TENNESSEE-AMERICAN WATER COMPANY, INC.

DOCKET NO. 22-00049

DIRECT TESTIMONY

OF

GRADY STOUT

ON

JOINT PETITION OF TENNESSEE-AMERICAN WATER COMPANY AND WALKER COUNTY WATER AND SEWERAGE AUTHORITY FOR THE APPROVAL OF A SPECIAL CONTRACT

Q. PLEASE STATE YOUR NAME AND PLACE OF EMPLOYMENT.

A. My name is Grady Stout. I am the Director, Engineering for Tennessee-American Water Company ("TAWC").

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY BEFORE THIS OR ANY OTHER UTILITY COMMISSION?

A. Yes. I submitted testimony in a number of Tennessee Public Utility Commission ("TPUC" or "Commission") matters, including Docket Nos. 20-00011, 20-00128, 21-00030 and 22-00021.

Q. PLEASE STATE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I received a B.S. degree in Civil Engineering from Tennessee Technological University in 2011. I am a licensed Professional Engineer in the State of Tennessee. Upon graduation from Tennessee Technological University, I began working with Tysinger, Hampton, & Partners, an engineering consultant firm in Johnson City, Tennessee. While with this firm, I served as the inspector over the Little Milligan Water System project that included the installation of wells, a chemical building, a storage tank, and distribution system. In 2012, after the project was complete, I became a Construction Project Manager for Bob Stout Construction Company, Inc. In this role I was the project manager of a 16" water main replacement project. I began working with TAWC in 2013 as an Engineer in the Engineering Department. My primary role was to design and manage water main replacements and other production projects in the Chattanooga, Whitwell, and Suck Creek districts of TAWC. In 2016, I was promoted to Project Manager. In this role I had both engineering and managerial responsibilities, along with managing relationships of key

stakeholders, elected officials, and regulators. In 2019, I was again promoted to Engineering Manager of TAWC. I have also served twice as VP of Operations for TAWC, the first from January 2020 – April of 2020, and the second from April of 2021- June of 2021. After serving as VP of Operations, I returned to my duties of Manager of Engineering. In May of 2022, I was promoted to my current role, Director, Engineering. I am an active member of American Water Works Association (AWWA), American Society of Civil Engineers (ASCE), and served as the 2020 President of the Chattanooga Engineer's Club.

Q. WHAT WERE YOUR DUTIES AS INTERIM VICE PRESIDENT OF OPERATIONS?

A. My primary responsibilities were managing and supporting water quality, field operations, production, and maintenance operations within the state. In this role, I had eleven direct reports that manage the different areas of the operation. I provided strategic and tactical responsibility for all operations and financials.

Q. WHAT ARE YOUR DUTIES AS DIRECTOR, ENGINEERING?

A. I am responsible for the coordination and administration of the TAWC Engineering Department. This includes the planning, development, and implementation of all aspects of construction projects. My responsibilities include working with developers for all new main extensions, replacement of existing mains, water treatment plant upgrades and modifications, new construction and improvement to network facilities. I also coordinate technical assistance to all other TAWC departments as needed and oversee the capital budget development and implementation. I report directly to the President of TAWC.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY TODAY?

A. The purpose of my testimony is to provide information to support the Joint Petition filed by TAWC and Walker County Water and Sewerage Authority ("WCWSA" or "Walker County") for the approval of the special contract between TAWC and WCWSA (the "Special Contract" or "Agreement"). On behalf of TAWC, I was involved in the negotiations that led to the Agreement. The Agreement between TAWC and WCWSA is attached to the Joint Petition as **Exhibit A**.

Q. CAN YOU SUMMARIZE WCWSA'S CURRENT SERVICE AREA?

A. WCWSA serves a growing population of about 11,000 in Walker County, Georgia.

Q. CAN YOU PROVIDE A BRIEF OVERVIEW OF TAWC'S SERVICE AREA?

A. TAWC has owned and operated the water system in our current footprint since 1887 and serves approximately 83,874 customer connections in Chattanooga, Tennessee, including surrounding areas of Hamilton County and North Georgia. In 2007, Suck Creek's water system was purchased by TAWC. Of the total number of customer connections, approximately 231 are located in Suck Creek. In 2014, the City of Whitwell's water system was acquired by TAWC. Of the total number of customer connections, there are currently about 2,859 customer connections in the City of Whitwell. In 2020, the water system serving Jasper Highlands was acquired by TAWC. Of the total number of customer connections, approximately 322 are located in Jasper Highlands.

Q. WHAT IS WCWSA'S CURRENT WATER SOURCE THAT IT USES TO PROVIDE SERVICE TO ITS CUSTOMERS?

A. The Walker County Water and Sewerage Authority provides water to its distribution system from three (3) primary sources: wells at the Chickamauga Water Treatment Plant (WTP), Coke Oven Wells, and Kensington Wells. WCWSA's water

sources for its Villanow service area are Dalton Utilities from the north and Chattooga County from the south.

Q. HAVE TAWC AND WCWSA PREVIOUSLY OPERATED UNDER A SPECIAL CONTRACT?

A. No, not to my knowledge.

Q. WHAT LEAD TO THE DISCUSSIONS AND SUBSEQUENT NEGOTIATIONS BETWEEN TAWC AND WCWSA FOR THIS SPECIAL CONTRACT?

A. In or about November 2020, WCWSA contacted TAWC and inquired about the possibility of obtaining a special contract rate.

Q. DURING THESE DISCUSSIONS AND NEGOTIATIONS, DID WCWSA RFERENCE ITS ABILITY TO OBTAIN THE WATER NECESSARY TO SERVE ITS CUSTOMER BASE FROM A SOURCE OTHER THAN TAWC.

A. Yes. Further, WCWSA advised TAWC that it was aware that TAWC had lost a sale for resale customer, namely Walden's Ridge, and that WCWSA was aware of the alternative water source option obtained by Walden's Ridge.

Q. HAS TAWC HAD SALE FOR RESALE CUSTOMERS DISCUSS, PURSUE AND ULTIMATELY OBTAIN WATER FROM A SOURCE OTHER THAN TAWC?

A. Yes. Walden's Ridge was a TAWC sale for resale customer either via our general tariff or under a special contract from 2003 to 2015. In 2014, Walden's Ridge approached TAWC for a special contract rate. TAWC and Walden's Ridge engaged in negotiations towards a special contract rate, but the negotiations were not successful. Thereafter, Walden's Ridge ceased obtaining water from TAWC and entered into an agreement to obtain water from Hixson Utility District.

Q. AT THAT TIME, DID TAWC HAVE ANY KNOWLEDGE, OR REASON TO BELIEVE, THAT HIXSON UTILITY DISTRICT WOULD MAKE THE CAPTIAL INVESTMENT NECESSARY TO SERVE WALDEN'S RIDGE?

A. No.

Q. IS TAWC AWARE OF ANY POTENTIAL ALTERNATIVE SOURCES OF WATER FOR WCWSA?

A. Yes, including Dalton Utilities, Chatooga County, and the City of Chickamauga.

Q. IS TAWC AWARE OF WHETHER WCWSA HAS ANY ANALYZES, REVIEWS, STUDIES, REPORTS OR PLANS RELATIVE TO ALTERNATIVE WATER SOURCES OTHER THAN TAWC?

A. Yes. It is our understanding that WCWSA is aware of the path taken by Walden's Ridge and was willing to take a substantially similar path or approach if an acceptable, short-term arrangement could not be successfully negotiated with TAWC. Further, even at the negotiated rate set forth in the Agreement, WCWSA still preferred a short-term arrangement, as WCWSA has decided to build-out its own facilities rather than enter a long-term special contract with TAWC. Based on the negotiations related to the Agreement, it is our understanding that WCWSA is in the active process of implementing plans to build-out its own facilities to provision its own water. Attached to my testimony are EXHIBIT 1, a June 2020 Water Treatment Expansion Preliminary Engineering Report, Water Treatment Alternatives Study and EXHIBIT 2, WCWSA's Filtration Plant Improvements – Design and Construction Time Line, both of which were provided by WCWSA.

Q. WAS TAWC AWARE OF WHETHER WALDEN'S RIDGE HAD ANY ANALYZES, REVIEWS, STUDIES REPORTS OR PLANS RELATIVE TO ALTERNATIVE WATER SOURCES OTHER THAN TAWC WHEN WALDEN'S RIDGE DECIDED TO NO LONGER OBTAIN WATER FROM TAWC?

A. TAWC was not aware of any such formal information at that time. But, like WCWSA, Walden's Ridge did reference during negotiations that it had options other than TAWC and that it was willing and ready to pursue the alternatives available to it in the event an agreement could not be reached with TAWC.

Q. WHEN WALDEN'S RIDGE DECIDED TO OBTAIN ITS WATER REQUIREMENTS FROM A SOURCE OTHER THAN TAWC, DID THIS HAVE A DETRIMENTAL IMPACT UPON TAWC AND TAWC'S CUSTOMERS? IF SO, PLEASE EXPLAIN.

A. Yes. TAWC's sale for resale customers contribute to common overhead and fixed costs, which impacts the rates of all other TAWC customers. When TAWC loses a sale for resale customer, such as Walden's Ridge, it loses such contributions, which has a negative impact upon the rates of all other TAWC customers. Further, the Agreement will benefit TAWC's existing ratepayers, as the additional water sales gained by TAWC pursuant to the Agreement will offset certain declining use experienced by TAWC as well.

Q. WHAT ARE THE TERMS OF THE SPECIAL CONTRACT BETWEEN TAWC AND WCWSA?

A. TAWC will provide potable water to WCWSA at such delivery points and in such quantities as outlined more specifically in the Agreement. We expect the location of interconnect to be on the southern portion of TAWC's system near the Fort Oglethorpe and

Catoosa County interconnects. The Agreement is a requirements contract, so WCWSA may not reduce its purchases from TAWC during the term of the Agreement. The water purchased by WCWSA from TAWC shall be used solely for resale to WCWSA's customers within its service area. Such water may not be sold by WCWSA to any other water utility without the express, prior written consent of TAWC. The initial term of the Agreement is three (3) years, with an extension upon the mutual written consent of TAWC and WCWSA. WCWSA shall pay a rate of $1.75 per 1000 gallons, and also include the TCJA impacts and the existing Capital Recovery Riders (and/or other applicable mechanism approved by the Commission).

Q. ARE THE RATES IN THE SPECIAL CONTRACT BETWEEN TAWC AND WCWSA THE HIGHEST RATES THAT COULD BE NEGOTIATED?

A. Yes. Under the whole of the circumstances presented during discussions and negotiations, TAWC believes these are the highest rates that could be negotiated.

Q. ARE THE RATES IN THE SPECIAL CONTRACT BETWEEN TAWC AND WCWSA FAIR, JUST AND REASONABLE AND NOT UNDULY DISCRIMINATORY?

A. Yes.

Q. WHAT DO YOU RECOMMEND WITH REGARD TO THIS PETITION?

A. Consistent with the public interest, I recommend that the Joint Petition be approved.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

GS Testimony Exhibit 1

Water Treatment Expansion Preliminary Engineering Report

Walker County
WATER & SEWERAGE AUTHORITY

CTI Engineers, Inc.
243 North Hamilton St., Suite 1
Dalton, GA 30720
706.278.8110

CTI Engineers, Inc.
1122 Riverfront Parkway
Chattanooga, TN 37402
423.267.7613

PRELIMINARY ENGINEERING REPORT
WATER TREATMENT
ALTERNATIVES STUDY

Prepared for:

Walker County Water and Sewerage Authority

Prepared by:

CTI ENGINEERS, INC.
Chattanooga, Tennessee
CTI Project No. G18013/G20015

June 2020

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1.0 EXECUTIVE SUMMARY

1.1 Background

The Walker County Water and Sewerage Authority (WCWSA) provides water to its distribution system with a total customer base of approximately 11,000 customers from three primary sources: wells at the Chickamauga Water Treatment Plant (WTP), Coke Oven Wells, and Kensington Wells (Figure 1.1). The Villanow service area is supplied by Dalton Utilities from the north and Chattooga County from the south.

