melissa, it will pick up wastewater flows from the residential areas in the northwest parts of Melissa just east of US Highway 75. Further downhill on the line, it will pick up wastewater from various residential and commercial collector lines. Near the Trinity west of the intersection of Melissa Road and Davis Road, the Throckmorton Creek Sewer will connect to and end at a junction box which will temporarily route flow to the existing Hunter's Ridge Offsite Sewer. This junction box will have an outlet for a future sewer line (Project #2) that will upgrade the capacity of the Hunter's Ridge Offsite Sewer to handle future City of Melissa loads.

Project #2: Trinity River Sewer & Hunter's Ridge Offsite Parallel

The existing Hunter's Ridge Offsite Sewer is not designed to drain most of the future wastewater flows from the extensive dense development expected near US-75. This sanitary sewer will drain the remainder of the Throckmorton Creek / Trinity River Basin and will follow

the same route as the Hunter's Ridge Offsite Sewer in doing so. At designated locations, a junction box will be installed in the place of a manhole on the Trinity River Sewer and will replace an existing manhole on the Hunter's Ridge Offsite Sewer. These junction boxes will balance the loads between the interceptors and will serve as designated collector points for outside flows via stubouts in the sides.

This interceptor will connect to the North Texas Municipal Water District's Honey Creek Sewer line after being metered through a Parshall flume and the wastewater flow will continue to the Wilson Creek Wastewater Treatment Plant.

Project #3: Stiff Creek Force Main and Lift Station

The Stiff Creek Force Main will carry wastewater from the likewise named Stiff Creek Basin into the neighboring Clemmons Creek Basin to the west, where it will become a gravity line after the line crosses the ridge separating the two basins. When the line approaches Clemmons Creek, it will connect to the North Creek Offsite Sewer Line already in place there.

Project #4: Stiff Creek Gravity Interceptor

Because there is no existing central collection system for wastewater in the Stiff Creek Basin and little development, installing a gravity line here to route to the lift station is straightforward. This gravity line will serve the future residential development in this area and connect to the Stiff Creek Lift Station.

Project #5: Fitzhugh Gravity Sewer Line

This line will be the main interceptor for wastewater through the Old Town and some future industrial/residential areas of Melissa. It will replace the main trunk of the Wastewater Collection and Transmission Facilities through downtown, bore under State Highway 121, and will retire the lift station there. South of SH121 it will continue south and downhill in the basin until it meets up with the North Creek Offsite Sewer. The estimated cost of rehabilitating part of the 12" sewer line through downtown has been subtracted from the total wastewater impact fee; however, the majority of the purpose of this line will be to serve future connections.

Project #6: Clemmons Sewer Line Expansion

Clemmons Creek runs southward directly through the middle of Melissa's development boundaries. A moderately sized gravity sewer line runs through here (North Creek Offsite Sewer), and it is sufficient to serve the basin for the expected development in the area. However, starting downhill and south of Melissa's development boundary it flattens out and shrinks in size, greatly limiting its capacity. Also, the Stiff Creek Force Main will drain into here, and a parallel line will be required to carry the additional flow. Further down the line, the Fitzhugh Gravity Sewer will connect as well. For the North Creek Offsite Sewer to provide adequate sewer service over the next 10 years, it must be upgraded with this parallel line. This sewer project is of particular importance, as it allows full sewer service to be provided to the Fitzhugh Branch, Clemmons Creek, and Stiff Creek basins.

Project #7: Davis Road Gravity Sewer Interceptor

The tributary that feeds the East Fork Trinity River in this small sub-basin has no name, but County Road 343/Davis Road does, and as such this project is named. The area to be served by this line is at the junction of State Highway 5, State Highway 121, and US-75, and promises to be a major commercial, mixed use, and high density residential area. This sewer line will allow development right at this major transportation hub to drain to the Trinity River and Hunter's Ridge Offsite Sewers.

Project #8: Unnamed Sewer Interceptor

The sub-basin this line will serve forms the heart of the rectangle enclosed by State Highway 5, Telephone Road, Melissa Road, and Davis Road (with US-75 running north-south through the middle). Like the area served by Project #7, this area promises a good deal of residential and commercial development. This currently unnamed wastewater interceptor will serve one of the only medium density (townhome) residential areas in Melissa, according to the Comprehensive Plan, and will also retire the Fannin Road Lift Station.

9.2 Wastewater Project, 2014-2019

Project #9: South Sister Grove Branch Sewer

The construction of this project is based on the expectation of development east of the Stiff Creek Basin, which is not entirely certain at this time. However, the Comprehensive Plan designates an industrial area south of the NTMWD landfill, along with some low density residential development, in this sub-basin of Sister Grove Creek. With the construction of this sewer interceptor, the City of Melissa will have sewer service available to parts of the easternmost areas of its jurisdiction.

9.3 Water Projects, 2009-2014

Project #1: South Water Take Point

Located in downtown near Melissa Road, the new pump station here will have the ability to add pumping capacity as the city grows, as well as utilize water from the Greater Texoma Utility Authority's (GTUA) regional water transmission line. In addition, a 500,000 gallon storage tank to be installed here will serve to offset peak demands by future customers on the water system.

Project #2: US-75 Southwest Bore

The mixed use and commercial areas west of US-75 will not develop without substantial water distribution from the main water system on the other side. This will be the first water line owned by the City to cross US Highway 75.

