



Legislation Details (With Text)

File #: 16-0137 **Version:** 1 **Name:** Water Master Plan
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Title: Presentation, possible action, and discussion regarding the updated Water Master Plan.
Sponsors: David Coleman
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Date	Ver.	Action By	Action	Result
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Presentation, possible action, and discussion regarding the updated Water Master Plan.

Relationship to Strategic Goals: Core services and infrastructure

Recommendation: None. Presented for information.

Summary: City Council approved funding in the FY-15 budget for staff to update the Water Master Plan. That work is now complete, and this presentation will include:

- Population Projections
- Water Demand Projections
- Water System Analyses
- Capital Improvements Plan
 - Capacity Expansion
 - Rehabilitation

Budget & Financial Summary: No impact.

Reviewed and Approved by Legal: Not required.

Attachment: None.

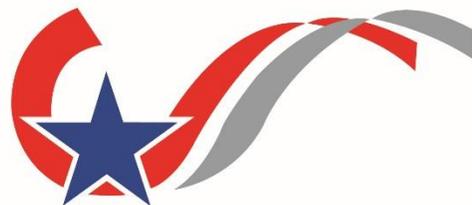


2016 WATER MASTER PLAN UPDATE

Prepared for:

City of College Station

January 2016



CITY OF COLLEGE STATION
Home of Texas A&M University®

Prepared by:

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

Freese and Nichols, Inc. (FNI) was retained in 2014 by the City of College Station to prepare a Water Master Plan Update. The City provides water to a service area of approximately 54 square miles. The existing water service area population is 86,966 and is projected to grow to 152,921 by buildout. The goals of the 2016 Water Master Plan Update were to evaluate the integrity of the existing water system and to recommend a phased Capital Improvements Plan (CIP) through buildout. The major elements of the scope of this project included:

- Population and Water Demand Projections
- Water Model Update
- Field Testing and Calibration
- Existing and Future Water System Hydraulic Analysis
- Water Line Renewal Program
- Water System Capital Improvements Plan
- Water Master Plan Report

2.0 POPULATION AND LAND USE

Population and land use are important elements in the analysis of a water system. Water demands depend on the residential population and commercial development served by the system and determine the sizing and location of system infrastructure. A thorough analysis of historical and projected populations, along with land use, provides the basis for projecting future water demands. The projected service population and living unit equivalents (LUEs) for each planning period is shown in **Table ES.1**. Non-residential growth is accounted for in the LUE projection.

Table ES.1: Projected Service Population and LUEs

Year	Service Population	LUEs
2014	86,966	53,187
2019	98,394	60,176
2024	111,324	68,084
Buildout	152,921	86,715

3.0 WATER DEMANDS

Water demands were projected for 2014, 2019, 2024 and buildout conditions. FNI developed a Microsoft Access database to store and calculate population and water demand data. Parcel data was imported from GIS, and a table was created that included the land use, number of units, and existing density of each parcel. The database can be used as a tool to track and update population and water demands in the future. All demand was calculated on a per LUE basis to account for non-residential demand. Peaking factors were applied to the average day demand to determine the maximum day and peak hour projected demand conditions. **Table ES.2** presents the projected water demand for each planning year.

Table ES.2 Projected Water Demands

Year	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
2014	13.31	27.94	50.30
2019	14.27	28.53	51.36
2024	15.70	31.39	56.51
Buildout	21.41	42.82	77.07

4.0 EXISTING WATER SYSTEM

The City of College Station’s water distribution system currently consists of approximately 418 miles of water lines, two elevated storage tanks, seven interconnections with neighboring water systems, and the Dowling Road Pump Station that consists of six pumps and two ground storage tanks. Water is supplied by the City’s nine groundwater wells and conveyed to the Dowling Road Pump Station by the Sandy Point Pump Station and transmission lines.

5.0 HYDRAULIC FIELD TESTING AND MODEL CALIBRATION

Field pressure testing was conducted at twelve locations throughout the City. FNI also conducted pump testing at the Dowling Road Pump Station as part of the Water Master Plan. The pump testing was performed to determine the actual physical and operating condition of the City’s pumping facilities.

A hydraulic model was updated as a tool in the evaluation of the City of College Station’s water distribution system. The City currently owns the InfoWater software by *Innovyze*® for modeling the water system. The model network was developed from the City’s Geographic Information System (GIS) and design plans. Supervisory Control and Data Acquisition (SCADA) data was supplemented by field pressure testing for the calibration of the model. The calibration process involved adjusting system operation, C-values,

demand allocation, and diurnal patterns to match a known condition. The 24-hour period occurring on September 3, 2014, from midnight to midnight was selected for calibration. A close correlation between modeled and observed values was achieved, creating a high degree of confidence in the accuracy of the model.

6.0 WATER SYSTEM ANALYSIS AND HYDRAULIC MODELING

Hydraulic analyses were conducted to identify deficiencies in the City of College Station’s existing water distribution system and to establish a CIP to reinforce the existing system and meet projected water demands through buildout. FNI and the City worked to develop a set of design criteria for sizing water lines and storage and pumping capacities. The existing system was evaluated to analyze pressure, velocity, headloss, fire flow, and water age.

Water system improvements were developed to accommodate the anticipated residential and non-residential growth through buildout. Challenges facing the water system include providing additional supply, pumping and storage capacity, high water pressures in low elevation locations, and meeting regulatory requirements. This is achieved by constructing improvements to enhance system operations, such as delineating a Lower Pressure Plane to address high pressure areas. The new Lower Pressure Plane would be established by a new elevated storage tank and pressure reducing valves in order to better maintain the desired range of pressures in the area east of State Highway 6.