WCWSA owns a WTP located within Chickamauga, Georgia; however, the filtration portion of the WTP is not operational at this time due to the age of the diatomaceous filtration equipment, which was bypassed several years ago, and are no longer in service. Until last year, water pumped from the wells was treated with chlorine and fluoride prior to being pumped into the system. In 2017, Georgia EPD declared the wells to be under influence from surface water, therefore WCWSA presently rents two package/trailer mounted full Microfiltration treatment membrane units treating up to 2 million gallons per day (mgd) adjacent to the existing WTP. The remainder of the WTP is still in use. Approximately 4,000 WCWSA connections are currently served by the WTP. The package WTP is classified as a direct filtration plant since it filters water without coagulation and sedimentation. Its water sources include up to 5 wells (not including Coke Oven) and a lake fed by two springs. Raw water has an average turbidity of 0.10 NTU, pH of 7.0, temperature of 16.5°C, low alkalinity, and nondetectable iron and manganese. Turbidity periodically spikes to over 100 NTU following rainfall events.

When the filtration units were operational, the old WTP was rated at 4.5 mgd based on the limitations of the filters and utilized diatomaceous earth (DE) filters. The existing water withdrawal permits are listed in Table 1.

TABLE 1
Existing Withdrawal Permits
Walker County Water & Sewerage Authority

Location	Ground Water	Surface Water
Coke Oven Well Field	2,800,000	
Water Treatment Plant*	4,500,000	4,000,000
Kensington Well Field	1,000,000	
Total Permitted Withdrawal Rate	8,300,000	4,500,000

To develop the basis for

the existing and projected peak daily demands in Table 2, the totals from Tables 3 and 4 were used along with the rate of growth established by the Georgia Office of Planning and Budget. In addition, WCWSA has contracted with the City of LaFayette to provide a maximum daily demand of 2,000,000 gallons and to provide to the City of Chickamauga a maximum daily demand of 1,000,000. These demands will be utilized to estimate both the minimum required volume of treated water capacity and the minimum recommended system storage. For one 12-mgd water plant operating at 95 percent efficiency to meet the system's peak month daily demand in the year 2035, it would have to operate 12 hours per day and over 15 hours per day if LaFayette and Chickamauga exercised their contracts to the fullest extent.

Table 3 examines the monthly production of the WTP well field as well as Coke Oven and Kensington service areas. Note that the WTP service area's largest customer, the City of LaFayette is metered near the WTP at Farming Rock Road. While it is typically separated from the water production total, LaFayette consumes an average of 40 percent of the plant's production and must be included in determining required capacity.

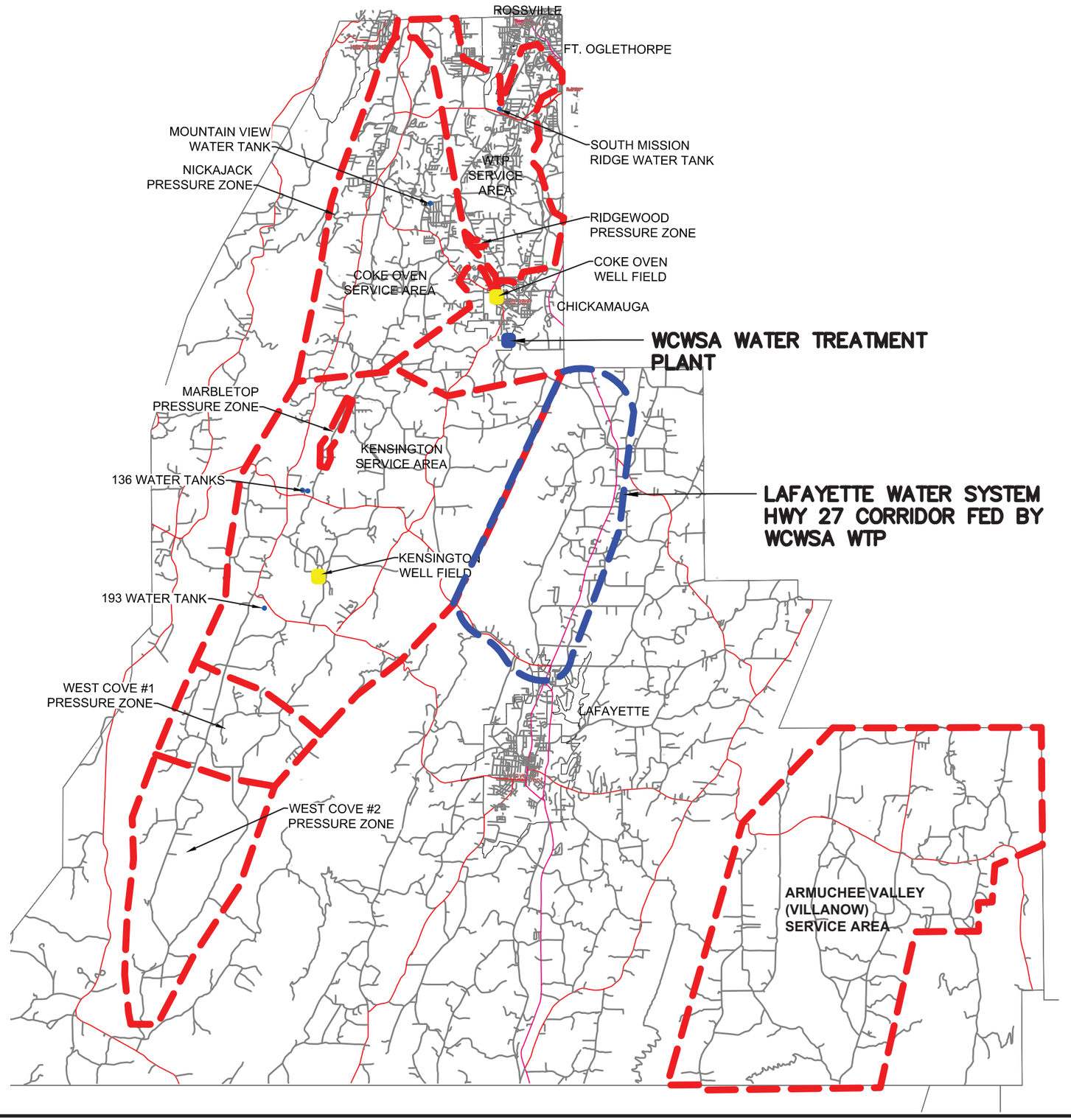
Table 4 lists the daily average and monthly maximum for each month of 2015, 2016, and 2017 for the WTP service area (excluding LaFayette), the Coke Ovens Well Field service area, and the Kensington Well Field service area.

TABLE 2
Existing & Projected Demands
Walker County Water & Sewerage Authority

	Peak Month Daily Demand	Projected 2035 Peak Month Daily Demand	Projected 2035 Peak Daily (1.5) Demand
Water Treatment Plant to WCWSA Service Area	1,877,800	1,937,000 [1]	2,910,000
WTP to LaFayette	1,340,200	1,398,000 [1]	2,100,000
Coke Oven Wells Service Area	1,673,500	1,726,000 [1]	2,590,000
Kensington Wells Service Area	547,967	566,000 [1]	850,000
Reserve for Contracted Maximum Demands of LaFayette and Chickamauga	1,659,800	3,000,000	3,000,000
SYSTEM TOTAL	**7,099,267**	**8,627,000**	**11,450,000**

[1] Based upon the State of Georgia's Office of Planning and Budget - Walker County Population growth from 2015 to 2035

[2] Peak Daily Maximum Contracted Demands of LaFayette and Chickamauga



WTP FEASIBILITY STUDY

FIGURE 1.1
WALKER COUNTY WATER AND SEWAGE AUTHORITY SERVICE AREA

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TABLE 3
Authority Area Production
Walker County Water & Sewerage Authority

Month	Water Treatment Plant	Coke Oven Wells	Kensington Wells	WCWSA System Total Sales	Total Sold to LaFayette	WTP Plus LaFayette	Total WTP Daily Average	System Daily Average*
January-2015	37,059,000	60,088,000	12,512,000	109,659,000	24,891,000	61,950,000	1,998,387	4,340,323
February-2015	35,441,100	53,937,000	11,526,000	100,904,100	22,068,000	57,509,100	2,053,896	4,391,861
March-2015	33,419,000	59,443,000	13,665,000	106,527,000	20,747,000	54,166,000	1,747,290	4,105,613
April-2015	31,808,000	56,637,000	13,756,000	102,201,000	19,784,000	51,592,000	1,719,733	4,066,167
May-2015	38,876,000	58,696,000	14,648,000	112,220,000	23,036,000	61,912,000	1,997,161	4,363,097
June-2015	42,936,000	56,576,000	15,406,000	114,918,000	23,064,000	66,000,000	2,200,000	4,599,400
July-2015	47,002,000	58,449,000	17,440,000	122,891,000	29,722,000	76,724,000	2,474,968	4,923,000
August-2015	45,034,000	58,359,000	15,750,000	119,143,000	29,626,000	74,660,000	2,408,387	4,799,000
September-15	39,838,000	56,202,000	15,248,000	111,288,000	27,382,000	67,220,000	2,240,667	4,622,333
October-2015	31,154,000	58,456,000	15,570,000	105,180,000	22,010,000	53,164,000	1,714,968	4,102,903
November-15	31,697,000	56,523,000	15,084,000	103,304,000	21,617,000	53,314,000	1,777,133	4,164,033
December-15	28,287,000	58,947,000	16,531,000	103,765,000	19,143,000	47,430,000	1,530,000	3,964,774
2015 TOTAL	**442,551,100**	**692,313,000**	**177,136,000**	**1,312,000,100**	**283,090,000**	**725,641,100**	**1,988,058**	**4,370,110**
January-2016	39,411,000	58,073,000	17,781,000	115,265,000	21,915,000	61,326,000	1,978,258	4,425,161
February-2016	32,432,000	55,032,000	16,183,000	103,647,000	20,840,000	53,272,000	1,836,966	4,292,655
March-2016	33,366,000	58,220,000	16,918,000	108,504,000	21,698,000	55,064,000	1,776,258	4,200,065
April-2016	33,923,000	54,565,000	15,817,000	104,305,000	21,251,000	55,174,000	1,839,133	4,185,200
May-2016	38,719,000	51,509,000	17,364,000	107,592,000	23,311,000	62,030,000	2,000,968	4,222,677
June-2016	52,151,000	49,838,000	17,410,000	119,399,000	33,719,000	85,870,000	2,862,333	5,103,933
July-2016	50,382,000	51,831,000	18,173,000	120,386,000	33,318,000	83,700,000	2,700,000	4,958,194
August-2016	50,696,000	52,056,000	16,145,000	118,897,000	36,152,000	86,848,000	2,801,548	5,001,581
September-16	56,334,000	50,205,000	16,439,000	122,978,000	40,206,000	96,540,000	3,218,000	5,439,467
October-2016	52,110,000	52,051,000	18,041,000	122,202,000	37,998,000	90,108,000	2,906,710	5,167,742
November-16	50,674,000	50,465,000	16,306,000	117,445,000	35,554,000	86,228,000	2,874,267	5,099,967
December-16	47,515,000	52,193,000	18,929,000	118,637,000	32,971,000	80,486,000	2,596,323	4,890,581
2016 TOTAL	**537,713,000**	**636,038,000**	**205,506,000**	**1,379,257,000**	**358,933,000**	**896,646,000**	**2,449,852**	**4,749,153**
January-2017	46,853,000	52,211,000	18,857,000	117,921,000	32,453,000	79,306,000	2,558,258	4,850,774
February-2017	32,336,000	47,416,000	14,109,000	93,861,000	23,840,000	56,176,000	2,006,286	4,203,607
March-2017	34,599,000	51,337,000	16,013,000	101,949,000	23,223,000	57,822,000	1,865,226	4,037,806
April-2017	32,552,000	49,925,000	16,702,000	99,179,000	20,168,000	52,720,000	1,757,333	3,978,233
May-2017	37,214,000	51,506,000	19,666,000	108,386,000	23,606,000	60,820,000	1,961,935	4,257,806
June-2017	34,223,000	50,364,000	21,120,000	105,707,000	21,263,000	55,486,000	1,849,533	4,232,333
July-2017	22,874,000	51,868,000	26,438,000	101,180,000	10,706,000	33,580,000	1,083,226	3,609,226
August-2017	37,603,000	51,268,000	17,249,000	106,120,000	22,195,000	59,798,000	1,928,968	4,139,194
September-17	29,911,000	48,642,000	16,672,000	95,225,000	20,119,000	50,030,000	1,667,667	3,844,800
October-2017	27,977,000	48,872,000	15,674,000	92,523,000	19,697,000	47,674,000	1,537,871	3,620,000
November-17	29,256,000	46,080,000	14,546,000	89,882,000	18,312,000	47,568,000	1,585,600	3,606,467
December-17	35,202,000	47,616,000	16,364,000	99,182,000	20,370,000	55,572,000	1,792,645	3,856,516
2017 TOTAL	**400,600,000**	**597,105,000**	**213,410,000**	**1,211,115,000**	**255,952,000**	**656,552,000**	**1,798,773**	**4,019,362**

