TOWN OF PITTSBORO

2014 JORDAN LAKE ALLOCATION REQUEST

FINAL
NOVEMBER 14, 2014

Table of Contents

Section I. WATER DEMAND FORECAST 1
Service Area 1
User Sectors 3
Sector Projections 4
Usage Rates 7
Demand Projections 8
Bulk Water Sales 9
References 10
Section II. CONSERVATION AND DEMAND MANAGEMENT 11
Water Efficiency Goals 11
A Systems Approach to Reducing Consumption 12
The Quantity/Quality Connection 14
Wastewater Discharge and Reuse Program 14
Education 14
Incentives 15
Utility Rate Structure 15
Rebate Programs 16
Reclaimed Water 16
Regulations 19
Ordinances 19
Water Use In Town Operations 20
Non-Revenue Water 20
Automated Meter Reading System 21
Impact On Water Use 21
References 22
Section III. CURRENT WATER SUPPLY 23
Available Supply from Existing Sources 23
Purchased Water 25
References 25
Section IV. FUTURE WATER SUPPLY NEEDS 26
Section V. WATER SUPPLY ALTERNATIVES 27
Alternative 1 - Preferred 27
Alternative 2 – Primarily Jordan Lake 29
Source Options 29

Water Supply Alternatives 29
Environmental Impacts 31
Water Quality Classification 31
Timeliness 31
Interbasin Transfer 32
Regional Partnerships 32
Technical, Institutional and Political Complexities and Public Benefits 32
Consistency with Local Water Supply Plans 34
Cost Analysis 35
SECTION VI. PLANS TO USE JORDAN LAKE 36
Implementation Plan and Timeline 36
Estimate of Costs 36

References Section I

References Section II

References Section III

Appendices

Appendix A. Jordan Lake Water Supply Workbook
Appendix B. Resolution Supporting the Jordan Lake Partnership and the Triangle Regional Water Supply Plan
Appendix C. Hydrostructures Memo
Appendix D. Chatham Park Letter
Appendix E. Wastewater Allocation Policy

Table of Tables

Table I.1. Water Use Sectors 3
Table I.2. Population Estimates for Pittsboro Water Service Area 8
Table I.3. Water Demand Projections by Sector (MGD) 9
Table I.4. Bulk Water Sales Contracts 10
Table II.1. Moderate and Aggressive Conservation Goals for the Town of Pittsboro 11
Table II.2. Existing and Planned Water Efficiency Measures for the Town of Pittsboro 13
Table II.3. Town of Pittsboro's Water Rates 15
Table II.4. 2013 Meter Replacement Program 21
Table III.1. Existing Source Summary, Available Supply 25
Table IV.1. Projected Water Needs (MGD in 5-year increments) 26
Table V.1. Source Options Descriptions 29
Table V.2. Source Composition of Supply Alternatives (MGD) 29
Table V.3. Alternatives Analysis 30
Table VI.1. Preferred Alternative Implementation Timeline 36
Table VI.2. Capital Cost Jordan Lake Western Intake 37

Table of Figures

Figure I.1. Map of Pittsboro's Current Service Area 2
Figure I.2. Future Water Service Area 5
Figure I.3. Water Demand Projections by Sector (MGD) 9
Figure II.1. Tri-fold Systems Approach 12
Figure II.2. NC Water and Wastewater Rates Dashboard for the Town of Pittsboro 16
Figure II.3. Planned Reclaimed Water Service Area 18
Figure II.4. Town of Pittsboro Billed and Non-Revenue Water 21
Figure III.1. Pittsboro Water Treatment Plant Location Map 24
Figure V.1. Proposed Regional Water Facilities for Western Jordan Lake 28
Figure V.2. Alternatives Timeline Showing Need Versus New Water Supply 30
Figure V.3. Pittsboro Land Use Map #9 34

SECTION I. WATER DEMAND FORECAST

The Town of Pittsboro is an active member of the Jordan Lake Partnership (JLP) and participated in the development of the two-volume Triangle Regional Water Supply Plan (TRWSP). When the *TRWSP Volume I: Regional Needs Assessment* report was being finalized in May 2012, Pittsboro did not have complete data regarding the proposed Chatham Park development. Assumptions were made regarding land use and density in order to predict future water needs for this development. In late 2013, the Chatham Park developer, Preston Development Company, provided a rough estimate of the future water needs for the 7,000+ acres within the planned development. The original land use-derived water demand projections for Chatham Park were then replaced with the updated data provided by Chatham Park. Therefore, tables in the original *TRWSP Volume I: Regional Needs Assessment* for Pittsboro do not match those presented in this application. However, the water demand projections presented herein are consistent with the updated regional demand projections in the recently finalized *TRWSP Volume II: Regional Water Supply Alternatives Analysis*.

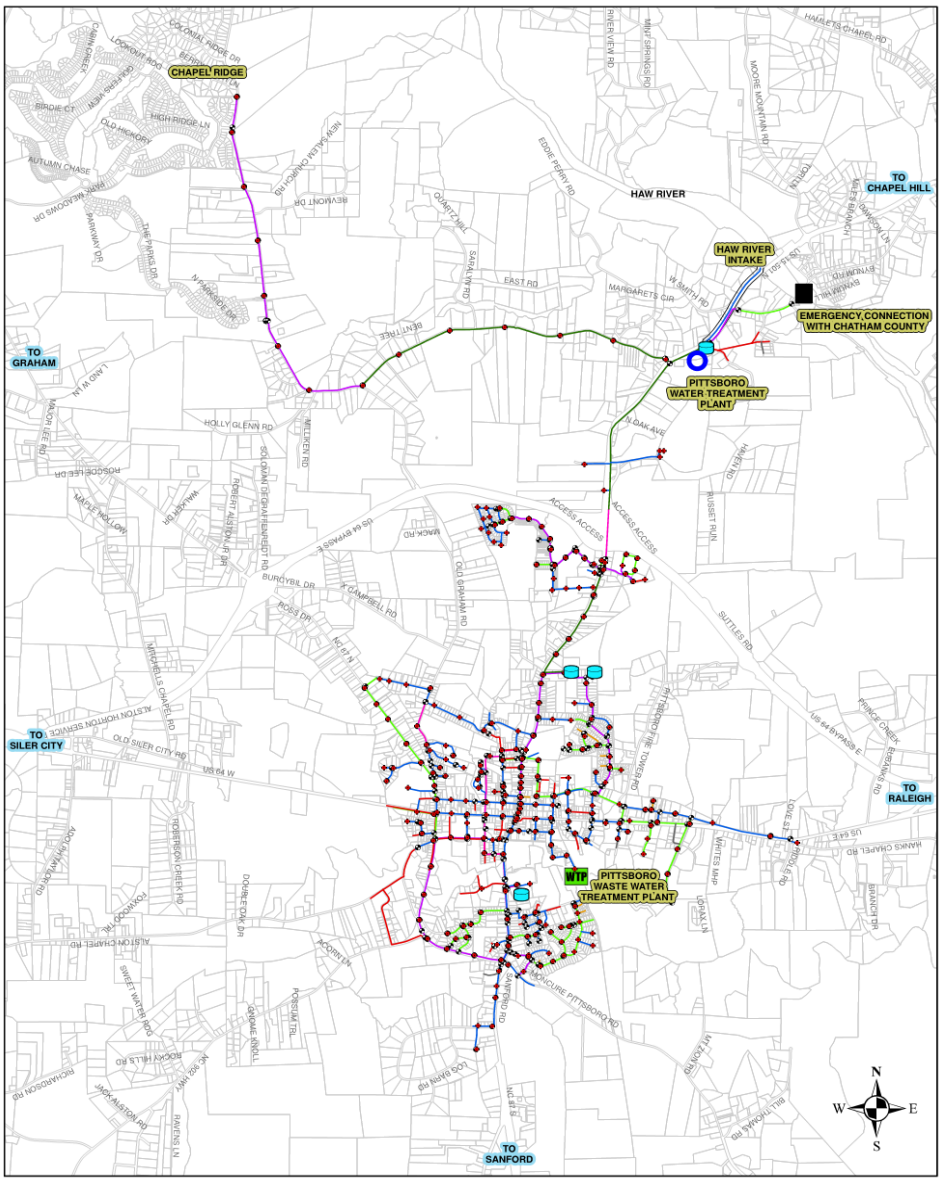
Pittsboro gained multiple benefits from participating in the JLP. Experience shared by larger systems that have dealt with rapid growth assisted with Pittsboro's planning for Chatham Park. Additionally, new water conservation and efficiency planning is already underway, and the Town is committed to implementing water conservation ordinances prior to any development in Chatham Park. The efficient use of the water supplies including Jordan Lake is a priority for both the Town of Pittsboro and the JLP.

The collaborative effort of the Partnership has genuinely improved water supply planning for Pittsboro. The exchange of information and extensive peer-review among the partners regarding water demand projection methodologies, assumptions and base data guided Pittsboro towards significant improvements in monitoring, collecting and managing water data. For example, Town staff have updated the utility billing software and revised water rates. They have also purchased meters to aggressively track flushing water and further identify all non-revenue water. These benefits are reflected back to the Partnership by improving confidence in regional modeling outcomes and solidifying data that projects the ability of the Partners to meet the long term water demand of the region. The water demand projections presented here are the result of better data from multiple Town of Pittsboro Departments and have been developed with substantial input and review from JLP members and technical support staff.

Service Area

Pittsboro is located approximately 15 miles west of Jordan Lake in Chatham County. The current water service area is generally defined by the Town limits and the Chapel Ridge Subdivision. However, Pittsboro serves several customers just outside the Town limits and along the distribution line that delivers water to Chapel Ridge. The current water service area is shown on the map in Figure I.1 below, which is also included in Pittsboro's 2013 Local Water Supply Plan (LWSP).

Figure I.1. Map of Pittsboro's Current Service Area



User Sectors

Pittsboro's water use sectors are divided into residential, commercial and institutional, industrial, bulk sales, and non-revenue. These divisions were based on the coding of services used in the water billing software in 2010. This software was updated in 2012, and Pittsboro will be able to track commercial and institutional use separately in the future, though they are grouped together in these future water demand projections. A brief description of each user sector is provided in Table I.1 below.

