PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE
ELECTRIC & WATER UTILITIES

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November 14, 2014

Mr. Thomas C. Fransen, P.E.
Deputy Director, Division of Water Resources
Department of Environment and Natural Resources
1611 Mail Service Center
Raleigh, North Carolina 27699-1611

Re: JORDAN LAKE WATER SUPPLY STORAGE APPLICATION

Dear Mr. Fransen:

The Public Works Commission of the City of Fayetteville (PWC) is pleased to submit this application to the Division of Water Resources (DWR) for a water supply storage allocation from Jordan Lake.

The original authorization for Jordan Lake considered municipal and industrial water supply as an expected use of water released for downstream low flow augmentation. However, as PWC water demands grow, our Cape Fear River withdrawals may expand to the point where they may exceed levels considered to be available at Fayetteville by the State.

PWC's available Cape Fear River supply used in this Jordan Lake water supply storage allocation application is based on the 7Q10 flow in the State's most recent Cape Fear-Neuse Basin hydrologic model. In this recent model, the simulated 7Q10 flow is 370 cfs under the 2045 demand scenario at the Lock & Dam #3 model node (i.e., Node 777). At 370 cfs (239.1 mgd), 20% of the 7Q10 is 47.8 mgd. This value is significantly lower than previous estimates of PWC's available Cape Fear River supply that were based on actual historical flow records; however, DWR has instructed applicants to rely on recent model simulation output which assumes current Jordan Lake operating rules throughout the model's period of record. With additional sources added in (i.e., Little Cross Creek impoundments and Big Cross Creek), the total combined supply available to PWC is 53.2 mgd.

PWC is hereby requesting a Jordan Lake water supply allocation to ensure that flows are released from Jordan Lake in sufficient quantity to allow PWC to meet projected future demands that exceed its available supply. Our understanding is that Level I allocations are based on projected water supply needs for a 20-year planning period and a stated intent to begin withdrawing water within 5 years, whereas Level II allocations are assigned for water

supply needs based on a 30-year planning period. As documented in our application, PWC requests a 10 mgd Level II allocation based on projected average Year 2045 demand of 63.5 mgd versus available supply of 53.2 mgd (all PWC sources). A Level I allocation is not being requested since PWC's Year 2035 demand projection is 53.6 mgd which only slightly exceeds our available supply.

At this time PWC is not participating in any regional partnership involved in water supply development pursuits. However, as documented in our application, PWC supplies water to other entities through bulk sale agreements.

In closing, PWC is prepared to enter into an agreement with the State that would commit us to those financial obligations related to PWC receiving an allocation from Jordan Lake.

Thank you for your consideration of our application.

Sincerely,

PUBLIC WORKS COMMISSION

M. J. Noland, P.E.
Chief Operating Officer
Water Resources Division

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Jordan Lake Water Supply Allocation Application

November 2014

Executive Summary added February 2015

Jordan Lake Water Supply Allocation Application

Prepared for:
Fayetteville Public Works Commission

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Our Ref.:
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Date:
November 17, 2014
Executive Summary added
February 6, 2015

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Table of Contents

Figures

Appendices

Executive Summary

The Public Works Commission of the City of Fayetteville (PWC) submitted a Jordan Lake Water Supply Allocation Application (Application) to the Division of Water Resources (DWR) on November 17, 2014 for a water supply storage allocation from Jordan Lake. This executive summary was added to the Application in February 2015 at the suggestion of DWR.

Background

The original authorization for Jordan Lake considered municipal and industrial water supply as an expected use of water released for downstream low flow augmentation. However, as PWC water demands grow, its Cape Fear River withdrawals may expand to the point where they may exceed levels considered to be available at Fayetteville by the State.

Future Demand Projections

As reported in the PWC 2013 Local Water Supply Plan (LWSP), the future average and peak day water supply needs were projected in 10-year increments through the year 2060 for the following categories:

- Residential Demand
- Commercial Demand
- Industrial Demand
- Bulk Water Sales
- System Process Losses
- Unaccounted for Water

A summary of average and peak daily water supply needs is shown below in Table E-1 (detailed breakdown by category is included in Table 1-7).

Table E-1 Fayetteville PWC Average and Peak Day Water Supply Demand Projections

Year	Average Daily Water Supply Required (MGD)	Peak Daily Water Demand (MGD)
2013	27.2	43.6
2020	37.0	59.2
2030	48.0	76.7
2040	59.2	94.7
2050	67.8	108.5
2060	76.4	122.3

Current Water Supply

PWC's available Cape Fear River supply used in this Jordan Lake water supply storage allocation application is based on the 7Q10 flow in the State's most recent Cape Fear-Neuse Basin hydrologic model. In this recent model, the simulated 7Q10 flow is 370 cfs under the 2045 demand scenario at the Lock & Dam #3 model node (i.e., Node 777). At 370 cfs (239.1 mgd), 20% of the 7Q10 is 47.8 mgd. This value is significantly lower than previous estimates of PWC's available Cape Fear River supply that were based on actual historical flow records; however, DWR has instructed applicants to rely on recent model simulation output which assumes current Jordan Lake operating rules throughout the model's period of record. With additional sources added in (i.e., Little Cross Creek impoundments and Big Cross Creek), the total combined supply available to PWC is 53.2 mgd.

Future Water Supply Need

It is understood that Level 1 allocations are based on the water supply needs for a 20-year planning period and a stated intent to begin withdrawing water within 5 years; and a Level II allocation is assigned for water supply needs based on a 30-year planning period. Based on the PWC projected demands, the current supply will be exceeded in the 30-year planning period, where 2045 average day demands are expected to be 63.5 mgd. Based on the available supply of 53.2 mgd, PWC requests a 10 mgd Level II allocation. A Level I allocation is not being requested since PWC's Year 2035 demand projection is 53.6 mgd which only slightly exceeds its available supply.

At this time PWC is not participating in any regional partnership involved in water supply development pursuits. However, as documented in this application, PWC supplies water to other entities through bulk sale agreements.

1. Water Demand Forecast

Fayetteville Public Works Commission (PWC) is required to submit a Local Water Supply Plan (LWSP) to the North Carolina Department of Water Resources (DWR) on an annual basis. This Allocation Application Report (Report) serves as a supplement to the 2013 LWSP that PWC submitted to DWR, which provides existing water use (2013), projected demand (through 2060), supply, and deficit. A copy of the 2013 LWSP in included in Appendix A. According to the Jordan Lake Water Supply Storage Allocation Application Guidelines (February 2014), the JLA-4 workbook must be included with the allocation application. The JLA-4 workbook contains much of the information contained in this Report, and is included in Appendix B.

1.1 User Sectors

In the 2013 LWSP, the PWC customer base was categorized into four user sectors, including:

- Residential
- Commercial
- Industrial
- Bulk Water Sales

Residential customers consist of single-family housing units as well as multi-family housing units. Multi-family residential units include apartment complexes, mobile home parks, duplexes, townhouses, and condominiums. Commercial customers include commercial establishments, hospitals, and institutions. In addition, interdepartmental and City of Fayetteville water usage was also categorized as commercial. City of Fayetteville water use includes all water used by City Hall, departments, parks, and recreational facilities. Industrial customers include all industries, as categorized by the Standard Industrial Classification (SIC) code. Bulk water sale customers include customers who have existing agreements for purchase of bulk water from PWC, whether for regular or emergency use.

1.2 Historical Demands

In the 2013 LWSP, historical demand data from 2010 through 2013 were reviewed to help develop demand projections. Table 1-1 summarizes the historical demand data by PWC customer category. It should be noted that some multi-family housing units are included in PWC's "commercial" billing category. As described in Section 1.1, the

number of multi-family residential customers in the "commercial" category were estimated and recategorized as residential for future demand projections.

Table 1-1 Fayetteville PWC Historical Water Demands by Customer Category

Fiscal Year (1)	Residential Daily Average Demand (MGD)	Commercial (2) Daily Average Demand (MGD)	Industrial Daily Average Demand (MGD)	Bulk Water Sales Daily Average Demand (MGD)
2010	11.04	5.40	1.63	2.969
2011	11.15	5.76	1.76	4.114
2012	10.73	5.52	1.86	3.898
2013	10.31	5.45	1.67	**3.775**

(1) A fiscal year is from July of the previous year through June of the year listed.
(2) Commercial water users include the following billing categories: commercial, interdepartmental, and City of Fayetteville.

1.2.1 Demand Projections

Residential Water Demand Projections

Population Projections

For the 2013 LWSP, the PWC service area projections were calculated by first estimating the base year (2000) service area population and the corresponding percentage that the PWC service area population is of the entire Cumberland County population. The future service area population was then estimated by multiplying the Cumberland County population projection by the estimated percentage of the Cumberland County population that PWC would serve for each horizon year. The future service area population projections excluded Fort Bragg, which has signed a 50-year private water service agreement.

The Cumberland County population was projected based historical population data for Cumberland County obtained from the North Carolina Office of State Planning in

addition to population projections through 2029 from the Office of State Planning Projections[1].

Based on the Year 2013 service area and county populations, PWC currently serves approximately 59.8% of the Year 2010 Cumberland County population. Except for Fort Bragg, which has signed a 50-year private water service agreement, PWC anticipates that it will serve nearly all of the County by 2040, or 90 percent of the Cumberland County population. Much of the 10 percent that PWC is not projected to serve includes Fort Bragg. However, some of the 10 percent accounts for other areas of the County for which there is uncertainty whether PWC will provide future service. PWC service area population projections through 2060 are shown in Table 1-2.

Table 1-2 PWC Future Service Area Population Projections

Year	Cumberland County Population	Percent of County Served[1]	PWC Service Area Population[2]
2010	333,558	59.69%	199,102
2011	336,406	59.67%	200,733
2012	337,392	60.34%	203,580
2013	340,189	59.82%	203,500
2020	363,155	70.00%	254,208
2030	395,966	80.00%	316,772
2040	427,084	90.00%	384,376
2050	458,203	90.00%	412,383
2060	489,322	90.00%	440,390

[1]Assumes that PWC service area will be expanded to 90% of Cumberland County by 2040.

[2] Calculated by multiplying Cumberland County Population by Percent of County Served.

[3]Year 2010 Cumberland County Population data shown is based on the just-released 2010 Census data for North Carolina. All demand projections included in this application were based on a Year 2010 County population estimate of 338,558. Because the difference between the estimated and actual population was less than 0.7%, the demand projections were not modified.

1 http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/county_projections.shtm

Residential Usage Rates

Residential water demands were calculated by multiplying the PWC service area population projections shown in Table 1-2 by the projected per capita usage rate. Usage rates were established based on an analysis of PWC historical and current usage rates and potential reductions from water conservation measures and replacement savings.

Future residential demand projections were calculated by multiplying future service area population by the per capita usage rates. This method avoided speculation on future household sizes.

Historical usage rates were estimated by dividing the residential service water sales by the estimated service area population. Accurate data were unavailable to disaggregate demand between single-family and multi-family use. Therefore, as allowed by DWR's Application Guidelines, a combined residential usage rate including both single and multi-family homes was estimated. Based on this analysis, the current (Year 2013) residential usage rate was estimated to be 51 gallons per capita per day (gpcd).

In general, the residential usage rate has decreased by approximately 15 gpcd over the last ten years. In addition, with continued implementation of water conservation measures, the usage rate is expected to continue to decrease in the future. Future usage rates were projected by accounting for savings from installation of low-flow and ultra low-flow plumbing fixtures in newer housing developments and retrofit of plumbing fixtures in older housing developments. To account for installation of lower flow plumbing fixtures, the PWC residential population was subdivided by age of homes and estimated water usage based on estimated savings from installation of low-flow plumbing fixtures. Under this methodology, it was determined that homes built prior to 1983 have a per capita water usage of 85 gpd, homes built between 1983 and 1994 have a usage rate of 70 gpcd, and homes built after 1994 have a usage rate of 59 gpcd. Based on Sate plumbing codes for ultra-low flow toilets and showers, all new development was assumed to have a water usage of 59 gpcd. Without accounting for replacement savings from retrofit of older homes, the average usage rate is expected to decline from 79 gpcd in 2000 to 70 gpcd in 2050.

To account for plumbing retrofit of older homes, it was assumed that all of the homes in the current PWC service area built prior to 1994 would be retrofitted with ultra-low flow plumbing by 2050. Based on this assumption, the estimated replacement rate is 1.3 percent per year for homes built prior to 1983 and 0.5 percent for home built between

1983 and 1994. Replacement savings were estimated by assuming that replacing high-flow (pre-1983 homes) with ultra-low flow plumbing would provide 26 gpcd savings, and that replacing low flow (homes built between 1983 and 1994) with ultra-low flow plumbing would provide 11 gpcd savings (based on water conservation estimates provided in a 1993 AWWA report titled, *Water Conservation Guidebook for Small and Medium Sized Utilities*).

Demand Projections

Table 1-3 shows the resulting residential water demand projections through 2060 for the PWC service area based on the population projections and usage rates described above. Actual calculated usage rates for 2010 through 2013 were relatively low, and likely represent unrealistic rates for future planning purposes, even with conservation savings associated with new home development and replacement programs; therefore, the residential usage rate for future planning scenarios (2020 through 2060) was held steady at 63 gpcd.

Because accurate data were not available to disaggregate historical single-family and multi-family usage rates, residential demands projections were estimated based on a combined single-family and multi-family home usage rate. This methodology eliminated the need to speculate on future household size and the relative mix of single and multi-family homes throughout the planning horizon. A 2060 combined residential usage rate of 63 gpcd is considered a conservatively low rate for the projected service area.

Table 1-3 Residential Water Demand Projections

Year	PWC Service Area Population (1)	Usage Rate (gpcd) (2)	Residential Demand (mgd) (3)
2010	199,102	55	11.042
2011	200,733	56	11.146
2012	203,580	53	10.729
2013	203,500	51	10.305
2020	254,208	63	16.0
2030	316,772	63	20.0
2040	384,376	63	24.2
2050	412,383	63	26.0
2060	440,390	63	27.7

(1) From Table 1-2.
(2) Assumes calculated actual usage rates for existing customers in 2010-2013 and average usage rate of 63 gpcd for future planning scenarios (2020-2060).

Commercial Growth

Insufficient data were available for the PWC Master Plan Update to estimate commercial demand on a per acre basis. Therefore, the non-residential portion of the commercial demand was estimated in the Master Plan Update based on commercial employee projections and historical water consumption.

The 2013 LWSP estimated the total number of commercial employees being served by PWC as a fraction of the PWC residential population. Based on 2006 Cumberland County population and employment data, approximately 40% of the PWC residential population is employed by commercial businesses. In comparison, the number of commercial employees in Cumberland County is approximately 30 percent of the total residential population (based on Employment Securities Commission data between 1993 and 1999).

Commercial employee projections for the PWC service area were estimated based on the following assumptions:

- Commercial employees will become more evenly distributed throughout the County.

- By 2040, when the PWC service area is anticipated to include 90% of the Cumberland County population, the number of commercial employees in the PWC service area will be 40 percent of the service area population.

PWC estimated commercial usage rates based on best available information. A unit flow factor (gpd/employee) was established for the non-residential component of PWC's commercial demand based on Year 2000 commercial water demand and commercial employee data. The unit flow factor for the Year 2000 was calculated to be 72.7 gpd/employee (419.9 gpd per 5/8th inch meter equivalent). It should be noted that this commercial use rate is lower than previous years as a result of conservation measures, and is comparable and, in some cases, less than experienced by other utilities in this region of the nation.

Table 1-4 summarizes the commercial demand projections. Water demand projections were developed by multiplying this unit flow factor by the projected number of commercial employees in the service area.

Table 1-4 Commercial Water Demand Projections

Year	PWC Service Area Population (1)	Commercial Employees (%) (2)	Commercial Employees in Service Area	GPD/Employee (3)	Commercial Water Demand (MGD)
2010	199,102	40%	80,238	67	5.403
2011	200,733	40%	80,895	71	5.756
2012	203,580	40%	82,043	67	5.523
2013	**203,500**	**40%**	**82,011**	**67**	**5.454**
2020	254,208	40%	102,446	67	6.9
2030	316,772	40%	127,659	67	8.6
2040	384,376	40%	154,904	67	10.4
2050	412,383	40%	166,190	67	11.1
2060	440,390	40%	177,477	67	11.9
(1) From PWC Future Service Area Population Projections table.					
(2) Based on fraction of 2006 Cumberland County population employed in civilian labor force.					
(3) GPD/employee based on year 2000 commercial water use which includes all customer categories except residential, industrial, and bulk water sales.					

Industrial Growth

PWC currently serves thirteen industries, including Black & Decker, Momentive, Cargill, Carolace, Chrome Rite Plating, Cutler Hammer, Kelly Springfield Tire Company, M.J. Soffe, Purolator, Valley Protein/Cape Fear Feeds, National Uniform, Rental Uniform, and Perdue. In Fiscal Year 2010, these thirteen industries had a combined water demand of 1.63 mgd. As shown in Table 1-1, the industrial demand has declined in the last two years due to the loss of a couple of major industries; however, the Fayetteville Area Economic Development Corporation (FAEDC) is working to bring new industries into Cumberland County. Despite slow industrial growth in the 1990s, the FAEDC projects that a new wave of industrial growth in Cumberland County will begin in the near future and will continue throughout the next fifty years.