* Includes monthly sales to LaFayette

TABLE 4
Three-Year Daily and Peak Daily 2015 – 2017
Walker County Water & Sewerage Authority

Water Treatment Plant				Coke Oven Wells				Kensington Wells			
Month-Year	Daily Average	Max	Date of Max	Month-Year	Daily Average	Max	Date of Max	Month-Year	Daily Average	Max	Date of Max
Jan-15	1.195	2.009	1/10/2015	Jan-15	1.938	2.123	1/30/2015	Jan-15	0.403	0.571	1/9/2015
Feb-15	1.265	1.928	2/23/2015	Feb-15	1.926	2.150	2/4/2015	Feb-15	0.411	0.596	2/25/2015
Mar-15	1.078	1.620	3/2/2015	Mar-15	1.917	**2.194**	3/16/2015	Mar-15	0.440	0.495	3/25/2015
Apr-15	1.060	1.681	4/10/2015	Apr-15	1.887	2.117	4/18/2015	Apr-15	0.458	0.700	4/30/2015
May-15	1.254	1.753	5/19/2015	May-15	1.893	2.087	5/15/2015	May-15	0.472	**1.087**	5/29/2015
Jun-15	1.431	**2.496**	6/19/2015	Jun-15	1.885	2.057	6/13/2015	Jun-15	0.513	0.875	6/1/2015
Jul-15	1.516	2.257	7/24/2015	Jul-15	1.885	2.012	7/2/2015	Jul-15	**0.562**	0.720	7/30/2015
Aug-15	1.452	2.306	8/8/2015	Aug-15	1.882	2.128	8/28/2015	Aug-15	0.508	0.598	8/26/2015
Sep-15	1.327	2.008	9/12/2015	Sep-15	1.873	2.020	9/18/2015	Sep-15	0.508	0.635	9/29/2015
Oct-15	1.004	1.510	10/7/2015	Oct-15	1.885	2.014	10/23/2015	Oct-15	0.502	1.060	10/5/2015
Nov-15	1.056	2.136	11/16/2015	Nov-15	1.884	2.036	11/20/2015	Nov-15	0.502	0.665	11/7/2015
Dec-15	0.912	2.036	12/5/2015	Dec-15	1.901	2.126	12/12/2015	Dec-15	0.533	0.728	12/21/2015
Max	1.516	2.496	6/19/2015	**Max**	1.938	2.194	3/16/2015	**Max**	0.562	1.087	5/29/2015
Jan-16	1.271	1.897	1/1/2816	Jan-16	1.873	2.003	1/8/2016	Jan-16	0.573	**0.893**	1/21/2016
Feb-16	1.118	1.790	2/11/2016	Feb-16	1.897	**2.822**	2/25/2016	Feb-16	0.558	0.805	2/2/2016
Mar-16	1.076	1.561	3/2/2016	Mar-16	1.878	1.992	3/11/2016	Mar-16	0.545	0.767	3/26/2016
Apr-16	1.130	1.597	4/29/2016	Apr-16	1.818	2.086	4/15/2016	Apr-16	0.527	0.643	4/12/2016
May-16	1.249	2.254	5/18/2016	May-16	1.661	1.786	5/6/2016	May-16	0.560	0.812	5/29/2016
Jun-16	1.738	2.395	6/29/2016	Jun-16	1.661	1.783	6/3/2016	Jun-16	0.580	0.783	6/18/2016
Jul-16	1.625	2.156	7/13/2016	Jul-16	1.671	1.834	7/29/2016	Jul-16	0.586	0.746	7/1/2016
Aug-16	1.635	2.265	8/12/2016	Aug-16	1.679	1.792	8/26/2016	Aug-16	0.520	0.877	8/9/2016
Sep-16	1.877	**2.517**	9/12/2016	Sep-16	1.673	1.756	9/23/2016	Sep-16	0.547	0.776	9/4/2016
Oct-16	1.680	2.155	10/17/2016	Oct-16	1.679	1.837	10/7/2016	Oct-16	0.581	0.792	10/1/2016
Nov-16	1.689	2.056	11/14/2016	Nov-16	1.682	1.809	11/25/2016	Nov-16	0.543	0.815	11/5/2016
Dec-16	1.532	2.388	12/2/2016	Dec-16	1.683	1.777	12/2/2016	Dec-16	0.610	0.820	12/ 23/201
Max	1.877	2.517	9/12/2016	**Max**	1.897	**2.822**	2/25/2016	**Max**	0.610	0.893	1/21/2016
Jan-17	1.511	**2.077**	1/9/2017	Jan-17	1.684	1.784	1/1/2017	Jan-17	0.608	0.936	1/10/201 7
Feb-17	1.154	1.864	2/27/2017	Feb-17	1.693	1.813	2/3/2017	Feb-17	0.503	0.594	2/ 22/201 7
Mar-17	1.116	1.496	3/14/2017	Mar-17	1.656	1.820	3/30/2017	Mar-17	0.516	0.804	3/22/2017
Apr-17	1.085	2.051	4/14/2017	Apr-17	1.664	1.779	4/7/2017	Apr-17	0.556	0.863	4/15/201 7
May-17	1.200	1.686	5/23/2017	May-17	1.661	1.748	5/5/2017	May-17	0.634	0.828	5/13/2017
Jun-17	1.140	1.697	6/28/2017	Jun-17	1.678	**1.893**	6/30/2017	Jun -17	0.704	0.804	6/14/ 2017
Jul-17	0.847	1.881	7/26/2017	Jul-17	1.673	1.791	7/10/2017	Jul -17	0.852	**1.285**	7/9/2017
Aug-17	1.213	1.730	8/20/2017	Aug-17	1.653	1.833	8/10/2017	Aug-17	0.556	0.962	8/23/2017
Sep-17	0.997	1.571	9/25/2017	Sep-17	1.621	1.794	9/11/2017	Sep-17	0.555	0.711	9/24/2017
Oct-17	0.902	1.324	10/2/2017	Oct-17	1.576	1.774	10/3/2017	Oct-17	0.505	0.747	10/8/2017
Nov-17	0.975	1.384	11/29/2017	Nov-17	1.536	1.536	Meter Out	Nov-17	0.484	0.654	11/29/2017
Dec-17	1.135	1.912	U/27/2017	Dec-17	1.536	1.536	Meter Out	Dec-17	0.527	0.710	12/27/2017
Max	1.511	2.077	1/9/2017	**Max**	1.693	1.893	6/30/2017	**Max**	0.852	1.285	7/9/2017

Table 5 details the costs of expanding the existing WTP in Chickamauga to 12 mgd. Considering the potential of the degrading of water quality of both well fields at Coke Oven and Kensington similar to what has already occurred at the WTP, the proposed plant expansion must consider meeting the entire system demand.

TABLE 5
Opinion of Costs
Upgrade Existing WTP to 12 MGD
Walker County Water & Sewerage Authority

Construction	**Costs**
Mobilization/Demobilization, Bonding, Insurance, Superintendent	$ 302,400
Membrane Filtration Equipment	3,590,000
Membrane Filtration Equipment Installation	440,000
Building Improvements (including laboratory, office, control areas, crane, basement flood-proof door and retaining walls)	797,000
Concrete Work - 3 Tanks (Air Supply, Chemical Storage and if needed Flocculation)	195,000
Raw Water Pumps	500,000
High-Service Pumps	690,000
Pipe Supports and Hangers	46,000
Plant Piping, Clearwell Baffles	320,000
Valves	52,000
Building HVAC Improvements	261,000
Electrical - VFD's, MCC, Lighting Improvements	819,000
Generator, 500 KW	183,000
SCADA Instrumentation and Telemetry Replacement	418,000
12 Months 2 MGD Membrane Trailer Rental	336,000
16% Construction Contingencies	1,386,600
Total Construction	**$ 10,336,000**
Engineering	
Withdrawal, Operating and Discharge Permits	25,000
Design Development Report	20,000
Membrane Filtration Equipment Procurement Contract Documents & Specifications	62,000
Treatment Plant Improvements Contract Documents & Specifications	410,000
Membrane Filtration Equipment Procurement Bidding & Bid Evaluation	20,500
Treatment Plant Improvements Bidding	41,500
Construction Phase Services	124,500
Topographic Survey	5,500
Geotechnical Investigation, soil compaction and concrete testing	9,500
NPDES Permit	10,000
Erosion, Sedimentation and Pollution Control Permit	7,000
Start-Up Services	15,000
Asset Manage System Development (If Required)	20,000
Resident Project Representative (12 months)	210,000
Administration and Legal	40,000
Project Contingencies	43,500
Total Project Cost	**$ 11,400,000**
Source: CTI Engineers, 2020	

CHAPTER 2

DESCRIPTION OF EXISTING FACILITIES

2.0 DESCRIPTION OF EXISTING FACILITIES

2.1 System Units

This chapter describes the major water supply, storage and treatment components individually. Specific deficiencies that will be corrected through replacement or upgrades are noted in the following chapters. The existing water withdrawal permits are listed below in Table 2.1. A summary of the monthly operating records for the last 3 years is shown in Table 2.2. An existing WTP hydraulic and process schematic is shown for the existing water treatment plant on Figure 2.1. The existing WTP site map is shown on Figure 2.2.

TABLE 2.1
Existing Withdrawal Permits
Walker County Water & Sewerage Authority

Location	Ground Water	Surface Water
Coke Oven Well Field	2,800,000	
Water Treatment Plant	4,500,000	4,500,000
Kensington Well Field	1,000,000	
Total Permitted Withdrawal Rate	8,300,000	4,500,000

Several of the following sections refer to the *Minimum Standard for Public Water Systems* of the Georgia Department of Natural Resources, EPD, Drinking Water Permitting & Engineering Program. These design criteria are useful for discussion purposes; however, these design criteria apply to conventional treatment processes, not to membrane filtration processes, which are recommended for use at this WTP. The WCWSA has selected membrane filtration technology as the most appropriate treatment technology for its water supply, and all alternatives considered in this report will be based upon that technology selection.

Raw Water Intake and Pumping Facilities

The WCWSA WTP's permitted groundwater or surface water withdrawal rate is 4.5 mgd; however, the total existing raw water pumping capacity is approximately 12.5 mgd with the largest pump out of service. Its source wells and springs are in the Knox/Newala aquifer, a limestone geological formation noted for potentially large quantities of groundwater.