Table I.1. Water Use Sectors

Use Sector	Use Sub-sector	Description
Residential		Single family homes, duplexes, apartments (including apartments with a master meter), and irrigation to these buildings.
Commercial & Institutional		Commercial businesses & institutional customers. Examples include county office buildings, schools, colleges, nursing homes, and daycares as well as irrigation to these buildings.
Industrial		Industrial customers. Currently serving WDL, Biolex-1, Biolex-2, and Piedmont Biofuel.
Institutional		Included in Commercial & Institutional sector.
Bulk Sales		Master meter to Chapel Ridge subdivision. Not included in residential sector because significant water demand is for golf course irrigation.
Non-Revenue	Distribution System Process Water	Included with Other Non-Revenue Water.
	Water Treatment Process	Process water used at water treatment plant (WTP) and returned to the Haw River. This water is not sent into the distribution system.
	Other Non-Revenue	Firefighting, leakage, and distribution system process water (water quality flushing).

Pittsboro's residential use sector includes single family homes, duplexes, apartments, and irrigation used by these customers. This sector also includes apartments that are supplied through a master meter, and it does not distinguish between customers that live inside or outside the Town limits or by the size of the meter.

The commercial use sector includes both commercial businesses and institutional customers. This category includes businesses, county buildings, schools and colleges, nursing homes and daycare facilities. It does not distinguish between customers by meter size or whether they are inside or outside the Town limits.

The industrial use sector includes four industrial manufacturing facilities in Pittsboro: WDL, Biolex-1, Biolex-2, and Piedmont Biofuel.

The bulk sales use is a separate, unique sector for water sales to Chapel Ridge, a large master-planned golf community subdivision. Build-out of this subdivision may take several more years, and the largest current water demand within Chapel Ridge is for golf course irrigation.

The non-revenue water sector for Pittsboro was broken into two subsectors for 2010, water treatment plant process water and other non-revenue water. At the time, data was not available to further distinguish between distribution system flushing water and system losses. In 2012, Pittsboro began to meter all flushing water and this data is used to further separate the distribution system process water into flushing water verses all other non-revenue water.

The JLP, in accordance with current water supply industry practice, no longer recommends the term *Unaccounted-for Water*. In general, non-revenue water falls into unbilled water used for system management, maintenance and operations purposes and all other non-revenue water use, such as leaks, firefighting and other municipal uses. The JLP members agreed in principle to separate the *System Process* usage according to where it was used, namely, at the water treatment plant or in the distribution system. This distinction is important as the *Distribution System Process* water is by definition finished, treated water and is most easily calculated as a function of total consumed or total finished water entering the distribution system. *WTP Process Water* is generally calculated as the portion of the raw water that is pulled from the source that does not become finished water. The *Other Non-Revenue* category is a flexible category for many other types of unbilled use including loss through leakage. The JLP members have been working towards completing water audits and measuring flows to be better able to categorize system process uses, reduce apparent losses, and more accurately define true losses in the *Other Non-Revenue* category.

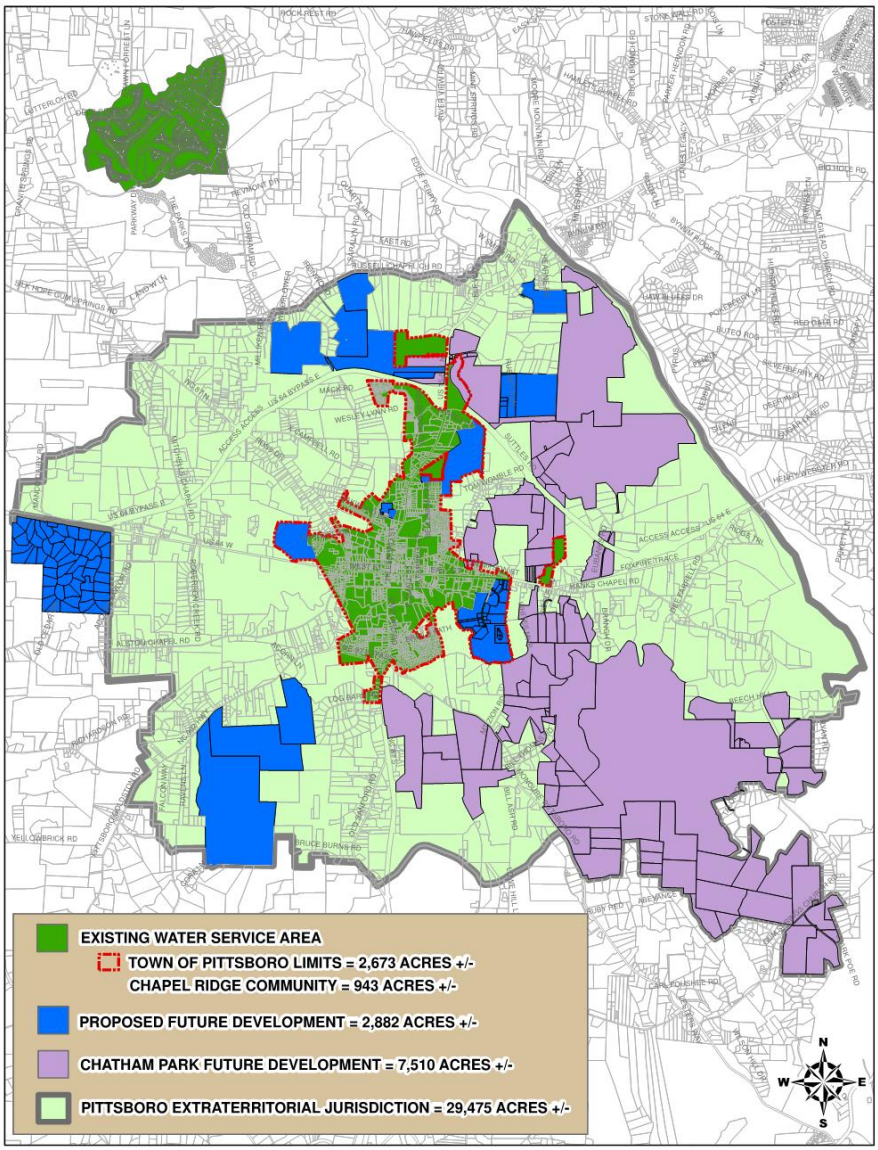
Breaking down what was once "unaccounted-for water" into these three sub-sector components allows a more complete representation of non-revenue water use that is still flexible enough to be used by multiple JLP members.

Sector Projections

The future service area, which included the entire Pittsboro ETJ, has ten-fold more land available for development than is currently developed. Of the land in the ETJ (29,000+ acres), almost 11,000 acres have been slated for future development. Pittsboro's 2010 population was 3,743, and the water department reported 1,755 meter connections. Pittsboro's small system has a limited data set from which to make future growth projections, especially given an estimated Chatham Park population of 64,000 people at build-out in 30 years (based on the developer's estimate of 27,570 housing units and an average of 2.33 people per household [pph] based on 2010 Census data for Pittsboro). Therefore, Pittsboro's future water demand projections were developed based on a land capacity/development type analysis, and the different analysis areas are shown on the map in Figure I.2.

Note: at the time of the draft application process, the Chatham Park Master Plan had not been approved by the Town Board of Commissioners. Therefore, the area indicated on the map in Figure I.2 was a potential area, to be rezoned as a Planned Development District (PDD). Since it is now approved, the area indicated is rezoned as PDD.

Figure I.2. 2045 Future Water Service Area



For the future land capacity/water demand projection analysis, the future service area was separated into four categories:

1) Existing Town limits & Chapel Ridge Subdivision (current service area)
2) Chatham Park (potential)
3) Known developments other than Chatham Park
4) Other undeveloped land in the ETJ

For the current service area, a review of the water billing records showed an average new connection growth rate for in-town meters of 1% per year for the last 10 years (1999-2009). So, an infill growth rate of 1% was assumed to continue inside the current Town limits.

Chatham Park developers recently provided water demand projections that have been included in Pittsboro's projections in this application. The estimate includes 27,570 housing units at build-out, and 2.33 pph was assumed. The planning for this large-scale development is just beginning. The water demand projections for Chatham Park are the best available estimate based on currently available information provided by the developer, though future water conservation measures may lower the actual demand. (Note: The TRWSP Volume I report was written prior to receiving water projection information from the Chatham Park developer. In the TRWSP Volume II plan (and this application), the information from the developer has been included.)

Several other large residential subdivisions are planned within the ETJ. There are no formal agreements in place at this time, but the Town will eventually supply the potable water for these areas. Therefore, the following assumptions were made for these known development areas:

1. A percentage of the total subdivision acreage (40%) was assumed as not developable due to space needed for transportation infrastructure, utilities, open space, etc.
2. For the remaining 60%, a density of 2 units per acre (based on approximate averaging of the existing Zoning Districts) was assumed with 2.33 pph (based on the 2010 Census).

The remaining undeveloped land in the ETJ is planned as Rural Residential or Low Density Residential (2012 LUP). After excluding undevelopable areas and those already subdivided, a density of 0.4 units per acre was assumed for these areas with 2.33 pph.

As a cross-check, the resulting population was compared to four other scenarios based on different assumptions. A 2011 Hydrostructures Technical Memorandum detailing the different growth scenarios is included for reference found in Appendix C. Of particular importance was a 2007 Chatham County School Board Study. This study, conducted by the Operations Research and Education Laboratory Institute for Transportation Research and Education at NC State, reported that more than 11,944 homes were expected to be built in Pittsboro and the ETJ by 2020. Using 2.33 pph, their estimate translates to an additional 27,800 people by 2020. The

population projections submitted in this application fall below the school board study, but are higher than originally estimated in the TRWSP Volume I report because more information is now known about planned densities in Chatham Park.

For the industrial sector, water demand has decreased in Pittsboro over the past 10 years, due mostly to initial modifications and ultimate closure of a chicken processing plant and an industrial plant. There are no specific industrial plans for development or re-development at this time, however, Chatham Park has indicated potential industrial development in the southern portion of the PDD, therefore water demands are projected to grow only modestly through 2045 and then remain somewhat flat through 2060.