Although PWC's industrial water demand has decreased over the last two years, the location of only one water intensive industry in the PWC service area would reverse this trend and substantially increase PWC's industrial demand. For example, a large poultry processor with a potable water demand of 1.0 MGD is presently considering locating within the PWC service area. There are other water-intensive industries such as pharmaceutical and semiconductor manufacturing facilities which have recently located or expanded in North Carolina and Virginia that will use between 4 and 10 mgd each. In projecting industrial demand, PWC did account for the potential location of a water-intensive industry, such as the current power generation prospects.

Industrial demand projections were estimated in the Master Plan Update based on existing industrial use and taking into account future industrial growth projected by the FAEDC. Existing industrial use data were used to establish a per acre industrial usage rate of 2,200 gpd/acre (7,529.0 gpd per 5/8th inch meter equivalent). Future industrial usage was then estimated by applying the 2,200 gpd/acre usage rate to the projected industrial acreage. Initially, future industrial sites were estimated by assuming that all of the industrial sites that the FAEDC projected would be developed within the next 20-years would actually be served water over a 50-year planning period. However, it was found that this assumption was overly optimistic when compared to residential growth projections. Therefore, the projected industrial acres were reduced to 50% of FAEDC's projection. This methodology would account for the location of water-intensive industry, such as the power generation plants discussed above. Table 1-5 summarizes the projected PWC industrial demands. The projected industrial acreage projected for 2050 is about half of the estimated industrial Buildout capacity.

Table 1-5 Industrial Water Demand Projections

Year	Total Acres Developed for Industrial Use (1)	Projected Industrial Water Demand (mgd) (2)
2010	741	1.63
2011	801	1.76
2012	844	1.86
2013	**758**	**1.67**
2020	2,641	5.8
2030	4,441	9.8
2040	6,141	13.5
2050	8,441	18.6
2060	10,741	23.6

(1) Includes existing industrial acreage plus estimates on future development. Estimates were based on information provided by the FAEDC.
(2) Projected Industrial Water Demand was based on a unit flow factor of 2200 gpd/acre.

The FAEDC reports multiple benefits that the Fayetteville / Cumberland County area provides to support the projected industrial growth. These benefits include:

- Cumberland County is strategically positioned along Interstate I-95 and, having rail service through Norfolk Southern and CSX railroads, Cumberland County offers a variety of transportation benefits.
- Excellent utilities, including inexpensive water and sewer service.
- Skilled labor force. With Fort Bragg, a large military base, located within the County, ex-military personnel provide an excellent source of multi-skilled labor for industries. Currently, the Employment Security Commission is working to identify and place ex-military personnel in jobs in Cumberland County.
- Economic incentives.

The FAEDC is actively working with Fayetteville PWC and Cumberland County to identify and develop sites for future industrial development.

Bulk Water Sales

The JLA-4 workbook included in Appendix B as well as the 2013 LWSP included in Appendix A has a breakdown of the anticipated bulk water sales through 2060 to all current customers. It should be noted that the following contract minimums and documented sales growth are not included in the projected bulk sales.

PWC has existing bulk water sale contracts with the following purchasers:

- Town of Spring Lake (13 MG/month) – conservatively estimated at 0.6 MGD for planning purposes until 2015 when the Town is annexed into the PWC service area.
- Fort Bragg (max. 8 MGD) – PWC began supplying 50% of Fort Bragg water in 2010.
- Hoke County (4 MG/month minimum, 6 MG/month maximum) - Based on current growth rates in Hoke County, Hoke County predicts that they may need to purchase as much as 7 mgd or more from PWC to meet their 2050 water demands. Based on the information provided by Hoke County, it may be assumed that PWC will provide 0.2 mgd (6 million gallons per month) to Hoke County starting in 2005 and that average sales will grow in linear fashion to 7 mgd by 2050. This procedure for factoring in sales to Hoke County is consistent with guidance provided to PWC in a March 2, 2001 letter from DWR.
- Brettonwood Hills – 0.012 MGD average sales in 2013. Maximum contract amount of 864,000 gallons/month.
- Brookwood South – 0.171 MGD average sales in 2013
- Cliffdale West – Emergency supply only (0 MGD sales in 2013)
- East Gate – 0.014 MGD average sales in 2013
- Kelly Hills – 0.006 MGD average sales in 2013. Maximum contract amount of 864,000 gallons/month.
- Rain Tree II – 0.019 MGD average sales in 2013
- Stoney Point – 0.020 MGD average sales in 2013
- Tangelwood South – 0.015 MGD average sales in 2013
- Town of Stedman – 0.109 MGD average sales in 2013. Minimum of 1.035 MG/month and maximum of 5 MG/month.

In 2013, the total bulk water sales were 3.775 MGD. For planning purposes, it is assumed that the bulk water sales will remain at a constant 3.79 MGD through the end of the planning horizon. While PWC is only planning on average bulk sales of 3.79

MGD through 2060, it should be noted that there is contract capacity in several of the agreements with bulk sales customers to supply a larger amount of water in the future.

System Processes and Unaccounted-For-Water

In PWC's Master Plan Update, PWC water supply data were analyzed to estimate water demand associated with system processes and unaccounted-for-water (UFW). The amount of system process water used by PWC was assumed to be the difference between the amount of water treated at the P.O. Hoffer and Glenville WTF and the amount actually pumped to the distribution system. The UFW level was then calculated as the difference between the amount of water pumped to the distribution system and the metered water sales.

Table 1-6 summarizes an analysis of system process and UFW levels for the PWC system between 1994 and 2000 (Fiscal Years 1995 through 1999). Although UFW levels varied from year-to-year, the combined system process and UFW levels varied only between 10 and 16 percent each year, with an average combined demand of 14 percent of metered water sales. For the demand projections, it was assumed that the UFW and system process demands would be maintained at 6 percent and 8 percent, respectively. The 8% system process demand also provides an allowance for County Fire Department water usage and flushing program water losses.

Table 1-6 Analysis of System Process And Unaccounted-For-Water

Fiscal Year	Withdrawal (MGD)	Pumped (MGD)	System Process (MGD)	Metered Sales (MGD)	System Process (MGD)	UFW (MGD)	Percent of Water Sales		
							System Process	UFW	Combined
1995	23.5	22.1	1.4	20.4	1.4	1.7	6.9%	8.4%	15.4%
1996	24.3	22.6	1.7	20.9	1.7	1.7	8.1%	7.9%	16.0%
1997	24.8	23.0	1.8	22.5	1.8	0.5	7.8%	2.2%	10.0%
1998	26.6	25.3	1.3	23.1	1.3	2.1	5.8%	9.2%	15.0%
1999	27.4	24.9	2.5	24.4	2.5	0.5	10.1%	2.0%	12.0%
						AVERAGE	**7.7%**	**5.9%**	**13.7%**

Total Demand Forecast

Table 1-7 summarizes the average and peak daily demands PWC projections through 2060. Peak daily demands were assumed to be 1.6 times the average daily demand. The maximum day to average day demand peaking factor was established in the ongoing *PWC Water Master Plan and Cumberland County Rural Water Study* (CDM, May 2001 draft). A map of the current and future PWC service area is included in Appendix C.

TABLE 1-7
Average and Peak Day Water Demand Projections

Year	Residential Demand MGD (1)	Commercial Demand MGD (2)	Industrial Demand MGD (3)	Subtotal of Base Demand MGD	Bulk Water Sales MGD (4)	Subtotal of Demand MGD	System Process MGD (5)	Unaccounted--for-water MGD (5)	**Average Daily Water Supply Required (MGD)**	**Peak Daily Water Demand (MGD)** (6)
2010	11.0	5.4	1.6	18.1	2.97	21.0	2.78	4.2	**28.0**	**44.8**
2013	10.3	5.5	1.7	17.4	3.78	21.2	3.18	2.9	**27.2**	**43.6**
2015	13.5	6.2	3.7	23.4	3.79	27.2	2.18	1.6	**31.0**	**49.7**
2020	16.0	6.9	5.8	28.7	3.79	32.5	2.60	1.9	**37.0**	**59.2**
2025	18.0	7.8	7.8	33.6	3.79	37.4	2.99	2.2	**42.6**	**68.2**
2030	20.0	8.6	9.8	38.3	3.79	42.1	3.37	2.5	**48.0**	**76.7**
2035	22.1	9.5	11.7	43.3	3.79	47.0	3.76	2.8	**53.6**	**85.8**
2040	24.2	10.4	13.5	48.1	3.79	51.9	4.15	3.1	**59.2**	**94.7**
2045	25.1	10.8	16.1	51.9	3.79	55.7	4.46	3.3	**63.5**	**101.6**
2050	26.0	11.1	18.6	55.7	3.79	59.5	4.76	3.6	**67.8**	**108.5**
2055	26.9	11.5	21.1	59.5	3.79	63.2	5.06	3.8	**72.1**	**115.3**
2060	27.7	11.9	23.6	63.3	3.79	67.1	5.36	4.0	**76.4**	**122.3**

(1) From Table 1-3 - Residential Water Demand Projections (Including Conservation Savings)
(2) From Table 1-4 - Commercial Water Demand Projections
(3) From Table 1-5 - Industrial Water Demand Projections
(4) Based on 2013 bulk sales equal to 3.775 mgd, and assuming a constant future sales of 3.79 mgd.
(5) Based on historical average of approximately 14% for system process and unaccounted-for-water combined. Approximate average of 8% for system process water and 6% for UFW for years 2015-2060. Actual system losses and UFW shown for years 2010 and 2013.
(6) Based on peak day/ average day peaking factor of 1.6 calculated based on the average annual peaking factor experienced by PWC between 1995 and 1999.

2. Conservation and Demand Management

The PWC maintains an active water conservation and maintenance program that consists of the following elements:

- UFW Reduction Programs – One of PWC's goals is to ensure that UFW levels are maintained below 10%. To meet this goal, PWC maintains a proactive maintenance program, which includes an on-going meter repair and replacement effort and ensures rapid responses to identified leaks. All meters in the PWC service area are tested, repaired, or replaced based on the following schedule:

  - Residential meters (mostly 5/8th inch meters): every 12 years
  - 1 ½ inch meters: every 5 years
  - 2 inch meters: every 3 years
  - 3 inch meters: every 4 years
  - 4, 6, and 8-inch meters: every 12 months.

PWC is currently converting all of its meters to a radio/read system. Under this program, all PWC meters will be retrofitted or replaced over the next three years. Upon upgrade of each meter, the regularly scheduled maintenance program will again be followed.

- Local Water Shortage Ordinance – The PWC has adopted a local Water Shortage Response Ordinance (Ordinance No. S2010-007), which is included in Appendix D.

- Public Education – The PWC continually distributes educational materials to the public regarding water conservation. In addition, PWC observes National Drinking Water week with promotions on the radio and in the Newspaper. This educational effort will continue in the future.

- PWC utilizes various mechanical and electronic leak detection devices to pinpoint known or suspected leaks. Chemical test kits are also used by field crews to determine if water is potable or non-potable.

- PWC performs unidirectional flushing of all water mains through fire hydrants on a five year cycle. The City of Fayetteville and Cumberland County Fire Departments inspect and work all fire hydrants on an annual basis.

- All valves are inspected/operated during unidirectional flushing of the distribution system. All valves 16" and larger are exercised annually.

- Wastewater reuse – Reuse systems are in service at both wastewater treatment facilities for irrigation and equipment washdown. Opportunities for reuse in the service area are discussed in Section 5 of this Application. Reclaimed water is used for irrigation at the Cross Creek and Rockfish Creek Water Reclamation Facilities during the months of May through September. An average of 0.160 MGD of reclaimed water is used in this system.

- In 2013, PWC began a pilot program to offer financial incentives to customers who switched to High Efficiency Toilets (HET).

- Odd-Even Landscape Irrigation Program – Beginning in 1994, the PWC has conducted a program each summer to encourage residents to irrigate only on odd calendar dates if their address ends in an odd number and only on even calendar dates if their address ends in an even number. The objective of this program is to reduce peak water demands.

- Waterwise Garden Demonstration Project – PWC, in conjunction with the Fayetteville Botanical Gardens, constructed a demonstration project in 1996 that provides the typical homeowner with practical, low-cost suggestions for reducing residential landscape irrigation requirements and encourage responsible irrigation practices. This program is part of PWC's on-going conservation public education programs and is funded annually for maintenance and issuance of brochures encouraging water conservation.

- A rate structure analysis was conducted for PWC. "Flat/Fixed" rate is the PWC temporary water rate; "Increasing Block" is for residential and irrigation use; and "Uniform" is for non-residential, non-residential irrigation, large water users and fire hydrant connections. Appendix E contains the current water rate schedule for PWC, taken from the 2014 Comprehensive Annual Financial Report for Fayetteville PWC.

3. Current Water Supply

Fayetteville PWC's current water supply sources consist of two major surface water sources, the Cape Fear River and Lake Impoundments on Little Cross Creek. In addition, Big Cross Creek, a smaller surface water source, is used as a supplemental raw water supply. PWC's existing raw water supplies are summarized in Table 3-1. A description of each of these water supply sources is provided below.

Table 3-1 Current Water Supply Sources For Fayetteville PWC

Source	County	Basin	Source Type	Safe-Yield (mgd)	Water Quality
Cape Fear River	Cumberland	Cape Fear	Surface	47.8[1]	Good
Glenville Lake	Cumberland	Cape Fear	Surface	4.5[2]	Good
Big Cross Creek	Cumberland	Cape Fear	Surface	0.0.9[3]	Good
Total Current Available Supply				53.2	

TBD: To meet determined.

[1]Based on 20% of the model simulated 7Q10 in the Cape Fear River at model node 777 (2045 demand simulation, 370 cfs 7Q10 flow)

[2]20 and 50-year safe yield.

[3]20% of the estimated 7Q10 flow.

Cape Fear River

The PWC relies on the Cape Fear as its major raw water supply. The segment of the Cape Fear River used as a water source is classified as a WS-IV segment. The PWC has two raw water intake / pump stations located on the Cape Fear River. The first pump station is used to provide a supplemental water supply source to the Glenville Lake WTF. This pump station has a design capacity of 32 mgd and a firm capacity of 16 mgd. The second pump station supplies raw water to the P.O. Hoffer WTF. The Cape Fear River is the sole raw water source for the P.O. Hoffer WTF. This pump station has a design capacity of 60 mgd and a firm capacity of 42 mgd.

According to the Jordan Lake Water Supply Storage Allocation Application Guidelines document (Round 4, revised February 18, 2014), the available supply for run-of-river sources should be calculated as follows:

> *For run-of-river sources, applicants will use the results of an instream flow study, when such is available, to determine the available supply. If the results of an instream flow study are not available for a given source, the applicant's available supply is assumed to be 20% of the 7Q10 flow as determined using the basecase scenario of the appropriate river basin hydrologic model if there are no other intakes in close proximity.*

Using this acceptable methodology, PWC's available Cape Fear River supply used in this Jordan Lake water supply storage allocation application is based on the 7Q10 flow in the State's most recent Cape Fear-Neuse Basin hydrologic model. In this recent model, the simulated 7Q10 flow is 370 cfs under the 2045 demand scenario at the Lock & Dam #3 model node (i.e., Node 777). At 370 cfs (239.1 MGD), 20% of the 7Q10 is 47.8 MGD. This value is significantly lower than previous estimates of PWC's available Cape Fear River supply that were based on actual historical flow records; however, DWR has instructed applicants to rely on recent model simulation output which assumes current Jordan Lake operating rules throughout the model's period of record.

Lake Impoundments on Little Cross Creek

The second major surface water source is a series of four lake impoundments on Little Cross Creek, including Bonnie Doone Lake, Kornbow lake, Mintz Pond, and Glenville Lake. Raw water from the Little Cross Creek Basin is treated at the Glenville Lake Water Treatment Facility (Glenville WTF). The raw water intake for the Glenville WTF is located on Glenville Lake. Little Cross Creek is classified as a WS-IV watershed.

The 20 and 50-year safe yield for Little Cross Creek is estimated to be 4.5 mgd.

Big Cross Creek (Supplemental Supply)

Big Cross Creek, a WS-IV classified watershed, serves as a smaller, supplemental water source for the Glenville WTF. In 1997, this raw water source was used 263 days at an average withdrawal rate of 1.765 mgd. The maximum withdrawal capacity for the Big Cross Creek is estimated to be 2 mgd.

The safe yield for Big Cross Creek was estimated, as per DWR's Round Four Application Guidelines, as 20% of the 7Q10 flow. Fayetteville PWC staff have determined the drainage area above the Big Cross Creek intake to be approximately 15.1 square miles. There is no streamflow gaging station on Big Cross Creek.