M:\CTI\Projects (All)\g18\G18013 (Walker County Water & Sewerage Authority)

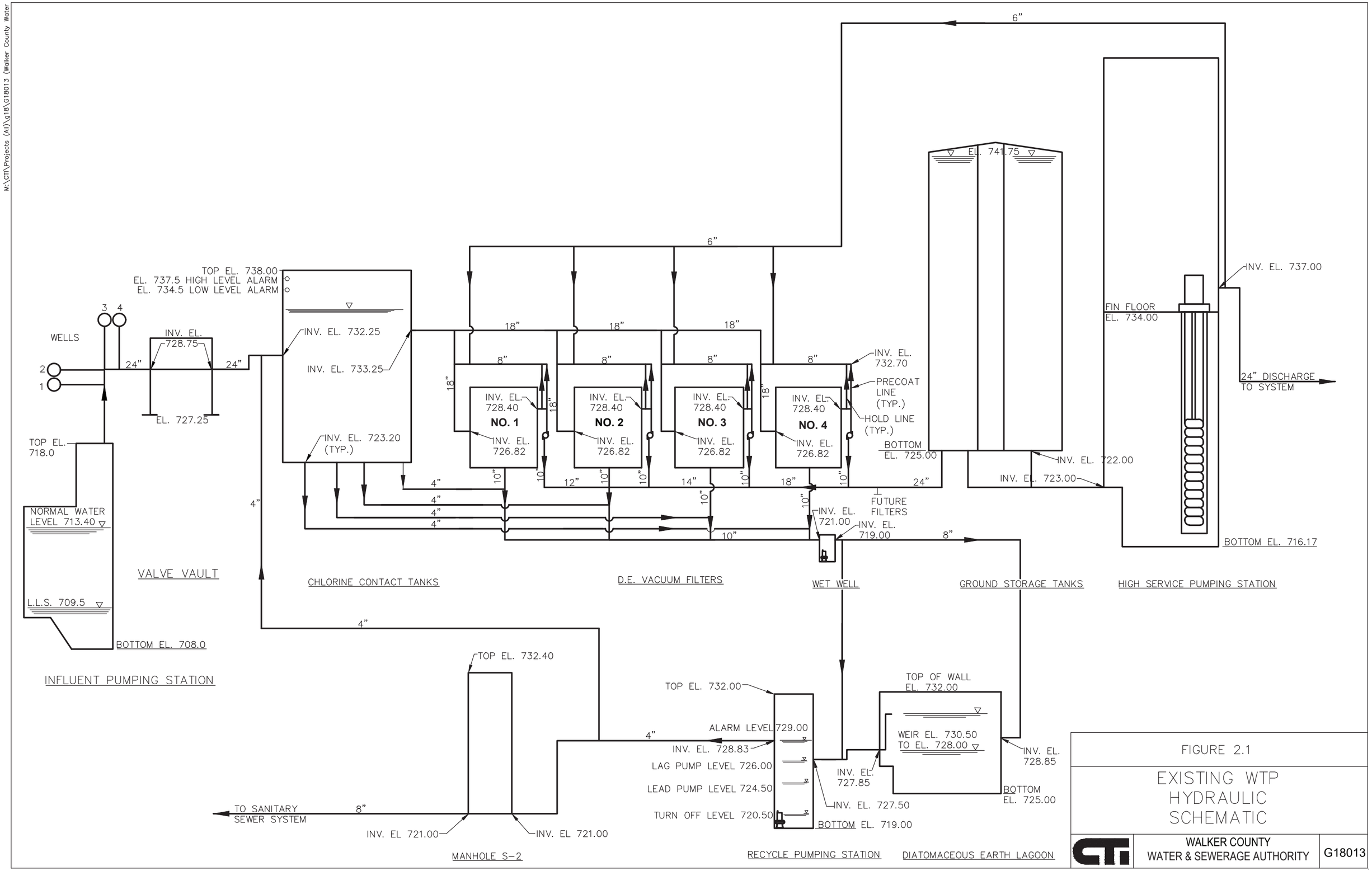
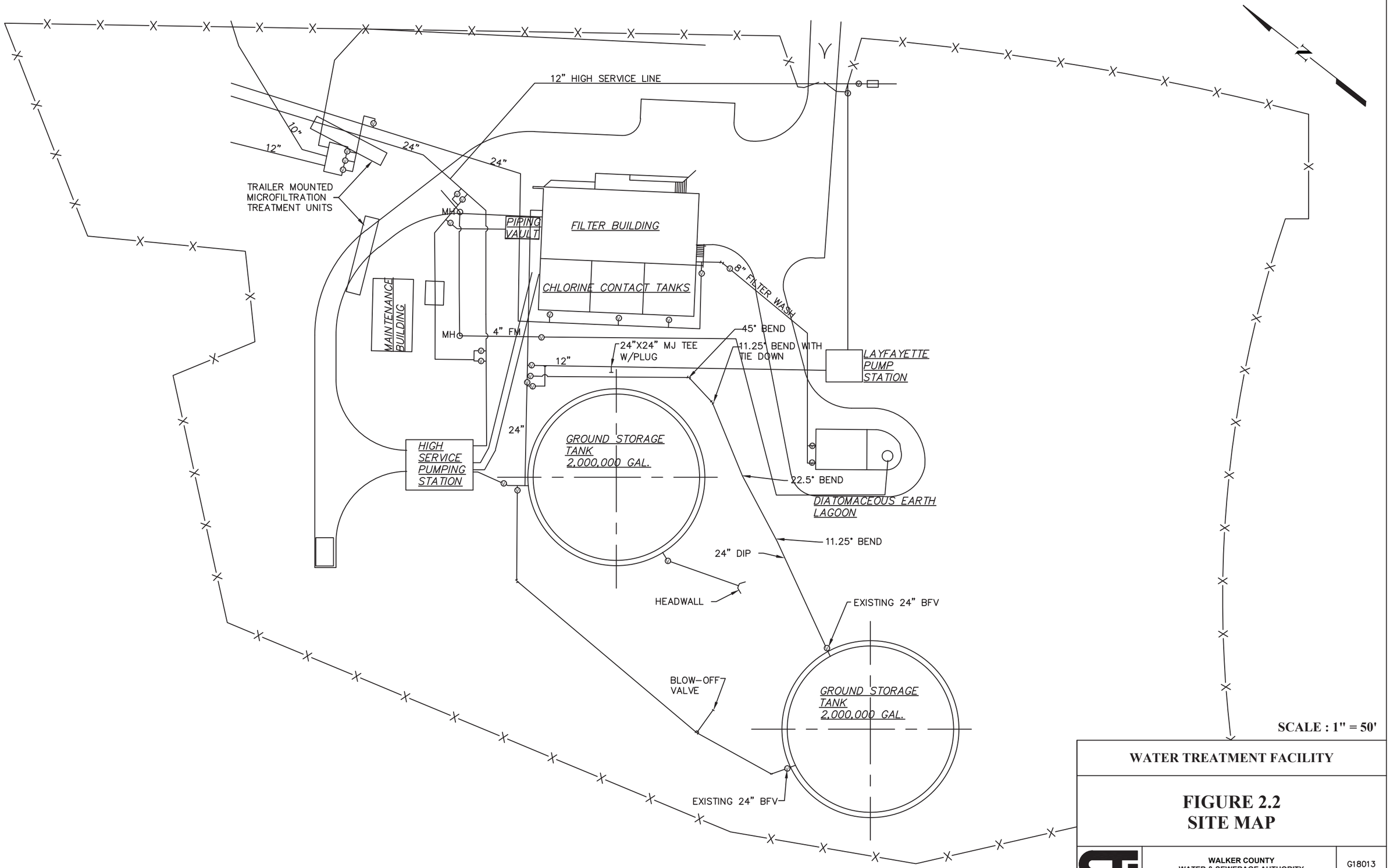


FIGURE 2.1

EXISTING WTP HYDRAULIC SCHEMATIC

WALKER COUNTY WATER & SEWERAGE AUTHORITY

G18013



SCALE : 1" = 50'

WATER TREATMENT FACILITY

FIGURE 2.2
SITE MAP

WALKER COUNTY
WATER & SEWERAGE AUTHORITY

G18013

TABLE 2.2 Existing Raw Water Pumps Walker County Water & Sewerage Authority		
Groundwater	**GPM**	**MGD**
Coke Oven Well #1[1]	550	0.79
Coke Oven Well#2[1]	850	1.22
Coke Oven Well #3[1]	550	0.79
Total	**1,950**	**2.81**
Kensington Well #1[2]	300	0.50
Kensington Well #2[2]	300	0.50
Total	**600**	**1.00**
WTP Well #1	400	0.58
WTP Well #2	850	1.22
WTP Well #3	700	1.01
WTP Well #4[3]	2,000	2.88
Well formerly Chickamauga's #1	450	0.65
Well formerly Chickamauga's #2	650	0.94
Total	**5,050**	**7.28**
Surface Water	**GPM**	**MGD**
WTP Crawfish Spring Pump #1	3,500	5.04
WTP Crawfish Spring Pump #1	3,500	5.04
(Space for one additional pump)		
Total	**7,000**	**10.08**

[1] Pumps run concurrently
[2] Pumps alternate
[3] Primary area pump

2.1.3 Ground Water Sources - These include three wells at the WTP site and one well approximately 1,200 feet northwest of the WTP with a combined total flow capacity of 5.7 mgd.

The City of Chickamauga had two wells at a site across the railroad track from WCWSA's Well No. 4. These have a total design capacity of 1.58 mgd and were the permitted withdrawal source for the City of Chickamauga until 2002. The City of Chickamauga has sold all rights to these wells to WCWSA.

The total capacity of the wells in use by and available to WCWSA at the Chickamauga WTP is 7.3 mgd, the total capacity of the wells at the Coke Oven Well field is 2.81 mgd, and the total capacity of the Kensington Well field is 1.00 mgd. All the wells were developed in similar Knox karst geolorical formations. With all 6 wells near the water plant becoming under the influence of surface water, WCWSA has decided it is prudent to prepare for a future that might have all wells under similar conditions and develop treatment capabilities to meet the entire system's demands

Surface Water Source - The permitted surface water source for WCWSA is Crawfish Spring Lake, which is fed by Crawfish Spring, which has a known low flow of 9 mgd and Blue Hole Spring, known low flow of 6 mgd (EPD Bulletin B-91) and has average combined flows in excess of 20 mgd. The existing surface water intake structure is designed for three 3,500-gpm pumps. With two pumps installed, its present total capacity is 10.08 mgd or 5.04 mgd with the larger pump out of service.

WTP Piping Vault

The raw water from the well fields and lake intake is pumped from each source to the WTP via a 24-inch ductile iron raw water line. This line passes through a concrete structure on the west of the filtration building that had been designated the "piping vault." During Fiscal Year 2004, WCWSA replaced the 14-inch Venturi meters within this vault that were installed during the original plant construction with 14-inch-mag-meters. The high service (finished water line) also passes through this vault. Connections for the pre-chlorination, post-chlorination, and fluoride feeds all occur within this vault. Due to corrosion within the vault that has occurred from breaks of these feed lines, a separate chemical feed vault is needed.

WTP Chlorine Contact Basins

Three parallel basins, each 28 feet long by 28 feet wide with 12-foot walls (70,370 gallons), provide a total of 67 minutes of pre-chlorination contact time at the plant's existing capacity of 4.5 mgd. This occurs before the raw water enters the existing plant filters. Pre-chlorination has been a necessity at the existing facility to inhibit algae growth, which could contribute to blinding the filters. The potential for this growth is due in large part to photosynthetic nourishment provided by the open basins. It is proposed that as a part of the plant upgrade and expansion, these basins be enclosed within the main filtration building, one or more be removed from plant hydraulics and utilized instead for plant equipment.

Flocculation/Sedimentation

The existing WTP in Chickamauga used direct filtration, which is described in the *Minimum Standards for Public Water Systems* as "filtration of a surface water without prior settling. The nature of the treatment process depends heavily upon raw water quality." Currently, no flocculation or sedimentation basins or clarification is used prior to in the membrane filtration units. The need for the addition of flocculation would depend on the maximum turbidity (NTU) that the membrane facility is designed to treat. The Authority has 3 years of experience with the membrane equipment trailers and have treated NTU's exceeding 100 without the need for flocculation or sedimentation. As a mater of practice, the trailers now cease operations when NTU exceeds 50 to reduce backwash cycles.

WTP Existing Filters

Filtration previously was accomplished by four DE filters, each with a design capacity of 1.5 mgd. Raw water turbidity is normally between 0.2 and 0.4 NTU. After significant rain storms when the ground has already approached saturation, turbidity of the raw water for the WTP climbs to 100 NTU or more. The previous DE filters would blind in waters exceeding 20 NTU and were not cost-effective to operate in waters above 5 NTU. Due to these constraints, the WTP previously could not filter water for periods as long as 5 days in succession. In June 2017, Georgia EPD declared the #4 well, the primary well at the WTP to be "under surface water influence;" WCWSA had in the past discontinued use of the #2 and #3 because #'4's better water quality. In response to this change in water quality, WCWSA rented trailer-mounted micro-filtration units from the PALL Corporation. Each unit is rated for 1.0 mgd.

WTP Clearwells

Filtered water storage and post-filtration disinfection (chlorine contract contact time) are provided by two clearwells. Each one is a 2.1-million gallon steel ground storage tank located behind the plant and is connected to the filtration building by 24-inch ductile iron piping.

Clearwell No. 2 was constructed with the original plant in 1983. It is 95 feet in diameter and 40 feet to the overflow elevation. Because this unbaffled tank has only one entrance/exit pipe, disinfection is very inefficient. The water level in the tank varies with the water system head and serves primarily as high service pump suction storage when the WTP is incapable of filtering water. Inspections in 2003 by CTI revealed that while the foundation and structure were in generally good condition; however, the following should be replaced:

- Exterior and interior coating systems,
- Vent screens,
- Level indicator float and cables, and
- Interior ladder.