The Town has one bulk water sales customer, the Chapel Ridge Subdivision, with a sales contract to supply the water needs of approximately 2,100 homes at build-out. Currently, Chapel Ridge is the Town's single, largest water customer, purchasing 23 million gallons total in 2013 (which is equivalent to an average daily use of approximately 63,000 gallons). The large volume of water used by this customer is not representative of the actual residential usage for the existing 150+ homes. A considerable amount of this water is used for golf course irrigation. As more homes are built, the community will substitute reuse water for irrigation and save potable water for the residential customers. Given the special situation for this customer, the future demand was projected by assuming build-out by 2030 of 2,100 homes, a clubhouse, pool, and other proposed buildings in the Chapel Ridge Master Plan.

The total non-revenue water use in 2010 was nearly 30% of the raw water demand. It was thought that an aggressive flushing program used to address water quality concerns in the distribution system was the primary cause of high non-revenue water use. So, in 2012, Pittsboro began to meter all flushing water, and this data will be used to further refine the estimates of distribution system process water and other non-revenue water in the future. The preliminary data seems to indicate that flushing water accounts for 5-8% of this non-revenue water. Therefore, Town staff have taken further steps to address non-revenue water by working to replace all large 2-inch meters, and the Rural Water Center has conducted the first phase of a leak detection program in April 2014. Current non-revenue water is still higher than Pittsboro would like, though direct action from staff in the past year has brought a reduction in non-revenue water. To demonstrate a strong commitment to reducing non-revenue water, future water projections for this sector were limited to 10% of raw water demand for water treatment processes and 10% of finished water for distribution flushing and system losses (distribution system process water and other non-revenue water).

Usage Rates

The residential usage rate was developed by examining the billing data from several recently built single-family residential subdivisions. These newer subdivisions are expected to be more representative of future development than older home stock in Pittsboro. Billing records indicate an average in-town household water use of 240 gallons per day (gpd) in these neighborhoods. Using the average household size from the 2010 Census data for Pittsboro of

2.33 pph, a per capita residential usage rate was calculated to be 103 gallons per capita per day (gpcd). This was rounded down to 100 gpcd for future water projections of existing, in-town homes. While this is Pittsboro's current usage rate and was used for projecting water use in existing in-town residences, the Town's water projections for future residential development (Chatham Park, ETJ, in-town) is based on 60 gpcd. This aggressive, but attainable, water usage goal has been approximately reached by other JLP partners using water conservation and efficiency programs similar to what Pittsboro will incorporate. Pittsboro's strong commitment to managing and using water much more efficiently today, and as new development occurs in the future is a cornerstone of this Round 4 allocation application. As a part of the Unified Development Ordinance process underway, the Town plans to implement a water conservation and efficiency ordinance and policies to continue to work towards this goal. Section II of this application describes this in more detail.

Next, a combined commercial and institutional use rate was determined by examining 2009 billing records. Given a total commercial and institutional use of 123,610 gpd and a 2009 population of 2,670, a system-wide commercial and institutional use rate of 46 gpcd was calculated. Thus, for each resident, 46 gallons per day of commercial and institutional water was used to support the residential population. While the commercial and institutional use may not be exactly correlated to the residential population, a corollary relationship is expected since the number of businesses and institutions can be expected to increase along with a growing population. So, failing a more precise water use metric for the commercial and institutional sector, this usage factor was used to scale future commercial and institutional use.

Demand Projections

Population estimates are shown in Table I.2 below and have been updated to include the most recent information provided by Chatham Park developers.

Table I.2. Population Estimates for Pittsboro Water Service Area

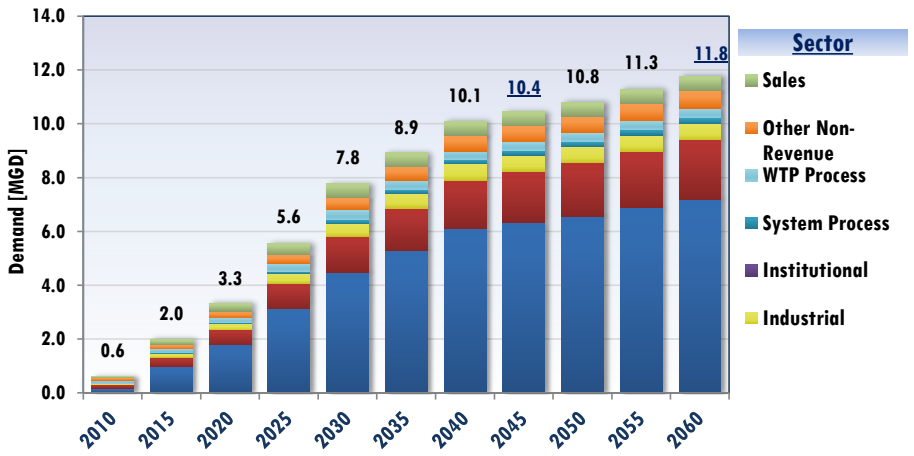
Service Area	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Pittsboro ETJ	3,700	9,700	15,700	37,200	58,600	69,300	79,900	83,500	87,100	92,000	96,800

Water demand projections are shown in Table I.3 below and have also been updated to include the most recent information provided by Chatham Park.

Table I.3. Water Demand Projections by Sector (MGD)

Sector	Subsector	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Residential		0.17	0.97	1.78	3.13	4.49	5.30	6.11	6.34	6.57	6.88	7.19
Commercial & Institutional		0.13	0.35	0.57	0.95	1.32	1.56	1.79	1.88	1.97	2.09	2.21
Industrial		0.07	0.15	0.22	0.35	0.48	0.54	0.61	0.61	0.61	0.61	0.61
Bulk Sales		0.06	0.18	0.29	0.41	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Non-Revenue	Dist. System	0.00	0.03	0.06	0.10	0.14	0.16	0.18	0.19	0.20	0.21	0.22
Non-Revenue	WTP Process	0.10	0.13	0.16	0.27	0.38	0.34	0.30	0.31	0.32	0.33	0.35
Non-Revenue	Other Non-Rev.	0.09	0.17	0.25	0.34	0.44	0.51	0.58	0.60	0.62	0.64	0.67
TOTAL		**0.62**	**1.98**	**3.34**	**5.55**	**7.77**	**8.93**	**10.09**	**10.44**	**10.80**	**11.28**	**11.76**

Figure I.3. Water Demand Projections by Sector (MGD)



Bulk Water Sales

The Town of Pittsboro has a sales contract to supply the water needs of approximately 2,100 homes and any buildings associated with the Chapel Ridge subdivision (club houses, pools, etc.). The demand projections for these homes and buildings have been included in the Bulk Sales sector.

An emergency water supply contract also exists to supply water to Chatham County, but it has never been used. This interconnection and another potential interconnections identified in the

JLP Interconnection Study by Hazen and Sawyer will be reviewed and further investigated by the Town.

Table I.4. Bulk Water Sales Contracts

Purchaser	PWSID	Contract Amount (MGD)	Begin Year	End Year	Regular or Emergency	Pipe Size (in.)
Chatham County North	03-19-126	0.5	1988	na	Emergency	8
Chapel Ridge S/D	40-19-009	0.5*	2002	na	Regular	12
TOTAL		0.9				

*Chapel Ridge contract is to supply 2,100 units and does not specify a specific volume of water in million gallons per day (MGD). Contract amount has been estimated for this table.

References

DWR, 2013. Local Water Supply Plan for Pittsboro.

Operations Research and Education Laboratory, 2007. Integrated Planning for School and Community, Land Use Supply.

2011 Water and Sewer Planning Update

Town of Pittsboro, 2012. Pittsboro Land Use Plan. Adopted October 2012.

Commented [TJCOG1]: This reference need an author and year.

SECTION II. CONSERVATION AND DEMAND MANAGEMENT

The Town of Pittsboro currently has two ordinances that address conservation and demand management. However, these ordinances encourage conservation practices, but they do not create enforceable regulations to ensure water conservation. The first ordinance is a voluntary conservation plan, and the second is a water shortage response ordinance. These reactive ordinances, while a good start for the Town, are not as proactive as what is proposed or planned as a part of this application. As a result of the Town's participation in the JLP, the Town is preparing to implement water conservation and efficiency efforts similar to the other regional partners. These measures have been included in our allocation request, and we see this as the critical step necessary to meet future demands responsibly.

The Town of Pittsboro's Water Efficiency Program, as proposed, will play a critical role in managing future water use. To use resources efficiently and to effectively manage demand from projected population growth, an ambitious systems approach comprised of education, incentives, and regulatory programs is planned. These programs will target water use for all customer classes – residential, commercial, industrial, and institutional. Where applicable, parallel measures will target water use by the Town (e.g., use of efficient fixtures and landscape watering practices). In addition, more aggressive measures will be used to address the Town's high water treatment, distribution system, and other non-revenue water (NRW) use. The Town began its NRW loss prevention program in 2012. This program will be expanded and will be part of a systematic, sustained effort to reduce and minimize losses. Over time, all programs will be monitored and adjusted as needed to ensure progress toward the Town's long-term efficiency goals.

Water Efficiency Goals

As described in Section I, Pittsboro's demand projections are based two different types of housing stock – existing and new development. The oldest housing stocks are fairly water inefficient and have an average water use of approximately of 100 gpcd. As shown in Table II.1, a moderate conservation goal is to reduce consumption by at least 20% over the planning horizon. Indoor water use in newer housing stock will be much more efficient due to plumbing codes and water-efficient fixtures, but outdoor use may still be higher. The tri-fold education, incentive, regulation approach will provide a foundation for aggressive efficiency, with the long-term residential consumption goal of 60 gpcd. In addition to achieving efficient use of a limited water supply, the aggressive scenario would save the Town significantly in facility expansion and operation costs.