Therefore, low flow statistics were reviewed for two surrogate gages in the local region with relatively small drainage areas, as shown in Table 3-2:

Table 3-2 Low Flow Statistics For Surrogate Gages

▪ Gaging Station		Drainage Area	Lowest Daily Mean Flow (cfs)	7Q10 Flow (cfs)
Flat Creek near Inverness	Full Drainage Area	7.63	2.2	3.6
	Per Square Mile	1.0	0.29	0.47
Rockfish Creek at Raeford	Full Drainage Area	93.1	34	41.8
	Per Square Mile	1.0	0.37	0.45

Applying these per square mile low flow statistics to the Big Cross Creek intake results in an estimated minimum daily flow of between 4.4 and 5.6 cfs and estimated 7Q10 flow of between 6.8 and 7.1 cfs. Based on DWR's Round Four Application Guidelines, available supply for unregulated streams can be estimated as 20 percent of the 7Q10 flow. For the two surrogate gages, 20 percent of the 7Q10 flow would be less than the minimum daily flow. Therefore, available supply at the Big Cross Creek intake is estimated to be 1.4 cfs (0.9 mgd), which is 20 percent of an estimated 7Q10 flow of 6.8 to 7.1 cfs.

4. Future Water Supply Needs

Table 4-1 provides a summary PWC's average and maximum day projected demands through 2050. Deficit projections are based on the recently calculated 7Q10 flow from the Cape Fear-Neuse hydrologic model.

Table 4-1 Deficit Projections for Fayetteville PWC

Year	Average Daily Demand (mgd)	Maximum Daily Demand (mgd)	Current Available Supply (mgd)	Deficit (mgd)	Demand as % of Supply
2010	**28.0**	**44.8**	53.2	-25.2	53%
2013	**27.2**	**43.6**	53.2	-26.0	51%
2015	**31.0**	**49.7**	53.2	-22.2	58%
2020	**37.0**	**59.2**	53.2	-16.2	70%
2025	**42.6**	**68.2**	53.2	-10.6	80%
2030	**48.0**	**76.7**	53.2	-5.2	90%
2035	**53.6**	**85.8**	53.2	0.4	101%
2040	**59.2**	**94.7**	53.2	6.0	111%
2045	**63.5**	**101.6**	53.2	10.3	119%
2050	**67.8**	**108.5**	53.2	14.6	127%
2055	**72.1**	**115.3**	53.2	18.9	136%
2060	**76.4**	**122.3**	53.2	23.2	144%

5. Comparison of Alternative Water Supplies

As discussed in Section 4, PWC's projected demand deficits reach 10.3 MGD in 2045 and 23.2 MGD in 2060. An evaluation of alternative water supplies was performed to assess potential long-term water supply alternatives for the PWC.

The following water supply alternatives are included this evaluation:

- Jordan Lake Allocation (via Cape Fear River Withdrawal Facilities)
- New Reservoir in Cumberland County
- Interbasin Transfer (IBT) from Lumber River Basin
- Interbasin Transfer from Reservoir Located on Yadkin-Pee Dee River
- Groundwater Sources
- Offstream Storage in Local Quarry

- Aquifer Storage and Recovery (ASR)
- Non-Potable Reuse
- Bulk Water Purchase.

A fatal flaw analysis was performed to determine the feasibility of each of the above water supply alternatives. The results from this evaluation are presented in Section 5.1. An alternatives evaluation was then performed for each of the feasible water supply options using the evaluation criteria provided in the Jordan Lake Allocation Application Guidelines. This alternatives evaluation is presented in Section 5.2.

5.1 Feasibility Analysis of Water Supply Alternatives

Jordan Lake Allocation (via Cape Fear River Withdrawal Facilities)

As PWC water demands grow, Cape Fear River withdrawals by PWC may expand to the point where they meet or exceed levels considered to be available at Fayetteville by the State. Depending on how a State policy for available Cape Fear River supply at Fayetteville is defined, PWC could require a Jordan Lake water supply allocation to ensure that flows are released from Jordan Lake in sufficient quantity to allow PWC to meet future demands. For purposes of this application, it has been assumed that the Jordan Lake Water Supply Storage Allocation Application Guidelines document (Round 4, revised February 18, 2014) govern how this available supply is defined. Under those guidelines PWC will need additional supply such as an allocation from Jordan Lake to meet its projected future demands.

The U.S. Army Corps of Engineers has estimated that the safe yield of the Jordan Lake water supply pool is approximately 100 mgd. To date, 63 mgd of the total supply has been allocated to surrounding water systems. Consequently, a maximum of 37 mgd could be allocated during Round 4. If PWC were granted its requested 10 MGD Level II water supply allocation from Jordan Lake, the additional supply would be withdrawn from the Cape Fear River using existing intakes. PWC has two raw water intake / pump stations located on the Cape Fear River. The first pump station, which is pumped to the Glenville Lake WTF through a 36-inch raw water main, has a design capacity of 32 mgd. This pump station can also provide raw water to the P.O. Hoffer WTF through a separate 36-inch raw water main and is used as a back-up pump

station for this facility. The second pump station supplies raw water to the P.O. Hoffer WTF through a 36-inch raw water main and has a design capacity of 60 mgd.

PWC would need to upgrade its existing withdrawal facilities to accommodate the 2060 peak demand of 122 mgd. This upgrade would include installation of new pumps to increase the design and firm pumping capacity of the intake pump station and modifications to the existing transmission line so that both of the 36-inch transmission lines to the P.O. Hoffer WTF could be utilized for raw water transmission. Based on a preliminary evaluation of the intake facilities and raw water pumping capacity, the intake structure is adequately sized to accommodate peak flows through 2040 and the raw water pump station has sufficient capacity to accommodate the projected peak demand through 2025. However, additional pumps would still need to be installed to increase the firm capacity of the intake pump stations to accommodate peak demands through 2025. Overall, these upgrades and modifications would be a minor capital investment in comparison to the other raw water supply alternatives. In addition, with the nearby location of the raw water source and the benefit of existing infrastructure, this alternative would also be the easiest to implement.

The majority of Cumberland County and eastern Hoke County is within the Cape Fear River Basin. A very small portion of the southwestern part of Cumberland County lies within the Lumber River Basin and the eastern portion of Cumberland County lies within the South River Basin. Although all of the PWC's wastewater treatment facilities discharge treated effluent to the Cape Fear River Basin, some consumptive losses would be expected to occur within the Lumber River and South River Basins if the PWC service area comprises the majority of Cumberland County. These consumptive losses would constitute an interbasin transfer if the total loss exceeded 2 mgd. However, it should be noted that the majority of transfer would probably occur within the South River basin, which drains to the Cape Fear River downstream of Fayetteville. Therefore, the potential for significant interbasin transfer outside of the Cape Fear River Basin would be small.

New Reservoir in Cumberland County

This alternative consists of creating a multi-purpose reservoir within Cumberland County that would be designed to serve as both a recreational facility and as a supplemental raw water source for the PWC during peak water demands. Cumberland County and the PWC collaborated to evaluate the feasibility and potential siting of a reservoir in Cumberland County. The results from this evaluation are reported in the *Cumberland County Preliminary Siting and Reservoir Feasibility Study* (Geometrics

Engineering, January 2000). The purpose of this study was to determine the feasibility of locating a reservoir in Cumberland County given the local water resources and environmental issues.

The results from this investigation indicated that development of a new reservoir is feasible, provided that additional studies are conducted to validate stream flows and environmental impacts. It was assumed that the reservoir would be used to provide a maximum supplemental potable water supply of 9 mgd. The Cape Fear River itself was not considered as a potential reservoir site since major uncertainties exist about whether such a facility could be permitted in today's regulatory environment. Excluding the Cape Fear River, Rockfish Creek and the Little River were the only other local surface water sources identified to have sufficient drought flows (7Q10 flows) to support the proposed reservoir. However, it was found that the Little River would be only marginally adequate in supporting the proposed reservoir and that excessive drawdown of the reservoir water level could occur during periods of severe drought and peak water demand. Alternatively, a reservoir located on Rockfish Creek would be capable of providing a raw water supply above 9 mgd. The most favorable location for the proposed reservoir was found to be near the Town of Hope Mills near the confluence of Little Rockfish Creek and Rockfish Creek. The reservoir would cover a surface area of approximately 1,500 acres with an average depth of 18 feet (27,000 acre-feet of storage). It was noted in the Reservoir Feasibility Study that locating the reservoir at Rockfish Creek would result in flooding of existing roadways, farmlands, forest and residential sites and that a detailed environmental impact study would be required. Based on inspection of U.S. Fish and Wildlife Service National Wetland Inventory Maps, it was estimated that the reservoir could impact approximately 200 acres of wetlands. However, no ground truthing has been conducted to verify wetland boundaries and acreage.

The available supply from the proposed reservoir was estimated using two methods. In the first method, a draft-storage relationship for the Rockfish Creek station near Hope Mills, provided in the 1975 USGS Publication, *Evaluation of Reservoir Sites in North Carolina*, was utilized to estimate the available storage. The total storage volume for a 1,500 acre reservoir at Rockfish Creek is estimated to be 27,000 acre-ft based on an average depth of 18 feet reported in the Reservoir Feasibility Study. According to the draft-storage relations provided in the 1975 USGS Reservoir Evaluation, this storage volume would provide a 50-year total draft rate of 226 cfs. Accounting for evaporation (estimated as 1.5 cfs, or 1 mgd, based on an assumed net evaporation rate of 10 inches/year from the reservoir surface) and infiltration (5 cfs maximum assumed in the Reservoir Feasibility Study), one would conclude that a net

available draft of 219 cfs (141 mgd) is available for reservoir release and water demand consumption. It is unknown what the minimum spillway overflow requirement would be for this reservoir. In the Jordan Lake Application Guidelines, the DWR indicates that it will provide guidance in estimating the minimum release for proposed reservoirs. If it assumed that the minimum reservoir release would be the 90% exceedance flow (116 cfs or 75 mgd), then the yield for the reservoir would be approximately 106 cfs (66 mgd).

Because the validity of the reservoir yield estimate using data from the 1975 USGS Reservoir Evaluation is unknown, a simple spreadsheet model, set-up using a daily time step methodology, was also used to estimate the safe yield. This model also provided flexibility to test various reservoir operating rules, including minimum release practices. Reservoir inflows through basin runoff were assumed to equal the daily stream flow records for Rockfish Creek near Hope Mills, NC. The period of record for this gage station includes April 1929 to December 1931 and March 1939 to December 1954. It was assumed that 25% of the total storage volume of 27,000 acre-feet would be storage reserve to account for the following:

- More severe drought conditions than modeled
- Future storage losses through sedimentation
- Protection of raw water quality
- Protection of fisheries
- Some protection of recreational use.

Net evaporation was estimated using 10 inches/year for net evaporation from the reservoir surface to simulate dry year conditions. At this evaporation rate, the net evaporation during drought conditions is estimated to be 1.0 mgd. Seepage losses were estimated to be 3 mgd based on data provided in the Cumberland County Preliminary Siting and Reservoir Feasibility Study.

Based on the above assumptions, the safe yield was estimated assuming three minimum reservoir releases. In the first case, the minimum reservoir release was set at 0 mgd to compare the safe yield projected by the model to the safe yield estimated using the USGS methodology. The resulting safe yield estimate for this scenario is

137 mgd, which is consistent with the 141 mgd safe yield projected by the USGS methodology.

The second and third scenarios considered the effects of various reservoir release schedules on the safe yield. In the second scenario, the minimum reservoir release was defined as the greater of two-thirds of the previous daily inflow or the 90% exceedance flow (116 cfs or 75 mgd). Figures 5-1 and 5-2 illustrate the results of this model run. As shown on Figure 5-1, at this release rate, the safe yield of the reservoir was estimated to be 38 mgd. For the third case, the minimum reservoir release was defined as the lesser of the previous daily inflow or the 50% exceedance flow (342 cfs or 221 mgd). This more stringent reservoir release schedule would significantly reduce the available yield to 14 mgd. These case scenarios highlight the sensitivity of the safe yield estimate to the minimum release schedule.

In its March 2, 2001 letter summarizing comments on PWC's December 2000 Draft Application, DWR stated that PWC should use the minimum release defined in the second scenario for purposes of the Jordan Lake Application, which would correspond to a safe yield of 38 mgd. If this alternative were developed in the future, a more site-specific study would be required to determine actual minimum releases.

In its March 2, 2001 comments, DWR asked if any existing reservoirs in Cumberland County could be utilized as an alternative water supply. There are several existing reservoirs in Cumberland County, including a reservoir on Little Rockfish Creek in the Town of Hope Mills (Hope Mills Lake) and a reservoir on Rockfish Creek (Upchurch Pond). However, the Hope Mills Lake is currently drained due to dam failure. Until litigation is complete, Hope Mills Lake is not a viable water supply source. Based on a surface area of 200 acres and an average estimated depth of between 5 and 12 feet, Upchurch Pond has an estimated volume of between 1,000 and 2,400 acre-feet (326 to 782 MG). In comparison to the new reservoir alternative, which has a total storage volume of 27,000 acre-feet (8,800 MG), both of these existing reservoirs are more than an order of magnitude smaller in volume. Based on this evaluation, it is concluded that existing reservoirs in Cumberland County would not be large enough to provide an adequate supply to PWC.

FIGURE 5-1

SIMULATED ROCKFISH CREEK RESERVOIR STORAGE HISTORY (MAR 1939 - DEC 1954)

Demand = 38 MGD; Minimum Release = Greater of 2/3 of Previous Daily Inflow or 90% Exceedance Flow

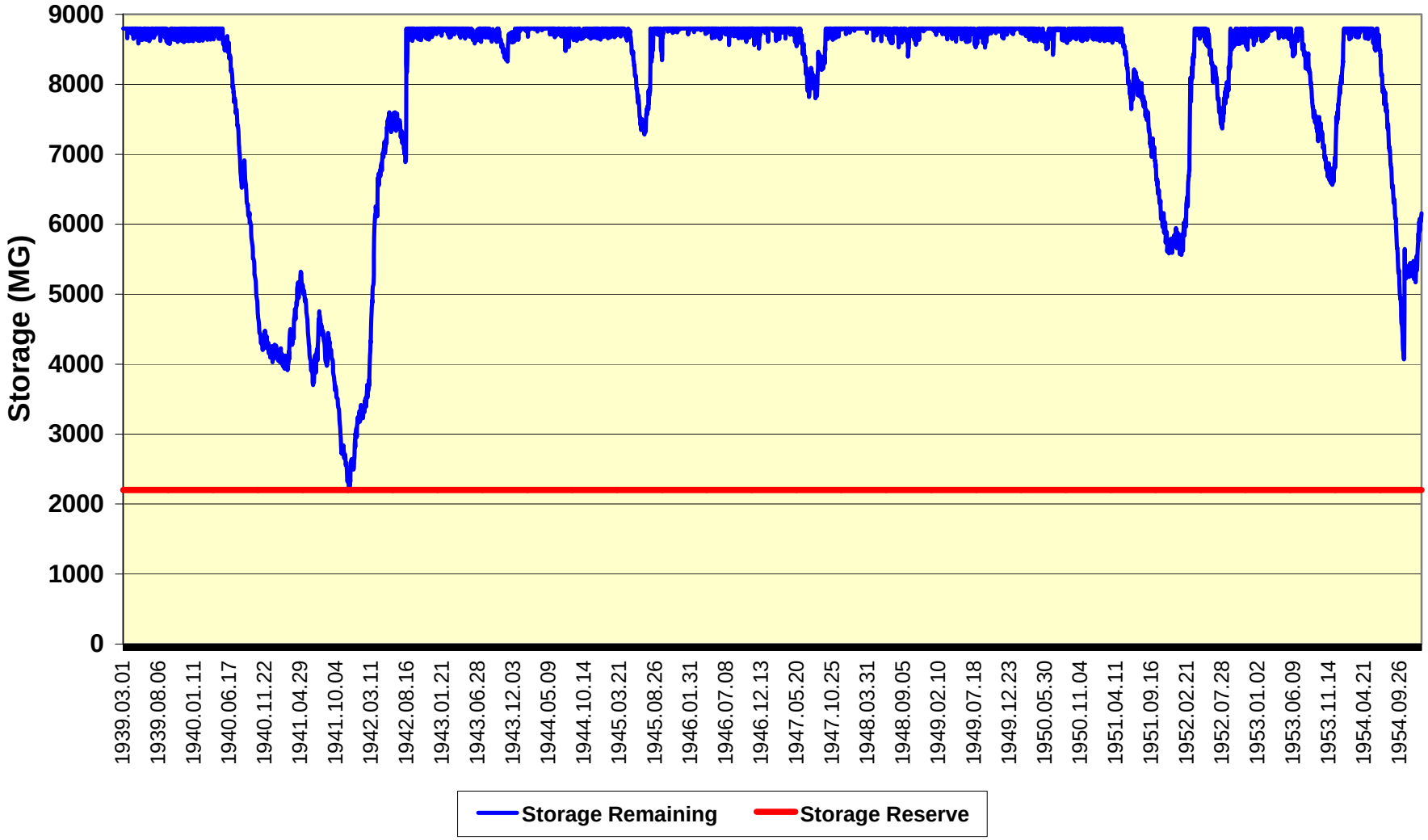
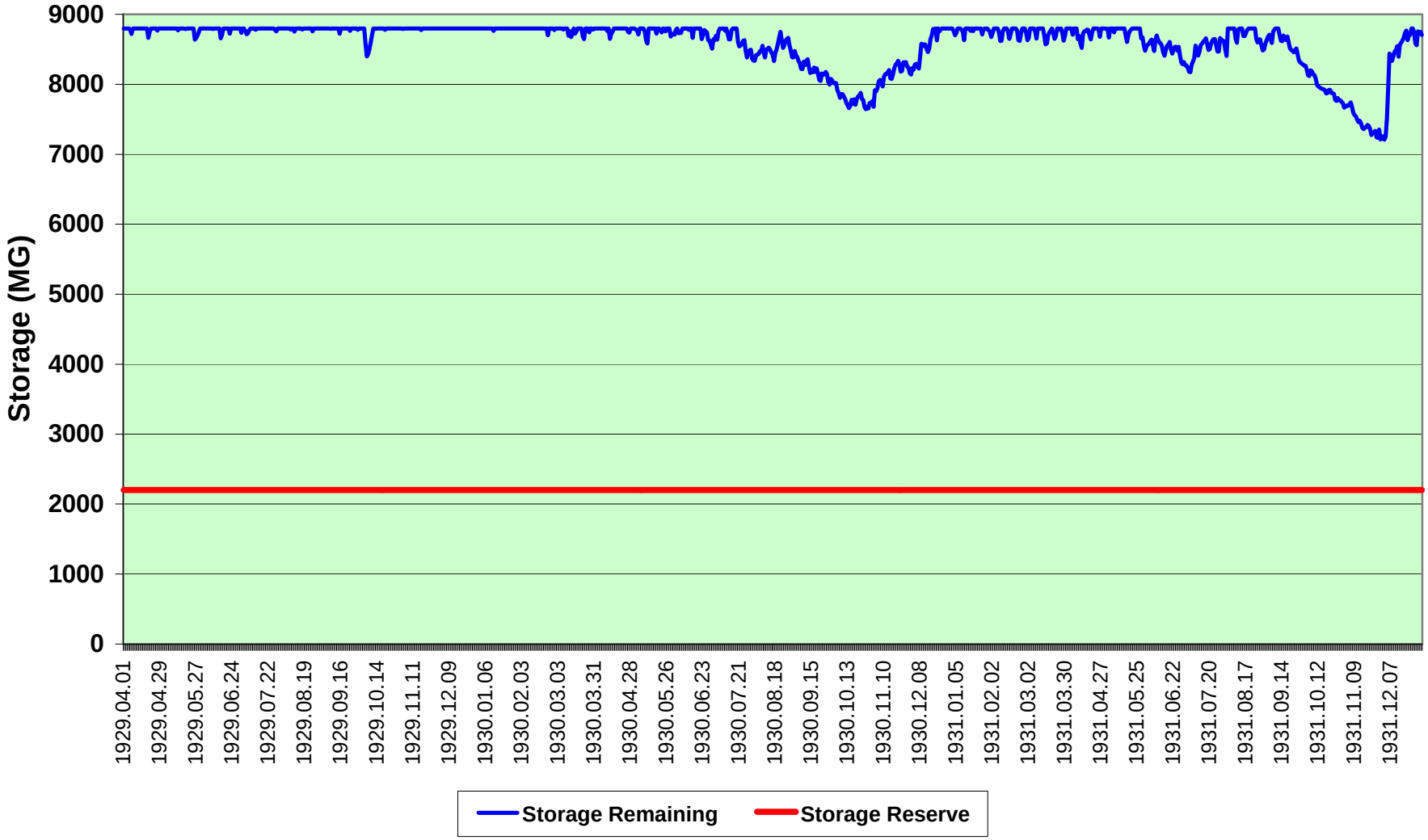