Metal loss due to corrosion was noted, and minor repairs requiring spot and/or seam welding are anticipated during the next repainting. It was recommended that during the coating system replacement of Clearwell No. 2, an entrance pipe be added and flexible membrane baffle walls be installed to increase the disinfection contact time water quality of the WTP. Clearwell No. 2 was repainted twice in or near 2006. Baffle walls and additional piping were not included in those repairs.

Clearwell No. 1 was constructed in 1995 and serves as the primary chlorine contact/disinfection tank. At the existing design rate of flow of 4.5 mgd with a USEPA baffling factor of 0.5, this multi-baffled tank provides over 5 hours of contact time. Inspections in 2003 by CTI noted that the foundation, structure, metal, safety, and paint systems were in good condition. Spot repairs of small corrosion areas on the exterior and interior coating systems were recommended as well as installation of screens at the overflow discharge flaps. This tank was also repainted at the time of Clearwell No. 2 repainting.

Neither Coke Oven Well Field or Kensington Well Field includes clearwells in their disinfection process. Each of these facilities utilizes existing pipelines to provide the necessary 30-minute disinfection contact time prior to water delivery to their first customer.

TABLE 2.3

Existing Clearwells and Water Storage Reservoirs
Walker County Water & Sewerage Authority

Name of Tank	Date Const.	Height	Diameter	Base	Overflow Elevation	Capacity (gallons)
South Mission Ridge	1983	57.50	95.00	1080.50	1138.00	3,050,000
Mountain View	1988	56.50	96.00	1113.50	1170.00	3,060,000
Hwy. 136 #1	1966	30.00	39.00	1039.33	1069.33	268,000
Hwy. 136 #2	1998	30.00	50.00	1039.33	1069.33	441,000
Hwy. 193	1968	65.67	36.00	1003.99	1069.66	500,000
Water Plant Clearwell #1	1995	40.00	95.00	680.00	720.00	2,121,000
Water Plant Clearwell #2	1983	40.00	95.00	680.00	720.00	2,121,000
Total Existing Storage						**11,561,000**

Distribution System

WCWSA operates its water distribution system illustrated in Figure 1.1 as 4 separate distribution systems with limited interconnectivity between the WTP service area, Coke Oven service area and the Kensington service area. Dimensions and capacities of water storage reservoirs that serve each of these areas are noted in Table 2.3. No one system service area has the ability to fully back up any other service area due to inadequate pipe sizes and number of connections. Improvements are presently under construction or in planning to allow water from the water treatment plant to add the Coke Oven and Kensington service areas to the plant's service area.

2.2 SUPPORT FACILITIES

Chemical Feed Systems

Chemicals are used at the WTP, Coke Oven, and Kensington include: (1) Chlorine (disinfection), (2 Polyphosphate (corrosion inhibition), and (3) Fluoride (dental prophylaxis). Although the chemical feed systems are adequate for current design conditions, modifications will be necessary to accommodate the expanded capacity and to replace equipment nearing the end of its service life.

Disinfection

Disinfection was accomplished by pre- and post filtration chlorination at the existing WTP facility. Pre-chlorination was accomplished by feeding chlorine into the 24-inch raw water line immediately before it entered the three chlorine contact basins. Basin dimensions are 28 feet square by 12 feet deep. Following filtration, chlorine was fed into the filtered water before entered the clearwells.

Unlike many surface water plants, the WTP raw water it receives from its wells does not have a high organic load that causes disinfection byproduct formation. Georgia State laboratory tests of potential disinfection by-products in the WTP raw water found that WCWSA typically is near or at non-detect in all disinfection by-product categories. TTHM's typically ranges near 10 ug/l, compared to MCI of 80 mg/l Total HAA-5 is near 5 ug/l compared to the MCL of 60 mg/l, with all other categories typically non-detect. It is expected that organic loads will increase when the plant utilizes its surface water withdrawal permit. Since the surface water intake is only 150 yards downstream from Blue Hole and 250 yards downstream form Crawfish Spring, the spring sources of the entire surface water supply, the organic loads may not be drastically greater than the wells. Surface water testing will be conducted during the design phase of the project. The pre-disinfection" step may be eliminated even at a design rate of 12 mgd.

WTP High Service Pumps

A hydraulic model of the transmission, distribution, and storage facilities has been developed. WCWSA has used the model to examine a variety of scenarios for increasing the high service pumping capacity at the WTP to 12 mgd. The first stage of this process was to include a transmission main upgrade and the installation of a new high service pump.

TABLE 2.4 Existing High Service Pumps Walker County Water & Sewerage Authority		
Water Treatment Plant #1[1]	2,780	4.00
Water Treatment Plant #2	885	1.27
Water Treatment Plant #3	1,500	2.16
(Space for one additional pump)		
Coke Oven #1[2]	980	1.41
Coke Oven #2[2]	750	1.08
Total	1,730	2.49
Kensington #1[3]	625	0.90
Kensington #2[3]	625	0.90
[1] Primary area pump [2] Pumps run concurrently [3] Pumps alternate		

The existing high service pump building has a manifold capacity for four pumps. Three are currently installed. High Service Pump No. 1 has a design capacity of 2,780 gpm or 4.147 mgd, Pump No. 2 has a capacity of 885 gpm or 1.274 mgd, and Pump No. 3 has a design capacity of 1,500 gpm or 2.16 mgd. High Service Pump No. 1 was redesigned with a 2,780-gpm variable frequency drive pump and installed in mid-2005. At that time, the total high service pumping capacity was 7.6 mgd, or 3.43 mgd with the largest pump out of service. Following the replacement of the remaining pumps with upgrades similar to Pump No. 1 and the addition of a fourth pump, the high service pumping capacity can be increased to 12 mgd. Completion of the pumping upgrade of Pump Nos. 2, 3, and the installation of high service Pump No. 4 are integral components of the WTP expansion to 12 mgd.

Construction has been recently awarded for pump upgrades for the high service pumps at Coke Oven funded by the USDA Rural Development Emergency Water Source grant program. The existing pumps will be replaced with variable frequency drive vertical turbine pumps that will allow the Coke Oven Well field to meet its current area demands and provide up to 1 mgd additional flow to meet the demands of the Kensington service area.

Kensington Well Field presently has two 625-gpm pumps that alternate to meet its service area demands. Upgrades to this system will be discussed further in Chapter 4.

Sludge Lagoons

The original WTP construction included a two-cell lagoon (concrete holding tanks) for the collection of the DE in the backwash water. The design originally provided for decant

return pumping from the cells either to the filters for recycling or to the sanitary sewer system. During construction in 2004, the lagoon piping was modified to discharge to the WCWSA sanitary sewer system rather than returning it to the plant. It is proposed that these lagoons be utilized as a part of the expansion for holding neutralized backwash water before it is pumped to Crawfish Creek at a low, constant rate. A NPDES permit will be required for this discharge.

Plant Hydraulics

Results of a hydraulic profile for the WTP are shown on Figure 2.1, and spreadsheet calculations are contained in Appendix D. Both the existing capacity of 4.5 mgd and the proposed capacities of 8 and 12 mgd were analyzed. The hydraulic capacity of major piping components of the WTP appear to be adequate.

Personnel/Administrative Areas

The personnel and administrative areas within the WTP are too small for a facility of this size:

1. The existing laboratory space is inadequate; additional counter space is needed for water quality and bacteriological testing. A new laboratory is recommended with separate rooms for QC and Bacteriological Testing.
2. The restrooms are inadequate, and should be upgraded.
3. Lighting is inadequate and should be upgraded to LED.
4. HVAC equipment is inadequate in the building and should be upgraded.
5. The WTP SCADA and Telemetry systems are outdated and need to be replaced.

As with most facilities of this age, cosmetic upgrades will enhance appearance and provide a more efficient and professional work environment.

Plant Electrical Facilities

The existing electrical service is sized to meet the existing plant capacity, but significant service upgrade will be required with plant expansion. Other electrical facilities are functional but dated. Over time, spare parts and repair items will become more difficult to obtain. The overall electrical system will be reviewed later in the report.

Instrumentation, SCADA and Telemetry Equipment

Most plant instrumentation has not been upgraded since original construction. Current

technology has surpassed the existing controls and recorders. Replacement of the existing instrumentation can provide additional operator interface for the entire facility including all wells, pumps, and reservoirs throughout the distribution system via personal computer. Recommendations for improvements are included in Chapter 4.

CHAPTER 3

PROJECTION OF CUSTOMER DEMAND GROWTH

3.0 PROJECTION OF CUSTOMER DEMAND GROWTH

As shown on Figure 1.1, WCWSA presently serves the western half of Walker County and the southeast corner. The projected population growth within this report is from data supplied from Northwest Georgia Regional Commission and the Southeast Tennessee Development District as developed by the Georgia Office of Planning and Budget and the Tennessee State Data Center at the University of Tennessee Knoxville. Population data for this report is based on U.S. Census Bureau data for 1990, 2000, and 2010, as well as growth rates developed by each State agency.

Table 3.1 provides projected populations for Walker County and adjacent counties through 2050. Counties with a large commercial base and near a major transportation corridor are projected to experience continued growth during the period. Rural counties like Dade, Chattooga, and Walker are projected to peak over the next 10 or 15 years and then begin a slow rate of decline. The Georgia Office of Planning and Budget projects Walker County to grow approximately 3 percent from now to 2035 and then decline by a little more than 2 percent by 2050 with only 35 more people in the County in 2050 than today.

Population growth can be significantly impacted by events such as the entry of new industry requiring large numbers of workers. Initially, many of those workers would be drawn from adjacent counties; as their length of tenure increased, many would relocate to Walker County.

Population growth can also be impacted by changes in traffic patterns. For example, if US 27 were completed to Chattanooga, much of I-24 traffic would divert south to avoid the congestion of the downtown ridge cut. Such a diversion would impact both commercial growth as well as population within Walker County.

TABLE 3.1
Walker County and Adjacent County Population Projections
Walker County Water & Sewerage Authority

COUNTY	2013	2014	2015	2016	2017	2018	2019	2020	2021
Georgia	9,992,167	10,121,139	10,250,112	10,379,084	10,508,057	10,637,029	10,766,121	10,895,213	11,024,305
Catoosa County	65,311	65,916	66,522	67,127	67,733	68,338	68,911	69,484	70,058
Chattooga County	25,138	25,154	25,171	25,187	25,204	25,220	25,222	25,224	25,226
Dade County	16,507	16,525	16,542	16,560	16,577	16,595	16,585	16,575	16,566
Floyd County	95,821	96,230	96,639	97,048	97,457	97,866	98,206	98,546	98,885
Gordon County	55,757	56,311	56,865	57,419	57,973	58,527	59,027	59,527	60,027
Walker County	68,198	68,464	68,730	68,995	69,261	69,527	69,730	69,933	70,136
Whitfield County	102,945	103,720	104,496	105,271	106,047	106,822	107,522	108,222	108,923
Hamilton County, TN				357,738	360,849	363,888	366,858	369,758	372,595

COUNTY	2022	2023	2024	2025	2030	2035	2040	2045	2050
Georgia	11,153,397	11,282,489	11,410,598	11,538,707	12,173,406	12,795,547	13,413,400	14,043,187	14,709,321
Catoosa County	70,631	71,204	71,747	72,290	74,878	77,170	79,250	81,230	83,210
Chattooga County	25,228	25,230	25,197	25,164	24,926	24,526	24,017	23,465	22,941
Dade County	16,556	16,546	16,521	16,497	16,353	16,149	15,892	15,622	15,393
Floyd County	99,225	99,565	99,862	100,159	101,509	102,514	103,214	103,763	104,392
Gordon County	60,527	61,027	61,469	61,912	63,966	65,650	67,045	68,235	69,290
Walker County	70,339	70,542	70,666	70,790	71,200	71,155	70,777	70,182	69,562
Whitfield County	109,623	110,323	110,926	111,528	114,277	116,368	117,828	118,760	119,343
Hamilton County, TN	375,370	378,092	380,765	383,388	396,019	408,475	421,376	434,972	449,205

Source: Georgia Office of Planning and Budget & Tennessee State Data Center

Table 3.2 examines the monthly production of the WTP well field as well as Coke Oven and Kensington service areas. Note that the WTP service area's largest customer, the City of LaFayette is metered near the WTP at Farming Rock Road. While it is typically separated from the water production total, LaFayette consumes an average of 40 percent of the plant's production and must be included in determining required capacity.