Table II.1. Moderate and Aggressive Conservation Goals for the Town of Pittsboro

2010 Existing	2060 Moderate	2060 Aggressive
100 gpcd	80 gpcd (20% reduction)	60 gpcd (40% reduction)

A Systems Approach to Reducing Consumption

The proposed education/incentive/regulation systems approach will accomplish water savings through both technology and behavior change. Education measures provide the foundation for the Town's water efficiency program. Education provides both the understanding for why water conservation is important and the practices needed to reduce water use. To further motivate customers to reduce water, incentives offer a financial benefit. The Town's water rate can motivate customers to use less water through reduced utility bills. Customers can also reduce water by using rebates for water efficient fixtures such as toilets. Regulations provide the third and final critical component of the systems approach to efficiency; ordinances can be used to accomplish both technological and behavior-oriented measures.

Figure II.1. Tri-fold Systems Approach

Education Incentives Regulation

With the systems approach, each area complements and supports the others, as depicted in Figure II.1. The Town of Pittsboro's plan summarized in Table II.2 aspires to achieve widespread water efficiency using the systems approach. Some customers will learn from education and use incentives. Other will follow regulations. For example, a water waste ordinance provides a tool to educate customers who excessively water their landscapes. The tiered rate structure is designed to get a customer's attention – higher than anticipated usage either from an indoor or outdoor leak or by known uses such as irrigation – can kick a customer into the next tier and result in a much higher bill.

An aggressive strategy to increase the reclaimed water program will be an important part of this systems approach. The Town currently sells approximately 50,000 gpd of reclaimed water. Expansion of the distribution system, including a bulk sales station, is planned.

The systems approach provides the means to sustain decreased water use over time. By simultaneously addressing multiple measures and multiple customer types, the program avoids reliance on a single measure to achieve goals. Similar combination approaches have been successfully used in other JLP utilities and progressive utilities around the country to attain efficient water consumption rates (Maddaus Water Management, 2009).

Table II.2. Existing and Planned Water Efficiency Measures for the Town of Pittsboro

Program	Target Use Class	Indoor	Outdoor
Education			
Current:			
Website	All	X	X
Festival Booths	All	X	X
Planned:			
Publications	All	X	X
Workshops	All	X	X
Audits	All	X	X
Utility Billing Consumption History	All	X	X
Incentives			
Current:			
Tiered Rate Structure	All	X	X
Reclaimed Water	Industrial	X	X
Planned:			
Water Efficient Fixtures Rebate Program	Residential	X	X
Reclaimed Water	Residential/Commercial		X
Regulations and Policies			
Current:			
Voluntary Water Conservation	All	X	X
Water Shortage Response	All	X	X
Planned:			
Water Waste Ordinance	All	X	X
Water Efficient Landscapes – Site Design and Irrigation	All		X
Tree Protection	All		X
Zero Footprint - New Development	Residential	X	
Town Operations			
Current:			
Meter Replacement	Non-Revenue Water (NRW)		
Water Treatment Plant Efficiency	NRW		
Waterline Replacement	NRW		
Landscape Watering Practices	NRW		X
Planned:			
Leak Detection	NRW		
Town Fixtures	NRW	X	X

The Quantity/Quality Connection

Most outdoor measures that improve water efficiency can also help reduce adverse water quality impacts caused by runoff. For example, proper landscape watering practices can prevent runoff from improper use of irrigation systems, which can transport nutrients into storm drains and waterways. Requiring reclaimed water use for irrigation and construction will help both educate and reduce water demand. The Town's education, incentive, and regulatory measures used to address water efficiency will serve a dual purpose and also support implementation of the Jordan Lake Nutrient Management Rules.

Wastewater Discharge and Reuse Program

In addition to the Jordan Lake Nutrient Management Rules, the Town's limited capacity to discharge wastewater (0.75 MGD currently with a maximum of 3.22 MGD) will constrain long-term wastewater discharges. Water used efficiently indoors as well as a robust and expanded reclaimed program will reduce wastewater effluent and water demand, and thus help the Town's ability to meet state permit requirements. It is noted that the Town also has a discharge permit issued to the water treatment plant. This permit is for the return of backwash and process water to the Haw River. This permit is not associated with any sanitary sewer discharges by the Town.

The Town has a new major permit modification to increase the capacity of the existing WWTP from 0.75 to 1.249 MGD and discharge into Robeson Creek. Planning is underway for this expansion. In addition, 1.97 MGD is permitted for discharge into the Haw River in the future. The Town's procedure for distributing sewer allocations to new development is on a first-come first-serve basis following the Town's Wastewater Allocation Policy (included in Appendix E).

Chatham Park has applied for and received a limited sewer allocation to cover their immediate building needs. Currently, there is no agreement between the Town of Pittsboro and Chatham Park concerning future sewer discharges. Their future development plans have a number of options to address future wastewater treatment that may or may not include a request for additional sewer allocation from the Town of Pittsboro. Please see the explanation of future sewer plans provided by Chatham Park in Appendix D.

Education

Pittsboro's public education program consists of outreach through the Town's website, mailings, street fairs and landscaping/water efficiency workshops sponsored in conjunction with local agencies. An early component of the Town's program will include public workshops and other outreach to solicit feedback on planned program initiatives.

In addition to educating citizens about indoor and outdoor residential water use, the public education program will share measures to improve water use efficiency in the Town's

industrial, commercial, and institutional sectors. The Town's voluntary measures ordinance adopted in 2007 provides a starting point for ongoing education measures to educate citizens about efficient water use.

Additional tools will be used over time to educate customers about water use. The Town recently installed a new utility billing system, which will eventually provide a water usage graphic showing historical consumption on utility bills. The Town will offer water audits to residential, commercial, industrial, and institutional customers to assess the presence of leaks and educate about savings opportunities.

Incentives

Over the past several years the Town has paid increased attention to incentive-oriented mechanisms to reduce water use. The block rate structure adopted in January, 2013 targets excessive water use through increased fees based on use. The Town also initiated reclaimed water service in 2010, offering a reduced rate for water used for industrial and bulk contracting uses. A third planned component to the Town's incentives is a rebate program to encourage use of efficient indoor fixtures. Other incentives will include low cost rain barrels and other water harvesting programs.

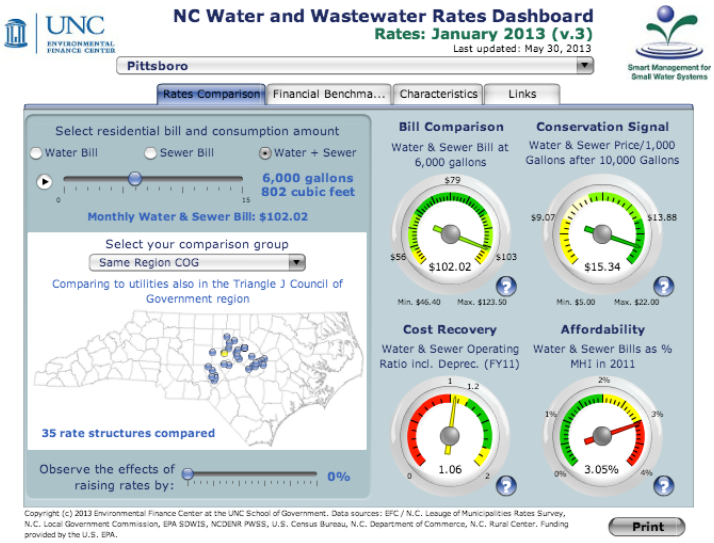
Utility Rate Structure

The Town's increasing block rate structure strongly discourages excessive indoor and outdoor water use. Pricing mechanisms are a key tool used around the country to accomplish effective demand management. As shown in Table II.2 and Figure II.2 below, the Town's structure sends a strong conservation signal. Table II.3 shows how the rate increases for increased usage. Figure II.2, obtained from the NC Water and Wastewater Rates Dashboard, shows how Pittsboro compares to other utilities within the Triangle J Council of Governments (many of which are JLP partners). As shown in the "Conservation Signal" indicator at the top right, the Town's pricing is extremely strong. It is anticipated that the aggressive rate structure will encourage customers to use water efficiently, and whenever possible, to see other sources such as reclaimed.

Table II.3. Town of Pittsboro's Water Rates

	Inside	Outside
Basic Service Charge (flat monthly fee for meter reading, billing and accounts management)		
Meters ≤ 1 inch	$13.00	$26.00
Meters > 1 inch	$24.00	$48.00
Monthly Usage Fee (per 1,000 gallons)		
0 to 2,000 gallons	$4.50	$9.00
2,001 to 6,000 gal.	$5.15	$10.30
> 6,000 gallons	$6.00	$12.00

Figure II.2. NC Water and Wastewater Rates Dashboard for the Town of Pittsboro



Rebate Programs

Rebates for water efficient products may provide another key component to the Town's incentive-oriented programs. Because about 35% of the Town's water customers live in older, less efficient housing stock, significant savings (20-40%) could be achieved by replacing indoor water fixtures. A program that may offer rebates for water efficient toilets, clothes washers, and dishwashers is planned for implementation for further development.