FIGURE 5-2

SIMULATED ROCKFISH CREEK RESERVOIR STORAGE HISTORY (APR 1929 - DEC 1931)

Demand = 38 MGD; Minimum Release = Greater of 2/3 of Previous Daily Inflow or 90% Exceedance Flow



Interbasin Transfer from the Lumber River Basin

This alternative considers supplementing PWC's existing raw water supply by transmission of raw water from another river basin. The closest surface water source to PWC that is not part of the Cape Fear River Basin is the Lumber River Basin. The Neuse River is the closest surface water source east of Fayetteville, but it is located substantially farther away from the PWC service area than the Lumber River. It is estimated that this alternative would require installation of approximately 33-miles of transmission line along the I-95 corridor between Fayetteville and the town of Lumberton. Because the Lumber River is not flow regulated, allowable withdrawals would be constrained by low-flow (drought) conditions. The closest available flow data for the Lumber River is a gage station located near Maxton, NC. At this station, the Lumber River is reported to have 365 mi^2 of drainage area. Based on flow data from 1987 through 1999, the lowest daily mean flow and annual 7-day minimum flow at this gage station were reported to be 75 cfs (1999) and 79 cfs (1999), respectively. Much lower flows probably occurred at this station in 1968, based on lower flows reported at another gage station in Boardman, NC (68 cfs lowest daily mean flow and 72 cfs annual 7-day minimum flow) with a significantly larger drainage area of 1,228 mi^2. These flows are so low that substantial drawdown would occur to satisfy PWC's demand. In addition, parts of the Lumber River, located both upstream and downstream of the proposed withdrawal location, have been designated, based on recommendations from the National Park Service, as a National Wild and Scenic River System. In addition, the Lumber River has also been designated by the State as a North Carolina Natural and Scenic River. As such, excessive drawdown would be unacceptable to preserving the river's scenic designation. For these reasons, the Lumber River is not considered a viable water supply option for the PWC.

Interbasin Transfer from Reservoir Located on Yadkin-Pee Dee River

In addition to siting a new reservoir, the PWC has also investigated transferring raw water from existing reservoirs located on the Yadkin-Pee Dee River. Although there are multiple reservoirs located on the Yadkin-Pee Dee River, only the more closely located reservoirs were considered for PWC. There are three consecutive reservoirs that are part of the Yadkin Chain lakes that are located west of the PWC service area. These reservoirs include:

- Badin Lake on the Yadkin River (farthest upstream).
- Lake Tillery on the Pee Dee River.

- Blewett Falls Lake on the Pee Dee River (farther downstream).

All three of these reservoirs are large impoundments used by either Carolina Power and Light (CP&L) or Yadkin, Inc. for power generation. Table 5-1 shows reported hydrologic data for the three reservoirs.

Table 5-1 Hydrologic Data For Yadkin Chain Lakes

Reservoir[1]	Drainage Area (sq. miles)	Total Capacity (acre-ft)	Usable Capacity (acre-ft)	Surface Area (acres)
Badin Lake	4,180	241,000	129,000	5,350
Lake Tillery	4,600	167,000	136,000	5,264
Blewett Falls Lake	6,830	97,000	42,500	2,570

[1]Data from NC Water Resources Data Report (USGS, Water Year 1999) and the 1998 Yadkin-Pee Dee River Basinwide Water Quality Management Plan.

Transmission of additional water supply from any of these reservoirs would require installation of a new raw water intake, pump stations, and a transmission line between Fayetteville and the reservoir. Of the three reservoirs, Blewett Falls is the closest to Fayetteville and would require the least linear footage of transmission line. It is estimated that a transmission line between Fayetteville and Blewett Falls would require installation of approximately 70 miles of transmission line. Because almost all of Montgomery County east of Badin Lake and Lake Tillery is designated as national forest, routing of a raw water transmission line to these reservoirs would be more difficult in comparison to routing to Blewett Falls. To avoid routing the transmission line through the national forest, an additional 20 to 40 miles of transmission line would be required to reach Badin Lake or Lake Tillery above the 70 miles of transmission line required to reach Blewett Falls.

Based on available location and potential environmental and institutional impacts, Blewett Falls Lake appears to be the most favorable reservoir on the Yadkin-Pee Dee River for PWC to use as a supplemental raw water supply. Therefore, a preliminary evaluation of reservoir and stream data was performed to determine if Blewett Falls Lake would have sufficient storage to support the withdrawal rates the PWC would likely need. Based on USGS data (Water Years 1928 – 1999) for the Pee Dee River

near Rockingham, NC, the following data were reported for the Pee Dee River just downstream of Blewett Falls Dam:

- 6,863 mi^2 of drainage area.
- Lowest daily mean flow: 58 cfs (1951).
- Annual 7-Day minimum flow: 185 cfs (1985).
- 90% exceedance flow: 1,750 cfs.

As shown in Table 5-1, Blewett Falls Lake has 31.6 billion gallons (97,000 acre-ft) of total storage volume and 13.8 billion gallons (42,500 acre-ft) of usable volume. In addition, based on stream flow data, flows just downstream of the dam exceed 1,131 mgd (1,750 cfs) 90% of the time. The large storage buffer of the lake should provide ample supply for the periods when extreme low flow events occur. Even with minimum inflows to the lake, 13.8 billion gallons would provide hundreds of days of supply at the withdrawal rate that PWC would likely need. Therefore, it can be concluded that Blewett Falls Lake is large enough to provide adequate supply to PWC, even during periods of minimum inflow to the lake.

Because use of Blewett Falls Lake would be considered an IBT, two sub-alternatives will be evaluated in the alternatives analysis. The first will consider only transferring raw water from Blewett Falls Lake to the P.O. Hoffer WTF. The second sub-alternative will also include a second transmission line for returning wastewater treatment effluent back to the Pee Dee River Basin to minimize impacts of the IBT.

Groundwater Sources

This alternative consists of pumping groundwater from local aquifers to supplement the Cape Fear River raw water surface supply. In evaluating groundwater supplies, two main issues must be addressed. First, the aquifers must provide an adequate safe yield to support the water demand. Second, the new wells must not result in a significant drawdown of groundwater levels in regional aquifer formations.

In 1997, the PWC performed a preliminary ASR evaluation. The results from this evaluation are documented in a Preliminary Engineering Report, Implementation of an Aquifer Storage and Recovery System (Hazen and Sawyer, 1997). As part of this

evaluation, local hydrogeologic conditions were evaluated. Supporting data for the following groundwater evaluation are provided in the ASR evaluation.

Fayetteville is situated 50 miles east of the western border of the North Carolina Coastal Plain. The two main aquifer formations located in the vicinity of the Fayetteville area are the Black Creek aquifer and the Cape Fear aquifer. From the 1997 Fayetteville hydrogeologic evaluation, it was concluded that the local hydrogeologic framework is highly variable and that most of the aquifers in the PWC service area are low yielding. The three main aquifers in the PWC service area include the surficial sand aquifer, the Cretaceous sand aquifer (which includes the Black Creek Aquifer), and the Cretaceous clay aquifer. Although the surficial aquifer is permeable, because of the relative thinness of this aquifer, sustainable yields from this aquifer are less than 50 gpm (0.072 mgd). The Cretaceous sand aquifer is the most productive aquifer in the Cumberland County area and is capable of achieving yields in excess of 100 gpm (0.144 mgd). In its 1992 Local Water Supply Plan, the Town of Spring Lake reported 24-hour yields of 142 gpm (0.205 mgd) and 172 gpm (0.247 mgd) for its two regularly operated groundwater wells in the Black Creek Aquifer. The Cretaceous clay aquifer, the least productive of the three aquifers, generally achieves yields of less than 20 gpm (0.029 mgd).

Parts of the North Carolina Coastal Plain, particularly the central and eastern sections, have experienced substantial decreases in potentiometric surfaces of several aquifers in areas where the groundwater demand exceeds the demands. A 1991 USGS Simulation of Ground Water Flow in the Coastal Plain Aquifer System on North Carolina indicated that, based on existing well systems, drawdowns in the western part of the Black Creek and Upper Cape Fear aquifers in the vicinity of the PWC service area are not substantial. However, it is unknown what a substantial increase in the groundwater pumping system would have on the groundwater aquifers in the western region of the Coastal Plain.

In summary, based on local hydrogeologic conditions in the Fayetteville area, groundwater yields are too low to support long-term water supply needs for the PWC. In addition, it is unclear what a substantial increase groundwater demand in the western region of the North Carolina Coastal Plain would have on regional drawdowns, particularly when central and eastern sections of the regional aquifers are already showing evidence of depletion.

Offstream Storage in Local Quarry

In 1998, the PWC performed a site feasibility study for a raw water impoundment for the P.O. Hoffer Plant (CDM, 1998) for water quality management. One of the potential storage sites was an existing water quarry owned by the City of Fayetteville and located about two miles north of the P.O. Hoffer WTF near the west bank of the Cape Fear River. The quarry was reported to have a surface area of 12 acres and an average depth of 10 feet. Based on these values, the total storage capacity of this quarry is 120 acre-ft or 39 million gallons. This quarry was ultimately eliminated as a potential raw water storage impoundment for several reasons, including the fact that the quarry was being considered for an alternative use and the quarry was found to under the direct influence of groundwater.

A preliminary evaluation of other quarries in Cumberland County was performed to identify potential sites for offstream raw water storage. Based on information from NC DENR's Division of Land Resources' 1999 mine location maps and data tables for North Carolina, two large, inactive sand/gravel quarries were found to be located south of Fayetteville within a few miles of the Cape Fear River. These quarries included Holmes Pit, a 39.6 acre quarry and W.J. Construction Company Pit, a 18.5 acre quarry. A detailed feasibility analysis would need to be conducted to confirm the storage volume and assess the suitability of these quarries for raw water storage. An initial evaluation, however, indicates that these quarries would provide small storage volumes (on the order of less than 100 to 200 million gallons) that would be capable of providing only a few days of supply to PWC during low flow periods. Therefore, it is concluded that there is not a local quarry large enough to store a large enough supply to justify this option as a long-term water supply alternative.

Aquifer Storage and Recovery

Aquifer storage and recovery (ASR) is the injection and storage of potable water in the ground for later retrieval. A preliminary ASR evaluation was performed for the PWC and is reported in a Preliminary Engineering Report titled, Implementation of an Aquifer Storage and Recovery System (Hazen and Sawyer, 1997). Results from this evaluation indicated that insufficient hydrologic data were available to determine the aquifer storage capacity. In addition, yield capacity for existing wells were found to be highly variable throughout the Fayetteville service area, ranging from low yields of less than 20 gpm to higher, more productive yields of greater than 100 gpm. Results from this investigation also indicated that permitting for ASR would be difficult. In addition, it was found that injection of treated surface water into the aquifers could result in several

potentially negative geochemical reactions, including dissolution of iron and precipitation of iron hydroxides and potential swelling of clays. For these reasons, ASR is not at this time considered a viable long-term water supply option for PWC.

Non-Potable Reuse

Non-potable reuse, or water reclamation, is the use of highly treated wastewater to satisfy non-potable demands for water. Potential non-potable water users in the PWC service area include large industrial users and the PWC co-generation facility. In August of 2011, a Water Reuse Feasibility Study was prepared for the PWC by McKim & Creed. This report concluded that wastewater reuse was a technically feasible option, and provided the following estimates of demand that could potentially be supplied:

- Cross Creek Wastewater Reclamation Facility: includes a service to 94 potential users totaling 6.4 MGD average daily demand. The total cost for Phases 1 through 4 was estimated at $11,028,000 (excludes O&M).
- Rockfish Creek Wastewater Reclamation Facility: includes service to six potential users totaling 1.63 MGD average daily demand. The total cost for Phases 1 through 4 was estimated at $3,582,000 (excludes O&M).

The projected impact to the water / sanitary sewer rate structure from debt accumulated to implement a Water Reuse System was deemed too adverse. Hence, further planning and design of a Water Reuse system are on hold at this time.

Bulk Water Purchase

As the primary purveyor of water to Cumberland County, the PWC is the only significant water supplier in the Fayetteville region. Harnett County, located upstream of the PWC, is the second largest water supplier in the neighboring counties. However, Harnett County also relies on the Cape Fear River for its raw water supply. As supported by its Round 2 Jordan Lake Water Supply Allocation Request of 12 mgd, Harnett County, like the PWC, also projects the need for additional water supply beyond its current allocation. In the September 2000, Round 2 Jordan Lake Water Supply Storage Allocation and IBT Recommendations, DWR did not recommend granting any additional water supply storage allocation to Harnett County. This decision was based on DWR's projection that Harnett County would still have a 19-

mgd supply surplus in 2015. However, it should be noted that the 2015 supply surplus was based on substantially reducing the County's demand projections and maintaining the 600 □50 cfs minimum target flow at the Lillington gage station on the Cape Fear River. Because flows at Lillington have frequently dropped below the minimum target, Harnett's "surplus" is considered uncertain at this time. In addition, given that Harnett County is waiting for analysis of available Cape Fear River supply to be completed, bulk water purchase from Harnett County is not considered a feasible alternative for the PWC.

5.2 Comparison of Feasible Alternative Water Supplies

Based on the above analysis of potential alternative water supply options for the PWC, feasible long-term water supply options were identified that could be used to supplement PWC's existing surface water supply. Based on the feasibility analysis, the following water supply options were considered for further evaluation:

- Jordan Lake Allocation (via Cape Fear River Withdrawal Facilities).
- New Reservoir in Cumberland County.
- Blewett Falls Lake.

The JLA-4 workbook in Appendix B provides a summary of the alternatives evaluation. A discussion of the evaluation criteria is provided below.

Available Supply

All three water supply alternatives would provide a large enough water supply to be considered a stand-alone water supply option for providing a supplemental water supply to PWC.

As explained previously, the U.S. Army Corps of Engineers has estimated that the safe yield of the Jordan Lake water supply pool is approximately 100 mgd. To date, 63 mgd of the total supply has been allocated to surrounding water systems. Consequently, a maximum of 37 mgd of the 100 mgd Jordan Lake supply could be allocated during Round 4.