Table 3.3 lists the daily average and monthly maximum for each month of 2015, 2016, and 2017 for the WTP service area (excluding LaFayette), the Coke Ovens Well Field service area, and the Kensington Well Field service area. The totals from Tables 3.2 and 3.3 were used along with the rate of growth established in Table 3.1 to develop the basis for the existing and projected peak daily demands Table 3.4. These demands will be utilized to estimate both the minimum required volume of treated water capacity and the minimum recommended system storage. For one 12-mgd water plant to meet the system's peak month daily demand in the year 2035 and meet both LaFayette and Chickamauga's maximum contractual demands, it would have to operate almost 24 hours per day.

AWWA recommends that a system should as a minimum have storage able to meet 1 peak day demand. In 2035, that peak day demand is projected to be approximately 12 million gallons.

Table 3.5 examines the existing potential required sales over a 3 year period utilizing the peak day demand each month over the period taken from Table 3.3 and adding the LaFayette average daily sales for that month (peak demand data was not available) plus the remaining amount of maximum contracted sales to the Cities of LaFayette and Chickamauga. The average peak demand of this period was 7,640,083 gallons per day which utilizing a membrane water treatment plants 95 percent efficiency would translate into an average of 8,042,193 gallons per day over the period.

TABLE 3.2
Authority Area Production
Walker County Water & Sewerage Authority

Month	Water Treatment Plant	Coke Oven Wells	Kensington Wells	WCWSA System Total Sales	Total Sold to LaFayette	WTP Plus LaFayette	Total WTP Daily Average	System Daily Average*
January-2015	37,059,000	60,088,000	12,512,000	109,659,000	24,891,000	61,950,000	1,998,387	4,340,323
February-2015	35,441,100	53,937,000	11,526,000	100,904,100	22,068,000	57,509,100	2,053,896	4,391,861
March-2015	33,419,000	59,443,000	13,665,000	106,527,000	20,747,000	54,166,000	1,747,290	4,105,613
April-2015	31,808,000	56,637,000	13,756,000	102,201,000	19,784,000	51,592,000	1,719,733	4,066,167
May-2015	38,876,000	58,696,000	14,648,000	112,220,000	23,036,000	61,912,000	1,997,161	4,363,097
June-2015	42,936,000	56,576,000	15,406,000	114,918,000	23,064,000	66,000,000	2,200,000	4,599,400
July-2015	47,002,000	58,449,000	17,440,000	122,891,000	29,722,000	76,724,000	2,474,968	4,923,000
August-2015	45,034,000	58,359,000	15,750,000	119,143,000	29,626,000	74,660,000	2,408,387	4,799,000
September-15	39,838,000	56,202,000	15,248,000	111,288,000	27,382,000	67,220,000	2,240,667	4,622,333
October-2015	31,154,000	58,456,000	15,570,000	105,180,000	22,010,000	53,164,000	1,714,968	4,102,903
November-15	31,697,000	56,523,000	15,084,000	103,304,000	21,617,000	53,314,000	1,777,133	4,164,033
December-15	28,287,000	58,947,000	16,531,000	103,765,000	19,143,000	47,430,000	1,530,000	3,964,774
2015 TOTAL	**442,551,100**	**692,313,000**	**177,136,000**	**1,312,000,100**	**283,090,000**	**725,641,100**	**1,988,058**	**4,370,110**
January-2016	39,411,000	58,073,000	17,781,000	115,265,000	21,915,000	61,326,000	1,978,258	4,425,161
February-2016	32,432,000	55,032,000	16,183,000	103,647,000	20,840,000	53,272,000	1,836,966	4,292,655
March-2016	33,366,000	58,220,000	16,918,000	108,504,000	21,698,000	55,064,000	1,776,258	4,200,065
April-2016	33,923,000	54,565,000	15,817,000	104,305,000	21,251,000	55,174,000	1,839,133	4,185,200
May-2016	38,719,000	51,509,000	17,364,000	107,592,000	23,311,000	62,030,000	2,000,968	4,222,677
June-2016	52,151,000	49,838,000	17,410,000	119,399,000	33,719,000	85,870,000	2,862,333	5,103,933
July-2016	50,382,000	51,831,000	18,173,000	120,386,000	33,318,000	83,700,000	2,700,000	4,958,194
August-2016	50,696,000	52,056,000	16,145,000	118,897,000	36,152,000	86,848,000	2,801,548	5,001,581
September-16	56,334,000	50,205,000	16,439,000	122,978,000	40,206,000	96,540,000	3,218,000	5,439,467
October-2016	52,110,000	52,051,000	18,041,000	122,202,000	37,998,000	90,108,000	2,906,710	5,167,742
November-16	50,674,000	50,465,000	16,306,000	117,445,000	35,554,000	86,228,000	2,874,267	5,099,967
December-16	47,515,000	52,193,000	18,929,000	118,637,000	32,971,000	80,486,000	2,596,323	4,890,581
2016 TOTAL	**537,713,000**	**636,038,000**	**205,506,000**	**1,379,257,000**	**358,933,000**	**896,646,000**	**2,449,852**	**4,749,153**
January-2017	46,853,000	52,211,000	18,857,000	117,921,000	32,453,000	79,306,000	2,558,258	4,850,774
February-2017	32,336,000	47,416,000	14,109,000	93,861,000	23,840,000	56,176,000	2,006,286	4,203,607
March-2017	34,599,000	51,337,000	16,013,000	101,949,000	23,223,000	57,822,000	1,865,226	4,037,806
April-2017	32,552,000	49,925,000	16,702,000	99,179,000	20,168,000	52,720,000	1,757,333	3,978,233
May-2017	37,214,000	51,506,000	19,666,000	108,386,000	23,606,000	60,820,000	1,961,935	4,257,806
June-2017	34,223,000	50,364,000	21,120,000	105,707,000	21,263,000	55,486,000	1,849,533	4,232,333
July-2017	22,874,000	51,868,000	26,438,000	101,180,000	10,706,000	33,580,000	1,083,226	3,609,226
August-2017	37,603,000	51,268,000	17,249,000	106,120,000	22,195,000	59,798,000	1,928,968	4,139,194
September-17	29,911,000	48,642,000	16,672,000	95,225,000	20,119,000	50,030,000	1,667,667	3,844,800
October-2017	27,977,000	48,872,000	15,674,000	92,523,000	19,697,000	47,674,000	1,537,871	3,620,000
November-17	29,256,000	46,080,000	14,546,000	89,882,000	18,312,000	47,568,000	1,585,600	3,606,467
December-17	35,202,000	47,616,000	16,364,000	99,182,000	20,370,000	55,572,000	1,792,645	3,856,516
2017 TOTAL	**400,600,000**	**597,105,000**	**213,410,000**	**1,211,115,000**	**255,952,000**	**656,552,000**	**1,798,773**	**4,019,362**

* Includes monthly sales to LaFayette

TABLE 3.3
Three-Year Daily and Peak Daily 2015 – 2017
Walker County Water & Sewerage Authority

Water Treatment Plant				Coke Oven Wells				Kensington Wells			
Month-Year	Daily Average	Max	Date of Max	Month-Year	Daily Average	Max	Date of Max	Month-Year	Daily Average	Max	Date of Max
Jan-15	1.195	2.009	1/10/2015	Jan-15	1.938	2.123	1/30/2015	Jan-15	0.403	0.571	1/9/2015
Feb-15	1.265	1.928	2/23/2015	Feb-15	1.926	2.150	2/4/2015	Feb-15	0.411	0.596	2/25/2015
Mar-15	1.078	1.620	3/2/2015	Mar-15	1.917	**2.194**	3/16/2015	Mar-15	0.440	0.495	3/25/2015
Apr-15	1.060	1.681	4/10/2015	Apr-15	1.887	2.117	4/18/2015	Apr-15	0.458	0.700	4/30/2015
May-15	1.254	1.753	5/19/2015	May-15	1.893	2.087	5/15/2015	May-15	0.472	**1.087**	5/29/2015
Jun-15	1.431	**2.496**	6/19/2015	Jun-15	1.885	2.057	6/13/2015	Jun-15	0.513	0.875	6/1/2015
Jul-15	1.516	2.257	7/24/2015	Jul-15	1.885	2.012	7/2/2015	Jul-15	**0.562**	0.720	7/30/2015
Aug-15	1.452	2.306	8/8/2015	Aug-15	1.882	2.128	8/28/2015	Aug-15	0.508	0.598	8/26/2015
Sep-15	1.327	2.008	9/12/2015	Sep-15	1.873	2.020	9/18/2015	Sep-15	0.508	0.635	9/29/2015
Oct-15	1.004	1.510	10/7/2015	Oct-15	1.885	2.014	10/23/2015	Oct-15	0.502	1.060	10/5/2015
Nov-15	1.056	2.136	11/16/2015	Nov-15	1.884	2.036	11/20/2015	Nov-15	0.502	0.665	11/7/2015
Dec-15	0.912	2.036	12/5/2015	Dec-15	1.901	2.126	12/12/2015	Dec-15	0.533	0.728	12/21/2015
Max	1.516	2.496	6/19/2015	**Max**	1.938	2.194	3/16/2015	**Max**	0.562	1.087	5/29/2015
Jan-16	1.271	1.897	1/1/2816	Jan-16	1.873	2.003	1/8/2016	Jan-16	0.573	**0.893**	1/21/2016
Feb-16	1.118	1.790	2/11/2016	Feb-16	1.897	**2.822**	2/25/2016	Feb-16	0.558	0.805	2/2/2016
Mar-16	1.076	1.561	3/2/2016	Mar-16	1.878	1.992	3/11/2016	Mar-16	0.545	0.767	3/26/2016
Apr-16	1.130	1.597	4/29/2016	Apr-16	1.818	2.086	4/15/2016	Apr-16	0.527	0.643	4/12/2016
May-16	1.249	2.254	5/18/2016	May-16	1.661	1.786	5/6/2016	May-16	0.560	0.812	5/29/2016
Jun-16	1.738	2.395	6/29/2016	Jun-16	1.661	1.783	6/3/2016	Jun-16	0.580	0.783	6/18/2016
Jul-16	1.625	2.156	7/13/2016	Jul-16	1.671	1.834	7/29/2016	Jul-16	0.586	0.746	7/1/2016
Aug-16	1.635	2.265	8/12/2016	Aug-16	1.679	1.792	8/26/2016	Aug-16	0.520	0.877	8/9/2016
Sep-16	1.877	**2.517**	9/12/2016	Sep-16	1.673	1.756	9/23/2016	Sep-16	0.547	0.776	9/4/2016
Oct-16	1.680	2.155	10/17/2016	Oct-16	1.679	1.837	10/7/2016	Oct-16	0.581	0.792	10/1/2016
Nov-16	1.689	2.056	11/14/2016	Nov-16	1.682	1.809	11/25/2016	Nov-16	0.543	0.815	11/5/2016
Dec-16	1.532	2.388	12/2/2016	Dec-16	1.683	1.777	12/2/2016	Dec-16	0.610	0.820	12/ 23/201
Max	1.877	2.517	9/12/2016	**Max**	1.897	**2.822**	2/25/2016	**Max**	0.610	0.893	1/21/2016
Jan-17	1.511	**2.077**	1/9/2017	Jan-17	1.684	1.784	1/1/2017	Jan-17	0.608	0.936	1/10/201 7
Feb-17	1.154	1.864	2/27/2017	Feb-17	1.693	1.813	2/3/2017	Feb-17	0.503	0.594	2/ 22/201 7
Mar-17	1.116	1.496	3/14/2017	Mar-17	1.656	1.820	3/30/2017	Mar-17	0.516	0.804	3/22/2017
Apr-17	1.085	2.051	4/14/2017	Apr-17	1.664	1.779	4/7/2017	Apr-17	0.556	0.863	4/15/201 7
May-17	1.200	1.686	5/23/2017	May-17	1.661	1.748	5/5/2017	May-17	0.634	0.828	5/13/2017
Jun-17	1.140	1.697	6/28/2017	Jun-17	1.678	**1.893**	6/30/2017	Jun -17	0.704	0.804	6/14/ 2017
Jul-17	0.847	1.881	7/26/2017	Jul-17	1.673	1.791	7/10/2017	Jul -17	0.852	**1.285**	7/9/2017
Aug-17	1.213	1.730	8/20/2017	Aug-17	1.653	1.833	8/10/2017	Aug-17	0.556	0.962	8/23/2017
Sep-17	0.997	1.571	9/25/2017	Sep-17	1.621	1.794	9/11/2017	Sep-17	0.555	0.711	9/24/2017
Oct-17	0.902	1.324	10/2/2017	Oct-17	1.576	1.774	10/3/2017	Oct-17	0.505	0.747	10/8/2017
Nov-17	0.975	1.384	11/29/2017	Nov-17	1.536	1.536	Meter Out	Nov-17	0.484	0.654	11/29/2017
Dec-17	1.135	1.912	U/27/2017	Dec-17	1.536	1.536	Meter Out	Dec-17	0.527	0.710	12/27/2017
Max	1.511	2.077	1/9/2017	**Max**	1.693	1.893	6/30/2017	**Max**	0.852	1.285	7/9/2017