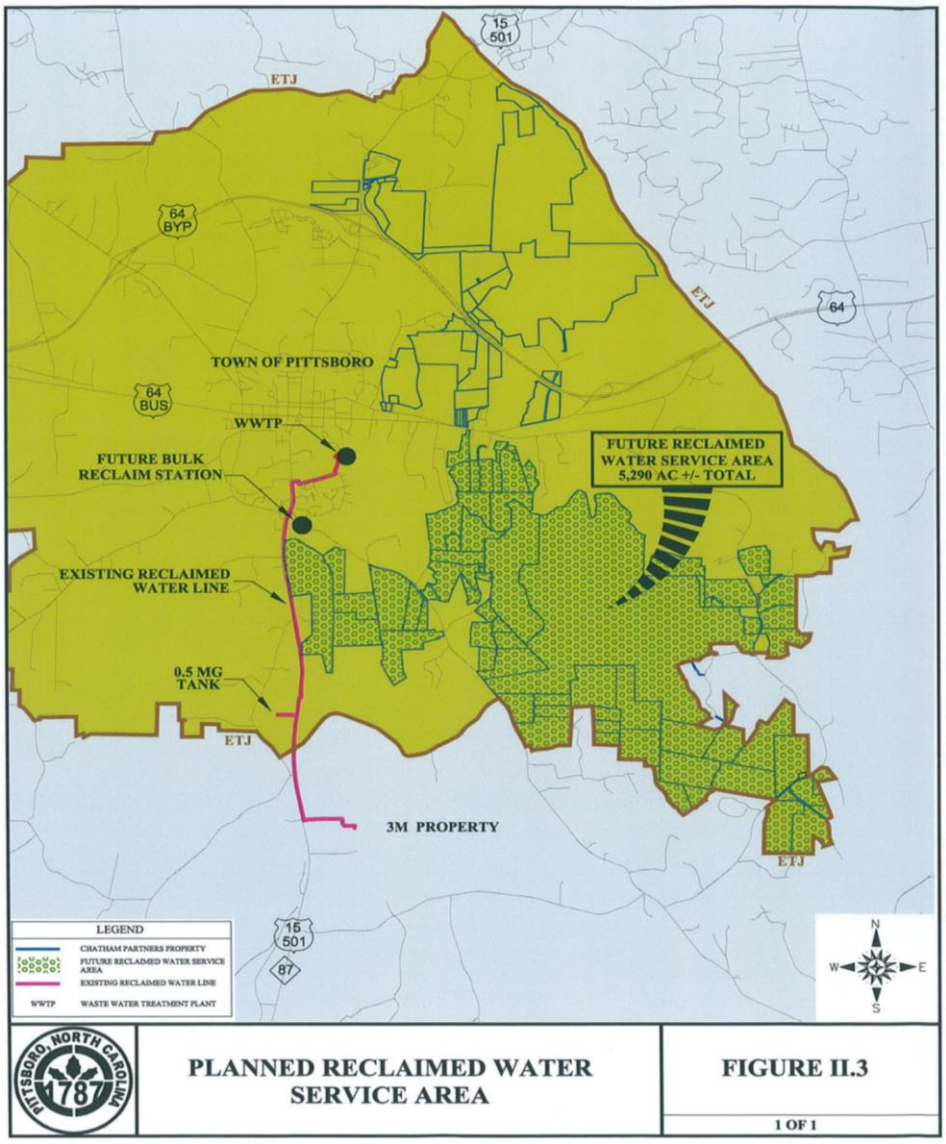
Reclaimed Water

Another key component of the Town's incentive programs is the availability of reclaimed water. In April 2010, the Town completed a reclaimed water system (RWS) and offers a discounted rate over potable water. The RWS has the capacity to pump up to 0.43 MGD, and currently provides a capacity of 0.05 MGD. In its first seven months of operation the Town delivered over 12 million gallons to 3M, the system's first customer. 3M uses the water for manufacturing. The water evaporates during the process, eliminating the discharge, creating a win/win for both the customer and the WWTP. The Town plans to partner with the customer to conduct an evaluation and use the results as part of a PR campaign touting their environmentally friendly business practices.

As shown in Figure II.3, the Town plans to expand the RWS infrastructure as new customers come online. The total reclaimed water supply available depends on the volume of water treated at the WWTP, which averaged 0.336 MGD in 2013.

The Town currently offers bulk potable water purchases at Town Hall for construction and other uses; in 2013 contractors used nearly 100,000 gallons. As construction and demand for water increases, the Town wishes to install a bulk reclaimed water port for contractor use. The first year demand is projected to be 50,000 gallons, replacing the bulk potable water purchases within approximately three years. Contractors working within a certain distance of the bulk reclaimed port or using water for irrigation or road construction may also be required to use reclaimed water.

Figure II.3. Planned Reclaimed Water Service Area



Regulations

Ordinances

The Town has two ordinances that address water conservation, and several other ordinances under consideration. In August 2007, the Town Board of Commissioners approved the Voluntary Conservation Measures ordinance. The measures encourage behavioral practices such as irrigation limits, mulching and hand watering, use of water efficient interior plumbing fixtures, and fixtures and other methods. In June of each year, this document is updated and shared with the public via the Town website and through other public outlets. The Town's second conservation-related ordinance -Pittsboro's Water Shortage Response Plan - is submitted each year to the NC Division of Water Resources. It includes provisions for different stages of water conservation from voluntary to mandatory to rationing.

To incorporate water efficiency into the Town's new and expanded infrastructure, additional ordinances are proposed. These ordinances primarily target water use in the landscape, which is anticipated to comprise a substantial component of the increased water use.

- Landscape Water Efficiency Ordinance – Under consideration is a comprehensive ordinance to address efficient water use in new landscapes, using techniques ranging from soil amendments to efficient irrigation system design, to requiring reclaimed water under certain conditions.
- Tree Protection Ordinance – Town staff are also examining the feasibility of a tree protection ordinance. Maintaining tree cover supports efficient water use because of reduced impacts from evaporative cooling loss. A recent tree canopy study will be referenced for this ordinance.
- Zero Footprint New Development Ordinance – One way to offset growth in the Town's system would be to require developers to contribute to a conservation account that provides funds for rebates to promote water efficient fixtures. This would essentially be a self-funded program that also increases efficiency. This could target particular sources such as the existing in-fill development.
- Water Waste Ordinance – This ordinance targets overwatering from irrigation systems and leaks.

With adoption of ordinances comes the administrative need to educate, implement, and enforce to achieve a successful program. This will have to be carefully reviewed from an administrative and fiscal viewpoint to ensure progress toward long-term efficiency goals.

Water Use In Town Operations

Through daily operations, town staff uses water in numerous ways, ranging from process water at the treatment plant to indoor fixtures in Town buildings. Pittsboro's plan includes an ambitious program to address non-revenue water, and utilize conservation-oriented features of the automated meter reading (AMR) system. Other Town initiatives will target landscape watering and indoor efficiency.

Non-Revenue Water

The non-revenue water losses prior to entering the distribution system are within staff's ability to review and address for possible reductions through management actions and new facilities and capital improvements. As shown in Figure II.4, water loss in the distribution system - the Town's "other non-revenue water" (NRW) - is estimated at twenty two percent (22%). Non-revenue water currently costs the Town about $225,000 in annual lost sales. A number of measures are underway with the goal to reduce distribution system loss by half, down to ten percent (10%).

The first step used by the Town of Pittsboro's Utilities Department to reduce NRW was to begin metering uses of process water such as for flushing operations. In 2013, staff also implemented a program to replace the Town's oldest, largest meters; results are summarized in Table II.4. As shown, the projected payback is less than 2.5 years. Staff will continue to target NRW by calibrating or replacing 2" and larger meters in 2014.

To address the remaining high loss, a systematic Capital Improvements Plan will be recommended to reduce the distribution system losses to <10% by 2025, or one percent per year. With this reduction realized, the Town will benefit from the cost savings and will be better positioned to minimize additional withdrawals and treatment capacity needs. The water loss reduction program will require a combination of public official education and approval, public education to inform the citizens, data collection, reviewing existing reports and planning/programming ongoing actions with sufficient budgets to accomplish the goals.

Figure II.4. Town of Pittsboro Billed and Non-Revenue Water

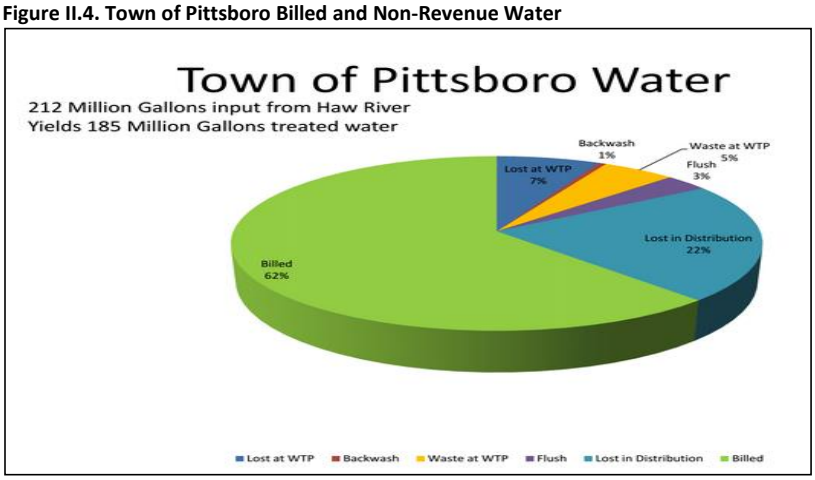


Table II.4. 2013 Meter Replacement Program

Total Replacement Meter Cost	$38,290
Meter Revenue:	$116,429
Total Gain:	$15,939.20
Total Payback in Years:	2.40

Automated Meter Reading System

The use of automated meter reading (AMR) technology holds one of the strongest opportunities for achieving a water efficient community. As with electric utilities, AMR in a water utility allows staff to monitor usage and alert customers when excessive or unusual usage occurs. The AMR system also allows a utility to spread out demand to manage fluctuations in the system. This feature will be especially useful as new development causes consumption spikes and staff learns to manage a rapidly growing system. The Town of Pittsboro began converting to AMR meters in 2002. Over 90% of the Town's meters now use AMR technology.

Impact On Water Use

The systems approach to conservation proposed by the Town of Pittsboro will enable the use of extraordinary measures to achieve long-term water use efficiency. As shown in the demand forecast, the Town aims to reduce per-capita consumption by up to thirty-three percent (33%) over the fifty year planning horizon. To expand the efficiency program measures, the Town will implement ordinances, policies, incentives and education programs. Careful monitoring will

help determine progress towards reduction goals, and allow for programmatic adjustments when necessary to ensure progress remains on track.

References

Atteberry, et. al, 2010. MY GROUP IS READY FOR WATER CONSERVATION. NOW WHAT?

Maddaus Water Management (MWM), 2011. "Why do new homes use more water than existing homes even during the recession?" Presentation at the Water Smart Innovation Conference. October 6, 2011.

Maddaus Water Management (MWM), 2009. Catawba-Wateree Water Management Group (WMG) Benchmarking Survey of Current Successful Water Demand Management Programs. Prepared for the Catawba-Wateree Water Management Group in cooperation with Jordan, Jones and Goulding, Inc.