Based on data from NC Water Resources Data Report (USGS, Water Year 1999), Blewett Falls Lake has a usable capacity of approximately 13.8 billion gallons (42,500 acre-ft). Based on this usable capacity and stream data just downstream of the reservoir, it is estimated that Blewett Falls Lake would be capable of providing a supplemental water supply in excess of 30 mgd even during sustained low-flow periods.

As described in Section 5.1, the safe yield for the Cumberland County reservoir alternative is estimated to be 38 mgd based on an assumed minimum release defined as the greater of two-thirds of the previous daily inflow or the 90% exceedance flow (116 cfs or 75 mgd).

Environmental Impacts

Of the three alternatives, the Cape Fear River withdrawal facilities expansion would have the least environmental impact. Expansion of the Cape Fear River withdrawal facilities would only require installation of new pumps to increase the design and firm pumping capacity and minor modifications to existing transmission lines. No in-stream construction would be required.

Siting of a Cumberland County reservoir near Hope Mills would significantly impact wetlands and also will result in flooding of existing roadways, farmlands, forest and residential sites, including a cemetery and golf-course. Of the three likely alternatives, siting of a new reservoir would have the most significant environment impacts and would likely require preparation of an extensive environmental impact statement.

The environmental impacts of using Blewett Falls Lake as a raw water source are considered moderate in comparison to the other two alternatives. This alternative would require construction of a raw water intake, pumping stations, and an approximate 70-mile transmission line. An environmental assessment or environmental impact statement would be required to determine the impacts of this alternative. Since this alternative would result in substantial transfer of water from the Yadkin-Pee Dee River Basin to the Cape Fear River Basin, an IBT certificate would also be required.

Water Quality Classification

All potential alternative water supply sources are classified as WS-IV, which is the same classification as all existing raw water sources for PWC.

Timing

The Cape Fear River withdrawal facilities expansion could be implemented in a very short period (less than two years), once an allocation is granted. Conversely, siting of a reservoir would require a significantly longer planning period. The permitting period alone for a new reservoir can require in excess of 10 years for some reservoirs. Therefore, it was assumed that the new reservoir alternative would require between a 10 and 20 year planning horizon. CP&L's FERC license for Blewett Falls Lake is up for reissuance in 2008. The planning period for the license renewal is five years. The proposed interbasin transfer would be an integral part of the license renewal process. The total time to permit and implement the Blewett Falls Lake alternative is estimated to be on the order of 10 years given the FERC re-licensing schedule.

Interbasin Transfer

As previously discussed, the majority of Cumberland County and eastern Hoke County lie within the Cape Fear River Basin, and PWC discharges its treated wastewater effluent to the Cape Fear River Basin. Therefore, continued PWC use of Jordan Lake releases via Cape Fear River withdrawals would probably not result in significant interbasin transfer (IBT). In addition, because the Cumberland County reservoir would be supported by a tributary of the Cape Fear River Basin, this alternative would also likely not result in significant IBT. The only alternative that would result in significant IBT would be transmitting water from Blewett Falls Lake. Even if wastewater effluent were discharged back to the Blewett Falls Lake, some IBT would occur. The IBT quantities could not be estimated since these values are dependent on PWC's yet unquantified deficit. Once the available PWC supply is known, and the deficits are determined, then the IBT quantities can be estimated for this alternative.

Regional Partnerships

While no regional partnerships would be organized as part of the Cape Fear withdrawal expansion, a regional partnership with Cumberland County and local governments would be an integral part of developing a Cumberland County Reservoir on Rockfish Creek. In addition, if Blewett Falls Lake were used as a supplemental raw water

supply, then tie-ins to the transmission line could be coordinated with other regional communities.

Technical, Institutional, and Political Complexity

As explained in Section 5.1, expansion of Cape Fear River withdrawals by PWC beyond what is considered the "available supply" at Fayetteville could require a Jordan Lake water supply allocation. Apart from the allocation, this alternative would be considered the easiest to implement technically and institutionally. Because the expansion would require minimal upgrades (installation of new pumps), no disturbance to the river is expected.

Siting and development of a Cumberland County Reservoir is considered technically, institutionally, and politically very complex. Planning for this reservoir would require coordination with several state and federal agencies to complete the required environmental impact studies. In addition, zoning and permitting would require cooperation with the local authorities (particularly the Town of Hope Mills), the County, and the State.

Use of Blewett Falls Lake is considered complex from a technical viewpoint, given the long distance of the transmission line. Environmental impact studies would require coordination will several state and federal agencies. In addition, an interbasin transfer certificate would be required from the EMC. Therefore, this alternative is considered institutionally and politically very complex.

Public Benefits

Of the three alternatives, the Cumberland County reservoir is the only alternative that would provide additional public benefits beyond the addition of raw water supply for the PWC service area. The reservoir alternative would be sized to provide recreational benefits in addition to water storage.

Consistency with Local Plans

Continued use of Cape Fear River withdrawals is consistent with Fayetteville area plans. However, for the other two alternatives, this information will be provided in the final application once PWC's deficit projections are known and alternatives can be appropriately sized and evaluated in more detail.

Cost

Detailed construction and operating costs were not developed for the application. However, relative project costs are compared. Of the three alternatives, the Cape Fear River withdrawal facilities would be the most cost effective and would be expected to be a fraction of the cost of the other alternatives. Conversely, the cost for developing a Cumberland County Reservoir would be substantial (tens of million dollar investment). The costs of installing a 70-mile transmission line from Blewett Falls Lake to the PWC water system would also be substantial (i.e., several orders of magnitude higher) in comparison to expansion of Cape Fear River withdrawal facilities.

5.3 Alternatives Summary

As described in the above alternatives analysis, the Cape Fear River is the most favorable and viable water supply for the Fayetteville PWC. Other alternatives (Cumberland County Reservoir on Rockfish Creek and Blewett Falls Lake) would require significantly longer planning horizons, development of environmental impact statements, significant mitigation of environmental impacts (Cumberland County Reservoir alternative) and major capital investments. In addition, the continued use of the Cape Fear River would minimize the need for potential IBT for the PWC service area. The PWC currently relies on the Cape Fear River for its raw water source, and analysis of long-term water supply alternatives indicates that the PWC should continue to use the Cape Fear as its major raw water source.

6. Plans to Use Jordan Lake

The PWC is requesting a Level II supply allocation of 10 MGD from the Jordan Lake water supply pool to meet long-term water demands. If PWC were granted an allocation, the raw water would be withdrawn from the existing Cape Fear River intakes.

Since PWC would continue to make use of Cape Fear River withdrawals, rather than direct withdrawals from Jordan Lake, monitoring of Jordan Lake water quality would not be necessary to establish raw water quality suitability for PWC. However, all raw and finished water that PWC uses from the Cape Fear River Basin are and will continue to be monitored in accordance with the EPA and NC DENR regulations. PWC operates the Cross Creek laboratory, which is a state certified laboratory capable of performing

most of the required raw and finished water quality monitoring. Analysis of parameters for which the laboratory is not certified is contracted out to various environmental testing laboratories.

ARCADIS

Appendix A

2013 Local Water Supply Plan for
Fayetteville, NC PWC

Fayetteville

2013

The Division of Water Resources (DWR) provides the data contained within this Local Water Supply Plan (LWSP) as a courtesy and service to our customers. DWR staff does not field verify data. Neither DWR, nor any other party involved in the preparation of this LWSP attests that the data is completely free of errors and omissions. Furthermore, data users are cautioned that LWSPs labeled **PROVISIONAL** have yet to be reviewed by DWR staff. Subsequent review may result in significant revision. Questions regarding the accuracy or limitations of usage of this data should be directed to the water system and/or DWR.

1. System Information

Contact Information

Water System Name:	Fayetteville	PWSID:	03-26-010
Mailing Address:	P. O. Box 1089 Fayetteville, NC 28302	Ownership:	Municipality
Contact Person:	M. J. Noland	Title:	Chief Operating Officer. WRD
Phone:	910-223-4733	Fax:	910-829-0207

PROVISIONAL

Distribution System

Line Type	Size Range (Inches)	Estimated % of lines
Asbestos Cement	2-16	18.00 %
Cast Iron	4-30	22.00 %
Ductile Iron	4-48	16.00 %
Galvanized Iron	0	0.00 %
Polyvinyl Chloride	2-16	44.00 %

What are the estimated total miles of distribution system lines? 1,354 Miles
How many feet of distribution lines were replaced during 2013? 6,728 Feet
How many feet of new water mains were added during 2013? 58,109 Feet
How many meters were replaced in 2013? 2,308
How old are the oldest meters in this system? 16 Year(s)
How many meters for outdoor water use, such as irrigation, are not billed for sewer services? 6,672
What is this system's finished water storage capacity? 36.100 Million Gallons
Has water pressure been inadequate in any part of the system since last update? No

29,558 feet of cast iron mains were lined in 2013.

Programs

Does this system have a program to work or flush hydrants? Yes, Annually
Does this system have a valve exercise program? Yes, 2 Years or More
Does this system have a cross-connection program? Yes
Does this system have a program to replace meters? Yes
Does this system have a plumbing retrofit program? Yes
Does this system have an active water conservation public education program? Yes
Does this system have a leak detection program? Yes

PWC performs unidirectional flushing of all water mains through fire hydrants on a five year cycle. The City of Fayetteville and Cumberland County Fire Departments inspect and work all fire hydrants on an annual basis.

All valves are inspected/operated during unidirectional flushing of the distribution system. All valves 16" and larger are exercised annually.

PWC utilizes various mechanical and electronic leak detection devices to pinpoint known or suspected leaks. Chemical test kits are also used by field

crews to determine if water is potable or non-potable.

In 2013, PWC began a pilot program to offer financial incentives to customers who switch to High Efficiency Toilets (HET).

Water Conservation

What type of rate structure is used? Flat/Fixed, Increasing Block, Uniform

How much reclaimed water does this system use? 0.160 MGD For how many connections? 2

Does this system have an interconnection with another system capable of providing water in an emergency? No

"Flat/Fixed" rate is the PWC temporary water rate. "Increasing Block" is for residential & irrigation. "Uniform" is for non-residential, non-residential irrigation, large water users & fire hydrant connections.

Reclaimed water is used for irrigation at the Cross Creek and Rockfish Creek Water Reclamation Facilities during the months of May thru Sept.

PWC has an interconnection with Harnett County, by way of both the Town of Spring Lake and Ft. Bragg, however this interconnection would be of little value in meeting the daily water requirements of the PWC. There are no other utilities within reasonable proximity with either the pumping or line capacity to supply PWC's customer base with water, even on an emergency basis.

2. Water Use Information

Service Area

Sub-Basin(s)	% of Service Population	County(s)	% of Service Population
Cape Fear River (02-3)	100 %	Cumberland	100 %

What was the year-round population served in 2013? 203,500

System Map: keep Fayetteville_2013.pdf

Has this system acquired another system since last report? No

In 2013, PWC and Harnett County supplied all of Ft. Bragg's water. This water demand is split 50/50 between the two utilities.

Water Use by Type

Type of Use	Metered Connections	Metered Average Use (MGD)	Non-Metered Connections	Non-Metered Estimated Use (MGD)
Residential	77,141	10.305	0	0.000
Commercial	6,469	5.454	4	0.008
Industrial	7	1.668	0	0.000
Institutional	0	0.000	0	0.000

How much water was used for system processes (backwash, line cleaning, flushing, etc.)? 2.896 MGD

Reduction in the number of customers from last year's PWC LWSP update, is a result of no longer supplying water to the Eastover Community. In November of 2012, Eastover began purchasing its water from the City of Dunn.

Water Sales

Purchaser	PWSID	Average Daily Sold (MGD)	Days Used	Contract MGD	Contract Expiration	Contract Recurring	Required to comply with water use restrictions?	Pipe Size(s) (Inches)	Use Type
Brettonwood Hills	03-26-286	0.012	365		2017	Yes	Yes	16	Regular
Brookwood South	50-26-018	0.171	365			Yes	Yes		Regular
Cliffdale West	03-26-332	0.000	26			Yes	Yes		Emergency
East Gate	03-26-280	0.014	365			Yes	Yes		Regular

Fort Bragg	03-26-344	2.203	365	2012	Yes	No	24	Regular
Hoke County	03-47-025	0.519	365	2012	Yes	Yes	16	Regular
Kelly Hills	03-26-300	0.006	365	2017	Yes	Yes	8	Regular
Rain Tree II	03-26-375	0.019	365		Yes	Yes		Regular
Stoney Point	03-26-341	0.020	91		Yes	Yes		Regular
Tangelwood South	03-26-367	0.015	365		Yes	Yes		Regular
Town of Spring Lake	03-26-020	0.702	365	2014	Yes	Yes	16	Regular
Town of Stedman	03-26-030	0.109	365		Yes	Yes	12	Regular

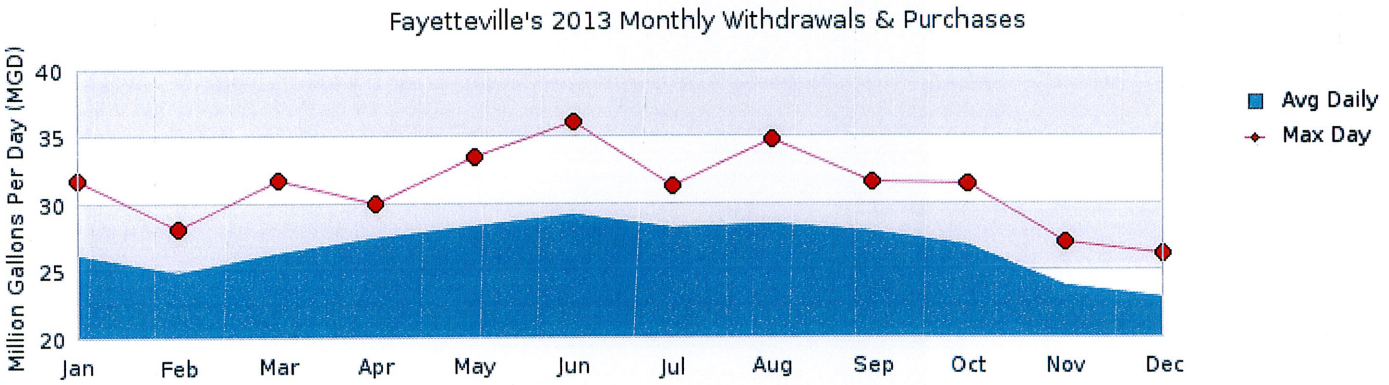
Contract amounts are as follows: Brettonwood Hills: no more than 864,000 per month., Ft. Bragg: no more than 8 MGD, PWC began supplying 50% of all Ft. Bragg water in 2010., Hoke County: no less than 4,000,000 per month and no more than 6,000,000 per month., Kelly Hills: no more than 486,000 per month., Spring Lake: 13,000,000 per month., Stedman: no less than 1,035,000 and no more than 5,000,000 per month.

3. Water Supply Sources

Monthly Withdrawals & Purchases

	Average Daily Use (MGD)	Max Day Use (MGD)		Average Daily Use (MGD)	Max Day Use (MGD)		Average Daily Use (MGD)	Max Day Use (MGD)
Jan	26.007	31.728	May	28.257	33.417	Sep	27.788	31.624
Feb	24.658	28.075	Jun	29.058	36.137	Oct	26.727	31.456
Mar	26.207	31.664	Jul	28.119	31.245	Nov	23.732	27.119
Apr	27.360	29.997	Aug	28.344	34.781	Dec	22.794	26.231

Withdrawals include water from both the Cape Fear River and Glenville Lake.



Surface Water Sources

Stream	Reservoir	Average Daily Withdrawal		Maximum Day Withdrawal (MGD)	Available Raw Water Supply		Usable On-Stream Raw Water Supply Storage (MG)
		MGD	Days Used		MGD	* Qualifier	
Big Cross Creek		0.000	0	0.000	0.900	F	0.000
Cape Fear - 2		7.967	169	12.540	42.900	F	0.000
Cape Fear River - 1		17.608	365	27.169	42.900	F	0.000
Little Cross Creek	Glenville Lake	7.635	253	11.204	4.500	SY50	250.000

* Qualifier: C=Contract Amount, SY20=20-year Safe Yield, SY50=50-year Safe Yield, F=20% of 7Q10 or other instream flow requirement, CUA=Capacity Use Area Permit

Surface Water Sources (continued)

Stream	Reservoir	Drainage Area (sq mi)	Metered?	Sub-Basin	County	Year Offline	Use Type
Big Cross Creek		15	No	Cape Fear River (02-3)	Cumberland		Emergency
Cape Fear - 2		4,360	Yes	Cape Fear River (02-3)	Cumberland		Regular
Cape Fear River - 1		4,360	Yes	Cape Fear River (02-3)	Cumberland		Regular
Little Cross Creek	Glenville Lake	9	Yes	Cape Fear River (02-3)	Cumberland		Regular

What is this system's off-stream raw water supply storage capacity? 250 Million gallons

Are surface water sources monitored? Yes, Daily

Are you required to maintain minimum flows downstream of its intake or dam? Yes

Does this system anticipate transferring surface water between river basins? No

The 85.8 mgd estimate of PWC\'s available Cape Fear River supply was presented in DWR\'s October 2001 Round Three Jordan Lake water supply allocation recommendations and in DWR\'s March 2002 draft Cape Fear River Basin Water Supply Plan. However, PWC understands that this estimate may change owing to recent drought periods and the Corps of Engineers revised Jordan Lake drought management protocol and their effect on low flow statistics.