7.0 WATER LINE RENEWAL PROGRAM

In addition to the capacity related improvements in the water system CIP, the City tasked FNI to update the City’s water line rehabilitation prioritization program. The program is based on a combination of physical data (water line age, material, capacity, and repair data) and operational data (critical locations, water quality complaints, and limited access areas) to prioritize candidates for replacement. Small, aging water lines can be subject to leakage, potential taste and odor problems from biofilms, loss in carrying capacity from C-factor reduction, maintenance difficulties, and inoperable valves. Therefore, replacing water lines in poor condition can potentially improve water quality, increase available fire flow, and reduce maintenance issues. Thirty-two renewal CIP projects were developed city-wide.

8.0 CAPITAL IMPROVEMENTS PLAN

A CIP was developed for the City of College Station’s water distribution system to ensure high quality water service that promotes residential and commercial development and meets the City’s desired goals. The recommended improvements will provide the required capacity and reliability to meet projected water demands through buildout. Capital costs were calculated for recommended CIP projects. The costs are in 2016 dollars and include an allowance for engineering, surveying, and contingencies. **Table ES.3** and **Table ES.4** summarize the cost of the water system capacity and condition CIPs by planning period.

Table ES.3: Capacity Capital Improvements Plan Cost Summary

	Project Number	Water System Capital Improvements Plan Projects	Cost
2019	1	SH 6 Water Line Connection Phase 1 - 24" SE of Creagor Lane	\$ 960,300
	2	SH 6 Water Line Connection Phase 2	\$ 2,326,700
	3	18-inch and 16-inch PRVs for Lower Pressure Plane	\$ 546,000
	4	New 3 MG Elevated Storage Tank	\$ 7,761,000
	5	Land Acquisition for Well 11	\$ 3,250,000
Water CIP Projects – 2014-2019			\$ 14,844,000
2024	6	SH 40 Water Line Extension - Graham Road to Barron Road	\$ 2,732,600
	7	SH 40 Water Line Extension - Sonoma Subdivision to Victoria Ave.	\$ 599,100
	8	SH 6 Water Line Connection Phase 3 - 24" SE of Greens Prairie Road	\$ 823,700
	9	Dowling Road Pump Station North Water Line Replacement	\$ 1,151,300
	10	Harvey Mitchell Parkway Water Line Replacement	\$ 3,580,200
	11	BioCorridor Water Line Improvements	\$ 2,081,900
Water CIP Projects – 2019-2024			\$ 10,968,800
Buildout	12	Water Supply Well 10	\$ 8,018,400
	13	Dowling Road Pump Station Water Line Replacement	\$ 6,163,500
	14	Dowling Road Pump Station Expansion	\$ 4,992,000
	15	24-inch PRV for Lower Pressure Plane	\$ 405,600
	16	Wellborn Road Water Line Improvement	\$ 2,534,200
	17	Water Supply Well 11	\$ 8,018,400
Water CIP Projects – 2024-Buildout			\$ 30,132,100
Total			\$ 55,944,900

Table ES.4: Condition Capital Improvements Plan Cost Summary

Project Number	Water System Rehabilitation Project	Cost
1	Eastgate Rehabilitation Phase 4	\$ 2,181,300
2	Eastgate Rehabilitation Phase 5	\$ 1,360,500
3	Southwood Valley Rehabilitation Phase 1	\$ 2,386,100
4	Southwood Valley Rehabilitation Phase 2	\$ 2,176,800
5	Marion Pugh Rehabilitation	\$ 1,088,400
6	Ridgefield Rehabilitation	\$ 2,239,600
7	Southwood Rehabilitation	\$ 1,988,400
8	Alpine Rehabilitation	\$ 2,176,800
9	Redmond Terrace Rehabilitation	\$ 2,176,800
10	Emerald Forest Rehabilitation	\$ 2,072,100
11	Northgate Rehabilitation	\$ 1,880,800
12	Prairie View Heights Rehabilitation	\$ 2,528,100
13	Woodson Village Rehabilitation	\$ 2,365,100
14	Plantation Oaks Rehabilitation	\$ 2,386,100
15	College Heights Rehabilitation	\$ 2,417,500
16	Oakwood Rehabilitation	\$ 2,490,700
17	The Knoll Rehabilitation	\$ 2,392,000
18	Brentwood Rehabilitation	\$ 1,925,600
19	Bee Creek Rehabilitation	\$ 2,191,700
20	Foxfire Rehabilitation	\$ 2,323,300
21	Raintree Rehabilitation	\$ 1,590,680
22	University Park Rehabilitation	\$ 1,402,310
23	McCulloch Rehabilitation Phase 1	\$ 1,768,590
24	Deacon Rehabilitation	\$ 2,197,650
25	Timber Ridge Rehabilitation	\$ 1,692,340
26	Camelot Rehabilitation	\$ 2,218,580
27	Eastgate Rehabilitation Phase 6	\$ 2,900,300
28	Autumn Chase Rehabilitation	\$ 1,489,020
29	Culpepper Plaza Rehabilitation	\$ 1,309,620
30	McCulloch Rehabilitation Phase 2	\$ 2,061,610
31	Dexter Place Rehabilitation	\$ 2,239,510
32	Carters Grove Rehabilitation	\$ 2,344,160
Total		\$ 42,747,700