Mayer, Peter and Al Dietemann, 2011. "Assessing Changes in Single Family Water Use". Water Research Foundation webcast. December 6, 2011.

Texas Water Development Board (TWDB), 2011. Water Conservation Savings Quantification Study.

UNC Environmental Finance Center, 2013. Small Systems Technical Assistance Memo. Prepared for Town of Pittsboro, July 13.

SECTION III. CURRENT WATER SUPPLY

Available Supply from Existing Sources

Pittsboro's current water supply is a run-of-river intake located behind the Bynum Dam on the Haw River. The river is classified as WS IV NSW and has a 20% 7Q10 flow of 8.91 MGD, based on a recent USGS and NCDENR analysis. See the associated e-mail references in the *Section III References* tab.

The current water treatment plant has a 2 MGD permitted capacity. See Figure III.1 showing the WTP location. Planning of water supply infrastructure upgrades generally include the following;

- Asset Management Plan development
- review of existing Haw River in-take structures and pumping facilities for capacity increases and long-term operations and maintenance
- planning for increased capacity at the water treatment plant
- rehabilitation or replacement of antiquated distribution system components
- planning for elevated storage tanks/pressure zones analysis
- planning for new distribution system components

While the Haw River is Pittsboro's only current water source, one emergency interconnection exists with the Chatham County North system. The JLP Interconnection Study identified another potential connection south of Pittsboro with the Chatham County Asbury system. Both of these connections require further study and cooperative efforts to establish their viability.

Figure III.1. Pittsboro Water Treatment Plant Location Map

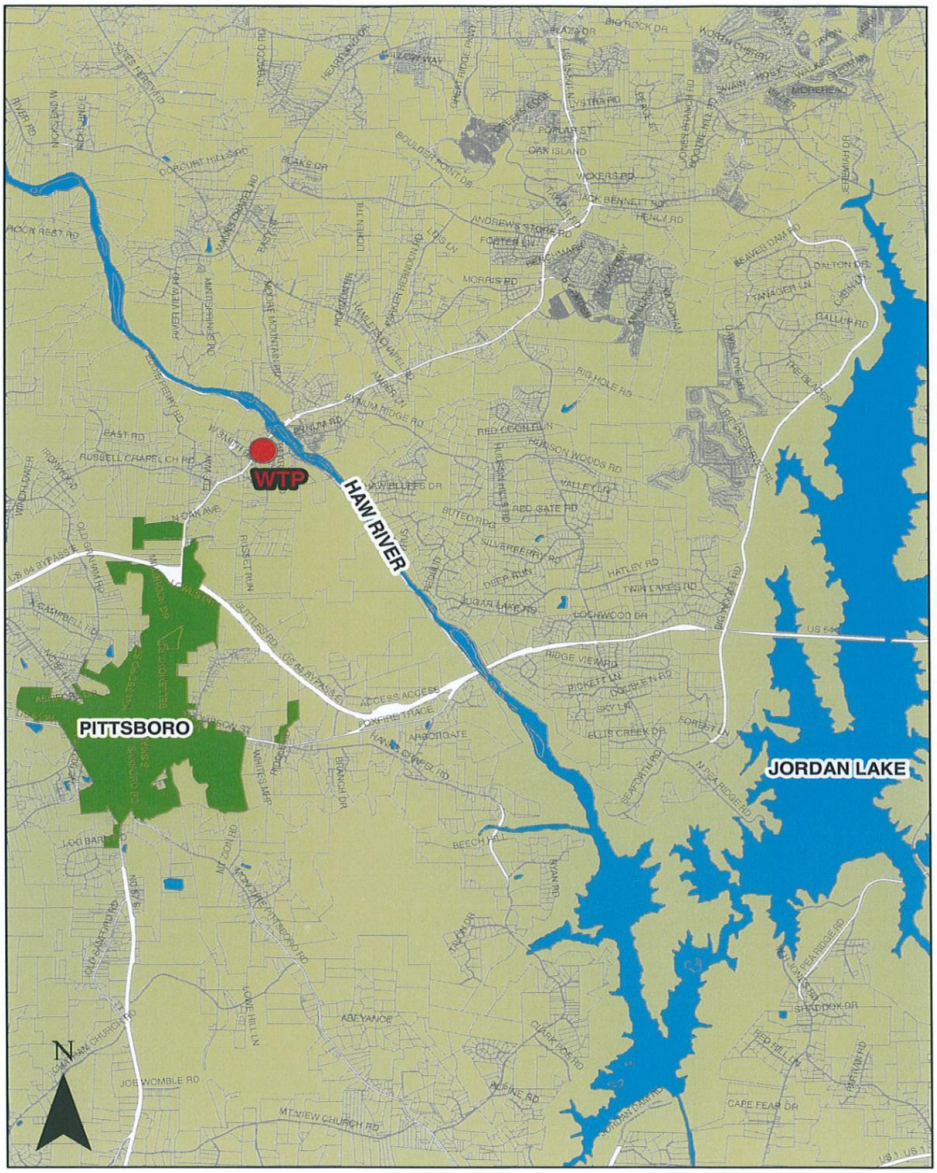


Table III.1. Existing Source Summary, Available Supply

Source	PWSID	SW or GW	Basin	WQ Classification	Available Supply (MGD)
Haw River	03-19-015	SW	Haw (2-1)	WS – IV - NSW	2.0

Purchased Water

The Town of Pittsboro does not purchase water or have contracts to purchase water from other sources or suppliers.

References

North Carolina Department of Environment and Natural Resources, Division of Water Resources, 2013. Haw River 7Q10 determination letter, signed by Fred R. Tarver III, Aquatic Monitoring Unit. Prepared for Town of Pittsboro, October 9, 2013.

Jordan Lake Potable Water Interconnection Study, Technical Memorandum, December 2011. Hazen and Sawyer Environmental Engineers & Scientists.

SECTION IV. FUTURE WATER SUPPLY NEEDS

The water demand projections presented in Section I have been peer-reviewed by the Jordan Lake Partnership members and represent the best available estimate of future water demands for Pittsboro on an average day basis over the planning horizon. Pittsboro's only current supply is the Haw River. The difference between the water demand projection and the water supply yield is the "water supply need" as shown in Table IV.

Pittsboro's Haw River supply will be sufficient to meet projected demand until approximately 2025, provided the WTP is expanded accordingly. The Town plans to incrementally increase treatment capacity and withdrawals from the Haw River, up to 6 MGD. This process allows time to plan, permit and construct the facilities to use Jordan Lake as a new water source for Pittsboro. The Town is working in partnership with the Orange Water and Sewer Authority (OWASA), the City of Durham, and Chatham County to study the potential for new intake and water treatment facilities on the western side of Jordan Lake.

Table IV.1. Projected Water Needs (MGD in 5-year increments)

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Demand	0.6	2.0	3.3	5.6	7.8	8.9	10.1	10.4	10.8	11.3	11.8
Supply	2	2	2	2	2	2	2	2	2	2	2
Demand % of Supply	*31%*	*99%*	*167%*	*278%*	*388%*	*446%*	*504%*	*522%*	*540%*	*564%*	*588%*
Need	0.0	0.0	1.3	3.6	5.8	6.9	8.1	8.4	8.8	9.3	9.8

SECTION V. WATER SUPPLY ALTERNATIVES

The Town of Pittsboro has two alternatives under consideration. Alternative 1 – (Preferred) is to supply half of Pittsboro's future water needs from the Haw River and half from Jordan Lake. Alternative 2 relies primarily on Jordan Lake as the supply for future water demand.

Alternative 1 - Preferred

This alternative fully utilizes the Haw River and then adds Jordan Lake as a supply to meet future demand needs. The current WTP has a capacity of 2 MGD. The first phase of this alternative would add 2 MGD of treatment capacity in approximately 2020 and an additional 2 MGD of treatment capacity in approximately 2025, for a total of 6 MGD from the Haw River. The goal is to use the Haw River first and expand the WTP to meet demands incrementally.

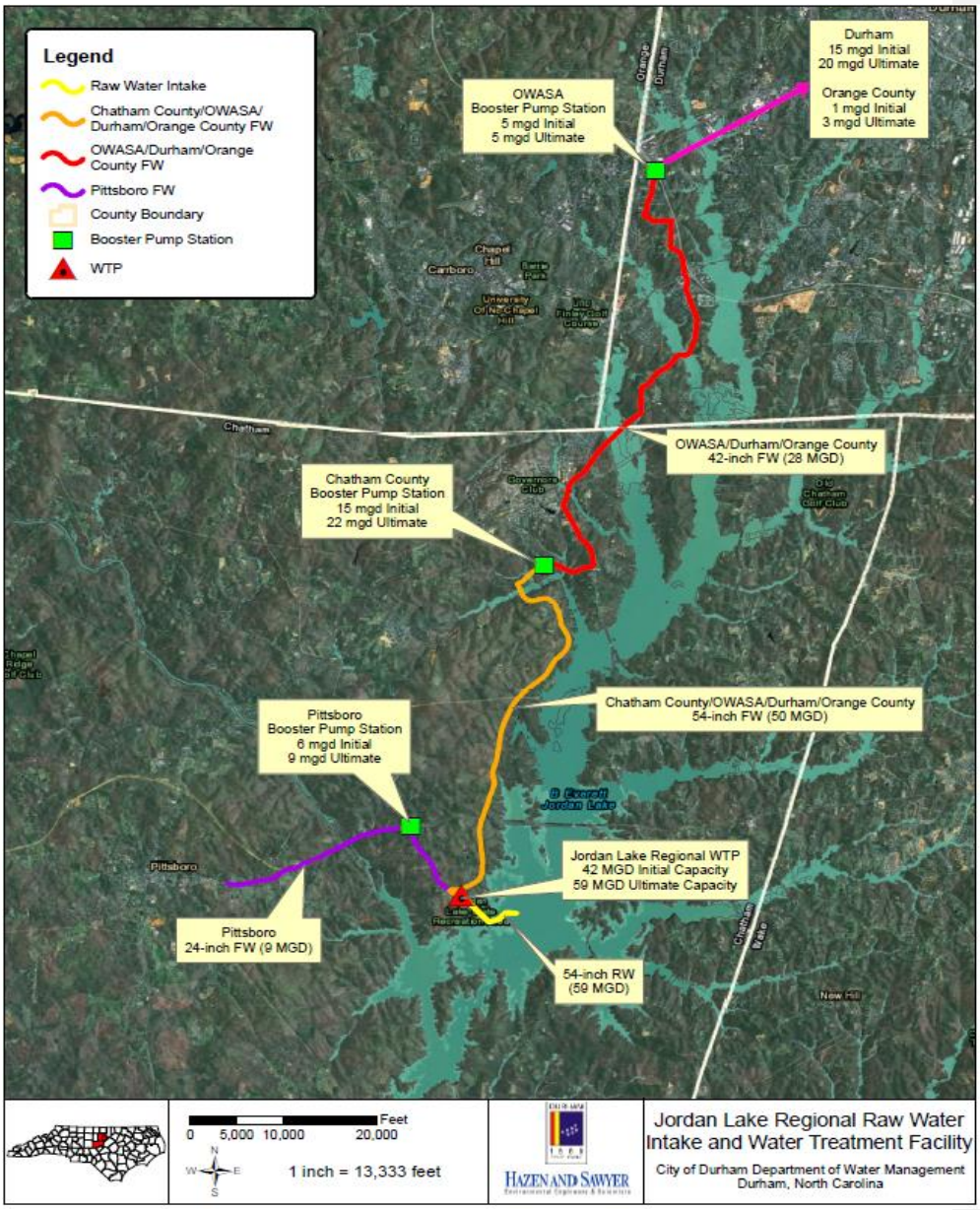
During this time, Pittsboro would continue to work with Chatham County, the City of Durham, and OWASA to explore a new regional intake and treatment plant plan on the western side of Jordan Lake. The second phase of this alternative would use Jordan Lake to meet additional demands.