TABLE 3.4 Existing & Projected Demands Walker County Water & Sewerage Authority			
	Peak Month Daily Demand	**Projected 2035 Peak Month Daily Demand**	**Projected 2035 Peak Daily (1.5) Demand**
Water Treatment Plant to WCWSA Service Area	1,877,800	1,937,000 [1]	2,910,000
WTP to LaFayette	1,340,200	1,398,000 [1]	2,100,000
Coke Oven Wells Service Area	1,673,500	1,726,000 [1]	2,590,000
Kensington Wells Service Area	547,967	566,000 [1]	850,000
Reserve for Contracted Maximum Demands of LaFayette and Chickamauga	1,659,800	3,000,000 [2]	3,000,000
SYSTEM TOTAL	**7,099,267**	**8,627,000**	**11,450,000**

[1] Based upon the State of Georgia's Office of Planning and Budget - Walker County Population growth from 2015 to 2035

[2] Sum of Total Contracted Maximum demands for LaFayette and Chickamauga

TABLE 3.5
Monthly Peak Demands plus Potential Contracted Demands
Walker County Water & Sewerage Authority

Month	WTP Average Daily	Coke Oven Average Daily	Kensington Average Daily	System Average Daily *1	PeakDaily WCWSA *2	AvgDaily SellsTo LaFayette	Total WCWSA Peak Daily	+ Maximum Contracted to LaFayette	+ Maximum Contracted to Chickamauga	Total Potential Required Sales by Contract
Jan-15	1,998,387	1,938,323	403,613	4,340,323	4,703,000	802,935	5,505,935	1,197,065	1,000,000	7,703,000
Feb-15	2,053,896	1,926,321	411,643	4,391,861	4,674,000	788,143	5,462,143	1,211,857	1,000,000	7,674,000
Mar-15	1,747,290	1,917,516	440,806	4,105,613	4,309,000	669,258	4,978,258	1,330,742	1,000,000	7,309,000
Apr-15	1,719,733	1,887,900	458,533	4,066,167	4,498,000	659,467	5,157,467	1,340,533	1,000,000	7,498,000
May-15	1,997,161	1,893,419	472,516	4,363,097	4,927,000	743,097	5,670,097	1,256,903	1,000,000	7,927,000
Jun-15	2,200,000	1,885,867	513,533	4,599,400	5,428,000	768,800	6,196,800	1,231,200	1,000,000	8,428,000
Jul-15	2,474,968	1,885,452	562,581	4,923,000	4,989,000	958,774	5,947,774	1,041,226	1,000,000	7,989,000
Aug-15	2,408,387	1,882,548	508,065	4,799,000	5,032,000	955,677	5,987,677	1,044,323	1,000,000	8,032,000
Sep-15	2,240,667	1,873,400	508,267	4,622,333	4,663,000	912,733	5,575,733	1,087,267	1,000,000	7,663,000
Oct-15	1,714,968	1,885,677	502,258	4,102,903	4,584,000	710,000	5,294,000	1,290,000	1,000,000	7,584,000
Nov-15	1,777,133	1,884,100	502,800	4,164,033	4,837,000	720,567	5,557,567	1,279,433	1,000,000	7,837,000
Dec-15	1,530,000	1,901,516	533,258	3,964,774	4,890,000	617,516	5,507,516	1,382,484	583,000	7,890,000
Jan-16	1,978,258	1,873,323	573,581	4,425,161	4,793,000	706,935	5,499,935	1,293,065	1,000,000	7,793,000
Feb-16	1,836,966	1,897,655	558,034	4,292,655	5,417,000	718,621	6,135,621	1,281,379	1,000,000	8,417,000
Mar-16	1,776,258	1,878,065	545,742	4,200,065	4,320,000	699,935	5,019,935	1,300,065	1,000,000	7,320,000
Apr-16	1,839,133	1,818,833	527,233	4,185,200	4,326,000	708,367	5,034,367	1,291,633	990,000	7,326,000
May-16	2,000,968	1,661,581	560,129	4,222,677	4,852,000	751,968	5,603,968	1,248,032	914,000	7,852,000
Jun-16	2,862,333	1,661,267	580,333	5,103,933	4,961,000	1,123,967	6,084,967	876,033	996,000	7,961,000
Jul-16	2,700,000	1,671,968	586,226	4,958,194	4,736,000	1,074,774	5,810,774	925,226	1,000,000	7,736,000
Aug-16	2,801,548	1,679,226	520,806	5,001,581	4,934,000	1,166,194	6,100,194	833,806	986,000	7,934,000
Sep-16	3,218,000	1,673,500	547,967	5,439,467	5,049,000	1,340,200	6,389,200	659,800	1,000,000	8,049,000
Oct-16	2,906,710	1,679,065	581,968	5,167,742	4,784,000	1,225,742	6,009,742	774,258	995,000	7,784,000
Nov-16	2,874,267	1,682,167	543,533	5,099,967	4,680,000	1,185,133	5,865,133	814,867	979,000	7,680,000
Dec-16	2,596,323	1,683,645	610,613	4,890,581	4,985,000	1,063,581	6,048,581	936,419	969,934	7,985,000
Jan-17	2,558,258	1,684,226	608,290	4,850,774	4,797,000	1,046,871	5,843,871	953,129	1,000,000	7,797,000
Feb-17	2,006,286	1,693,429	503,893	4,203,607	4,271,000	851,429	5,122,429	1,148,571	1,000,000	7,271,000
Mar-17	1,865,226	1,656,032	516,548	4,037,806	4,120,000	749,129	4,869,129	1,250,871	1,000,000	7,120,000
Apr-17	1,757,333	1,664,167	556,733	3,978,233	4,693,000	672,267	5,365,267	1,327,733	1,000,000	7,693,000
May-17	1,961,935	1,661,484	634,387	4,257,806	4,262,000	761,484	5,023,484	1,238,516	941,866	7,262,000
Jun-17	1,849,533	1,678,800	704,000	4,232,333	4,394,000	708,767	5,102,767	1,291,233	994,000	7,394,000
Jul-17	1,083,226	1,673,161	852,839	3,609,226	4,957,000	345,355	5,302,355	1,654,645	1,000,000	7,957,000
Aug-17	1,928,968	1,653,806	556,419	4,139,194	4,525,000	715,968	5,240,968	1,284,032	979,334	7,525,000
Sep-17	1,667,667	1,621,400	555,733	3,844,800	4,076,000	670,633	4,746,633	1,329,367	934,066	7,076,000
Oct-17	1,537,871	1,576,516	505,613	3,620,000	3,845,000	635,387	4,480,387	1,364,613	826,000	6,845,000
Nov-17	1,585,600	1,536,000	484,867	3,606,467	3,574,000	610,400	4,184,400	1,389,600	854,000	6,574,000
Dec-17	1,792,645	1,536,000	527,871	3,856,516	4,158,000	657,097	4,815,097	1,342,903	1,000,000	7,158,000

*1 - From Table 3.2

*2 - From Table 3.3

Average Peak Demand	7,640,083
Raw Water Demand based upon WTP 95% Efficiency	8,042,193

CHAPTER 4

EVALUATION OF ALTERNATIVES

4.0 EVALUATION OF ALTERNATIVES

4.1 No Action Alternative

If the “no action” alternative is selected by the Authority, WCWSA will continue to operate two 1-mgd microfiltration membrane trailer-mounted treatment plants for a rental fee of almost $60,000 per month. The manufacturer originally limited the maximum turbidity of raw water supplying these plants to 10 NTU. During the first 16 months of operation, there were periods of high turbidity lasting a week or longer; therefore, water level in the Authority’s water storage tanks ran very low and almost required the system to go on severe water rationing. This NTU limit was later increased to 50 allowing greatly increased operation of the 2 mgd facilities. Furthermore, a “no action” alternative provides no backup for the karst water sources supplying the Coke Oven and Kensington service areas. In the future if these sources follow the course of the water treatment plant wells and become under the influence of surface water, it will require obtaining 4 additional trailers adding $120,000 per month to the Authority operating budget. A “no action” alternative is not considered a viable alternative for the WCWSA as a provider of public water long-term.

4.2 Replace the DE Vacuum Filtration System with Membrane Filtration Equipment

This alternative provides the customers of WCWSA an absolute physical barrier to all bacteria and similar sized microorganisms. Properly designed pretreatment will allow these membrane filters to operate through almost all ranges of raw water turbidity seen at the WTP, allowing continued service to the customers of the Authority and eliminating potential water shortages from high turbidity events. The existing water treatment plant had 3 chlorine contact tanks that could be used in the future for flocculation if turbidity events increased in duration to make it an economic necessity to continue filtration during those high turbidity events. Membrane filtration with the proper capacity can meet the long-term needs of the citizens and businesses of Walker County.

4.3 Replace the DE Vacuum Filtration System with Conventional Filtration Equipment

This option considers the replacement of the existing DE vacuum filters with packaged conventional filtration equipment. This option would have similar capital cost to the microfiltration option; however, this technology would not be as effective in treating low turbidity groundwater as microfiltration due to the difficulty of coagulating the low turbidity source water. This problem would require operators to be very proficient in coagulation chemistry in order to meet all drinking water regulations.

4.4 Replace the DE Vacuum Facility with Similar DE Filters

This option considers the replacement of the existing DE vacuum filters with filters manufactured by one of the remaining companies that manufacture such filters. While this option would have a

capital cost of almost $300,000 less per MGD unit, it would be almost impossible to permit within the State of Georgia. Fifteen years ago, there were only 2 DE plants remaining in Georgia and EPD influenced Dublin, Georgia, to replace their DE filters with a more accepted technology. New DE filters would have all the same limits of treatability as the old filters. They would limit WCWSA treatment capacity once the raw water exceeded 10 NTU.

4.5 Impact Assessment

A categorical exclusion application has been approved for this project. The original water plant is built upon 10 or more feet of fill. The only construction outside the footprint of existing buildings and structures will be the addition of a small electrical room adjacent to the high service pump station to provide a conditioned environment for the vfd's and electrical control panels, a similar sized electrical room adjacent to the original chlorine contact tanks for the membrane filtration equipment and the trenching of electrical and SCADA conduit on WCWSA WTP property, which will impact far less than the area regulated by the State erosion, sedimentation, and pollution control statutes. The electrical room will match the existing exterior of the high service pump building and will occupy less than one quarter the space presently occupied by the membrane trailers which will be removed at the end of construction.

5.0 DESCRIPTION OF PROPOSED PROJECT

5.1 Identification of Applicable Federal, State and Local Design Standards

The following regulations apply to the design, construction and operation of a public water facility within the State of Georgia. This project will be designed to meet those standards and reviewed by the State of Georgia Environmental Protection Division to insure that the standards are met.