For reporting purposes, the total 85.80 mgd available supply is divided equally between the Cape Fear River-1 and the Cape Fear River -2 intakes referenced above.

Minimum flow of 4 cfs must be maintained downstream of the Glenville Lake dam.

Little Cross Creek feeds four impoundments, which have a total capacity of 250 MGD. This was considered by NCPWS as off-line storage, when the P.O. Hoffer WTF was granted an uprating.

Water Purchases From Other Systems

Seller	PWSID	Average Daily Purchased (MGD)	Days Used	MGD	Contract Expiration	Contract Recurring	Required to comply with water use restrictions?	Pipe Size(s) (Inches)	Use Type
Harnett County	03-43-045	0.000	0	0.000		No	No	N/A	Emergency

PWC has an interconnection with Harnett County, by way of both the Town of Spring Lake and Ft. Bragg, however this interconnection would be of little value in meeting the daily water requirements of the PWC.

Water Treatment Plants

Plant Name	Permitted Capacity (MGD)	Is Raw Water Metered?	Is Finished Water Ouput Metered?	Source
Glenville Lake WTF	18.000	Yes	Yes	Glenville Lake, Cape Fear River
P.O. Hoffer WTF	39.500	Yes	Yes	Cape Fear River

Did average daily water production exceed 80% of approved plant capacity for five consecutive days during 2013? No

If yes, was any water conservation implemented?

Did average daily water production exceed 90% of approved plant capacity for five consecutive days during 2013? No

If yes, was any water conservation implemented?

Are peak day demands expected to exceed the water treatment plant capacity in the next 10 years? No

Flow projections will need to be refined further as more usage data becomes available, especially with regards to both BRAC/Ft. Bragg and PWC's county-wide water efforts.

4. Wastewater Information

Monthly Discharges

	Average Daily Discharge (MGD)		Average Daily Discharge (MGD)		Average Daily Discharge (MGD)
Jan	23.800	May	24.000	Sep	24.700
Feb	24.800	Jun	27.700	Oct	24.000
Mar	24.500	Jul	31.900	Nov	23.500
Apr	24.200	Aug	26.800	Dec	24.800

How many sewer connections does this system have? 81,991

How many water service connections with septic systems does this system have? 7,813

Are there plans to build or expand wastewater treatment facilities in the next 10 years? Yes

An anticipated future Phase III expansion of the Rockfish Creek WRF to 28 MGD is likely to begin design in fiscal year 2017. PWC has on record an Environmental Assessment (EA) to expand the facility beyond the current 21 MGD permitted flow and has received permit limits for 28 MGD which will assist in future planning.

Wastewater Permits

Permit Number	Permitted Capacity (MGD)	Design Capacity (MGD)	Average Annual Daily Discharge (MGD)	Maximum Day Discharge (MGD)	Receiving Stream	Receiving Basin
NC0023957	25.000	25.000	11.680	21.100	Cape Fear River	Cape Fear River (02-3)
NC0050105	21.000	21.000	13.710	20.900	Cape Fear River	Cape Fear River (02-3)

Wastewater Interconnections

Water System	PWSID	Type	Average Daily Amount		Contract Maximum (MGD)
			MGD	Days Used	
Eastover Sanitary District	00-00-000	Receiving	0.056	365	0.000
Hoke County	03-47-025	Receiving	0.151	365	0.500
NORCRESS	00-00-000	Receiving	0.102	365	0.400
Town of Stedman	03-26-030	Receiving	0.099	365	0.000

5. Planning

Projections

	2013	2020	2030	2040	2050	2060
Year-Round Population	203,500	254,208	316,772	384,376	412,383	440,390
Seasonal Population	0	0	0	0	0	0
Residential	10.305	16.000	20.000	24.200	26.000	27.700
Commercial	5.462	6.900	8.600	10.400	11.100	11.900
Industrial	1.668	5.800	9.800	13.500	18.600	23.600
Institutional	0.000	0.000	0.000	0.000	0.000	0.000
System Process	2.896	2.900	3.500	4.200	4.800	5.300
Unaccounted-for	2.483	2.100	2.600	3.200	3.600	4.000

Future Supply Sources

Source Name	PWSID	Source Type	Additional Supply	Year Online	Year Offline	Type

Cape Fear River	03-26-010	Surface	2.500	2020	Regular

The first phase of expansion for the PO Hoffer WTF from 32 MGD to 48 MGD is underway. The expected project completion date is 2020. Initial Cape Fear River withdrawals expected to increase by 2.50 MGD.

Demand v/s Percent of Supply

	2013	2020	2030	2040	2050	2060
Surface Water Supply	90.300	90.300	90.300	90.300	90.300	90.300
Ground Water Supply	0.000	0.000	0.000	0.000	0.000	0.000
Purchases	0.000	0.000	0.000	0.000	0.000	0.000
Future Supplies		2.500	2.500	2.500	2.500	2.500
Total Available Supply (MGD)	90.300	92.800	92.800	92.800	92.800	92.800
Service Area Demand	22.814	33.700	44.500	55.500	64.100	72.500
Sales	3.775	3.790	3.790	3.790	3.790	3.790
Future Sales		0.000	0.000	0.000	0.000	0.000
Total Demand (MGD)	26.589	37.490	48.290	59.290	67.890	76.290
Demand as Percent of Supply	29%	40%	52%	64%	73%	82%

The purpose of the above chart is to show a general indication of how the long-term per capita water demand changes over time. The per capita water demand may actually be different than indicated due to seasonal populations and the accuracy of data submitted. Water systems that have calculated long-term per capita water demand based on a methodology that produces different results may submit their information in the notes field.

Your long-term water demand is 51 gallons per capita per day. What demand management practices do you plan to implement to reduce the per capita water demand (i.e. conduct regular water audits, implement a plumbing retrofit program, employ practices such as rainwater harvesting or reclaimed water)? If these practices are covered elsewhere in your plan, indicate where the practices are discussed here.

Are there other demand management practices you will implement to reduce your future supply needs? Currently implemented practices include increasing block water rates. Irrigation rate starts at the top tier. Continuation of odd/even irrigation schedule. Currently evaluating use of smart meters which would allow real time leak detection for customers and system monitoring for pressure problems and water main leaks. Consideration is also being given to time of use rates for water customers. On-going systematic rehabilitation/replacement of water mains and water laterals will reduce water loss due to main breaks and leakage. The budget for rehabilitation and replacement is increased approximately 5-10 % per year. Consideration is also being given to implementing customer plumbing retro-fit programs to reduce water usage and a water reuse study was recently completed to gauge the feasibility of starting a reuse program.

Reclaimed water is used for irrigation at the Cross Creek and Rockfish Creek Water Reclamation Facilities from May through September.

The PWC Water Shortage Response Ordinance (WSRO) is based on Cape Fear River and Jordan Lake levels, as well as daily water demands. The WSRO includes four stages of increasing water conservation, beginning in Stage I with a voluntary water alert, up to Stage IV, directing residential users to reduce water consumption to a level necessary to sustain human life and the lives of domestic pets and to maintain minimum standards of hygiene and sanitation.

What supplies other than the ones listed in future supplies are being considered to meet your future supply needs? There are none.

How does the water system intend to implement the demand management and supply planning components above? Implementation of smart meters is expected to start within one to two years.

Additional Information

Has this system participated in regional water supply or water use planning? Yes, Yes, PWC has participated in the Cape Fear River Water Supply Plan and the Cape Fear Lock and Dam Study. PWC has also been coordinating with Ft. Bragg and BRAC with regards to current and future regional water needs/expectations.

What major water supply reports or studies were used for planning? PWC Water System Master Plan, 2002 Update (CDM)
Cumberland County Rural Water Demands and Preliminary Water District Evaluation (CDM, May 2001)
Cumberland County Preliminary Siting and Reservoir Feasibility Study (Geometrics Engineering, January 2000)
Site Feasibility Study for the P.O. Hoffer Raw Water Impoundment (CDM, July 1998)
Implementation of an Aquifer Storage and Recovery System, PER (Hazen and Sawyer, May 1997)

Please describe any other needs or issues regarding your water supply sources, any water system deficiencies or needed improvements (storage, treatment, etc.) or your ability to meet present and future water needs. Include both quantity and quality considerations, as well as financial, technical, managerial, permitting, and compliance issues: For the distribution system, PWC has implemented an annual program for rehabilitating selected water mains via an epoxy or cement mortar lining system. These mains are predominately unlined cast-iron pipe that have tuberculated with age.

PWC is in need of a "safe-yield" amount from the State for future Cape Fear River withdrawals.

PWC is currently seeking a Jordan Lake water allocation.

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Appendix B

Jordan Lake Allocation Application - JLA-4 Workbook

Local Water Supply Plan supplemental information for Jordan Lake Allocation Application

Applicant	Public Works Commission of the City of Fayetteville
Date	14-Nov-14

Projections

Population to be Served

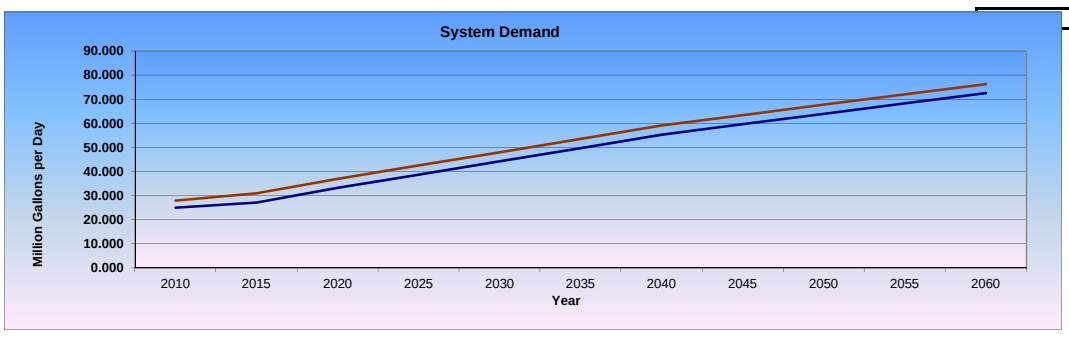
	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Year-round	199102	226655	254208	285490	316772	350574	384376	398380	412383	426387	440390
Seasonal (if applicable)	0	0	0	0	0	0	0	0	0	0	0

Indicate months of seasonal use	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec

Type of Use (Average Daily Service Area Demand in Million Gallons per Day (MGD) Do not include sales to other systems)

		2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
(1) Residential		11.042	13.521	16.000	18.000	20.000	22.100	24.200	25.100	26.000	26.850	27.700
Metered Irrigation												
(2) Commercial		5.403	6.152	6.900	7.750	8.600	9.500	10.400	10.750	11.100	11.500	11.900
Metered Irrigation												
(3) Industrial		1.630	3.715	5.800	7.800	9.800	11.650	13.500	16.050	18.600	21.100	23.600
Metered Irrigation												
(4) Institutional		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Metered Irrigation												
Sub-total		18.075	23.388	28.700	33.550	38.400	43.250	48.100	51.900	55.700	59.450	63.200
(5) System Processes	**% as Decimal** 0.08	2.782	2.2	2.6	3.0	3.4	3.8	4.2	4.5	4.8	5.1	5.4
(6) Unaccounted-for Water	**% as Decimal** 0.06	4.188	1.6	1.9	2.2	2.5	2.8	3.1	3.3	3.6	3.8	4.0
(7) Total Service Area Demand		25.045	27.192	33.249	38.778	44.307	49.836	55.365	59.697	64.029	68.304	72.579

Sales Commitments		2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Existing Sales Contracts (list buyer and years covered by contract)												
Brettonwood Hills			0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Brookwood South			0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171
Cliffdale West			0	0	0	0	0	0	0	0	0	0
East Gate			0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Fort Bragg			2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203	2.203
Hoke County			0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.519	0.519
Kelly Hills			0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
Rain Tree II			0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019
Stoney Point			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Tangelwood South			0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Town of Spring Lake			0.702	0.702	0.702	0.702	0.702	0.702	0.702	0.702	0.702	0.702
Town of Stedman			0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109
Existing commitments for additional Future Sales (list buyer)			0	0	0	0	0	0	0	0	0	0
Total Sales Contracts		2.969	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790
Total System Demand		28.014	30.982	37.039	42.568	48.097	53.626	59.155	63.487	67.819	72.094	76.369
		2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060



Future Sales Contracts that have already been agreed to.

Water Supplied to:		Contract Amount and Duration			Pipe Size	Regular or
System Name	**PWSID**	**MGD**	**Year Begin**	**Year End**	**(inches)**	**Emergency**

Future Supplies List all new supplies or facilities which were under development as of July 1, 2012

Source or Facility Name	PWSID	SW or GW	Sub-Basin	Wat Qual Classification	Expected Supply	Development Time	Year Online

Supply-Demand Comparison (Show all quantities in Million Gallons per Day)

Available Supply , MGD	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
(1) Existing Surface Water Supply	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200
(2) Existing Ground Water Supply	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(3) Existing Purchase Contracts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(4) Future Supplies	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(5) Total Available Supply	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200	53.200
(6) Service Area Demand	25.045	27.192	33.249	38.778	44.307	49.836	55.365	59.697	64.029	68.304	72.579
4 **(7) Existing Sales Contracts**	2.969	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790
(8) Contracts for Future Sales	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000
(9) Total Average Daily Demand	28.014	31.982	39.039	45.568	52.097	58.626	65.155	70.487	75.819	81.094	86.369
(10) Demand as Percent of Supply	53%	60%	73%	86%	98%	110%	122%	132%	143%	152%	162%
Additional Information for J.L. Allocation											
(12) Sales Under Existing Contracts	2.969	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790	3.790
(13) Expected Sales Under Future Contracts	0	0	0	0	0	0	0	0	0	0	0
(14) Demand in Each Planning Period	28.014	30.982	37.0386	42.5676	48.0966	53.6256	59.1546	63.4866	67.8186	72.0936	76.3686
(15) Supply Deficit (Demand minus Supply)	(25.186)	(22.218)	(16.161)	(10.632)	(5.103)	0.426	5.955	10.287	14.619	18.894	23.169

Public Works Commission of the City of Fayetteville	Applicant
14-Nov-14	Date

Future Supply Alternative 1 - New Reservoir in Cumberland County

List the Components of each alternative scenario including the expected period when each component will come online. Show all water volumes in millions of gallons per day

	(label the alternative presented in this table)										
	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
(1) Line (15) From Demand - Supply Comparison Table	-25.186	-22.21765	-16.1614	-10.6324	-5.1034	0.4256	5.9546	10.2866	14.6186	18.8936	23.1686
(2) Supply from new reservoir	0	0	0	0	0	38	38	38	38	38	38
(3) Supply Available for future needs	**-25.186**	**-22.21765**	**-16.1614**	**-10.6324**	**-5.1034**	**38.4256**	**43.9546**	**48.2866**	**52.6186**	**56.8936**	**61.1686**
(4) Total discharge to Source Basin											
(5) Consumptive Use in Source Basin											
(6) Total discharge to Receiving Basin											
(7) Consumptive Use in Receiving Basin											
(8) Amount NOT returned to Source Basin	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

List details of the future supply options included in this alternative scenario

Future Source	PWSID	SW or GW	GS 143-215.22G Basin	Wat. Qual Classification	Additional Supply mgd	Development Time (years)	Year Online

Public Works Commission of the City of Fayetteville	Applicant
14-Nov-14	Date

Future Supply Alternative 2 - Interbasin Transfer from Blewett Falls Lake on Yadkin-Pee Dee River (with no return)

List the Components of each alternative scenario including the expected period when each component will come online. Show all water volumes in millions of gallons per day

(label the alternative presented in this table)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
(1) Line (15) From Demand - Supply Comparison Table	-25.186	-22.21765	-16.1614	-10.6324	-5.1034	0.4256	5.9546	10.2866	14.6186	18.8936	23.1686
(2) New Intake and Pipeline from Blewett Falls Lake	0	0	0	30	30	30	30	30	30	30	30
(3) Supply Available for future needs	**-25.186**	**-22.21765**	**-16.1614**	**19.3676**	**24.8966**	**30.4256**	**35.9546**	**40.2866**	**44.6186**	**48.8936**	**53.1686**
(4) Total discharge to Source Basin											
(5) Consumptive Use in Source Basin											
(6) Total discharge to Receiving Basin											
(7) Consumptive Use in Receiving Basin											
(8) Amount NOT returned to Source Basin	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

List details of the future supply options included in this alternative scenario

Future Source	PWSID	SW or GW	GS 143-215.22G Basin	Wat. Qual Classification	Additional Supply mgd	Development Time (years)	Year Online

Public Works Commission of the City of Fayetteville	Applicant
14-Nov-14	Date

Future Supply Alternative 3 - Interbasin Transfer from Blewett Falls Lake on Yadkin-Pee Dee River (with wastewater effluent return)

List the Components of each alternative scenario including the expected period when each component will come online — Show all water volumes in millions of gallons per day

(label the alternative presented in this table)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
(1) Line (15) From Demand - Supply Comparison Table	-25.186	-22.21765	-16.1614	-10.6324	-5.1034	0.4256	5.9546	10.2866	14.6186	18.8936	23.1686
(2) New Intake and Pipeline from Blewett Falls Lake	0	0	0	30	30	30	30	30	30	30	30
(3) Supply Available for future needs	**-25.186**	**-22.21765**	**-16.1614**	**19.3676**	**24.8966**	**30.4256**	**35.9546**	**40.2866**	**44.6186**	**48.8936**	**53.1686**
(4) Total discharge to Source Basin											
(5) Consumptive Use in Source Basin											
(6) Total discharge to Receiving Basin											
(7) Consumptive Use in Receiving Basin											
(8) Amount NOT returned to Source Basin	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

List details of the future supply options included in this alternative scenario

Future Source	PWSID	SW or GW	GS 143-215.22G Basin	Wat. Qual Classification	Additional Supply mgd	Development Time (years)	Year Online

Applicant	Public Works Commission of the City of Fayetteville
Date	14-Nov-14

Alternatives	Summary Description
Alternative 1	New Reservoir in Cumberland County
Alternative 2	Interbasin Transfer from Blewett Falls Lake on Yadkin-Pee Dee River (with no return)
Alternative 3	Interbasin Transfer from Blewett Falls Lake on Yadkin-Pee Dee River (with wastewater effluent return)
Alternative 4	
Alternative 5	

	Jordan Lake Allocation	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Allocation Request (% of storage)	10%					
Total Supply (MGD)	10*	38	>30	>30		
Environmental Impacts	Low	High	Moderate	Moderate		
Water Quality Classification	WS-IV	WS-IV	WS-IV and B	WS-IV and B		
Interbasin Transfer (MGD)	TBD**	TBD**	TBD	TBD		
Regional Partnerships	No	Yes	Yes	Yes		
Technical Complexity	Not Complex	Very Complex	Complex	Complex		
Institutional Complexity	Not Complex	Very Complex	Very Complex	Very Complex		
Political Complexity	Not Complex	Very Complex	Very Complex	Very Complex		
Public Benefits	None	Many	None	None		
Consistency with local plans	Yes	TBD	TBD	TBD		
Total Cost ($ millions)	Low	High	High	High		
Unit Cost ($/1000 gallons)	Low	High	High	High		
	Detailed cost estimates not available at this time.					