Pittsboro's requested Jordan Lake allocation of 6% would be implemented as a Level I (3%) allocation to meet initial needs and a Level II (3%) allocation to meet future demands. Hazen and Sawyer has developed concept-level plan and cost estimates for a new raw water intake, raw water transmission facilities, a water treatment plant, and shared as well as separate finished water pumping facilities and transmission lines. A map of the concept plan is shown in Figure V.1 below.

According to our best available projections, Pittsboro's water supply needs beyond the Haw River are expected to be 4.4 MGD (4.4%) by 2045, however we are requesting 6% in two Levels. 3% as Level I and 3% as Level II. This is because;

1) There are inherent run-of-river uncertainties by relying on the Haw River as a primary source.
2) Reliability or resiliency can be obtained from the Jordan Lake source.
3) Prudent planning out to 2060 indicates the need for a Level II allocation.

Figure V.1. Proposed Regional Water Facilities for Western Jordan Lake



Alternative 2 – Primarily Jordan Lake

This alternative does not increase the current Haw River intake or treatment capacity above the existing 2 MGD and proposes to supply all future water demand, up to 10 MGD, from Jordan Lake with a 10% allocation of the water supply storage pool. This would require the same western intake as described in Alternative 1, but would be on a faster construction path that may or may not be possible. This option would only be considered under unforeseen circumstances. This increased Jordan Lake Allocation would over-allocate the water supply pool. This is an undesirable scenario, but it is considered as an alternative.

Source Options

Table V.1. Source Options Descriptions

Source	Type	Basin	WQ Classification	Year Online (earliest)	Available Supply (MGD)	Supply Range (MGD)
Jordan Lake Allocation	Jordan Lake	Haw (2-1)	WS IV B NSW CA	2030	10.0	0.0
Expand Haw River	River Withdrawal	Haw (2-1)	WS IV NSW	2020	0.0	0.0
Expand Haw River	River Withdrawal	Haw (2-1)	WS IV NSW	2025	0.0	0.0

Water Supply Alternatives

Table V.2. Source Composition of Supply Alternatives (MGD)

Need and Source Options	Alternative 1	Alternative 2
Total Projected Need (2045)	*8.4*	*8.4*
Total Projected Need (2060)	*9.8*	*9.8*
Sources:		
Jordan Lake Allocation - Rd 4	6.0	10.0
Expand Haw River	2.0	0.0
Expand Haw River	2.0	0.0
Total New Supply (MGD)	**10**	**10**

Figure V.2. Alternatives Timeline Showing Need Versus New Water Supply

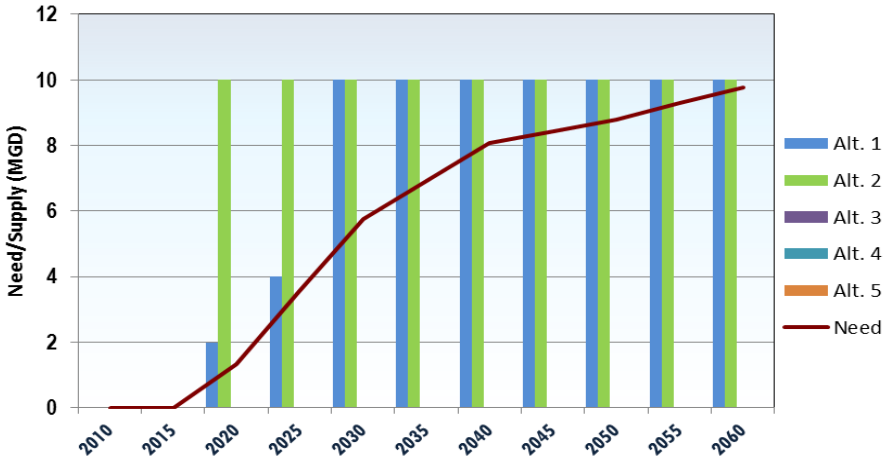


Table V.3. Alternatives Analysis

Classification	Alternative 1	Alternative 2
Rd. 4 Allocation Request (% of storage)	6.0%	10.0%
Total Supply (MGD)	10.0	10.0
Environmental Impacts	Less Than	More Than
Water Quality Classification	WS IV NSW	WS IV B NSW CA
Timeliness	Acceptable	Problematic
Interbasin Transfer (MGD)	None	None
Regional Partnerships	JLP	JLP
Technical Complexity	Complex	Very Complex
Institutional Complexity	Complex	Complex
Political Complexity	Not Complex	Very Complex
Public Benefits	None	None
Consistency with local plans	Yes	Yes
Total Cost ($ millions)	74.9	80.0
Unit Cost ($/1000 gallons)	7.49	8.00

Environmental Impacts

The preferred alternative, Alternative 1, utilizes the Town's existing raw water intake in the Haw River. No impacts to the river bed, bank or existing riparian buffer are anticipated. The existing easement area would continue to be used.

Expansion of the treatment plant immediately adjacent to the existing WTP would have little environmental impact to the already cleared area. These impacts describe the preferred scenario of increasing the plant capacity at the Haw River up to 6 MGD in a phased approach to meet demand needs.

The second part of Alternative 1 requires a new intake at Jordan Lake, pump station, treatment plant and distribution system. Since Jordan Lake is not a new water supply source, major environmental costs are not anticipated. Impacts will be largely limited to the construction activities needed for the new raw water intake, pumping, treatment, and finished water transmission.

The Alternative 2 environmental impacts would be virtually the same as Alternative 1.

Water Quality Classification

The Haw River classification is WS IV NSW. This is Pittsboro's only water source and will continue to always supply at least 2 MGD in either alternative. For Alternative 1, Pittsboro proposes to add Jordan Lake as a new source. Jordan Lake's classification is WS IV B NSW CA. For alternative 2, Pittsboro will also add Jordan Lake, just at a higher volume.

Timeliness

The Alternative 1 timeline proposes 2 MGD increases in 5 year increments to stay ahead of the demand projections. Development in phases of Pittsboro's existing water source allows for efficient and timely implementation that stays ahead of development demand. By the time 6 MGD is used from the Haw River, Pittsboro will have worked with the partners to complete the new Jordan Lake intake. The western intake will mostly supply the Chatham Park area (assuming it's approval) and the eastern side of Pittsboro; putting supply close to demand for cost effective pumping and delivery.

Alternative 2 proposes to maintain the Haw River at 2 MGD and aggressively develop the western intake at Jordan Lake for 10 MGD. The problem with this alternative is that Pittsboro's demand will exceed the current Haw River capacity of 2MGD in approximately 2015. Completion of the western Jordan Lake intake will be dependent on the Western Intake Partnership, where the earliest reasonable completion is 2025.

Interbasin Transfer

The Town of Pittsboro does not transfer water out of the Haw River Basin (2-1). Implementation of either Alternative 1 or 2 would not require IBT certification for Pittsboro.

Regional Partnerships

Pittsboro actively participates in the Jordan Lake Partnership and the Town has included their water data in both Volume I & II of the TRWSP. The JLP provided vetting and peer review, interconnectivity studies, and modeling results that verified Pittsboro's preferred Alternative 1 could be met and is also supported by the Partnership.

Pittsboro is also a part of the Western Intake subgroup of the JLP, along with Chatham County, OWASA, and the City of Durham. This group, working with Hazen & Sawyer, has already completed the engineering feasibility study and cost estimation needed to begin the process of developing a western intake on Jordan Lake.

Both alternative 1 and 2 would require the formal participation by the Western Intake Partners to finance, govern, and operate the proposed new facilities. It is anticipated that this will be possible based largely on the collaboration demonstrated by the Jordan Lake Partnership. These partners have produced a credible body of research and information that local policy boards can use to move forward with formal agreements.

Technical, Institutional and Political Complexities and Public Benefits

Technical Complexity:

For Alternative 1, the complex rating is based on Pittsboro accessing Jordan Lake as a water source. In order to access a 6% allocation of the Jordan Lake water supply pool, estimated to yield 6 MGD, Pittsboro must partner with other municipalities to build a new intake and a new treatment plant. For Alternative 2 this is the same requirement, but is listed as very complex because the increase in volume requested for this alternative would require that the JLP re-evaluate the partners' allocations in order to remain below the maximum total allocation for the water supply pool.