Federal	
Rule	**Authorizing Legislation (Law)**
Arsenic Rule	SafeDrinking Water Act
Chemical Contaminant Rules-Phases 1-5	
Lead and Copper Rule	
Radionuclides Rule	
Variance and Exemptions Rule	
Ground Water Rule	
Stage 1 & 2 Disinfectant/ Disinfection Byproducts Rule	
Surface Water Treatment Rules	
Total Coliform Rule and Revised Total Coliform Rule	
Consumer Confidence Report Rule	
Public Notification Rule	
State of Georgia	
Environmental Rule	**Authorizing Statute (Law)**
391-3-2 Groundwater Use	OCGA 12-5-90 Georgia Ground Water Use Act
391-3-5 Safe Drinking Water	OCGA 12-5-170 Georgia Safe Drinking Water Act of 1977 OCGA 12-5-470 Georgia Water Supply Act OCGA 12-5-120 Georgia Water Well Standards Act
391-3-6 Water Quality Control*	OCGA 12-5-20 Georgia Water Quality Act OCGA 12-5-520 Comprehensive Statewide Water Management Planning Act
391-3-7 Erosion and Sedimentation	OCGA 12-7-1 Georgia Erosion and Sedimentation Act (2013)
391-3-30 Rules for Drought Management	Same as 319-3-5
391-3-33 Rules for Public Water Systems to Improve Water Supply Efficiency	OCGA 12-5-4 Programs for Voluntary Water Conservation and Enhancing Water Supply OCGA 12-5-20 Georgia Water Quality Act OCGA 12-5-90 Ground Water Use Act OCGA 12-5-170 Georgia Safe Drinking Water Act of 1977
Local	
Walker County Water & Sewerage Authority Water and Sewer Design and Construction Standards	

5.2 Required Permits

The Walker County Planning Office issues permits for construction of buildings, electrical service installation and modification, and land disturbance activity. As a part of the federal funding for the project loan, a Notice of No Significant Impact (NONSI) was required and has been obtained for environmental and historical permitting. A NPDES permit will be required to allow a neutralized, low turbidity plant effluent to be discharged in waters of the State instead of

discharging in the WCWSA sanitary sewer. A revised surface water withdrawal permit was required and has been obtained. The surface water permit of 4.5 mgd peak day and 4.0 monthly average demand remains at its existing values but the provision allowing a combined total of 4.5 ground water and surface water was removed from the language of the surface water withdrawal permit. Without that provision being removed, WCWSA would not have been able to meet its contractual obligations to the Cities of LaFayette and Chickamauga and meet it's system's peak demands with the new water treatment plant. It is proposed that the three separate groundwater withdrawal permits be combined into one permit to make system reporting easier and keep the same monthly average and peak day withdrawal at 8.3 mgd.

5.3 Operation and Maintenance Requirements

The selected membrane filtration equipment manufacturer will provide 2 weeks of classes detailing the operation and maintenance requirements of the new facility. Equipment manufacturers will be required to supply extensive operation and maintenance documentation for each major item. In addition, WCWSA will develop an asset management plan for the entire facility, detailing maintenance needs, life expectancy, and replacement costs for all items necessary for the continued safe operation of the facility. WCWSA water plant employees have been operating two 1-MGD microfiltration membrane trailer facilities on-site for over a year. Each licensed operator now is experienced with the technology and methodology of operations and will have the capabilities and expertise to operate and maintain the new facility after new facility manufacturer training.

5.4 Proposed Improvements

The proposed membrane filtration equipment will not only provide WCWSA a long-term solution to a reliable water supply, it will provide an absolute barrier to bacteria and other microbial organisms and will reduce turbidity (the measure of the degree to which water loses its transparency due to the presence of suspended particles) as much as 30 times more than present regulations require. With WCWSA tap water that exceeds current and probable drinking water regulations, residents will have a safe and convenient supply rather than purchasing bottled water.

The membrane filtration equipment can be located inside the basement of the WTP after removing the existing DE filtration equipment or in a new room built upon the existing chlorine contact tanks. The ancillary equipment including backwash supply tank and pumps, chemical cleaning tank and pumps, etc., will fit inside the building or inside one of the chlorine contact tanks if necessary. One or two of the chlorine contact tanks will remain to act as a surge tank providing a buffer between the wells and membrane filters or to provide for future flocculation if needed.

The existing WTP was designed and constructed during the early 1980's. Proposed

modifications include:

- Construction of additional laboratory and office space in the existing DE storage area,
- Improvements to the chlorine and fluoride feeding facilities,
- Creation of a new control room, and
- Addition of separate electrical rooms for membrane filtration equipment and the high service pumping equipment.

In the existing high service pump station, the electrical gear is in the same room as the pumps and piping. The proposed electrical and pump improvements will require the construction of additional space as well as conditioning of the space. Therefore an electrical room utilizing the existing building is proposed as an addition to the high service pump station.

The existing laboratory is located in the area common with the plant control and entry areas. It is recommended that the laboratory be divided into two rooms with one dedicated to bacteriological testing and one room for QA/QC testing. A partition and separate HVAC system, as well as other general improvements, are proposed for the laboratory areas. The existing control cabinets will be removed and replaced with state-of-the-art PC-based controls. Casework and access flooring will be provided for the operator in this area. Finally, the entryway will be improved with new doors and glass.

Various other improvements are proposed in order to modernize the facility and bring it into conformance with current code requirements, primarily the Americans with Disabilities Act (ADA). These improvements include a private office for the plant manager, addition of a “break/lunch room,” improvements in the chlorinator and chlorine storage rooms, fluoride feed room, conversion of the existing restroom/shower facility to one which is accessible, and addition of an accessible ramp to the front entrance.

The proposed modifications will enable the existing process to remain in service while new facilities are constructed. The modifications incorporate one 480 Y/277 volt electrical service. The main electrical service provided by the City of Chickamauga will remain located at the high service pump facility. The opinion of electrical construction cost for the high service pump building and main service facilities is included in the opinion of cost in Table 5.1.

TABLE 5.1
Opinion of Costs
Upgrade Existing WTP to 12 MGD
Walker County Water & Sewerage Authority

Construction	Costs
Mobilization/Demobilization, Bonding, Insurance, Superintendent	$ 302,400
Membrane Filtration Equipment	3,590,000
Membrane Filtration Equipment Installation	440,000
Building Improvements (including laboratory, office, control areas, crane, basement flood-proof door and retaining walls)	797,000
Concrete Work - 3 Tanks (Air Supply, Chemical Storage and if needed Flocculation)	195,000
Raw Water Pumps	500,000
High-Service Pumps	690,000
Pipe Supports and Hangers	46,000
Plant Piping, Clearwell Baffles	320,000
Valves	52,000
Building HVAC Improvements	261,000
Electrical - VFD's, MCC, Lighting Improvements	819,000
Generator, 500 KW	183,000
SCADA Instrumentation and Telemetry Replacement	418,000
12 Months 2 MGD Membrane Trailer Rental	336,000
16% Construction Contingencies	1,386,600
Total Construction	**$ 10,336,000**
Engineering	
Withdrawal, Operating and Discharge Permits	25,000
Design Development Report	20,000
Membrane Filtration Equipment Procurement Contract Documents & Specifications	62,000
Treatment Plant Improvements Contract Documents & Specifications	410,000
Membrane Filtration Equipment Procurement Bidding & Bid Evaluation	20,500
Treatment Plant Improvements Bidding	41,500
Construction Phase Services	124,500
Topographic Survey	5,500
Geotechnical Investigation, soil compaction and concrete testing	9,500
NPDES Permit	10,000
Erosion, Sedimentation and Pollution Control Permit	7,000
Start-Up Services	15,000
Asset Manage System Development (If Required)	20,000
Resident Project Representative (12 months)	210,000
Administration and Legal	40,000
Project Contingencies	43,500
Total Project Cost	**$ 11,400,000**
Source: CTI Engineers, 2020	

GS Testimony Exhibit 2

WCWSA Filtration Plant Improvements - Design and Construction Time Line

Project Schedule	Schedule Using Pall Bid Schedule:			Alternative Schedule Using CTI Specified Schedule:		
START	Date June 9, 2020	Days Required	Cummulative Days Total	Date June 9, 2020	Days Required	Cummulative Days Total
Permitting & Financing						
1 Preparation and Sumittal of ARC Grant Application	complete			complete		
2 Historical/Enviromental Permitting	complete			complete		
3 Preparation of Final GEFA Application	June 9, 2020	37	37	June 9, 2020	37	37
4 GEFA Review and Budget Approval	August 25, 2020	77	114	August 25, 2020	77	114
5 Schedule and Conduct EPD Pre-design meeting	January 7, 2021	30	144	January 7, 2021	30	144
Membrane Bid Preparation						
1 Modification of Specs & Documents for WCWSA & GEFA	February 6, 2021	30	174	February 6, 2021	30	174
2 GEFA & EPD approval of procurement docs	April 20, 2021	73	247	April 20, 2021	73	247
Membrane Filtration Equipment Procurement Schedule						
1 Invitation to Bid	May 18, 2021	28	275	May 18, 2021	28	275
2 Bidder Questions Due	June 2, 2021	15	290	June 2, 2021	15	290
3 Bids Received	June 18, 2021	16	306	June 18, 2021	16	306
4 Bid Evaluation Complete	July 7, 2021	19	325	July 7, 2021	19	325
5 Award of Membrane Equipment	July 13, 2021	6	331	July 13, 2021	6	331
6 Contracts Executed	September 27, 2021	76	407	September 27, 2021	76	407
7 1st Submittals (P&ID's, Membrane Valve & Module Rack GA's, and Electrical One-Line)	November 8, 2021	42	449	November 8, 2021	42	449
8 1st Submittals Approval	November 22, 2021	14	463	November 22, 2021	14	463
9 2nd Submittals (SFD's, CIP skid/tank GA's, Panel Drawings, Cutsheets, Spare Parts List)	February 1, 2022	71	534	February 1, 2022	71	534
10 Review and Approval of Pall Files, including Technical Data and Drawings; some to be revised and resubmitted	March 2, 2022	29	563	March 2, 2022	29	563
11 Release to Fabricate	March 9, 2022	7	570	April 5, 2022	28	591
12 Membrane Equipment (except modules) Ready for Delivery	September 7, 2022	182	752	May 2, 2023	392	983
13 Membrane Modules Ready for Delivery	September 21, 2022	14	766	July 31, 2023	90	1,073
14 Begin Membrane System Start-Up	December 16, 2022	86	852	October 25, 2023	86	1,159
15 Complete Membrane System Start-Up/Begin Performance Test	December 20, 2022	4	856	October 29, 2023	4	1,163
16 Performance Test Complete	January 3, 2023	14	870	November 12, 2023	14	1,177
Final Design and Construction						
1 1st Submittals (P&ID's, Membrane Valve & Module Rack GA's, and Electrical One-Line)	November 8, 2021	42	449	November 8, 2021	42	449
2 1st Submittals Approval	November 22, 2021	14	463	November 22, 2021	14	463
3 2nd Submittals (SFD's, CIP skid/tank GA's, Panel Drawings, Cutsheets, Spare Parts List)	February 1, 2022	71	534	February 1, 2022	71	534
4 Reviewed and Approved 112 Pall Files, including Technical Data and Drawings; required some to be revised and resubmitted	March 2, 2022	29	563	March 2, 2022	29	563
5 Complete Construction Drawings and Specifications	June 15, 2022	105	668	June 15, 2022	105	668
6 EPD/GEFA Review and Approval Drawings & Specs	July 15, 2022	30	698	July 15, 2022	30	698
7 Advertise for Bids	July 22, 2022	7	705	July 22, 2022	7	705
8 Receive Bids	August 21, 2022	30	735	August 21, 2022	30	735
9 Award Construction Contract	September 20, 2022	30	765	September 20, 2022	30	765
10 Start Construction	October 20, 2022	30	795	October 20, 2022	30	795
11 Complete Construction	October 20, 2023	365	1,160	October 20, 2023	365	1,160

Source: CTI Engineers, Inc., 4/5/2022

STATE OF Tennessee)
)
COUNTY OF Hamilton)

BEFORE ME, the undersigned authority, duly commissioned and qualified in and for the State and County aforesaid, personally came and appeared Grady Stout, being by me first duly sworn deposed and said that:

He is appearing as a witness on behalf of Tennessee-American Water Company before the Tennessee Public Utility Commission, and if present before the Commission and duly sworn, his testimony would be as set forth in his pre-filed testimony in this matter.

Grady Stout

Sworn to and subscribed before me
this 13 day of June, 2022.

Kathryn Robinson
Notary Public

Kathryn Robinson
STATE OF TENNESSEE NOTARY PUBLIC
COUNTY OF HAMILTON

My Commission Expires: 10/20/2024

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served via U.S. Mail or electronic mail upon:

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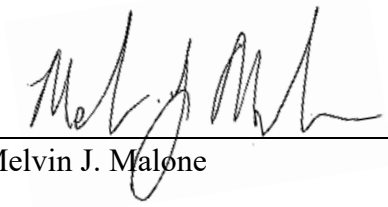
This the 13th day of June 2022.



Melvin J. Malone