Project #3: West Side Low Pressure Plane Expansion

The land near the Trinity River, even above the 100-year floodplain designated by FEMA, is low lying and necessitates a separate pressure plane. With a connection to the main water system, this network will provide water service to all the areas near Telephone Road within

Melissa's jurisdiction. This water line project will distribute water along the west side of US-75 in the southwest area.

Project #4: Northwest Tower and Lines

The US-75 corridor will be the most heavily developed area of Melissa. Elevated water storage in this area is crucial to ensure that useful levels of pressure will be maintained during high demand periods.

Project #5: Fannin Distribution Line

The future water demands of Melissa west of downtown will require a water line parallel to Melissa Road to help service the US-75 corridor, as well as the dense residential developments along Fannin Road to the south. This project will also serve to form a hydraulic loop with Project #6, ensuring good circulation of treated water through the system.

Project #6: Southwest Water Mains

The intersection of US Highway 75, State Highway 5, and State Highway 121 is an area expected to develop very heavily in Melissa. The Southwest Water Mains will provide water service to this area and will put to good use the increased water distribution and supply capacity from the downtown water take point (Project #1).

Project #7: Southwest Tower

An elevated tank will complement Project #6 and will buffer peak demands on the water system as the southwest commercial and residential areas continue to develop.

Project #8: Berry Road Line Upgrade and Industrial Line

The 8" water line parallel to Berry Road is not meant to serve the future residential and industrial development to its west. This line will supply the industrial area and allow the connection of more housing in the area.

Project #9: FM 2933 Main

Farm to Market 2933 will need a trunk line to serve the future low density (but extensive) residential development in the area. This project is a likely candidate to begin Melissa's residential expansion into the southeast quadrant of its development boundaries.

Project #10, #10*: North Water Tap and Pump Facility, Future Public Works Maintenance Facility Land Acquisition

The northern area of Melissa is also the highest elevated. Some development (Hunters Creek, North Creek) already is established in these "highlands", distant from downtown, and from a hydraulic standpoint, it is difficult to provide properly pressurized water from the distant, low-lying pump station there (Project #1). This northern facility will use a planned second tap into the GTUA's highly pressurized transmission line that runs through Melissa and will provide some needed ground storage at a high elevation, which will save on pumping costs. This will allow efficient water supply and distribution as Melissa expands to the north.

In addition to the direct water supply improvements this facility will provide, it will establish City-owned space for a future public works facility.

Project #11: North Facility to Downtown Connection

The North Water Facility is useless without a connection to the water system, and this water line will allow it to go online. As well as serving the downtown area, this water line will feed into water lines supplying water to nearby residential subdivisions and retail zones along State Highway 5.

9.4 Water Projects, 2014-2019

Project #12: US-75 Melissa Road Bore

Key to further development along US-75, this bore will expand water distribution to the heavy development areas west of US-75 as it continues growth.

Project #13: US-75 Throckmorton Road Bore

Similar to Project #12 in purpose, this bore will complete the water supply network begun by Project #3 west of US-75 and will ensure consistent pressurized water service to that high demand area.

Project #14: County Road 365 Water Line

This water line, while not likely to be very large, will allow residential areas to the west of the retail area along SH 5 to develop around the Country Ridge and Villages of Melissa subdivision.

Project #14*: Public Works Maintenance Facility

A growing water and sewer system will require the construction of a Public Works Maintenance Facility, north of downtown Melissa, to ensure that the City water and wastewater utilities will be kept in good repair. It is not in the scope of this Impact Fee Study to determine or estimate the costs of equipment that will be stored and maintained here, but only to list the estimated cost of the facility itself.

Project #15: Northwest Transmission Line

The full supply capability of the North Water Tap and Pump Facility (Project #10) will not be able to be utilized to its fullest capability without a large and direct line traveling west to the US-75 corridor. The low pressure plane to the west will reach its maximum distribution potential with the installation of this line. In addition, this transmission line will provide needed water to the dense mixed use areas expected to develop along the northernmost reaches of the City, between SH 5 and US-75.

Project #16: East Water Facility

This water facility will establish for the City the ability to provide water to its easternmost areas. Keeping a 10-year plan in mind, the facility will not immediately have its fullest supply



capabilities as soon as it is built, but will expand its ground storage and pump capacity as Melissa continues growth.

Project #17: East Water Facility Transmission Lines

Since the first customers to use the East Water Facility's water will reside largely to the south and west along the triangle formed by SH 5, SH 121, and the Melissa City Limit to the north, these transmission lines will be installed to serve them.

9.5 Impact Fee Studies

Chapter 395 of the Texas Local Government Code requires that the land use assumptions and capital improvements plan upon which the impact fees are based must be updated at least every five years. Costs incurred in the development and update of future capital improvements plans within 10 years are payable by impact fee, thus an allowance for them is budgeted in the water and wastewater project costs. These Impact Fee Studies are listed as IFS1 (2014) and IFS2 (2019).



¹ City of Melissa Comprehensive Plan 2006; Dunkin, Sefko, and Associates, Inc.

² Land Development for Civil Engineers, 2nd Ed., T.R.Dion, P.E. & L.S., LLC, "Water System Demands", ©2002, p. 559