Institutional Complexity:

Alternative 1 – Complex. The permitting for the increased withdraw from the Haw River will be minimal as the proposed 6 MGD total is below 20% of 7Q10 and therefore should not require extensive environmental review.

For both alternatives, the institutional complexity will be the same for the development of the Jordan Lake western intake. The same regulatory and environmental review requirements will apply whether Pittsboro has a 6% or 10% allocation. Jordan Lake will be a new water source for Pittsboro, but since it is already permitted as a water supply source for Cary, the selected rating

was complex. Permitting requirements may be difficult, but not impossible. A brief list of the expected permits and authorizations needed to implement the a new water treatment plant on the western side of Jordan Lake Regional along with a new raw water Intake and water mains includes:

- SEPA Environmental Analysis (EA)
- 401/404 Permit
- USACE Land Use Request
- Duke-Progress Energy Encroachment Agreement
- NCDOT Encroachment Agreement
- NCDOT Driveway Permit
- Sedimentation and Erosion Control Permit
- NPDES Permit (for waste process water)
- DWR Site Evaluation Approval
- Water System Management Plan Certification/DWR Authorization to Construct
- Durham Public Works/Water Main Extension
- Chatham County Site Plan/Construction Plan Approval
- Chatham County Building Permit
- Blasting Permit (Contractor)
- DWR Operating Permit Application (post construction)

Political Complexities:

Alternative 1 – Not Complex. The approach of balancing Pittsboro's water supply between the Haw River and Jordan Lake is a popular view among Pittsboro's elected officials. It is seen to reduce the risk to the Town by having two water sources and provides good emergency planning. Anticipated public perception is expected to be most favorable with this alternative as the long term pumping and energy costs to deliver the water should be less by using a water source that is close to the demand. The western intake will primarily supply areas south and east of Pittsboro and the Haw River will supply the north and west areas of Pittsboro. In addition, by having two source options Pittsboro can adjust operations based on need.

Alternative 2 – Very Complex. This would be more difficult than alternative 1 as it would likely not be supported by the JLP. Officials also see this option as more risky in drought conditions and not providing a balanced long-term water supply plan for Pittsboro. Public perception of a plan that does not meet the projected short-term demand forecast seems to be that the plan limits the growth of jobs and development.

Public Benefits:

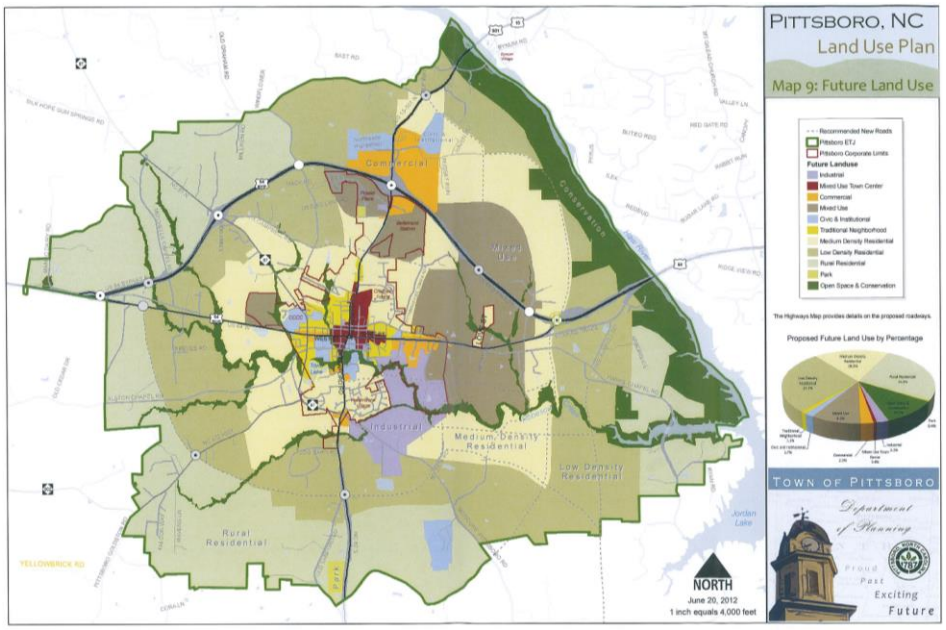
For both alternatives there are no additional public benefits; both water sources are existing and the benefits are in place at this time.

Consistency with Local Water Supply Plans

This allocation application is consistent with the Town of Pittsboro Local Water Supply Plan, 2013. Both TRWSP Volume I and Pittsboro's 2010 LWSP did not include the most recent water demand needs from the proposed Chatham Park development. This application and the 2013 LWSP have been revised to include preliminary information provided by Chatham Park.

The Town's 2012 Land Use Plan identifies development primarily on the north and south-east side of Town. These areas will benefit most from Alternative 1 – the balanced water supply approach. With the water sources located nearest the water demand areas, long term pumping, energy, and maintenance costs are kept to a minimum. Land Use Map #9 shows the expected high growth areas.

Figure V.3. Pittsboro Land Use Map #9



Cost Analysis

For Alternative 1 the existing Haw River Water Treatment Plant would be expanded to accommodate an additional 4 MGD, and replacement of the equipment for the existing 2 MGD, for a total of 6 MGD in new treatment capacity. The estimated cost for this improvement is $28.4M or $7.1M/MGD

Pittsboro's portion of the estimated capital costs for the additional 6% allocation (estimated to safely yield 6 MGD) from the Jordan Lake western intake, treatment plant, pump stations and distribution is $46.5M or $7.77M/MGD. The total estimated cost for Alternative 1 is $74.9M.

For Alternative 2 the existing WTP would only receive small modifications and upgrades at an estimated cost of $1M/MGD.

The estimated capital costs for the additional 10% allocation (estimated to safely yield 10 MGD) from Jordan Lake is $7.7M/MGD.

SECTION VI. PLANS TO USE JORDAN LAKE

Based on the need demonstrated in Section IV, and the alternatives analysis presented in Section V, the Town of Pittsboro is planning to implement Alternative 1. Accordingly, this application includes a request for Jordan Lake Water Supply Storage in the amount of a 6% Allocation (3% Level I and 3% Level II).

Implementation Plan and Timeline

Table VI.1. Preferred Alternative Implementation Timeline

Source	Year Online	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Expand Haw River	2020	0	0	2								
Expand Haw River	2025	0	0	0	2							
Jordan Lake Allocation	2030	0	0	0	0	3						
Jordan Lake Allocation	2060											3
TOTAL NEW SUPPLY		0	0	2	4	7	7	7	7	7	7	10

The Town's 2013 Local Water Supply Plan (LWSP) describes the current water supply as 2 MGD from the Haw River, which is based on the permitted treatment capacity of the Water Treatment Plant. The LWSP also describes the future demand (2060) as 11.76 MGD. Thus, the Town's long term need, calculated as demand minus supply is 9.76 MGD. For future water supply, the Town intends to balance the future supply sources between Haw River and Jordan Lake. This planning will include the expansion of the Haw River treatment plant capacity from 2 MGD to 6 MGD. The Jordan Lake source will be developed cooperatively with the Western Intake Partners (Chatham County, the City of Durham, OWASA, and Pittsboro) to allow Pittsboro to access the 6% Jordan Lake allocation.

Estimate of Costs

A conceptual-level capital cost estimate was prepared by Hazen & Sawyer for the Western Intake Partners. The estimate, which follows preferred Alternative 1, provides the economic basis for developing the Jordan Lake allocation request.

Capital costs for this scenario include a new raw water intake, raw water transmission facilities, a water treatment plant (WTP), plus shared as well as separate finished water pumping facilities and transmission lines. Where applicable, costs also include the purchase of land/easements, environmental mitigation, and water supply storage allocations. Each Partner's share of the capital costs of those facilities was calculated as the ratio of that Partner's ultimate demand to the total ultimate facility capacity. The WTP and shared pumping facilities are assumed to be

constructed in two phases, with initial sizing to meet interim (2045) demands. A summary of ultimate estimated capital costs (in 2010 dollars) is presented below:

Table VI.2. Capital Cost Jordan Lake Western Intake

Conceptual-Level Capital Cost Estimates			
Partner	Tot Allocation Request (mgd)	Cost Share ($M 2010)	Cost Per MGD of Allocation ($M 2010)
Chatham County	18	$102.5	$5.69
Durham	16	$111.10	$6.94
OWASA	5	$30.80	$6.16
Orange County*	2	$18.30	$9.15
Pittsboro	6	$46.60	$7.77
Total	47	$309.30	$6.58

*Orange County will be served via Durham-Hillsborough finished water interconnection; costs to be recovered through interlocal agreement.

Unlike the other water supply alternatives considered in the Town of Pittsboro's application package, this Jordan Lake scenario and associated capital costs comprise new finished water (treatment and transmission) as well as raw water facilities. Unit cost comparisons to other supply alternatives do not include finished water treatment and transmission facilities and may therefore be misleading (i.e., the unit costs for Jordan Lake may be disproportionately high), as they do not represent levelized or "apples to apples" comparisons. However, separating treatment and finished water transmission costs from the raw water components of this Jordan Lake scenario would not be meaningful, due to the locations and distances from Chatham County's and Pittsboro's existing treatment plants and service areas. Raw-water-only scenarios are not feasible for Chatham County, Orange County, or Pittsboro, but might be viable for OWASA and/or Durham. Such raw-water-only scenarios were not evaluated by the four Partners.

The estimated total capital cost of $309 million represents an average unit cost of $6.58 million per MGD of Jordan Lake water supply allocation; however, as noted above, this includes finished water treatment and transmission facility as well as "water-supply-only" costs.

No specific agreements are yet in place among any of the Partners regarding possible financing, ownership, governance, or operation of such a regional project, but potential institutional arrangements could include single-entity ownership and operation (e.g., Durham, OWASA, Chatham County, or Pittsboro); shared or joint ownership, such as the present Cary-Apex water

treatment or Western Wake (Cary-Apex-Morrisville) water reclamation facility; interlocal agreements among individual utilities; or the creation of a new entity, such as a Jordan Lake water supply authority. The actual institutional setting for any new regional enterprise will be established by the appropriate local policy-making bodies.