* Total Level II allocation request of 10% based on 100 mgd total storage being available.

** Because small portions of Cumberland County are located outside the Cape Fear River Basin (in the Lumber River Basin and South River Basin), some consumptive losses would be expected to occur outside the Cape Fear River Basin. These consumptive losses would constitute an interbasin transfer if the total exceeded 2 mgd. However, the quantities cannot be quantified until the PWC's available supply is determined.

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Appendix C

PWC Current and Future Service Area Map

PWC WATER SYSTEM
SERVICE AREA- NOVEMBER 2014

N

HARNETT

LINDEN SERVICE AREA

HARNETT CO.
WATER SERVICE

GODWIN

FALCON

SPRING LAKE
SERVICE AREA

FORT BRAGG

WADE

EASTOVER SANITARY
DISTRICT

SAMPSON

PWC WATER
SYSTEM

STEDMAN

HOKE

CAPE FEAR RIVER

ROBESON

BLADEN

NOT TO SCALE

- PWC Water Main
- Eastover Water Main
- Stedman Water Main
- Harnett County Water Main
- PWC Existing Service Area
- PWC Future Service Area
- Rural Water Districts / Other

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Appendix D

2010 Water Shortage Response Ordinance (No. S2010-007)

--ORDINANCE NO. S2010-007

CITY OF FAYETTEVILLE, NORTH CAROLINA

WATER SHORTAGE RESPONSE

ADOPTED: MAY 24, 2010

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF FAYETTEVILLE AMENDING ARTICLE "V", OF CHAPTER 28 OF THE CODE OF ORDINANCES OF THE CITY OF FAYETTEVILLE, NORTH CAROLINA

BE IT ORDAINED by the City Council of the City of Fayetteville that:

Section 1. Article V, Chapter 28, of the Code of Ordinances, entitled "Water Shortage Response" is deleted in its entirety and the following is substituted in lieu thereof:

Sec. 28-261. Introduction.

1. The purpose of this water shortage response article is to provide for the declaration of increasingly serious stages of water shortages and to define voluntary and mandatory water conservation measures to be implemented during these various stages. These written procedures will minimize the need to make last minute decisions and will allow the Public Works Commission to respond quickly to changing conditions, which will preserve the water resources of the Public Works Commission to provide for the water demands of human consumption, sanitation, and fire protection throughout the service area of the Public Works Commission of the City of Fayetteville, North Carolina.

2. This article shall apply to all users connected directly or indirectly to the Public Works Commission's public treated water supply, regardless of whether the user is located within the city limits or outside of the city limits.

Sec. 28-262. Objectives of article.

The specific objectives of this article are as follows:

1. To establish the authority of the General Manager of the Public Works Commission of the City to declare water shortage conditions and implement and enforce the procedures established in this article;

2. To establish a chain of command for implementation of the procedures established herein:

3. To establish voluntary and mandatory water conservation measures;

4. To establish enforcement protocol for violations of mandatory water conservation measures outlined in this article.

Sec. 28-263. Definitions.

1. The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

   (a) ***Contamination*** means the addition to any watershed area, reservoir, storage tank, or distribution system of any material that appears in an above-normal concentration or has high nuisance or harmful effect on the consumer or the system.

   (b) ***Emergency*** means, when referring to water shortage, that conditions exist such that treated water supplies cannot meet customer demands and that serious treated water shortages exist.

   (c) ***Essential Use*** means:

      (1) Use of water to sustain normal life and the lives of domestic pets, and to maintain minimum standards of hygiene and sanitation;
      (2) Use of water for patient care and rehabilitation;
      (3) Firefighting, including certain testing and drills by the fire department if conducted in the interest of public safety and if approved by the Public Works Commission;
      (4) Health and public protection purposes, if specifically approved by health officials and the Public Works Commission, including flushing of water lines and hydrants.

   (d) ***Non-Essential Use*** means categories of water use, other than essential use, that may be curtailed during droughts and water emergencies.

   (e) ***Mandatory Conservation*** means that conservation measures are not voluntary, and that if users fail to comply, they are subject to the penalties outlined in this article.

   (f) ***Public Works Commission*** means the Public Works Commission of the City acting through its General Manager, deputy, agent, or designated representative.

   (g) ***Treated Water*** means water that has been withdrawn from an approved source and has been processed by the Public Works Commission.

   (h) ***User*** means any person using water for any purpose from the Public Works Commission's water distribution system, either directly or indirectly, and for which either a regular charge is made or, in the case of bulk sales, a cash charge is made at the site of delivery.

(i) ***Water Shortage*** means that conditions exist when the demands and requirements of water customers served by the Public Works Commission cannot be satisfied without depleting the available supply of treated water or the available water supply to or below a critical level, i.e., the level at which the continued availability of water for human consumption, sanitation, and fire protection is jeopardized. Conditions contributing to a water shortage may include but are not limited to the following:

(1) Water supplies are below the level necessary to meet needs;
(2) Water quality has been threatened due to a contamination situation;
(3) Power outages or equipment malfunction;
(4) Peak customer demands on the water system;
(5) Inability to maintain adequate pressure and/or water supply throughout every portion of the Public Works Commission water distribution system;
(6) Natural disasters.

(j) ***Water Supply*** means any body of water from which the Public Works Commission obtains water for treatment and subsequent distribution into the public treated water supply system.

Sec. 28-264. Chain of Command

The Chief Operating Officer of the Water Resources Division (COOWR) shall be responsible for continually monitoring the water supply, water demands, and area conditions. Based upon any one or more of the triggers established by Section 28-270, the COOWR shall notify the General Manager that water conservation measures be implemented. The General Manager shall be empowered and shall declare and implement conservation stages I and II. In instances in which declaration and implementation of stages III and IV are required, the General Manager shall notify the Mayor of the City of Fayetteville, who shall issue a proclamation declaring the implementation of a water conservation stage III or IV. The General Manager shall also notify PWC's Communications and Community Relations Manager and Key Accounts Agent. The Communications and Community Relations Manager shall notify local government agencies, water system employees, and all water system users of the water restrictions through a public awareness campaign using any or all of the following strategies; 1) local daily newspaper for 2 consecutive issues or weekly as long as conditions persist; 2) public service announcement via local radio and government access television channel; 3) signs posted in City Hall, City office buildings, and utility department offices; 4) website; 5) water bills; and any other means as appropriate for the shortage situation. The Key Accounts Agent shall notify key customers. Notifications should include but not be limited to the description of the conservation stage and the conservation measures enacted. Any changes to the water shortage situation will be announced through the same strategies used initially and other means as deemed appropriate.

Once a conservation stage is declared or changed, the conservation stage shall remain in effect until lifted by the General Manager or in the case of stage III or IV, the Mayor of the

City of Fayetteville. The COOWR shall continually monitor the conditions responsible for activation of the conservation stage, and if the trigger for a more stringent stage is met, then the COOWR shall so advise the General Manager who shall be empowered to declare the more stringent stage consistent with the above paragraph.

When the current stage triggers have abated, the stage shall either be reduced to the appropriate stage or all conservation measures rescinded depending on conditions. This chain of command process shall be repeated whenever a change in the status of the conservation stage or conservation measures is necessary.

During the effective period of any water shortage, the PWC is empowered to promulgate such regulations or policies as may be necessary to carry out the provisions of this Ordinance. The PWC General Manager, or his duly authorized agent charged with implementation and enforcement of this Ordinance shall be and is hereby granted the authority to implement and enforce any of the treated water use restrictions.

The General Manager shall have authority to implement, maintain, modify, and rescind any one or more of the conservation measures in a conservation stage and to make them applicable during various times of the month, week, or day as he deems appropriate to protect the public health, safety, and welfare until the PWC determines that the conditions requiring their imposition no longer exist.

Sec. 28-265 Water Conservation Measures

1. It shall be mandatory for every user to comply with the following schedule for the irrigation of outdoor landscaping (such as grass, shrubbery, trees, flowers, and vegetable gardens) on a year round basis.

   (a) For addresses that end in the number 1,3,5,7,or 9 watering of lawns, grass, shrubbery, trees, flowers, and vegetable gardens using an automatic irrigation or sprinkler system or hose end sprinkling device shall only be done on Sunday, Tuesday, and Thursday. For addresses that end in the number 0,2,4,6, or 8 watering shall only be done on Saturday, Monday, and Wednesday. Provided however that a person regularly engaged in the sale of plants shall be permitted to use water for such purposes at any time or any day.

   (b) For new sod, seeded lawns, or planted landscapes, the user may water any day of the week as necessary to establish the new plantings for a period of 30 days following the planting.

   (c) These measures shall remain in effect as long as there has been no Stage II, III, or IV declaration as stated in Sections 28-267 through 28-269 of this Article. If a Stage II, III, or IV declaration is made the restrictions therein supersede the conservation measures in this section.

2. The owner or occupant of any land or building which receives water from the Public Works Commission and that also utilizes water from a well or supply other than that of the Public Works Commission shall post and maintain in a prominent place thereon a sign furnished by the Public Works Commission giving public notice of the use of the well or other sources of supply.

3. In addition, all users should attempt to conserve treated water at all times. Users may refer to PWC's water conservation guidelines for tips and information on various water conservation measures.

Sec. 28-266 Water Conservation Stage I – Water Shortage Alert

1. When a Water Shortage Alert is declared users should begin limiting the following uses where possible:

   (a) Outdoor water use for landscape irrigation.

   (b) Washing of automobiles, trucks, trailers, boats, airplanes, or any other type of mobile equipment.

   (c) Washing of outside areas such as streets, driveways, service station aprons, parking lots, office buildings, exteriors of existing or newly constructed homes or apartments, sidewalks.

   (d) Introduction of water into any pond, ornamental fountain, pool, or other structure.

   (e) Use of water from public or private fire hydrants for purposes other than fire suppression, public emergency, or PWC need.

   (f) Use of treated water for dust control or compaction.

Sec. 28-267. Water Conservation Stage II--Water Shortage Warning.

1. When a Water Shortage Warning is declared, the following mandatory conservation measures shall be in effect:

   (a) For addresses that end in 1,3,5,7, or 9 watering of lawns, grass, shrubbery, trees, flowers and vegetable gardens using an automatic irrigation or sprinkler system or hose end sprinkling device shall only be done on Sunday and Thursday. For addresses that end in the number 0,2,4,6, or 8 watering shall only be done on Saturday and Wednesday. Provided however, that a person regularly engaged in the sale of plants shall be permitted to use water for such purposes at any time or any day.

   (b) It shall be unlawful to intentionally waste treated water.

(c) All residential, industrial, manufacturing, and commercial users shall reduce consumption to any degree feasible with a goal of reduction of at least 10%. It is the primary responsibility of each user to meet its mandated water use reduction in whatever manner possible, including limitation of operating hours, or days, if necessary.

Sec. 28-268. Water Conservation Stage III--Water Shortage Emergency.

1. In the event of a Water Shortage Emergency, the following mandatory water conservation measures shall apply:

   (a) It shall be unlawful to water or sprinkle any lawn, grass, shrubbery, trees, or flowers with treated water using an automated irrigation or sprinkler system or hose end sprinkling device. Watering is permitted only by hand held hose with a spring-loaded nozzle, by container, or by installed drip type irrigation. Provided, however, that any person regularly engaged in the sale of plants shall be permitted to use automated irrigation or sprinkler systems but only in amounts necessary to prevent the loss of nursery stock.

   (b) It shall be unlawful to intentionally waste treated water.

   (c) All residential, industrial, manufacturing, and commercial users shall reduce consumption to any degree feasible with a goal of reduction of at least 20%. It is the primary responsibility of each user to meet its mandated water use reduction in whatever manner possible, including limitation of operating hours, or days if necessary.

   (d) Restaurants and other food serving establishments shall use single serving utensils, plates, and cups and shall serve water only at the patron's request.

   (e) It shall be unlawful to use treated water from hydrants except fire suppression or other public emergency or PWC need.

   (f) It shall be unlawful to use treated water for dust control or compaction without demonstrating a lack of alternative sources.

Sec. 28-269. Water Conservation Stage IV--Water Shortage Crisis.

1. In the event of a Water Shortage Crisis, in addition to the restrictions made unlawful heretofore, the following mandatory conservation measures shall be in effect:

   (a) It shall be unlawful to water any lawn, grass, shrubbery, trees, or flowers with treated water. Provided, however, that any person regularly engaged in the sale of plants shall be permitted to use automated irrigation or sprinkler systems but

only in amounts necessary to prevent the loss of nursery stock. Persons regularly engaged in the sale of plants shall meet the same percent reduction goals as other commercial establishments as stated in Section 28-269(c) below.

(b) It shall be unlawful to intentionally waste treated water.

(c) All residential, industrial, manufacturing, and commercial users (to include nursery operations) shall reduce consumption to the degree feasible with a goal of a reduction of at least 30%. It is the primary responsibility of each user to meet its mandated water use reduction in whatever manner possible, including limitation of operating hours, or days if necessary.

(d) Restaurants and other food serving establishments shall use single serving utensils, plates, and cups and shall serve water only at the patron's request.

(e) It shall be unlawful to use treated water from hydrants except fire suppression or other public emergency or PWC need. Fire suppression must be maintained but where possible tank trucks shall use untreated water.

(f) It shall be unlawful to use treated water for dust control or compaction.

(g) It shall be unlawful to wash automobiles, trucks, trailers, boats, airplanes, or any other type of mobile equipment except at commercial car wash facilities. Commercial car wash facilities shall meet the same percent reduction goals as other commercial establishments as stated in Section 28-269(c) above.

(h) It shall be unlawful to use treated water to wash down outside areas such as streets, driveways, service station aprons, parking lots, office buildings, exteriors of existing or newly constructed homes or apartments, sidewalks, or patios or use water for other similar purposes, provided however, that any person regularly engaged in the business of washing such areas shall be permitted to use water for such purposes. Persons engaged in the business of washing such areas shall meet the same percent reduction goals as other commercial establishments as stated in Section 28-269(c) above.

(i) It shall be unlawful to introduce treated water into any pond, ornamental fountain, or other structure making similar use of water.

(j) It shall be unlawful to fill newly constructed swimming or wading pools, or refill swimming or wading pools that have been drained. Supplementing of existing pools shall only be done in amounts necessary to maintain structural integrity or filtration systems.

(k) The General Manager may declare additional measures of mandatory conservation controls such as larger percentage reductions in consumption, banning of all non-essential use, termination of service to specific areas in the

water system on a rotating basis, prohibition of all industrial uses of treated water, etc., or whatever is necessary to protect the health and safety of the customers of the water system.

Sec. 28-270 Water Conservation Stage Triggers

There are a variety of conditions that might contribute to a water shortage, including but not limited to: peak customer demands on the water system; water supplies below the level necessary to meet needs; water quality threatened or impaired due to contamination; power outages or equipment malfunction; and natural disasters. The following water conservation stage triggers have been established to allow the PWC to respond to a water shortage with the appropriate stage of conservation.

1. Triggers Based on Water Supply

Water Conservation Stage	PWC Trigger
Water Shortage Alert	**Unusually dry conditions result in severely low stream flows that are consistently below seasonal norms and dry conditions are forecast.**
Water Shortage Warning	**Target flow of the Cape Fear River at Lillington is reduced to 250 CFS or less.**
Water Shortage Emergency	**Daily demands exceed 50% of available flow.**
Water Shortage Crisis	**Daily demands exceed 75% of available flow.**

2. Triggers Based on Wet Well Levels

Water Conservation Stage	Hoffer Wet Well Level (ft)	River Stage at Fayetteville (ft)	Elevation at G&D #3 (ft)
Voluntary Water Shortage Alert	**7 consecutive days at 12.4**	**9.45**	**29.97**
Water Shortage Warning	**11.85**	**8.9**	**29.42**
Water Shortage Emergency	**11.35**	**8.4**	**28.92**
Water Shortage Crisis	**10.66**	**7.66**	**28.18**

3. Triggers Based on Daily Water Demands

Water Conservation Stage	PWC Trigger
Voluntary Water Shortage Alert	**3 consecutive days of demand exceeding 85% of available capacity**
Water Shortage Warning	**3 consecutive days of demand exceeding 90% of available capacity**
Water Shortage Emergency	**5 consecutive days of demand exceeding 90% of available capacity**
Water Shortage Crisis	**1 day of demand exceeding 100% of available capacity**

Sec. 28-271. Enforcement.

1. Any person who violates the provisions of this article, who fails to carry out the duties and responsibilities imposed by this article, or who impedes or interferes with any action undertaken or ordered pursuant to this article shall be subject to enforcement actions. In addition to the enforcement actions in Sections 28-271.2, continued or recurring violations may subject the violator to criminal prosecution in Environmental Court.

2. The COORWR shall be responsible for monitoring and enforcement of this Article. Enforcement actions may include, but are not limited to, the following:

   (a) Written Warning

   Whenever the COOWR or his duly authorized representative finds that any user has violated or is violating this Article or any prohibition, limitation, or requirement contained herein, or policy issued pursuant thereto, a written warning may be issued to such offender by an authorized representative of the Public Works Commission. The written warning shall notify the violator of the nature of the violation and the need to take corrective action and that failure to do so will result in the issuance of a Notice of Violation.

   (b) Notice Of Violation

   The COOWR or his duly authorized agent may serve upon such offender a written Notice Of Violation stating the nature of the violation. The written Notice Of Violation shall be affixed to the property where the violation occurred and/or mailed certified with return receipt requested to the customer of record and to any other person known to the Public Works Commission to be responsible for the violation or its correction. When a customer of record refuses to accept a Notice Of Violation by certified mail, hand delivery of the written Notice Of Violation to the customer of record or to the person in charge of the premises where the violation occurred shall also constitute service. The notice of violation shall inform the user of the violation, their responsibility to discontinue the activity within a specified period of time, and possible recriminations including civil penalties and termination of service if the violation continues.

   (c) Civil penalties.

   The Public Works Commission's General Manager may assess a civil penalty to any offender who shall continue any violation beyond the time limit provided for in the aforementioned Notice Of Violation. Each day, beginning at 12:01 AM, in which a violation of any provision of this article shall occur or continue shall constitute a separate and distinct offense. The amount of the civil penalty shall be in accordance with the penalty schedule as stated in the Public Works

Commission Policies and Procedure Manual, Section 640.03, Water Shortage Ordinance Civil Penalty Policy. Appeals of civil penalties assessed in accordance with this section shall be as provided in section 28-272.

(d) Suspension of Service

If after issuance of a Civil Penalty, compliance is not achieved and/or the penalty is not paid within 30 days, the COOWR or his duly authorized agent may immediately terminate or restrict the service to the premise where such violation has occurred and may in addition thereto, or in the alternative, take such other appropriate legal action as provided by law.

At such time the COOWR is satisfied that the offender(s) are no longer in violation of any treated water use restrictions, the Public Works Commission may reinstate water service to the premise following the payment of all civil penalties assessed as well as any applicable suspension/reconnection fees as outlined in PWC's Rates and Policies Manual.

(e) The Public Works Commission may implement special rates, fees, and/or surcharges to further encourage water conservation by its users.

(f) Any and All Measures

The PWC General Manager may use any and all enforcement measures listed in this section without prior notice, warning, or prerequisite enforcement action depending on the severity and/or nature of the violation as deemed necessary to achieve compliance with the provisions of this article. In addition, enforcement may include any one, all or a combination of the remedies authorized and prescribed by the North Carolina General Statutes.

Sec. 28-272. Adjudicatory hearing/appeals.

1. Any user whose water use has been restricted or terminated or who has been assessed a civil penalty under 28-271 shall have the right to an adjudicatory hearing before a hearing officer designated by the general manager of the Public Works Commission. Users requesting an adjudicatory hearing must do so by submitting a written request, which identifies the specific issues to be contended, to the general manager of the Public Works Commission within 72 hours following notice of the issuance of a civil penalty. Unless such demand is made within the time specified in this section, the decision to restrict or terminate the water use, or the civil penalty assessment, shall be final and binding.

2. The hearing officer shall notify the user of the date, time, and place for the hearing. The hearing shall take place within 10 business days of the written request for a hearing. A decision shall be made within 10 calendar days from the date of the hearing and a copy of the written decision shall be mailed to the user by certified mail, return receipt requested.

3. When a final decision is issued pursuant to the above subsection, the Public Works Commission shall prepare an official record of the case that includes:

   (a) All notices, motions, and other like pleadings;

   (b) A copy of all documentary evidence introduced;

   (c) A certified transcript of all testimony taken, if testimony is transcribed. If testimony is taken and not transcribed, then a narrative summary of any testimony taken;

   (d) A copy of the final decision of the Public Works Commission.

4. Any user against whom a final decision of the Public Works Commission is entered pursuant to the hearing procedure under Section 28-272.1 of this Article may appeal the order or decision by filing a written petition for judicial review within 30 days after receipt of notice by certified mail of the order or decision to the general court of justice of the county or of the county where the order or decision is effective, along with a copy to the Public Works Commission. Within 30 days after receipt of the copy of the petition of judicial review, the Public Works Commission shall transmit to the reviewing court the original or a certified copy of the official record, as outlined in Section 28-272.3 of this Article.

Sec 28-273. Ordinance Changes

This ordinance may be changed, revised, amended, replaced or rescinded by approval of the Board of Commissioners of the Public Works Commission and subsequent approval of the City Council of the City of Fayetteville. Public input will be considered through the normal process of adoption/modification of ordinances by City Council.

Sec 28-274 Variances and Variance Criterion

A variance from prevailing water conservation measures may be granted to a customer that would otherwise be prohibited. The General Manager or his duly authorized designee shall have the authority to issue variances to the water use restrictions in sections 28-265 through 28-269. In order to qualify for a variance, a customer/user must apply, in writing, to the General Manager or his designee, indicating: 1) the physical address of the location where the water will be used or where the water bill is mailed; 2) the basis for the variance from prevailing water restrictions; and, 3) the duration of the requested variance.

Until such time as the variance is approved, if it is, the customer will continue to comply with the restrictions until a decision has been made. If and when the variance is approved the variance notification will be sent to the customer who must maintain a copy of the variance for inspection. The customer must abide by all conditions and provisions of the variance. All variances will be recorded for use by enforcement officials.

Notification of approval or disapproval of the requested variance shall be sent to the customer within 5 business days from the date the request was received. Depending on the exigency for which the variance is requested, other methods of notification may also be used in the discretion of the General Manager or his designee.

Each variance will be considered on a case by case basis. Criterion used for consideration of approval of the variance will include but not be limited to: impact on water supply demand; existence of an alternative source; social or economic importance; prevention of structural damage; or other reasons deemed important by the General Manager or his designee.

Sec 28-275 Evaluation

The effectiveness of the restrictions in this Article will be evaluated based on review of raw water pumping data. Daily flows will be tracked and compared to pre-water shortage conditions to determine if restrictions are achieving the necessary usage reduction. If the restrictions are not meeting the flow reductions necessary to achieve the goals established by the General Manager additional measures may be taken at that time and the ordinance will be reviewed for possible modifications.

Sec. 28-276 Revision

This Water Shortage Ordinance will be reviewed and revised as necessary to adapt to new circumstances, after the occurrence of a water shortage emergency, or every five years, whichever occurs first.

Sec 28-275.5. Severability

If any section, subsection, sentence, or clause of this article is adjudged to be unconstitutional or otherwise invalid, such adjudication shall not affect the validity of the remaining portion of this article. It is hereby declared that this article would have been passed, and each section, sentence, or clause thereof, irrespective of the fact that any one or more sections, subsections, sentences, or clauses might be adjudged to be unconstitutional, or for any other reason invalid.

Section 2. It is the intention of the City Council, and it is hereby ordained that the foregoing amendments shall become and be made a part of the Code of Ordinances of the City of Fayetteville, North Carolina, and that Article V of Chapter 28 is rewritten as above provided. The effective date of this ordinance is May 24, 2010.

ADOPTED this 24th day of May, 2010

CITY OF FAYETTEVILLE

Anthony G. Chavonne

ANTHONY G. CHAVONNE., Mayor

ATTEST:

Rita Perry

Rita Perry, City Clerk

ARCADIS

Appendix E

PWC Water Rate Schedule

Schedule 7

PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE, NORTH CAROLINA
Water Rates
Last Ten Fiscal Years

	2005		2006		2007		2008		2009	
	inside city	outside city	inside city	outside city	inside city	outside city	inside city	outside city	inside city	outside city
Base rate *(meter size)*										
5/8"	$ 3.71	$ 4.27	$ 4.08	$ 4.69	$ 4.08	$ 4.69	$ 4.87	$ 5.84	$ 5.24	$ 6.81
3/4"	3.71	4.27	4.08	4.69	4.08	4.69	4.87	5.84	5.24	6.81
1"	5.42	6.23	5.99	6.89	5.99	6.89	7.33	8.80	7.96	10.35
1.5"	9.32	10.72	10.36	11.91	10.36	11.91	12.97	15.56	14.19	18.44
2"	14.20	16.33	15.82	18.19	15.82	18.19	20.01	24.01	21.97	28.56
3"	25.67	29.52	28.65	32.95	28.65	32.95	36.55	43.86	40.25	52.33
4"	42.02	48.32	46.94	53.98	46.94	53.98	60.13	72.16	66.31	86.21
6"	82.52	94.50	92.26	106.10	92.26	106.10	118.57	142.28	130.89	170.15
8"	131.32	151.02	146.86	168.89	146.86	168.89	188.97	226.76	208.69	271.29
Usage rate *1,000 gallons*										
Residential										
first 5,000 gallons=5Mgal	-	-	-	-	-	-	2.20	2.64	-	-
next 5,000 gallons=(6-10Mgals)	-	-	-	-	-	-	3.23	3.88	-	-
first 6,000 gallons = 6 Mgal	2.09	2.40	2.29	2.63	2.29	2.63	-	-	-	-
each additional 1,000 gallons	2.95	3.39	3.23	3.71	3.23	3.71	3.88	4.66	-	-
first 2,000 gallons=2Mgal	-	-	-	-	-	-	-	-	2.10	2.73
next 3,000 gallons (3-5Mgals)	-	-	-	-	-	-	-	-	2.52	3.28
next 5,000 gallons=(6-10Mgals)	-	-	-	-	-	-	-	-	3.47	4.51
each additional gallon	-	-	-	-	-	-	-	-	4.17	5.42
Water irrigation										
per 1,000 gallons = 1 Mgal	2.95	3.39	3.23	3.71	3.23	3.71	3.88	4.66	-	- [a]
first 30,000 gallons=30Mgal	-	-	-	-	-	-	-	-	4.49	5.84
next 30,000 gallons=(31-60Mgals)	-	-	-	-	-	-	-	-	5.53	7.19
each additional gallon	-	-	-	-	-	-	-	-	8.66	11.26
Backflow Prevention Assembly Inspection Charge									-	-
Commercial water service										
per 1,000 gallons = 1 Mgal	2.08	2.39	2.18	2.51	2.18	2.51	2.23	2.68	2.40	3.12
Large water usage										
per 1,000 gallons = 1 Mgal	1.59	1.59	1.67	1.67	1.67	1.67	1.71	1.71	1.84	1.84
Fire hydrant delivery										
Basic Facilities per Meter Set	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
per 1,000 gallons = 1 Mgal	2.08	2.08	2.18	2.18	2.18	2.18	2.23	2.23	2.40	2.40
Bulk water delivery										
Basic Facilities per Truckload	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	-	-
per 1,000 gallons = 1 Mgal	2.08	2.08	2.18	2.18	2.18	2.18	2.23	2.23	-	-
Yearly permit fee	-	-	-	-	-	-	-	-	225.00	225.00
Temporary Permit=1 Month	-	-	-	-	-	-	-	-	50.00	50.00
each additional month <3 months	-	-	-	-	-	-	-	-	50.00	50.00

[a] Rate structure in this category was based on first 1mgals in 2008.

PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE, NORTH CAROLINA
Water Rates
Last Ten Fiscal Years

		2010		2011		2012		2013		2014	
		inside city	outside city	inside city	outside city	inside city	outside city	inside city	outside city	inside city	outside city
Base rate *(meter size)*											
	5/8"	$ 5.24	$ 7.07	$ 5.74	$ 8.04	$ 6.27	$ 9.09	$ 7.00	$ 10.50	$ 7.75	$ 12.00
	3/4"	5.24	7.07	5.74	8.04	6.27	9.09	7.00	10.50	7.75	12.00
	1"	7.96	10.75	8.62	12.07	9.52	13.80	11.00	16.50	12.00	18.60
	1.5"	14.19	19.16	15.19	21.27	16.94	24.56	19.00	28.50	21.00	32.55
	2"	21.97	29.66	23.41	32.77	26.22	38.02	30.00	45.00	33.00	51.15
	3"	40.25	54.34	42.73	59.82	48.00	69.64	55.00	82.50	60.00	93.00
	4"	66.31	89.52	70.27	98.38	79.12	114.72	90.00	135.00	100.00	155.00
	6"	130.89	176.70	138.49	193.89	156.14	226.40	175.00	262.50	195.00	302.25
	8"	208.69	281.73	220.69	308.97	248.94	360.96	280.00	420.00	310.00	480.50
Usage rate *1,000 gallons*											
	Residential										
	first 5,000 gallons=5Mgal	-	-	-	-	-	-	-	-	-	-
	next 5,000 gallons=(6-10Mgals)	-	-	-	-	-	-	-	-	-	-
	first 6,000 gallons = 6 Mgal	-	-	-	-	-	-	-	-	-	-
	each additional 1,000 gallons	-	-	-	-	-	-	-	-	-	-
	first 2,000 gallons=2Mgal	2.10	2.84	2.17	3.04	2.22	3.22	2.22	3.33	2.22	3.44
	next 3,000 gallons (3-5Mgals)	2.52	3.40	2.59	3.63	2.64	3.83	2.64	3.96	2.64	4.09
	next 5,000 gallons=(6-10Mgals)	3.47	4.68	3.54	4.96	3.59	5.21	3.59	5.39	3.59	5.56
	each additional gallon	4.17	5.63	4.24	5.94	4.29	6.22	4.29	6.44	4.29	6.65
	Water irrigation										
	per 1,000 gallons = 1 Mgal	-	-	-	-	-	-	-	-	-	-
	first 30,000 gallons=30Mgal	4.49	6.06	4.56	6.38	4.61	6.68	4.61	6.92	4.61	7.15
	next 30,000 gallons=(31-60Mgals)	5.53	7.47	5.60	7.84	5.65	8.19	5.65	8.48	5.65	8.76
	each additional gallon	8.66	11.69	8.73	12.22	8.78	12.73	8.78	13.17	8.78	13.61
	Backflow Prevention Assembly Inspection Char	-	-	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
	Commercial water service										
	per 1,000 gallons = 1 Mgal	2.40	3.24	2.56	3.58	2.67	3.87	2.67	4.01	2.67	4.14
	Large water usage										
	per 1,000 gallons = 1 Mgal	1.84	1.84	1.94	1.94	2.06	2.06	2.06	2.06	2.03	2.06
	Fire hydrant delivery										
	Basic Facilities per Meter Set	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
	per 1,000 gallons = 1 Mgal	2.40	2.40	2.56	2.56	2.67	2.67	2.67	2.67	2.67	2.67
	Bulk water delivery										
	Basic Facilities per Truckload	-	-	-	-	-	-	-	-	-	-
	per 1,000 gallons = 1 Mgal	-	-	-	-	-	-	-	-	-	-
	Yearly permit fee	225.00	225.00	275.00	275.00	275.00	275.00	275.00	275.00	275.00	275.00
	Temporary Permit=1 Month	50.00	50.00	-	-	-	-	-	-	-	-
	each additional month <3 months	50.00	50.00	-	-	-	-	-	-	-	-